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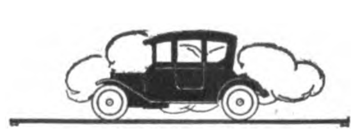

THE CLASS JOURNAL COMPANY

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VOL. XXXI NEW YORK—THURSDAY, JULY 2, 1914—CHICAGO No. 1

The AUTOMOBILE
SAE

S. A. E. Closes Successful Summer Session at Cape May

S. A. E.
ACCOMPLISHED

Standardization

1—**Iron and Steel Report Adopted.**

2—**Report of Broaches Division.**

3—**Report of Motor Testing Division.**

4—**Standard Rim Tests Accepted.**

5—**Insulation Tests Are Adopted.**

Papers

6—**Seventeen Papers Are Presented.**

7—**Valuable Discussions Resulted.**

8—**Papers of Instructive Value.**

9—**Papers Follow Standards Work.**

Business

10—**New Constitution Is Adopted.**

11—**New Members Added Number 207.**

12—**Student Enrollment Is Accepted.**

Accepts in Whole or Part Reports of Five Standards Divisions—Seven Report Progress—Valuable Papers

By J. Edward Schipper

CAPE MAY, N. J., June 26.—Today ended the programme of the 4-day convention of the Society of Automobile Engineers, held at the Hotel Cape May. Combining a list of important business and professional sessions with an intermixture of successful social and entertainment features the Summer meeting of 1914 has been a success which has rarely been surpassed in the history of the society.

While the attendance this year of members and their families hovered closely around the 300 mark, whereas in previous Summer sessions held in the Middle West, the attendance has been fully 50 per cent. greater, yet for pithiness and importance of discussion and in the value of the papers read, the meeting was all that could be desired from a business and social standpoint. Not a drop of rain marred the perfect weather of the 4 days, and full advantage was taken by all those present of the beautiful seashore site selected as the meeting place.

The three broad lines of endeavor of the society, namely: Standardization, research and the promotion of social acquaintanceship, each received its full share of attention from the members who attended. Standardization work was represented by the reports from twelve divisions of the Standards Committee, which met on Tuesday, the first day of the convention, and which forwarded the results of their work to the society at large during the session which followed. Nine reports of progress or reports on definite standards suggested were put up before the meetings for final acceptance. The result of the discussions on the reports of these divisions were the adoption of several new standards which will not be put into the hands of engineers through the medium of the S. A. E. data sheets.

The work of research was represented by a programme of thirteen papers on varied subjects. These papers which covered timely topics such as a study of the tire situation from both the passenger and truck standpoint, electric starting, lighting and ignition devices, the desirable features to be incorporated in the ideal car, etc., were not only of the highest educational value themselves, but provoked discussion which

Group of those present on the front veranda of the Hotel Cape May on the last day of the session

Bathing scene on the beach at Cape May

Henry Souther, Standards Chairman

will make a valuable addition to the transactions of the society. In the instance of the papers on tires the work of the pleasure car wheels division of the standards committee was closely followed—and the papers served as an excellent educational medium to clearly bring out what is required of the standards committee in their adoption of higher dimensions and rim requirements.

The same holds true of the paper giving a general summary of the truck tire situation, and that on tap drill sizes and causes of stripped threads. These two papers follow the work of the truck standards and miscellaneous divisions, which are covering respectively the requirements of truck tires and the fit in tapped holes.

The social end of the programme at the convention furnished the relaxation essential to an efficient consideration of the entire business programme. In addition to all that the hotel, especially designed to meet the requirements of those engaged in the pursuit of pleasure, could afford, there were the sports and amusements provided by the entertainment committee of the society. Never before had sports been given such an amount of study as in this summer meeting, and the result was that they were more heartily entered into and more thoroughly enjoyed than in previous summer meetings. Outside of the swimming, dancing and entertainments by the sections of the society during the evenings of the convention, there was at the close of the business session a complete programme of athletic field sports for which the sports committee had provided a series of handsome prizes. This arrangement induced a spirit of friendly competition and went far towards making the meeting the all-around success that it was.

When the midsummer meeting of the society opened at 2 P. M. Wednesday in the ballroom of the Hotel Cape May, with President Leland presiding, the Mayor of Cape May, introduced by Coker F. Clarkson, secretary of the society, extended the freedom of the city to the guests in the presence of an interested audience of 200 engineers. After the close of President Leland's address, which was reported in last week's issue of THE AUTOMOBILE, Mr. Clarkson read a letter from T. B. Browne, President of the British Institution of Automobile Engineers, presenting the society with a beautiful reading table as a pleasant reminder of the visit paid by members of the institution on the occasion of the joint midsummer meeting of the two societies held on board the City of Detroit III, last summer, while cruising the Great Lakes. The society by a unanimous rising vote passed a resolution to forward a suitable reply to the English engineers.

Howard Coffin, of the Hudson company

The report of the treasurer, Hermann F. Cuntz, was read by Mr. Clarkson. The report showed total receipts of $31,691.63; $2,412.95 of this was in cash on hand and in bank and $29,278.68 in the form of receipts. The disbursements amounted to $30,127.76, leaving a balance of $1,563.87.

The report of the tellers of election showed a gain in membership since the January meeting of 207. The increase in actual members of the Society number 76, increase in associates 106, in Juniors 15, affiliates 7, and departmental 3. This shows the membership of the Society to be steadily growing.

Of considerable importance to the Society is the adoption of the proposed amendments to the constitution as determined at the January, 1914, meeting. The two articles which caused the most discussion were those dealing with the composition of the nominating committee. After considerable debate an entirely new article was formulated by which the nominating committee will have seven members, three of whom will be elected by the sections of the society, each section having the power to choose one member of the committee, and the four other members will be elected by the Society at large. In the event of there being more than three sections, the three having the greatest membership shall have the choice of the three members of the committee to be elected by the sections.

Another important feature brought up at the business end of the meeting before the regular professional session was started was the question of student enrollment. It was suggested that a paragraph be added to that article of the constitution which outlines the power of the council to authorize the organization of sections of any or all grades of membership, providing that bona-fide students of automobile engineering under 30 years of age may be enrolled as students and for the sum of $3 annually receive the S. A. E. Monthly Bulletin and be privileged to attend the meeting of the Society. To enter as a student, the endorsement of a member of the Society and the approval by the council is necessary. The object of the student enrollment, which is by no means a membership of any grade in the Society, is to foster the work of the Society in promoting the study of automobile engineering.

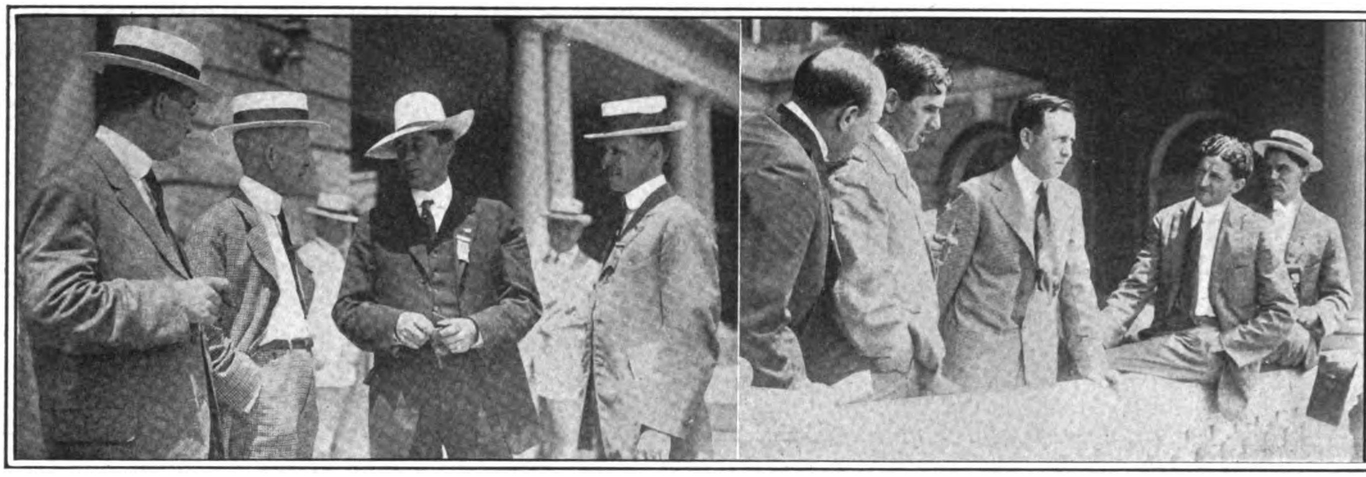
Next Meeting Place Considered

The question of the location of the next summer session of the Society was raised when Coker Clarkson read an invitation from the Panama-Pacific Exposition officials to hold the next summer meeting of the Society in San Francisco. This did not seem to strike a popular keynote, however, as it was felt that the value of the next meeting would be considerably lost through small attendance if the meeting were held on the Pacific coast. It was stated that the work of the Society is too valuable to have a single session lost in this manner, at this active period in the industry.

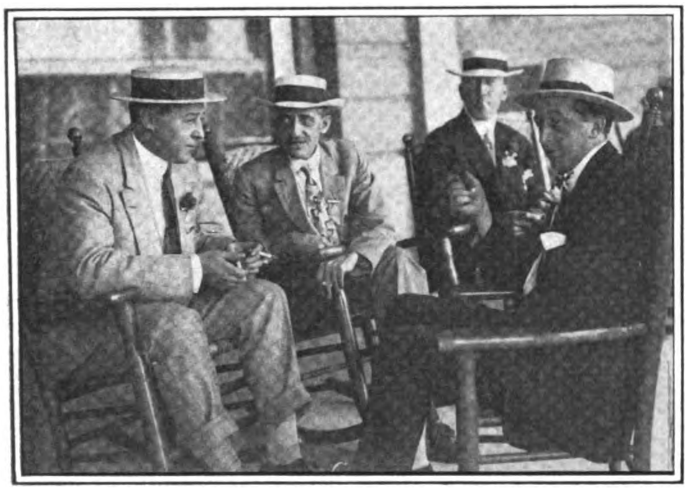
An invitation from the Detroit Board of Commerce was also

Ball game, Indianapolis section vs. the New Yorkers

Groups of engineers on veranda, left to right, Coker Clarkson, general manager of the society; Otis Friend, Mitchell-Lewis Co.; C. W. Hatch, Perfection Spring Co.; A. B. Browne; Herbert Chase, A. C. A.; H. C. Wilson



Left to right—John Demmler; Roger Griswold, Cutler-Hammer Co.; R. M. Owen, Entz Transmission; Charles Chevraux, Cleveland-Canton Spring Co.; F. E. Moscovics, Marmon Co.; David Beecroft; S. E. Jones; V. W. Kliesrath, Bosch Magneto Co.; R. H. Combs



Left to right—W. T. Norton, Jr., C. E. Clemens, Perfection Spring Co.; V. F. Lacy, James Cunningham Co.; Norman Bell

presented and while the hot weather would doubtless interfere with a meeting held in the actual city of Detroit during the month of June, it was felt by many of those present that the Detroit River would make an excellent starting point for a cruise among the thirty thousand Islands in the northern part of the Great Lakes, and the suggestion of chartering the City of Detroit III as a floating hotel seemed to meet with considerable favor. It was finally decided to secure the suggestions of different members and incorporate them in a circular letter to be voted upon by the voting members of the society.

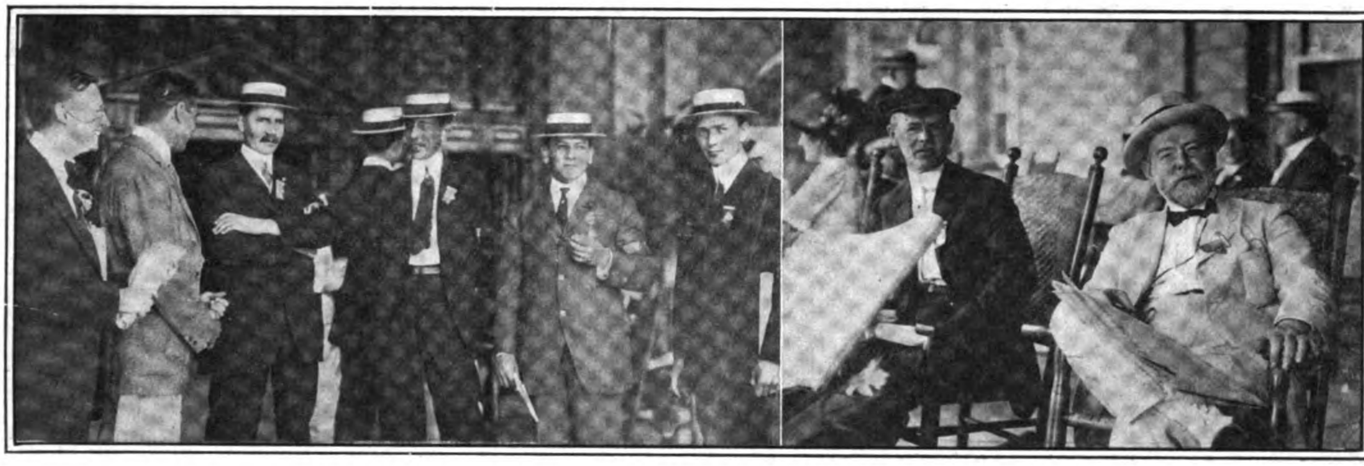
On Thursday evening the semi-annual banquet was held and this year it was graced by the presence of the ladies of the party. The banquet was tendered by the management of the hotel and was attended by all the members of the party. After the banquet, Orrel C. Parker gave a lecture on the coming European trip and by means of stereopticon slides and moving pictures toook his audience through the various countries to be visited by the Society of Automobile Engineers on their European trip, which starts next October.

Five reports submitted by the Standards Committee to the Society at large were accepted either in whole or in part. The report of the Iron and Steel division, presented by Henry Souther, chairman of this division, was accepted in toto. In discussing the report of the division, Mr. Souther called attention to the importance of its work, and stated that where manufacturers claimed that they did not make use of S.A.E. steels they really did use these steels in many instances without knowing it; that is, they used steel of the same composition and practically the same heat treatment. He went on to say that the number of steels is diminishing each year and for this reason it has been possible to cut the number of steel specifications practically in half. The report of the division permits an increased allowance of .005 in the phosphorus and sulphur contents. This has been done for commercial reasons and there does not seem to be any real proof that this means a lowering of the quality of the steels used in automobile manufacture. If a manufacturer needs a high quality steel he has but to specify it, and now that the more reasonable limit .045 phosphorus or sulphur has been adopted it may be expected that the steel maker will rigidly abide by it.

Papers Provoke Discussion

The papers on tires by E. R. Hall and J. E. Hale, experimental engineers for the Goodyear Tire and Rubber Co., on starting, lighting and ignition devices by A. D. Libby of

Winners of prizes. Left to right—J. Edward Schipper, THE AUTOMOBILE, all-around championship; S. L. Murfey, Grant Lees Gear Co., aquatic championship; Frank Martin, Stewart-Warner Co., fat men's race; R. H. Combs, Prest-O-Lite Co., bowling



Left to right—Herbert Chase, A. C. A.; J. E. Schipper, A. B. Browne. Joseph Anglada, Arthur Waterman. Right-hand photograph, Thomas Moore, Halcombe Steel Co.

the Splitdorf Co. and the Electric Transmission for Motor Cars by J. B. Entz of the White company, proved to be the prize discussion producers. These discussions, which are reported in part in this issue, showed the keen interest with which developments in the tire situation and in the gasoline-electric plant are followed. The discussion after Mr. Libby's paper entered a phase which seems to be uppermost in the minds of engineers of the present day, who are interested in the development of the electrical equipment of the automobile. This point is whether or not the 6-volt system or the 12-volt system is the better for all-around practicability on the automobile. The discussion did not show conclusively an advantage for either side.

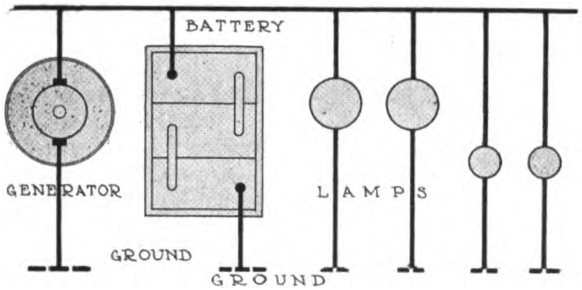
The report of the Electrical Equipment division was another which was accepted in part. This report embodied a standard insulation test and also the recommendation that the single wire system be adopted as preferred practice. No debate was occasioned on the subject of the insulation test and this part of the report was carried unanimously. When it came to the single-wire system, however, this proved to be one of the richest sources of debate of the meeting. The one-wire design was opposed by many because they deemed it to be unsafe and by others because they felt that the use of fuses was objectionable. Both these points were strongly opposed by those in favor of the single wire. The adherents of the single-wire system stated that the contention that the system is unsafe is absurd and that its successful use on 60 per cent. of the new models alone argued against this claim. They also held that the use of fuses was not an objection. The matter was finally automatically tabled because fifty voting members of the society were not present at the time.

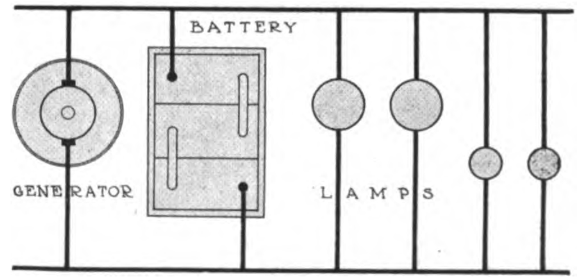
T. F. Harris, Twombly Motors; E. A. DeCampi, National Lead Co.; F. B. Pierson, National Lead Co.

The social side of the convention was an immense success. While the attendance was not so great as at some of the other summer meetings, the opportunity for a general good time was perhaps greater than ever before. That this was so was not a little due to the presence of the wives and families of many of the members. Bathing, tennis, golf and the hundred-and-one possibilities presented by the seaside environment were eagerly seized, in addition to the well-balanced programme of sports outlined by the entertainment committee. On Wednesday evening the sections of the Society entertained with original features of their own. The Metropolitan section produced a trial of a cyclecar driver, the Detroit section read a paper on a farcical ideal car and the Indiana section gave for the benefit of the members present a representation of an Indian trial in which other members of the Society were captured and tied to the stake in true Indian style.

Members of the Metropolitan section of the S. A. E. on hotel steps

Single-Wire Versus Two-Wire System





"The single-wire system with grounded return shall be recommended practice"—Report of the Electrical Equipment division of the Standards Committee.

Bijur—"Motor car manufacturers use the single-wire system because it uses less wire."

Libby—"System should not be adopted because it is not safe; a ground may mean a fire."

Conant—"Single-wire system should be adopted because it is in line with modern trend."

Moscovics—"The art has not as yet developed to a sufficient degree to recommend it."

Fergusson—"We have given up the two-wire system because we had trouble and use one wire."

Lloyd—"It will be easier to adopt this measure now than it will be a year from now."

Towle—"Strongest objection to the one-wire system is its lack of fire safety."

McMurtry—"The issue should not be delayed; heavy installations are using one wire."

THE fifth report of the Electrical Equipment division brought up the warm debate that was confidently expected on the respective merits of the one and two-wire systems. In spite of the lateness of the hour the question was argued pro and con and finally tabled after an undecisive vote, since there were not fifty voting members present. The report of the division follows:

1—All insulating material used in connection plugs, sockets and similar devices of electrical apparatus for use on gasoline automobiles shall be capable of withstanding for thirty minutes a temperature of 300 deg. F.

2—The single-wire system with grounded return shall be recommended practice.

The first part of the report of the Electrical division regarding the tests on insulation was passed without comment upon a motion by R. McA. Lloyd. The second part, however, on adopting the single-wire system as recommended practice proved the cause of the warmest debate of the session.

Three letters from Leonard Kebler, representing the Ward Leonard company; W. E. Winship, of the Titan Storage Battery company and the United States Lighting and Heating company, each protesting against the recommendation, were read.

The letter from the U. S. L. company follows:

"The Electrical Equipment division of the S. A. E. will submit the following for vote at the meeting on Thursday, June 25, at 2 p. m.

" 'The single-wire system with grounded return shall be recommended practice.'

"We believe it inadvisable for the S. A. E. to adopt such a recommendation at this time, and respectfully ask your consideration of the following arguments in favor of postponing action for at least 1 year.

"Advantages of the Grounded Return.

"First, Better contact and insulation in the lamp receptacle.

"Second, Fewer connections and simpler wiring.

"Advantages of the two-wire system.

"First, Not necessary to provide special returns for lamps carried on the body.

"Second, Short-circuit impossible if one ground occurs, or if two occur they must be on opposite sides of the line to form a short-circuit.

"Third, Circuits do not depend on lamps being tightly secured to the lamp brackets.

"Fourth, Circuits do not depend on the cleanliness of the metal frame where the ground is made as on single wire systems.

"Before a standard is adopted it would be advisable for the society to further consider the trend of electrical equipment design.

F. E. Moscovics, of the Marmon company, stated that he wished to warn the S. A. E. against the too rapid adoption of a recommendation, especially one of such a serious nature as this, where such eminent authorities seemed to be divided in their opinions. He cited the case of the Bosch design, where in spite of the fact that in their one-wire system they intended to lay out their design without fuses they were compelled finally to fuse every circuit for safety's sake.

W. H. Conant stated that he regretted that A. L. Riker, the chairman of the division, was not present to throw the weight of his personality and arguments into the matter. He said in part: "This matter has been discussed and postponed now for 2 years. In the meanwhile the car makers are doing

Some of those who took a prominent part in the one and two-wire discussion: Joseph Bijur, Bijur Lighting company; Leonard Kebler, Ward Leonard company; W. H. Conant, Gould Storage Battery company; F. E. Moscovics, Nordyke & Marmon; David Fergusson, Pierce-Arrow; A. L. McMurtry, consulting engineer; R. McA. Lloyd, consulting engineer as they please and adopting rapidly the one-wire system. After consideration of the subject the Electrical division had decided that the adoption of this system would be the starting points of much better electrical practice."

Herbert Towle said: "The question seems to me of two-fold importance. First, the strongest objection to the one-wire system is in its lack of safety. Any ground causes a flash and in the presence of gasoline a flash means a fire. Secondly, a sound, durable condition of insulation must exist. Automobile manufacturers are careless in wiring, etc., and are not giving the electrical equipment a chance to show itself to its best advantage."

Mr. Moscovics stated his opinion that the art had not progressed far enough to settle a question of this nature as yet or to assert that one practice is better than another. Mr. Conant retorted that this argument could have been used at the time of adoption of practically every standard. He stated that Mr. Riker was at one time an advocate of the two-wire system, but was convinced the single-wire was better.

Mr. Moscovics stated that the only difference in Mr. Conant's ideas and his own was that he believed the art had not progressed far enough to adopt the recommendation. R. McA. Lloyd stated that he believed it would be easier now than a year hence. He stated that 60 or 70 per cent. of the cars now being built have the single-wire system. E. H. Ehrman, of the Chicago Screw Co., moved that a vote be taken on the matter, and after Joseph Bijur, of the Bijur Lighting company, had stated himself as being against the adoption of the system, Mr. Lloyd asked him why he had voted for it in committee. Mr. Bijur stated that he had never expressed himself as being in favor of the recommendation, but had merely remained silent after seeing the hopelessness of winning over those who wanted it. He said that the fire risk with the single-wire system was not twice as great but 500 times as great and that he believed the underwriters would stop us if the single-wire system were adopted. Mr. Bijur said: "Motor car manufacturers do not use the single-wire system because they like it better but because it uses less wire."

Albion D. Libby, of the Splitdorf company, cited the case of a $3,500 car which recently had caught fire through a short circuit and on which disaster had been prevented only by a quick removal of a battery lead by an expert who happened to be near. He stated it as his belief that the S. A. E. should not recommend the practice merely because "manufacturers who are turning out cars like sausages are using the single-wire system."

Mr. Conant stated that since there were not many in the room and the hour was getting late the vote be held over. Herbert Towle asked, "Why not hold over another year?" Mr. McMurtry stated that it was his belief that the issue should not be delayed, and cited the fact that the General Electric Co. built their high-voltage cars on the one-wire system. To this Mr. Moscovics rejoined that they were driven by experts.

David Fergusson, chief engineer of the Pierce-Arrow company, said that they had shifted to the one-wire system because of trouble with the two-wire system in getting good lamps and fittings.

A vote was then taken and the motion to pass the recommendation was lost. Mr. Conant protested that fifty voting members were not present.

6-Volt System vs. 12-Volt System

ALBION D. LIBBY'S paper on the new Splitdorf electric lighting, starting and ignition system provoked a debate on the merits of the 12-volt system.

W. H. Conant, of the Gould Storage Battery company, stated that he was in accord with the trend toward the 12-volt system. The reason he assigned to that tendency was the increase in efficiency of the 12-volt motors. He went on to say:

"Mr. Libby mentions the size of the plates, stating that they should be of sufficient size to meet the requirements of power, but I would like to emphasize that cognizance must be taken of the quantity and quality of the electrolyte. I further believe that it is not good practice to put the head and side lamps in series. The headlights have a tendency to flicker and if one is in trouble both go out. Concerning the use of fuses I believe it to be desirable but question if it is practical. Fuses are peculiar things, as I am well aware from knowledge of experiments on fuses which have covered years. It is hard to say, however, what they will do, even if they are only limited as closely as mentioned in the paper. Assuming that we have a fuse and it is blown, it means that the circuit is overtaxed, that something is the matter with the motor which makes it hard to crank. The owner or driver of the car will have to search for the trouble, and he is sure to close his circuit with a pair of pliers or a piece of copper wire or some other means.

"In fact," continued Mr. Conant, "I even suspect that some of you gentlemen have bits of copper in the basements of your houses which are doing the work that fuses should do. I agree with the author of the paper that an ammeter should be used and am convinced that the driver of today takes a delight in informing himself on the mechanical and electrical devices on his car."

Albion D. Libby, patent attorney for the Splitdorf Electrical Co., whose paper on electrical equipment started the discussion on 12 volts versus 6 volts

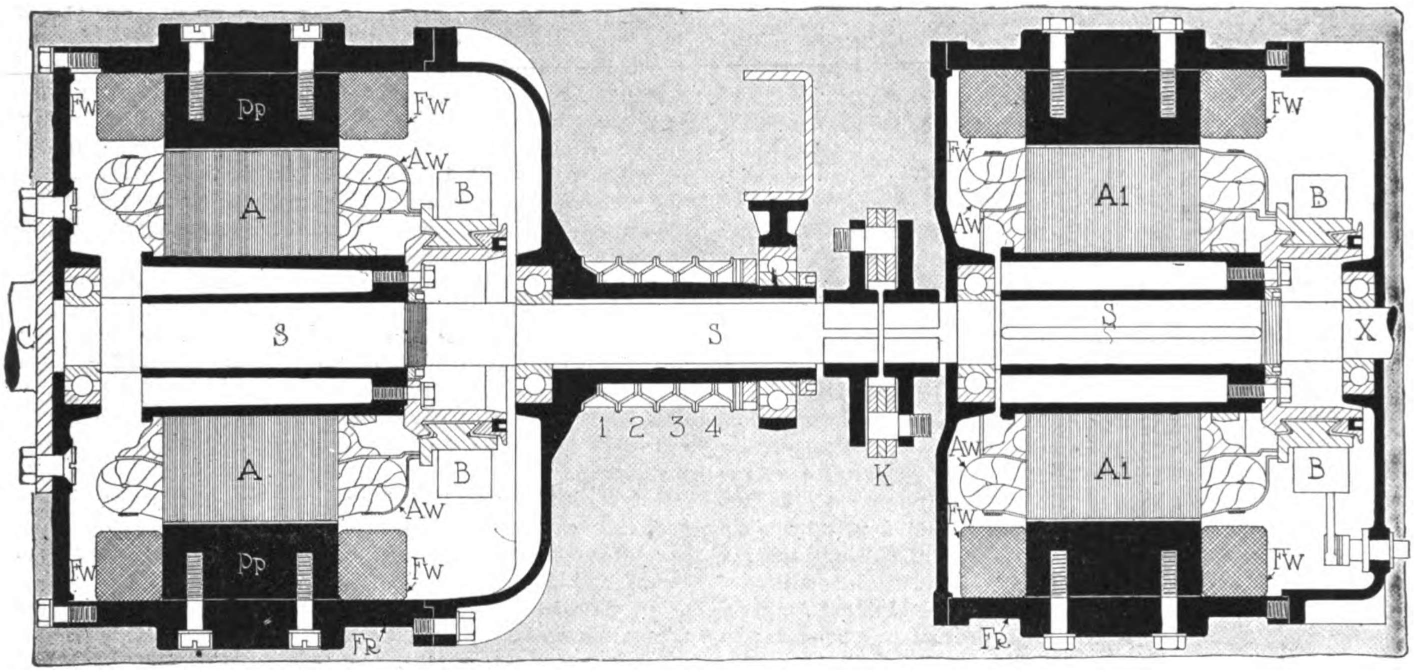
Mr. Libby illustrated the light weight of the present-day starting motor by citing an installation of a 22-pound motor on the Winton car he had driven down to Cape May. He said he wanted the lamp builders to build lamps of higher voltages and that he believed that the 14-volt lamp focussed as well as the 7-volt type.

Mr. Lloyd said he differed with Mr. Libby and favored the 6-volt lamp on account of its better focussing ability and stronger filament. Mr. Moscovics mentioned the latest Bosch 12-volt lamp and illustrated its filament, asserting that it had excellent focal ability. Mr. Libby said he was an optimist on the lamp situation and pointed to the example of the 6-volt lamp which at one time consumed 4 watts to the candlepower but now was rated at 1 watt per candlepower.

Mr. Bijur said that he was not committed beyond reason to the 6-volt system, but that he had seven arguments in its favor. These are as follows:

Less battery weight, stronger filament, only three cells, better focus, stronger portable lamps, less space for insulation, punch of 6-volt motor as good.

Electric Transmissions for Motor Cars



IN the Entz system of electrical transmission, the patents for which are owned by R. M. Owen & Co., New York City, a generator and a motor are used in an unusual way. The casing of the generator FR, which carries the fields or pole pieces PP, is bolted directly to the crankshaft and thus replaces the flywheel; the armatures, A and A1, of the two machines are coupled together at K and their shaft S is permanently fastened to the drive shaft at X at the rear. The fields of the motor are stationary, being supported by the frame.

The speed of the car is regulated by the throttle and the torque for different loads is varied by changing the field strength of the generator and on lower speeds, by sending the generated current to the motor. When the car is running along the level, at which time a mechanically driven car would be on high gear, the generator winding Aw is short-circuited on itself and therefore with a very slight amount of slippage between the field and the armature, a heavy current is generated, this current being of sufficient strength so that the magnetic attraction between field and armature is equal to the torque required to propel the car at that speed. The slippage varies directly with the torque required, so that if a slight grade is encountered, the slippage will become slightly greater; this will increase the voltage of the generator and then the current will increase, which will produce a stronger magnetic attraction for the armature on the field, and thus the torque will become greater. On high gear the slippage might be, for example, 40 revolutions per minute when the engine is making 1,000 revolutions.

On lower speeds, and there are seven, the increase in torque on the drive shaft is obtained by weakening the fields of the generator and also by sending the current generated into the motor. When a very steep hill is encountered, the torque between generator field and armature will be greater than the engine is capable of producing if the field is not weakened or the current pumped into the motor, and thus the engine would slow down. But when the field is weakened, the motor must rotate just so much faster to produce the maximum pulling force between the field and the armature of the generator. This means a large increase in the slippage and thus a large current will be generated and pumped to the motor where it will aid in pulling the car up the hill.

Digest and Discussion of Paper by Justus B. Entz

ELECTRIC transmission systems as applied to motor cars are constituted of methods of electrically controlling the transmission of the power of the engine to the wheels. It is necessary not only to control and transmit the power but to do so at varying speed and torque ratios while developing the full power of the gasoline engine.

One method of electric transmission consists of a dynamo or electric generator driven by the engine and supplying electric energy to one or more motors connected with the driving wheels.

Another method consists of a dynamo-electric machine connected with or mounted on the driving-shaft and adapted to assist the engine at times of heavy load, drawing its energy from a storage battery, and in turn charging at times of light load, becoming automatically a generator for that purpose and utilizing the surplus power of the engine.

Justus B. Entz

The third system is known as the Entz electric transmission and consists of a dynamo-electric machine, one member of which, the field magnet, is connected to the engine crankshaft and takes the place of the flywheel, the armature being connected with the driving-shaft. This unit serves to transmit the turning effort of the engine to the driving-shaft by means of current established in its circuit, due to a speed difference between its members on what constitutes the high speed of the electric transmission.

This clutch-generator of the electric transmission constitutes a very elastic clutching and transmitting means, but is not by itself capable of transmitting more than the torque of the engine. For higher torque upon the driving-shaft, use is made of an electric motor whose armature is mounted upon the driving-shaft and which receives current from the first machine or clutch-generator. Thus on speed positions below the highest the motor is included in the circuit of the clutch-generator. If the windings of the two machines be the same, and the same current passing through each, the torque represented by that current which will be the same in each, and the electromotive-force will be the same in each for the same speed-difference between armature and field.

Thus if the full torque of the engine were transmitted for a slip or speed-difference between armature and field of the clutch-generator of 75 revolutions per minute and the motor with the same electrical resistance were included in the circuit, the slip loss would be increased to 150; if the engine were running at 1500 revolutions per minute the speed representing useful power would be 1350 revolutions per minute at engine torque; but the torque on the driving-shaft will have been doubled because of the motor, and a C.E.M.F. all will have been set up in the motor, which must be overcome by the clutch-generator, which results in a speed of 675 of the driving-shaft and a torque double that of the engine, the clutch-generator then having a slip of 825, 150 being due to the resistance of the clutch-generator and motor and 675 to overcoming the C.E.M.F. of the motor, the latter representing useful work in the return it gives to the driving-shaft in additional torque. Gradations of control in speed and torque are secured by means of varying the field strength of the clutch-generator and motor, as will be shown later on.

We will now consider the electric transmission of the engine power to the wheels and make a comparison between a generator-motor system, wherein the generator converts all of the power of the engine into electric energy and supplies it to the motor, and the Entz electric transmission system wherein the generator acts also as a clutch and converts only part of the engine power into electric energy, and only when in the lower speeds.

Inspecting Owen car with Entz transmission. From left to right, C. W. Hatch, R. M. Owen, J. B. Entz, H. C. Wilson

The electric energy equal to the maximum horsepower of 42 1-2 at 1,500 revolutions per minute is 31,700 watts. We will consider that the same electrical units are used in each of the two above-mentioned systems. We will call the current which represents the full output of the generator at full field strength 100 per cent. We will call the C^2R loss at this current 2 1-2 per cent. of the total input, for each armature and each field winding, and the core losses for full field strength and full speed difference 5 per cent. in each armature. The first losses vary as the square of the current and the core losses nearly as the square of the voltage, or the product of the field strength and speed, to which the voltage is equal.

In the generator-motor system with 100 per cent. current we have 2 1-2 per cent. C^2R loss in each armature and field winding or 5 per cent. in generator and 5 per cent. in motor, a total of 10 per cent., which appears as a speed loss as it lowers the effective voltage by that amount, so that the vehicle speed is reduced from 50 miles per hour, corresponding to 1,500 revolutions per minute of the engine, to 45 miles per hour. There is also 5 per cent. core loss in each armature or 10 per cent. total, corresponding to a reduction in tractive effort from 6.9 to 6.2 per cent. The total efficiency is 80 per cent.

Full Torque Transmitted

In the electric transmission system the full torque of the engine is transmitted by the generator unit alone, short-circuited upon itself, and with no torque loss.

To get double the torque with the electric transmission it is not necessary to increase the current, but the motor is included in the circuit of the clutch-generator and its torque added to that of the engine as transmitted by the clutch-generator and the latter slips a little more than one-half engine-speed to supply the necessary voltage for the motor.

To get three times torque with the generator-motor system we will figure on 300 per cent. current and 3 1-2 times torque of 100 per cent. current.

To get three times torque with electric transmission we must double the current through the motor and reduce the field strength of the clutch-generator to one-half so that it can deliver double current.

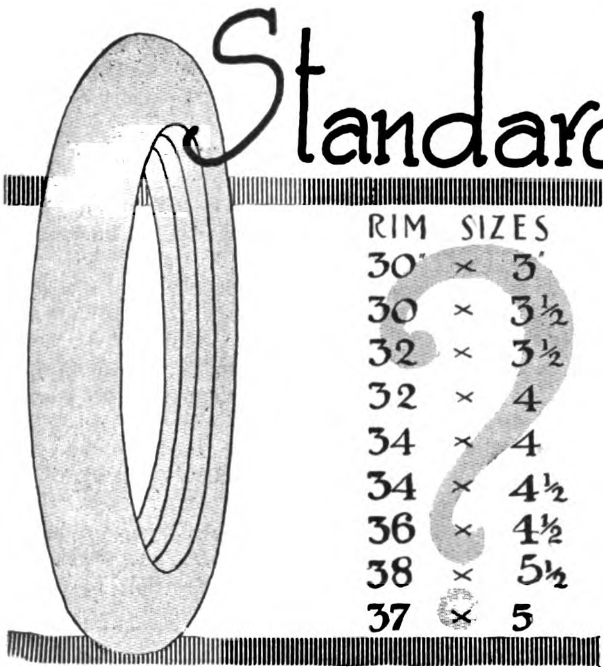
Herbert Chase Opens Discussion

Herbert Chase opened the discussion on this paper by asking if the curves shown were founded on practice. To this Mr. Entz replied that the curves were the results of dynamometer tests. He further stated that with this system the gear reductions do not vary and that in slipping the clutch you secured the same effect as with the ordinary type of drive. A. L. Moscovics, of the Marmon company, asked if Mr. Entz had any data on the amount of weight saved by the use of the electric transmission. Mr. Entz replied that so many of the parts of the car were replaced that there was no resulting weight increase of importance. Mr. Chase asked if the weight could not be further reduced by the use of a light-weight high-speed motor. Mr. Entz stated that he thought this would be feasible by using a greater reduction in the transmission and also that it must be remembered that the weight of the electric starter is included in the plant.

R. McA. Lloyd, a consulting engineer of New York, stated that in his belief people were not satisfied with merely the transmission of torque, but that they want an actual transmission of horsepower. That is to say, they want the capacity to get the power to the wheels, and while it is comparatively simple to get torque a large motor generator is necessary in getting power. He said, also, that it is impossible to state that there is no loss of power through the transmission. Mr. Entz agreed with him, saying that it is not true that there is no loss in the transmission, but that

(*Continued on page* 13)

Standardizing Tire Sizes



Society Aims to Reduce Tire Sizes from Fifty to Nine—Important Papers and Discussions—Rim Test Determined

THE tire work of the Society was divided under two heads, standardization and educational. The standards work was incorporated in the reports of the Pleasure Car Wheels division and the educational work in papers presented by E. R. Hall, C. C. Carlton and J. E. Hale.

When brought before the Society, the report of the Pleasure Car Wheels division was offered by its chairman, Henry Souther, as a progress report with the exception of that part which refers to the method of rim inspection, this being in such from that approval was thought advisable. The only other subdivision is that offering eight sizes of tires as recommended sizes. These eight sizes will take in 85 per cent. of the demand, the oversizes comprising a good part of the remaining 15 per cent.

The main features of this report follow:

James E. Hale, Experimental Engineer of the Goodyear Tire & Rubber Co., who is actively interested in tire standardization

Routine Test of Rims

It is the opinion of the Pleasure Car Wheels division that the test of bursting strength or to destruction is not the best routine test to be used in connection with the inspection of rims for pneumatic tires. It is the opinion of the division that a pressure test with predetermined deflection under predetermined pressure is a good routine test; the test to be made with water pressure.

The measurement of deflection of a clincher rim should be made across the outside of the clinches.

The deflection of a straight-side rim should be measured across the edges of the straight sides.

Tire Sizes Determined

In recommending a decreased number of tire sizes the division considered the needs of the different weights of cars and fixed upon a sufficient number to take care of the weights of the entire range of cars and at the same time permit the engineer sufficient choice to allow him to provide a satisfactory factor in taking care of different car loads.

Eight tire sizes which the division decided to recommend are shown in the following table:

RIM SIZES	TIRE SIZES					TIRE SEAT DIAMETER
30x3	30x3					24"
30x3½		30x3½				23"
32x3½		32x3½				25"
32x4			32x4			24"
34x4			34x4			26"
34x4½				34x4½		25"
36x4½				36x4½		27"
38x5½					38x5½	27"

This table, it will be noted, involves only eight rim sizes, and five tire seat diameters. One or two other regular tire sizes are under consideration by the division.

It was thought by the division that tire oversizes should not be recommended for regular equipment.

In speaking of the report, Mr. Souther pointed out that the deflections given are the results of a great many tests, and that no attempt at enforcement of the recommendations would be made before next January, in order to give the manufacturers time to prepare for them. Standard demountable rims are not ready for report, the division feeling that it needs more light on the subject and more investigation before anything concrete is offered the Society.

A good point was made by O. A. Parker when he said that the standard rims would be economical to maker and user alike to utilize well-balanced tires. If they are too large in section, they are out of proportion and hence not serviceable.

Fergusson Wants 37 by 5 Standard

David Fergusson thought that the 37 by 5 size should be added to the list of standard sizes. It is now regarded as an oversize, but it is used by a large number and has been found to be a very good proportion.

E. R. Hall explained that it was the intent to have all the tire sizes even, and that the standardization should cause all manufacturers to use even sizes, whereas the manufacturer who puts a 37 by 5 on a 36 by 4 1-2 rim gives no chance for the oversize idea, except that the purchaser would then regard the 38 by 5 1-2 as the oversize. This is somewhat out of balance, however.

Henry Hess has run a car equipped with 37 by 5 tires for months on the original air and finds that size very useful, strengthening Mr. Fergusson's remarks. He made the point that by having oversizes, the report suggests that the user pay extra, and he could not see the reason for having a well-proportioned size such as this 37 by 5 made anything but standard.

Mr. Souther agreed that this extra charge point was logical, but pointed out that no matter what size tires are on the car, some customers always want something a little larger. If the car be equipped with 37 by 5 tires, some would want 38 by 5 1-2 sizes.

Mr. Fergusson objected to the 36 by 5 as being a size which is not known, but Mr. Hall stated that this size has had considerable testing and is found to be better than the 36 by 4 1-2 or the 37 by 5, due to better balance that may be thus secured.

E. R. Hall, Experimental Engineer of the Goodyear company, who is active in tire standardization

Mr. Souther said the division was glad to get the suggestions, and explained that even if several more sizes had to be added to the eight proposed as standard, it would not be a serious matter. There are at present from 48 to 51 sizes which have to be furnished by the tire people, and the drop to eight or ten is a big one indeed. He deprecated the unfortunate use of very large oversize tires on narrow rims, likening this practice to the big soap bubble which wobbles on a pipe. It is the same with the big section tire which rolls on the narrow rim against the side rings and tends to rim cutting and flexing of the bead.

Three Educational Tire Papers

Three papers, which will prove of great assistance to the Pleasure Car Wheels division, were given the society at this meeting, occupying a good share of one of the morning sessions. These dealt with the standardization of rims and felloe bands and were the results of exhaustive research and experimental work by E. R. Hall, experimental engineer with the Goodyear Tire and Rubber Co., and C. C. Carlton of the Firestone Tire and Rubber Co. Two of these papers were by Mr. Hall, one being a criticism of the standard rims adopted by the Society of Motor Manufacturers and Traders of Great Britain, and the other dealing with suggestions for the standardization of pneumatic tire rims. Mr. Carlton discussed the possibilities and difficulties of formulating acceptable recommendations for one standard felloe band for wheels to be equipped with pneumatic tires.

The British Standardized millimeter clincher rim was decided upon in June, 1913, and tolerances were adopted in September, 1913. These are open to criticism from the American viewpoint, and Mr. Hall explained why. The main features of this paper follow:

Ever since the clincher type automobile rim has become popular in Great Britain and Europe a chaotic condition has existed in millimeter rim design. Each manufacturer of millimeter rims had his own so-called standard design to which he worked and the result was that rims marked the same size and supposed to take the same tire differed widely in design. The tolerances which the rim manufacturers allowed themselves were so gross that there was oftentimes considerable variation between two rims of the same size and manufactured by the same manufacturer. This condition prevailed in spite of the fact that it is ruinous to a beaded edge or clincher type tire, such as is in general use abroad, to be used on a rim which it does not fit exactly. A great hardship was thereby worked upon the tire manufacturers who had to make the bead of their tire small enough to slide into the smallest rim of its rated size on the market, and to trust to luck for satisfaction in their product when used on the larger rims of its rated size.

The Society of Motor Manufacturers and Traders of Great Britain in June, 1913, standardized the millimeter clincher rim and later, in September, 1913, adopted a set of permissible tolerances to which the rim manufacturer should work. The society has produced a most complete set of rim checking templates, tapes and printed specifications covering its standard.

As far as we are able to determine, this standard, known as the S. M. M. T. standard, has been universally adopted abroad.

Although a very great step in the right direction and possibly the best that could be made at this time, the S. M. M. T. standard is open to criticism from the American viewpoint.

Two Chief Dimensions

It will be noted that the two chief dimensions of the rim section are the width between clinches and the depth of clinch and that the majority of the other section dimensions can be expressed in terms of these two. As a matter of convenience and record this feature is admirable. The width of the rim was apparently chosen arbitrarily, as it does not increase in increments corresponding to the increase in rated rim size. Between any two of the first six sections the increase in rated size of rim and tire section is exactly 15 millimeters, while the corresponding increases in width are respectively as follows: 13.0, 11.0, 5.0, 9.5 and 13.5 millimeters. The increase in rated size between the 150 and 175-millimeter rim is 25 millimeters, while there is no increase in width. We would have preferred to have this increase a constant quantity, possibly 10 millimeters, between any two consecutive sizes from 75 millimeters to 150 millimeters, inclusive, and the increase between the 150 millimeter and 175 millimeter sizes to be the same as at present. This would certainly give a more uniform and logical step-up in tire sectional

Group of those who entered tire discussion: Left to right, E. R. Hall, Cornelius T. Myers, mechanical engineer; W. H. Roberts, assistant engineer of the department of finance, New York City, and James E. Hale sizes, provided the tires were made anywhere near rated size.

The depth of clinch increases by very small increments as the rim size increases, not more than 2 millimeters in any case. As these differences are so small, and in view of the fact that the tolerances prescribed permit them to entirely disappear and in some cases overlap (as will be noted below), we would prefer to see dimension *V* equal 13 millimeters for both 90- and 105-millimeter rims and 16 millimeters for 120- and 135-millimeter rims. This would give only four different inside rim contours instead of six as at present prescribed, making it necessary for the rim manufacturer to have only four sets of contour rolls instead of six, thus cutting down the forming roll equipment 33 per cent. Under these conditions the rims should fit the tires exactly as satisfactorily as in the case of the present standard.

The American Viewpoint

The above criticisms and suggestions are entirely from the American viewpoint. We must admit that the S. M. M. T. standard as it stands is a very great improvement over former conditions, and is probably the very best that could be attained under the circumstances. Credit is due the Society of Motor Manufacturers and Traders for causing the adoption of an admirable rim section contour comprising excellent proportions, bearing the same relation to each other in all sizes. In this particular their standard is certainly better than the American standard.

It is improbable that any of the improvements to the S. M. M. T. standard suggested above could be incorporated at this time. For this reason we favor its universal adoption in its present form, excepting tolerances.

The tolerances specified by the S. M. M. T. standard are so great that they almost entirely defeat its purpose from the American standpoint. Accustomed to rims manufactured with a very high degree of precision and to very close tolerances, the American tire manufacturer designs his tire to give an ideal fit on a rim exact to standard and he is sure the tire will fit practically as perfectly in a maximum or minimum rim of its size. If a tire is made to fit a correct S. M. M. T. standard rim as perfectly, the tire cannot be made to enter a minimum rim and will float around and be a very poor fit in a maximum rim.

Very helpful data and valuable suggested standard rims for pneumatic tires are given in Mr. Hall's other paper. There are six representative groups of rims manufactured today, and from each a typical rim, which combines all the attractive and as few of the unattractive features of the rims of its group as possible, is picked out. This applies to all except the demountable rims, in which case only the selection of the felloe bands was made, leaving the type of top rim optional.

C. C. Carlton in his paper on standard pneumatic felloe band recommendations pointed out that there is no part of the motor car in which there are more varieties and at the same time more possibility of standardization. He makes plain the feasibility of standardization of the wood felloes for the three types of rims, namely, the demountable, detachable and the clincher. His remarks follow:

The Pleasure Car Wheels division of the Standards Committee, of the Society of Automobile Engineers, was created to study various types of pleasure car wheels with particular attention to diameters, to various types of steel felloe bands and to the various methods of carrying pneumatic tires thereon. From this standpoint, pleasure car wheels can be divided into three classes, namely, those equipped with a one-piece regular clincher rim; second, those equipped with quick detachable rims requiring no steel felloe, and third, those equipped with a steel felloe band upon which is mounted a demountable rim.

We believe we are safe in saying that there is no part of the automobile in which there is more variation and at the same time, in which there is so great a possibilitiy of standardization as the wheel. The types of tire carrying rims being manufactured number about fifty, while the types in general use actually run over twenty.

One-Piece Regular Clincher Rim

The most simple form of an automobile wheel is the first above mentioned, namely, that carrying a regular clincher rim. The rim is practically standardized at the present time, the only variation possible being in the thickness of the steel from which the rim is manufactured. This variation is so slight that for all practical purposes the wood wheel may be considered already standardized.

Quick Detachable Rims

The quick detachable rim, whether for clincher or straight side tires, varies only in the thickness of the steel itself, and in the method for detaching the tire. For all practical purposes it may be said that the wood wheel on which quick detachable rims are used, is already standardized, the only variation now being the thickness of the steel section. The only further step that can be made in the standardization of the wheel carrying a quick detachable rim is to standardize the device for detaching the tire, and there are so many greater problems presenting themselves, that it seems well to forego any further action along this line, for the present at least, especially in view of the fact that the quick detachable rim has been practically displaced by the demountable.

Two Distinct Classes of Demountable Rims

As already said, the consideration of the adoption of a standard wood wheel dimension for all demountable rims, presents at once the type of steel felloe, which in turn is governed, first by the device by which the tire carrying rim is fastened, and second, by the very nature of the rim base itself. Practically all of the demountable rims in common use, in fact, considerably over 90 per cent. of the demountable rims purchased by the car manufacturers today, can be divided into two classes: First, the so-called local wedge type rim which is seated upon a felloe band manufactured from straight bar steel, by merely being flanged up in some form at the back side; the bearing at the front being secured by a type of local wedge which is forced flat against the steel felloe on the one side and upon which the tire carrying rim rests on the other.

The second class of rim above mentioned is equipped with two beads on the underside of the rim base. The rim in this class are for the most part quick detachable as well as demountable. The felloe band itself must be a hot rolled section with a flange or bevel upon the back side upon which the bead of the rim rests. Whether this rim be for straight side, clincher tires or universal, is immaterial as far as the present discussion is concerned.

This type of rim depends for its fastening device either upon a continuous wedging ring or upon a local wedge which has a similar bearing. This type is in use by a very great majority of American cars selling at $1,500 or above.

The members of the Pleasure Car Wheels division, who have spent much time at the study of this problem, will admit, we believe, that it will be a comparatively simple matter to adopt a set of wheel dimensions and a set of steel felloe bands, to which could be adapted with only slight changes, considerably more than 90 per cent. of all the rims of this type in common use. This would be a step forward, but to have adopted two S. A. E. standard truck felloe bands, we will all admit now would have been a mistake.

Universal Standard—The Acme

Mr. Wall, in opening the discussion, agreed with Mr. Hall that the Acme is some day to have a universal standard for rims. The time will come when we will be as interested in this work as we are at present in the American standards.

Mr. Carlton agreed with everything Mr. Hall said and suggested writing to the S. M. M. T., telling that organization of the objections of the Americans to these low tolerances.

Mr. Hall pointed out that he has advocated two types of felloes in his paper, while Mr. Carlton seeks to standardize one alone. This, of course, is very desirable, but Mr. Hall thinks it almost too much of an undertaking to come at once, two being hard enough to consider.

Further backing up his argument against the introduction of a 36 by 5 tire, Mr. Fergusson explained that it means another size of felloe band, whereas the 37 by 5, the 36 by 4 1-2 and the 38 by 5 1-2 take the same band—additional support for the 37 by 5.

Truck Tire Situation an Important Element

Easily a feature of the meeting was the paper by J. E. Hale of the Goodyear company, entitled "A General Summary of the Truck Tire Situation." This gives a synopsis of the whole solid tire matter and shows that the situation is really quite complex. The paper is one of the best expositions of the condition of affairs which has been compiled and indicates a great deal of research work by its author.

The question is largely a matter of how best to compromise between the hard tire and the more resilient type. The very hard rubber tire is longer lived, but, on the other hand, it gives the mechanism of the truck more vibration, whereas the softer type which is best in this latter respect has a shorter life. The great need is for a better interchange of compositions among the tire people and the giving by the manufacturers of better tires in the opinion of truck men.

The Hale paper, which appeared in the May Bulletin of the society, is given in part:

The Truck Standards division in its efforts to arrive at a universal schedule of solid tire carrying capacities satisfactory to all concerned, discovered that the situation is really quite complex and decided therefore that a synopsis of the solid tire situation as a whole might be worth while. As an introduction let me state that there is almost no opportunity to resort to theories and exact formulae in solid tire design, a fact which will be readily appreciated after consideration of the discussion which follows; experience and judgment being by far the chief requisites for producing results. It is fair to add, however, that the application of good engineering practice and methods can reasonably by expected to produce better results than could be obtained from the hit-or-miss attention of salesmen and factory workmen. It is unfortunate that the art has not progressed sufficiently to permit the presentation of data and facts which can be considered at all complete or satisfying. However, even though the absence of theories and data is so regrettable I hope, since the truck tire problem is so intimately connected with the truck industry, to find that the following remarks will prove of interest, and especially that they may serve as a basis of starting something for the betterment of the situation.

Taken in a broad sense undoubtedly economy of truck operation is the real issue. It follows therefore that if an "economical tire" could be evolved an ideal solution would be at hand.

Solid tires in service under certain operating conditions give certain results in the performance of their functions. These results are dependent on the tires themselves and on the conditions under which the tires are used.

Mr. Hale stated that there is no doubt that a large proportion of the energy of the motor is consumed in internal friction in the tire itself and that it therefore follows that there would be a saving in gasoline if there were not so much energy consumed in the tire. These conclusions are founded upon experiments.

Electric Transmissions for Motor Cars

(*Continued from page* 9)

at high speed the loss does not exceed 5 per cent. of the power of the engine. Because the torque is transmitted directly there is but small loss. The principle is the same as in the electric dynamometer, the difference in speed between the two members of the dynanometer causing the only loss.

Mr. Lloyd inquired if there was no loss of energy in keeping the magnets excited. To this Mr. Entz exclaimed: "Yes, that is where the loss occurs because that means the difference in speed between the dynamometer elements." He further stated that there is also a core loss and an eddy current loss as shown in the tabulations given in the paper. In response to question as to external resistance used in control Mr. Entz replied that this was only used in employing the dynamometer as a brake. The shunts to the motor field are not external, being contained within the controller unit. He stated his belief that as a manufacturing proposition the electric transmission would be cheaper than the mechanical, because the testing and assembly work are much simplified. The circuit is always closed.

Can Run Steadily at Full Load

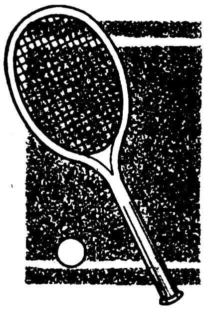
John Heinze, chief engineer of the Northway Motor Co., asked how long the electric transmission would last if it were run continuously at full load. To this Mr. Entz replied that it would be forever. To Mr. Heinze's inquiry as to the rise in temperature, Mr. Entz stated that the apparatus would never become so warm that the hand could not be placed on the brushes or coils. He further stated that when run as a clutch there are no core losses at all. As first constructed the armature shaft was non-continuous, but now it is manufactured in one piece.

Mr. Heinze asked what would happen if a 50-horsepower machine were taken to the Indianapolis speedway to be run at high speed; what would the weight of the magnetic parts be. Mr. Entz stated that the armatures would weigh 100 pounds each. Mr. Heinze expressed his conviction that with the transmission of so much power through such small units there must be a marked temperature rise, but Mr. Entz said that as far as the temperature was concerned the plant would stand the full horsepower. Bruce Ford, of the Electric Storage Battery company, Philadelphia, asked if the power would be proportional to the slip in the 50-horsepower engine. Mr. Entz replied that the full torque of the instrument is transmitted to the rear wheels and to a further inquiry from Mr. Heinze Mr. Entz stated that if the motor developed 50 horsepower then 48.5 would be delivered to the propeller shaft.

High Efficiency Obtained

Mr. Entz stated that the elimination of the losses in the instrument permits one to work at high efficiency with a wide open throttle, and that in ordinary work it is similar to any clutch where it can be worked at a slip and still transmit torque to the rear wheels. Mr. Heinze then stated his belief that in all ordinary work the electric transmission is perfectly satisfactory.

A general debate ensued for a time on the possibilities of transmitting such a large amount of power through such a comparatively small and light unit. To clarify the situation, Herbert Towle explained that it must be remembered that the generator developed only 5 per cent. of the energy imparted by the transmission and therefore for transmitting 50 horsepower it need only be a 2.5 horsepower electric machine. The only time that the machine will have to get rid of any amount of heat would be when the field lags behind the armature and therefore the heat is least when the slip is a minimum.



All Work and No Play Makes Jack a Dull Boy

ON Friday afternoon, on the sands where America's first Beach Races were held, after the business of the meeting had ceased to occupy the attention of the engineers, they turned themselves loose on the program of sports that had been arranged by Chairman F. E. Moscovics, of the Marmon company, who headed the sports committee. After the grand parade, in which was incorporated a contest for the most bizarre costume, the cortege broke up and assembled on the hard beach. Here, amid the clicking of moving picture machines and the snapping of camera shutters, the engineers disported themselves with a remarkable lack of dignity.

Conant Takes the Prize

Coker Clarkson, general manager of the S. A. E., in a modest baby blue Oliver Twist suit, gamboled about the beach without fear, surrounded on all sides by the tribe of Indiana section Indians in full war paint. But, best of all, was ballet dancer W. H. Conant, the erstwhile silver-tongued orator for the single-wire system in the warmest debate of the professional session. Dressed in a delicate pink lampshade ballet costume, with a mass of much-bleached blonde hair, he easily captured first honors.

In the baseball game, which was of the indoor variety, the Indians literally tied their Metropolitan rivals to the stake. The tenderfeet had no show, in spite of their brilliant playing, for, wherever the ball was batted, the huge form of an Indian in full war paint would loom up and with the easy grace of months of preparation for this contest, would put the Metropolitanite out. The final score was 12 for the Indians and 5 for the Metropolitans. The batteries for the winners were Berne Nadall, advisory engineer of the Stewart-Warner company, and E. L. Vail, of the Waltham Watch Company. For the Metropolitan section the twirling was done by Herbert Chase, laboratory engineer of the A. C. A., and the catching by D. J. Burns, of the Ward Leonard company.

Finish of the 100-yard dash by J. Edward Schipper, winner of the S.A.E. all-around athletic championship.

Waltham Watches for Athletics

The field contests were next held, the matches including a base running contest, shot put, hammer throw, 100-yard dash and a swimming race. The scoring was done on a point system, in which first place counted 5, second 3 and third 1. The contestant securing the greatest number of points was awarded the all-around championship trophy, a beautiful opera model gold watch donated by the Waltham Watch Company. Separate trophies were awarded for the base-running contest, and the aquatic championship, although points on these contests were included in the all-around championship. The tennis tournament, bowling and fat men's race were not counted in the all-around championship, but had trophies of their own. Alfred Reeves, general manager of the National Automobile Chamber of Commerce; John Wetmore, of *The Evening Mail*, and George W. Houk, of the Houk Mfg. Co., were in charge of the scoring.

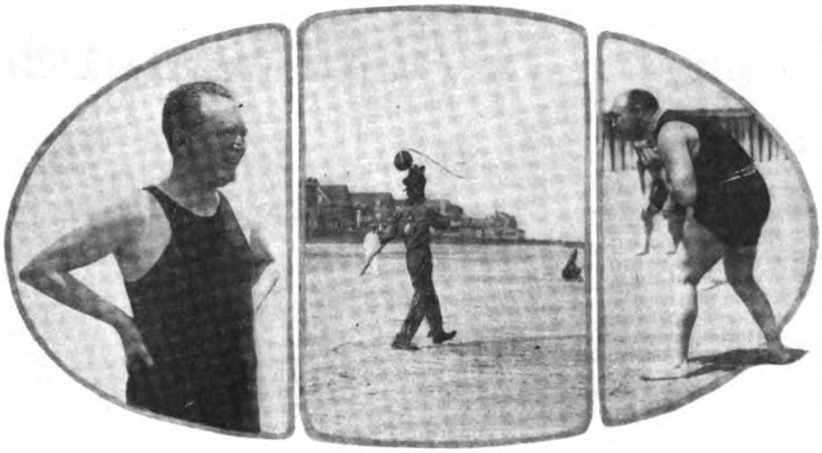
The all-around athletic championship of the society was won by J. Edward Schipper, Engineering Editor of THE AUTOMOBILE, with thirteen points acquired by first place in the shot-putting and broad-jumping events, and second place in the base running. Second place was taken by S. L. Murfey, of the Grant Lees Gear company, a new applicant to the society, with 11 points gained by taking first place in the swimming and base-running matches and third in the 100-yard dash.

The 100-yard dash was won by D. R. Swinton, mechanical engineer for the Tuthill Spring company, of Chicago. In addition to capturing first place in the fat men's race, Frank Martin won the hammer throw.

A trophy cup was awarded to Mason P. Rumney, factory manager of the Detroit Steel Products company, and Miss Marion Bate, daughter of John Bate, of the Mitchell company, as first prize in the dancing contest. Second prize in dancing was awarded to Walter Allen, of the Bijur com-

Left—S. L. Murfey, winner of the swimming race and base running contest. Center—D. R. Swinton, winner of the 100-yard dash. Right—Frank Martin, winner of the fat men's race and hammer throw pany, who danced with Miss Margaret Houk, daughter of George Houk, of the Houk Wire Wheel company. The bridge whist prize, a piece of tapestry, was won by Mrs. A. B. Browne, wife of Arthur B. Browne, consulting engineer, Branford, Ct.

The tennis tournament has not as yet been concluded. Herbert Chase has reached the finals by defeating Coker Clarkson. David Beecroft, Walter M. Nones, general manager of the Norma company, and J. E. Schipper are still in the tri-finals. As these men are all from New York, the match will be played off in that city.



Left—William Gray, an active participant in the beach sports. Center—One of the Indians throwing the hammer. Right—F. E. Moscovics, chairman of the Sports Committee

The bowling trophy, a cup offered by the management of the Cape May hotel for the bowler making the highest score, went to R. H. Combs, engineer of the Prest-O-Lite company, who averaged 196 for six games, with 213 as his high score. P. D. Burns, of the Ward Leonard Electric Co., fought him to the finish, having a high score of 206.

Histrionic Ability of Engineers

On Wednesday evening an entertainment program was provided by each of the three sections of the society. The Metropolitan (New York) section gave a mock trial, the Detroit section a paper on the ideal car and the Indiana (Indianapolis) section a trial at the stake by the Indians.

In the show given by the Metropolitan section the plot was a mock trial of the driver of a cyclecar who, while in a hilarious condition, had run between the wheels of a 5-ton brewery truck and wedged the shaft and done other serious damage to it. In the lap of the driver was a young cabaret singer who introduced valuable testimony in the case. The part of the singer was admirably rendered by Herbert Chase, who labored under the name of Miss Cyclecine Bloomerstripe. Others taking part were Joseph Anglada, as Judge Rumhauser; Orrel A. Parker, counsel for plaintiff; J. E. Schipper, counsel for defense; A. E. Potter, court officer; A. J. Poole, truck owner; Coker Clarkson, truck driver; Louis Marburg, fixed post cop; Frank Trabold, motorcycle policeman; A. B. Browne, garage mechanic; N. B. Pope, pedestrian; Henry C. Wilson, Professor S. A. E.; A. B. Cumner, foreman of jury, and eleven jurors.

The Ultra Ideal Car

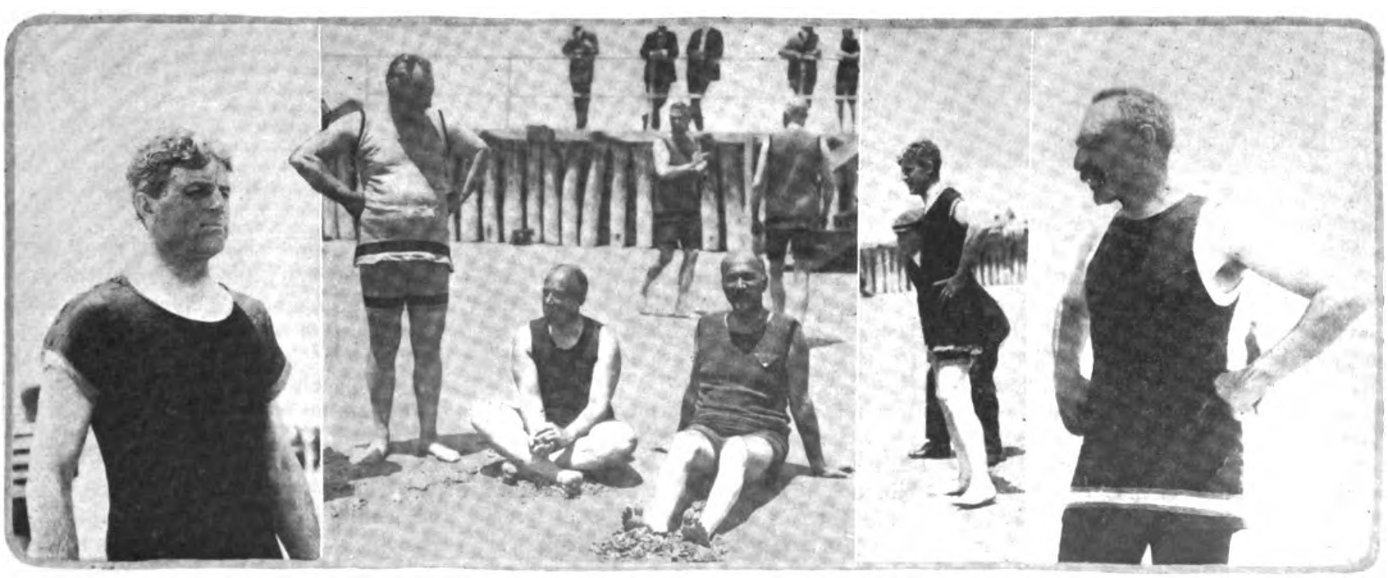
A paper on the ultra ideal car in which the motor, to conform with the specifications, would have had to be a human being, was read as the contribution of the Detroit section of the society. The car was then driven upon the platform and was shown to be a member of the Detroit section, walking within a baby carriage made up to resemble an automobile.

The Indiana Indians, under the leaderchief of F. E. Moscovics, captured John Wilkinson of the Franklin company and put him on trial for making an air-cooled car. After a trial in which he had practically no chance of defending himself, Mr. Wilkinson was sentenced to spend a week in Tarrytown with John D.

C. C. Hinkley, designing engineer of the Chalmers company, was also captured by the Indians and after a brief trial was sentenced to take Henry Ford riding in a Saxon car and to make him like it.

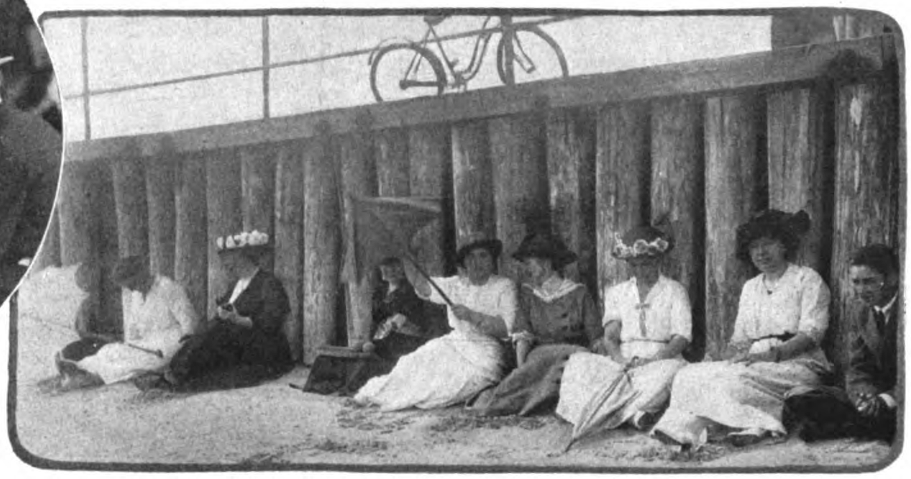
On Thursday evening the management of the hotel tendered a banquet to the society and this was attended by all the members of the party including, as an innovation, the ladies. The banquet was an informal one and no speeches were made at its conclusion except a toast to A. B. Cumner.

After the banquet the party adjourned to the ball room where Orrel A. Parker, president of the Newmastic company, delivered a lecture on the coming European trip which will be made by the S. A. E. in October. The lecture was illustrated by stereopticon views and motion pictures and proved of great interest.



Left—John Wilkinson of the Franklin company. Center—One of the scenes on the bathing beach. At the right are shown Wilkinson and W. H. Conant, with Joseph Bijur on the end

S. A. E. Summer Session a



Left—Henry Hess, R. M. Owen, Walter Baker and Alfred Reeves. Right—Ladies watching the sports on the beach. Among them are Mrs. Clarkson, Mrs. Owen, Miss Weil and Miss Owen

Mrs. Parker, C. W. Hatch, Christian Girl, Orrel Parker and Mrs. Girl

Mrs. Howard Coffin

Mr. and Mrs. John W. Bate

Mr. and Mrs. R. H. Combs

COMBINING business with pleasure is an art that does not seem to have escaped the members of the society if the social end of the 1914 Summer convention can be taken as a criterion. The fact that many of the engineers brought with them their wives and families added the final touch necessary to make the convention a complete success. Those who left their families behind will probably think twice before doing so again and as time goes on it is safe to predict that this annual outing will be looked forward to as eagerly by the ladies as by the men who derive the benefits of the society and yet enjoy the needed amount of relaxation.

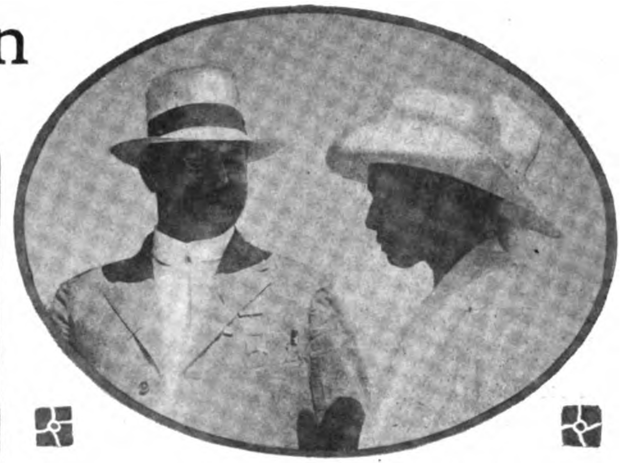
Ladies at the Banquet

A feature this year which was new to the society was the presence of the ladies of the party at the semi-annual banquet. This is a custom which might well grow, as it affords the one opportunity of the year for the entire party to come together. The annual January banquet is generally more of a business occasion, coming as it does in the Winter season when the opportunities for relaxation are not nearly so great and when most of the members of the society are in New York for business in connection with the show.

The annual convention of the society offers to many an opportunity to enjoy the only vacation of which they can avail themselves and at the same time they can hear or participate in the discussions. The fact that the business taken up by the society at these meetings represents to a large extent the latest development of the industry

Delightful Social Occasion

Mr. and Mrs. C. E. Clement taking advantage of the cool hotel veranda



Mr. and Mrs. Ernest E. Sweet

Mr. and Mrs. Alfred Reeves, Miss Margaret Houk and Mrs. David Beecroft

Mrs. David Fergusson

Walter Baker, President, American Ball Bearing Co.

F. S. Slocum, Jones & Laughlin Steel Co., and Samuel G. Stafford, Vulcan Crucible Steel Co.

makes it imperative that others be present and the opportunity of hearing these developments and at the same time enjoying a short vacation has not failed to be appreciated.

Plenty of Recreation

At Cape May the opportunities of the ladies to enjoy themselves was perhaps greater than it has been in previous meetings. On board the steamships chartered for the past two seasons they were limited in their choice of amusements, but at the seashore they had the attractions of tennis, bathing, automobiling, golf, rambling, dancing in such a varied measure that not a dull moment was experienced. The ladies enjoyed the program of sports to the utmost and were equally well entertained by the plays arranged by the Metropolitan (New York), Indiana (Indianapolis) and Detroit sections of the society.

The weather was pleasant during the entire 4 days and full advantage was taken of the spacious verandas of the hotel. The comfortable porch chairs were always occupied by chatting groups of ladies and these were often joined by the engineers and associate members who were for the time being relieved from the duties of the convention. The surf bathing claimed many devotees. The beach is known as one of the best and firmest on the Atlantic coast and is the place where America's first beach races were held.

Trip by Car Fine

The roads to and from Cape May are among the finest in the East. Several who attended the convention traveled in their cars and found a most enjoyable trip through a picturesque part of New Jersey awaiting them. Those who traveled down from New York found convenient stopping places at Lakewood or Atlantic City with the roads in excellent condition all the way to their destination.

The Automobile

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Lost

TOO many automobile and parts manufacturing companies are not yet awake to the possibilities accruing from attendance at the mid-winter and mid-summer meetings of the Society of Automobile Engineers.

Those who were unfortunate enough not to be able to attend the mid-summer session last week missed an opportunity to hear at first hand lengthy discussions and pertinent papers on subjects which are of prime importance in automobile development to-day.

Those who consider that there is little to be gained from these sessions are neglecting the opportunity of keeping their ears close to the ground to interpret the more or less vague rumblings from which the story of the future must be deciphered.

On a Tangent

Last week's session was not the best attended for summer sessions, largely due to the fact that Cape May, N. J., is too remote from Detroit, Toledo, Indianapolis and Cleveland to permit of heads of many factory departments attending, who generally attend at their own expense being given the necessary time off by the factory. The session naturally suffered because of the absence of such, and this fact will without question be a strong weapon to have next year's session held on the great lakes or in that immediate locality, where it is a short railroad trip from any of the great manufacturing centers.

That the standards committee with its various active sub-committees is still doing valiant service for the automobile industry was once more indicated by the half-day session that this committee gave over to the consideration of the various sub-standard reports before representing them to the council of the S. A. E. and finally to the entire S. A. E. membership as represented at the meeting in open session.

If any criticisms could at one time be pointed towards this committee for over-zealousness in standardizing automobile parts, there is not any place for such criticism, in fact, the industry is to-day requesting that this committee take up actively other aspects of standardizing and push it to completion as rapidly as possible.

The Pigmy Engineer

At last has a fraction of the industry at least come to realize that the work of standardization is a real work, and that it is now high time to call a halt on those engineers who are using parts that vary but very slightly from standard parts, the only reason for such variation being to have something a little different from the other maker. Such insignificant variations are not engineering but mere whims of the egotist, who is following such a nonsensical policy either to carry out a few of his pet whims or is doing it to impress his organization with his importance as an engineer. In ninety-nine cases out of every hundred it is questionable if any rational excuse can be had for such minute variations.

From 247 to 47

The session brought out one or two, perhaps more, glaring needs for further standardization work, and in each case, it is money back of the movement. The lack of standardization makes the parts cost more to the manufacturer and naturally more to the consumer. Standardization will partly eliminate these abuses. No better example of that could be cited than in the case of tapered roller bearings, as cited in the standards committee work. There are at present approximately 247 different sizes of these bearings and the sub-committee on this work has recommended that this be cut to forty-seven. Some of the roller bearing makers have said that they would desire nothing better than cutting the number from 247 to forty-seven and that the 247 different sizes have been made necessary by the demands of automobile engineers, who have demanded different sizes from those used in similar places by other makers.

In Dollars and Cents

And what do these different sizes cost?

One maker places the factory cost of carrying each size at $8,000.

You can readily calculate the difference to the maker in carrying 247 different sizes at $8,000 each and carrying but forty-seven at the same figure each.

Here is one example of the need of more standardization, and but one of the many examples why engineers from all factories should be present at the regular sessions of the society. The 247 different sizes have been borne by the automobile engineers and not by the bearing makers, and the quickest and surest ways of cutting down to forty-seven is to have these same engineers present and listen to the folly of their ways.

From 50 to 15

Cutting the number of sizes of pneumatic tires from over fifty to fifteen is another possibility of the work of the Standards committee. This, too, is a possibility because over 85 per cent. of the pneumatic tires now used come within these standard sizes.

Some time ago tire manufacturers voiced the cost of manufacturing and carrying in stock such a variety of sizes and dealers have been loud in their complaints, breathing the difficulties of carrying casings of fifty different sizes and the necessary range of inner tubes to fill such demands. Cutting from fifty to fifteen will take a burden off the dealer, it will make the tire question easier to the car owner, and it will unquestionably result in the better adaptation of stock tire sizes to cars when sold by the maker.

The Safety Valve

But the safety valve is also working in this S. A. E. standardization work, and there is little need of any faint-heart running up the danger signal.

One example suffices: The recommendation to makers to use single-wire installations for lighting and starting instead of two-wire systems brought this out excellently, and although the sub-committee made such a recommendation, the society in session refused to ratify it and passed the subject over as a progress report.

Two Blades of Grass

"MAKING two blades of grass grow where one formerly grew," is a high ideal in productiveness as voiced by President Leland in his presidential address to the Society of Automobile Engineers.

This a high ideal for the agriculturist, and metaphorically speaking it is an equally high ideal in the engineering field, in the production field and in the selling field.

Designing one part that will do the work of two, is but another adaptation of this two-blade policy.

Making one pound of steel go as far as two is another chapter in this simple theory of the agriculturist.

Making 1 gallon of gasoline go as far as 2 gallons have formerly carried you is another chapter in the story.

So designing your chassis and so manufacturing your tires that one set will approximate the mileage of two must be counted in as but a corollary of the same axiom.

So rearranging your factory assembly methods so that one set of chassis assemblers do practically as much as two formerly did is another application of it.

So improving your machinery that one machine will do the work of two is in the same category of greater efficiency.

Making one dollar go as far as two formerly did is still another phase of the question and the greatest of all to the buyer, who expects for his one dollar as good if not better materials, design and workmanship.

To attain such a goal is no mean task. There is no royal road to such an achievement. By the sweat of the brow and the application of intelligence only can such an accomplishment be realized.

It calls for the concentration of an entire factory organization to bring about such a result. An engineering force working at its own tangent to the general cycle of activity of the organization cannot be possible in a factory that will develop two healthy blades where one formerly grew.

You cannot be a disciple of the two-blade theory and have a designer who sets his back on the practicalities of foundry practice.

43 Per Cent. of Cars in New South Wales Are American

SYDNEY, N. S. W., AUSTRALIA, June 4—The total registration of automobiles in New South Wales from January 1 to May 14 this year shows 8,615 motor cars, 238 taxicabs, and 497 commercial cars.

For the same period the registrations in Victoria, one of the other countries in Australia, are 7,300 motor cars, and 330 commercial vehicles.

Official figures have just been given out giving the complete registrations from January 1 to December 31, 1913, and these show when contrasted with registrations for the first 4½ months this year that these two countries in Australia are buying motor cars at a much faster rate than a year ago.

The total registration figures from January 1 to December 31, 1913, showed 7,641 private motor cars in New South Wales alone. Of this total 3,347 were American cars, this figure representing 43 per cent. of the total.

A further analysis of the 1913 figures shows that in all 283 different makes of cars are registered, and of these there are eighty-seven different makes recorded. These figures do not include motor trucks or taxicabs.

In point of numbers America takes first place, the Ford registrations totaling 1,043. Overland carries off second place with 434. Third place goes to Europe, Renault having 346. America gets back in line for fourth honors, the Hupmobile registrations showing 323.

Some of the other leading American registrations are: Buick, 201; Cadillac, 155; Metz, 99; Maxwell, 88; Chalmers, 76; Studebaker, 75; Flanders, 68; Brush, 62; Empire, 57; E. M. F., 48; Regal, 44; Detroiter, 38; Hudson, 35; American, 30; Oakland, 29; Reo, 28; Schacht, 28; Oldsmobile, 26; Mitchell, 22; Little Four, 22; Holsman, 21; Krit, 16; Jackson, 13; Michigan, 12; Moline, 12; Cutting, 9; R. C. H., 9; Abbott, 9; Rambler, 8; Paige, 8; Everitt, 7; Thomas, 7; Parry, 7; Henry, 6; Cole, 5; Auburn, 4.

There are three each of the Paterson and Stutz.

There are two each of Pierce-Arrow, Kissel, Marion, Coleman, Stanley, Pope, Herreshoff, Cartercar, Dixie, Black Crow, and Lexington.

There are one each of Anderson, Apperson, Colby, Franklin, Havers, Gt. Western, Garford, Jeffery, King, Lewis, National, Norwalk, Pope-Hartford, Pope-Tribune, Premier, Packard, Pathfinder, McIntyre, Pilot, Pope-Toledo, Nyberg, and Winton.

Some of the leading registrations, irrespective of the country in which they are made, follow:

Ford	1043	Austin	146	Empire	57
Overland	434	Minerva	141	E. M. F.	48
Renault	346	Brasier	106	Regal	44
Hupmobile	323	Metz	99	Detroiter	38
Talbot	305	Napier	94	Hudson	35
Star	273	Clement	93	Oakland	29
Fiat	219	Wolseley	88	Reo	28
Buick	201	Maxwell	88	Schacht	28
F. N.	193	Chalmers	76	Oldsmobile	26
Cadillac	165	Studebaker	75	Mitchell	22
Daimler	164	Flanders	68	Little Four	22
Humber	153	Brush	62	Holsman	21

New South Wales is but one of the six countries comprising the commonwealth of Australia. It has a population of approximately 1,500,000, out of a total of 4,270,000 for all of Australia.

Conditions generally in this country at the present time, in fact through all the six countries in Australia, are very prosperous and even the taxation (commissioner's report, on the income tax) proves that all of Australia is passing through a period of record prosperity. There is every indication of a similar season ahead.

Knight Motors Built for Trade

Moline Co. Decides to Utilize Full License Perquisites with R. B. McMullen as Sales Agent

EAST MOLINE, ILL., June 30—The Moline Automobile Co. of this city is going to build Knight sleeve-valve motors for sale to the motor trade, this decision having been made by W. H. Van Dervoort, president of the company, last week.

The Moline company, while extending its activities in this way, will not drop its car manufacture, but solely utilize to the full the capacity of its motor plant, which will be 20,000 per year, without any additions. The motor department of the Moline company has been in the gasoline motor field for many years and last season marketed over 18,000 motors of one type or another.

For the present its Knight sleeve-valve motor activity will be confined to one model, a four-cylinder design, 4 by 6 inches bore and stroke, this being the same motor that so successfully went through the 336-hour test in January at the laboratory of the Automobile Club of America, New York City. It is reported that a smaller size is at present going through the engineering department. Deliveries will be made practically immediately on the 4 by 6-inch size.

While the manufacture for the trade will be carried out entirely by the Moline company, the marketing of these motors will be looked after exclusively by Robert B. McMullen, Edison building, Chicago, and with a branch office in the Ford building, Detroit. Mr. McMullen for years has been marketing to the manufacturing trade various car parts, such as frames, motors, axles, etc. He thinks that there has not been any more opportune moment for a firm with Moline's reputation as a motor builder to enter into the work of supplying Knight sleeve-valve motors to the trade. The Moline company has a license from Knight & Kilbourne covering the use of the motor for Moline cars as well as selling it generally to the trade, and Mr. McMullen feels that there is no better motor builder.

Buick, Prosperous, to Make 40,000 Cars

NEW YORK CITY, June 29—The Buick Motor Co., a subsidiary of the General Motors Co., had a prosperous year, according to reports, which state that practically every automobile of the 1914 model has been sold, making a total of 32,000 passenger cars, which constituted the capacity of the company's plant. The company has decided to increase the output for 1915 by 8,000 machines, thereby bringing the total output up to 40,000 cars.

The prices for the coming season will be materially reduced. The runabouts will be scheduled at a price $50 lower than that of last year, touring cars $100 less and the six-cylinder cars $335 less. Last year the price of the Buick B-24 model roadster was $950, the B-25 touring car was $1,050 while the B-55 six-cylinder model cost $1,985.

The 1915 models will have some improvements on the design of the bodies. The body will be built so as to give increased facilities for the doors, and the new six-cylinder car will be equipped for seven passengers instead of five. There will be a few slight improvements on the engine design.

Work on the new cars has been going on for some time, so that now the company is in a position to make delivery of its 1915 models between July 5 and 10.

Motion tq Sell Pope Factory at Auction

HARTFORD, CONN., June 27—Judge William L. Bennett, of the Superior Court in this city, having declined to authorize the receiver of the Pope Mfg. Co. to accept the offer of $1,800,000 made for the Pope assets in Connecticut and Massachusetts, the offer has been withdrawn. It was made by a syndicate represented by George R. Nutter, of Boston, who stated that he appeared for Daniel Gurnett and James T. Putnam, of Boston, and Carl Bonney, of Worcester, Mass.

As no other bidders have thus far appeared, it is regarded as probable that the properties will have to be liquidated by the receiver, and as the bulk of the assets in Connecticut are in real estate and machinery and the demand for idle factories is not keen the liquidation proceedings will, it is believed, be rather slow.

Under the terms of the reorganization which was to have been effected had the court accepted the offer, a new corporation with $2,800,000 capital was to have been formed and $1,800,000 was to have been paid for the Pope properties. Only $400,000, however, was to be paid in cash, the remaining $1,400,000 to be in 5-year 6 per cent. notes secured by a closed mortgage.

Judge Bennett at a hearing last week classed this as speculation, inquiring whether the proposition was not asking the court to allow the receiver to sell the assets on five years' credit. The syndicate, however, stated that it was unable to offer more and the reorganization movement ended at that point. Neither the stockholders of the old company nor the merchandise creditors were particularly impressed with the offer, as the stockholders stood to realize practically nothing and the creditors did not favor being paid in 5-year notes.

Following the refusal of the court to accept the offer, the creditors' committee, representing chiefly banks, moved that the plants at Hartford, Conn., and Westfield, Mass., be sold at public auction. Judge Bennett ordered a hearing on this motion July 2.

According to Edward M. Day, who represented the Pope interests as chief preferred stockholders, the Westfield plant is valued at $1,464,270.47, and that there are accounts and bills receivable of $396,280.33 and cash of $61,221.49. At the Hartford factory, he stated, are bills receivable of $142,231, and $49,000 cash.

New Fischer-Detroit Light Car for $595

DETROIT, MICH., June 29—A new car, the Fischer-Detroit light car, is being constructed in Detroit by the C. J. Fischer Co., a newcomer in the automobile manufacturing metropolis. The little four-cylinder will be made in one standard chassis, having a wheelbase of 104 inches and 56 inches tread. There will be five models of bodies for two and four-passengers, and the car will sell at $595 to $845.

The motor will have 2¾ inches bore and 4 inches stroke, the radiator will be of the V-type, while the clutch will be either a multiple disk or a cone. There will be a three-point suspension. The transmission will be selective, sliding gear, with three forward speeds and one reverse. The propellor shaft made of 3½ per cent. nickel steel, equippd with Spicer universal joint. The rear axle is of the semi floating bevel gear type, with Hyatt roller bearings on the live axle shaft, which is made from 3½ per cent. nickel steel and has double row of ball bearings on pinion shaft. Front springs are semi-elliptic and the rear three-quarter elliptic, standard.

The bodies are of the streamline type, interchangeable with the standard chassis. Model A is a two-passenger speedster, model B a two-passenger tourist, model C a two-passenger cabriolet, with disappearing window and collapsible top, model D a four-passenger tourist with single door, one man top, and model E a four-passenger sedan. Models A, B, C, have 30 by 3 inches tires, and models D. E, 31 by 3½ inches tires. All have 30 by 3 inches artillery wheels, with standard demountable rims.

Standard electric generator system consisting of two headlights and one rear light with connector switch will form the lighting system. The fenders will be of the semi-crown type, black enamel finish.

The equipment will consist of standard electric starter and generator, electric lights and battery, ammeter, speedometer, extra rim, tool kit, jack pump, top, envelope and windshield.

Model A and B will sell at $595, model A will have Houk wire wheels, set of five, standard equipment but no top or windshield. Models C and D cost $645, and model E $845, all F. O. B. factory.

Van Patten Gets Larger Territory

NEW YORK CITY, June 29—L. A. Van Patten, New York City distributor of the Saxon car, has been awarded five new counties in New Jersey in which to sell his car. The new territory includes the following counties: Union, Essex, Morris, Somerset and Middlesex, taking in the cities of Newark, Morristown, Plainfield, New Brunswick, Elizabeth and Perth Amboy. There are at present twenty-seven dealers handling the Saxon in his territory. He expects to increase the number to thirty-three. In addition to the new territory awarded to Mr. Van Patten, he controls the following: Greater New York and Long Island, together with Rockland, Putnam and Westchester counties in this state, and part of Duchess and Sullivan counties; and Fairfield and Berkshire counties in Connecticut.

Houpt Acquires More Territory for Lozier

NEW YORK CITY, June 26—Harry S. Houpt, the Lozier dealer in this city, has been awarded new selling territory. Not only Philadelphia, but the eastern half of Pennsylvania, the whole state of Delaware, the east coast of Maryland, with the exception of Baltimore and Washington, and the southern half of New Jersey, has been put under his control.

Buys Flanders Mfg. Co. Forge

PONTIAC, MICH., June 25—The Pontiac Drop Forge Co., has been organized in Pontiac, Mich., its capital stock being $112.500 and its officers, M. Rothschild, president; E. P. Waldron, vice-president; A. G. Griggs, secretary and D. C. McCord, treasurer. These officers with F. H. Carrol compose the board of directors. The company has purchased the drop forging plant and equipment of the old Flanders Mfg. Co. and has now one of the most complete forge plants in the country equipped to any and all kinds of carbon, alloyed steel and copper forgings with heat treatment treating and carbonized departments in connection. J. M. McGrieve, well known in the forging trade is superintendent of the works. The company has its headquarters in Pontiac and will start operations at once.

Savage 20 to Sell for $650

DETROIT, MICH., July 1, *Special Telegram*—Final organization of the Savage Motor Car Co. has taken place. Delbert H. Cummings is president and general sales manager; E. E. Taylor, vice-president; R. W. Fishback, treasurer, secretary and general manager. Headquarters have been secured at 60 Lafayette avenue. Although the plant will be in Detroit, the selection of location has not been decided. The car will be known as the Savage 20 light car, costing $650. It will have a four-cylinder motor, 3 3-8 inches bore, 4 1-4 inches stroke and weighing 1,600 pounds. Only one chassis model and body will be constructed for the present, wheelbase being 108 inches and 56 inches tread. First car to be out about August 15. The concern has been nominally capitalized at $10,000.

Hurlburt to Operate Bus Lines

NEW YORK CITY, June 30—The Hurlburt Motor Truck Co., this city, has started an innovation in the way of catering to the pleasures of the men down in the Wall street district. It has started a line of buses running from Wall street in the afternoon up to the Polo Grounds. At night a number of buses will leave Times Square for Brighton Beach, stopping at the Hotel Shelbourne.

FINDLAY, O., June 26—Ray Austin, previously connected with the Studebaker Corp. and the Amplex Motor Co., has been appointed assistant engineer for the Grant Motor Co.

New York Garage Men to Increase Rents

NEW YORK CITY, June 30—The West Side garages in the city of New York have undertaken to make storage a paying part of the business and to reduce the heretofore unduly large profit on gasoline. A committee of the West Side garagemen met yesterday afternoon, June 29, in the Apthorp Garage, 214 West 80th street, and each man agreed to canvass a certain section of the city on the West Side between 8th and 116th streets and endeavor to induce all garages to raise storage $5 a month and charge a 5 per cent. profit on gasoline. The new rates, if adopted, will be $35 for open cars and $40 for closed cars in the older style of garages and $40 and $45, respectively, in new and first-class buildings. The West Side garages have reduced their prices on "gas" 2 cents, following the recent reductions by the oil company, making the retail price now 22 and 23 cents, according to location.

ST. PAUL, MINN., June 26—L. C. Erbes, 1479 Minnehaha avenue, who recently bought the Dilver Mfg. plant, 2654 University avenue, will manufacture commercial cars and Bob Burman's racing car. Mr. Erbes, who is associated with Burman, has bought practically the entire outfit of the Bull Moose Outing Co., Jackson, Mich., and has ordered it shipped to his St. Paul factory. He plans to begin operations in 90 days and to make up to 250 commercial cars a year and six racing machines.

Hurlburt bus for service in New York City

Big Plant Bought by Chevrolet Co.

Old Maxwell-Briscoe Factory at Tarrytown, N. Y., Acquired for Eastern and Foreign Trade

NEW YORK CITY, June 28—W. C. Durant has purchased the old Maxwell-Briscoe Motor Co.'s plant at Tarrytown to build Chevrolet cars so as to supply the demand on the Atlantic Coast and also the export trade.

Mr. Durant states that the Fifty-seventh street plant in this city and the Tarrytown plant will be combined under the New York management to build the right-hand Chevrolets. After alterations, etc., have been completed in the new Tarrytown plant, it is expected that active operations will commence around January 1, 1915. The output is expected to be at the rate of fifty cars a day. The Flint (Mich.) plant is at present turning out thirty-five cars a day, while the output of the Fifty-seventh street plant is about twenty cars.

The Tarryown property comprises about ten acres of land. The buildings comprise about 205,000 square feet of floor space. The property was held at $267,000.

When the Maxwell-Briscoe Motor Co. was in full operation in Tarrytown it occupied two plants, one known as the Kingsland Point plant, the one just sold, and the other known as the Beekman avenue plant, and employed about 2,500 people. After the liquidation of the old United States Motor Co., that company decided to turn back its holdings into the original companies. The Maxwell-Briscoe Motor Co., one of the concerns included in the U. S. Motor Co., decided to concentrate its efforts in the manufacturing of automobiles in its Detroit plant, and offered for sale four of its plants in the East, two in Tarrytown, N. Y., one in Hartford, Conn., and one in Providence, R. I. The Providence plant was sold to the Universal Winding Co., Providence, in December, 1913.

Billings & Spencer Buy Columbia Plant

HARTFORD, CONN., June 29—The Columbia plant was sold this week to Billings & Spencer Co., Hartford, Conn., well known manufacturers of machine and hand tools. This plant comprises about 250,000 square feet of floor space. The real estate has been assessed at $250,000 and the machinery at $100,000. The plant was originally erected by the Pope interests. The Columbia & Electric Vehicle Co., later known as the Electric Vehicle Co., then took it over. This company went into the receivers' hands and was later reorganized and known as the Columbia Motor Car Co. The United States Motor Co. then took it over and in due course it became the property of the Maxwell interests.

Studebaker Six Makes 16 Miles to the Gallon

BUFFALO, N. Y., June 28—Despite the heavy, intermittent rains last Sunday, the Studebaker six averaged better than 16 miles to the gallon of gasoline on the fourth of its five 200-mile runs. The total mileage was 200.6 miles. Twelve and a half gallons of gasoline, 2 quarts of oil and 1 quart of water were consumed. The average mileage secured per gallon of gasoline was 16.04 miles. This beats all the previous records the car has established on this tour. The next run will be made July 5. This will be the last of 200-mile runs of the 1,000-mile economy tour.

SAGINAW, MICH., June 26—The Saginaw Motor Car Co., Saginaw, Mich., which was organized to build a $395 light car, plans to begin operations this month with an initial output of ten cars. If the company's plans mature it will build 2,000 cars in 1915 and employ 300 men. A. R. Thomas, Detroit, and David Cuthbertson are behind the project. The company has secured the Brooks Motor Wagon plant, 200 by 400 feet.

Kissel Truck in Transcontinental Trip

NEW YORK CITY, June 26—A KisselKar truck with a carryall body, will be driven across the continent. Charles Courtney will be the driver. He will probably start late in the summer, and will arrive at San Francisco in the spring of 1915 for the Panama-Pacific Exposition.

A Commission to Regulate Competition?

In Measure Before Congress, Federal Board Has Power to Prosecute Unfair Enterprises

NEW YORK CITY, June 29—With the object of broadly covering the subject of unfair competition a bill is now on its way through Congress creating a Federal Trade Commission, which would have powers of investigation into instances of unfair competition by corporations. The measure is regarded as preferable to certain other statutes regulating business conditions in that it attempts to lay down no hard and fast rules or definitions, but gives to the commission those powers which now are vested in the Bureau of Corporations. The measure is substantially like the unfair competition law of Germany. None of the expense attached to investigations falls upon the little business man; it is all borne by the government. If any corporation believes the commission has been mistaken in its rulings or orders, the offending corporation need not discontinue its practices, but may go ahead and leave it to the commission to bring a court action. Any employee of the commission who divulges any information not within the line of his duty shall be subject to a fine not exceeding $5,000 or by one year's imprisonment or both if he is convicted.

An extract from the law follows:

Provide: That unfair competition in commerce is hereby declared unlawful.

The commission is hereby empowered and directed to prevent corporations from using unfair methods of competition in commerce.

Whenever the commission shall have reason to believe that any corporation has been or is using any unfair method of competition in commerce, it shall issue and serve upon such corporation a written order, at least thirty days in advance of the time set therein for hearing, directing it to appear before the commission and show cause why an order shall not be issued by the commission restraining and prohibiting it from using such method of competition, and if upon such hearing the commission shall find that the method of competition in question is prohibited by this Act it shall thereupon issue an order restraining and prohibiting the use of the same. The commission may at any time modify or set aside, in whole or in part, any order issued by it under this Act.

Whenever the commission, after the issuance of such order, shall find that such corporation has not complied therewith, the commission may petition the district court of the United States, within any district where the method in question was used or where such corporation is located or carries on business, praying the court to issue an injunction to enforce such order of the commission, and the court is hereby authorized to issue such injunction.

Discuss Workmen's Compensation Act

NEW YORK CITY, June 25—The workmen's compensation act was discussed from the angle of the employer at a meeting held recently by the Merchants' Assn. The matter of the desirability of employers insuring through the state fund created by the new law, or through stock insurance or mutual insurance companies, chiefly occupied the speakers.

Edmund Dwight, manager of the Employees' Liability Assurance Corp., stated that he believed some employers would carry their own risks, as is permissible under the law, but they would be few and would include chiefly the very large employers. He stated that it would be reasonably advantageous to employers to take out policies with the state fund. With the stock companies, he said employers would find a protection which is absolutely essential considering the hardships that he was inclined to believe the new law inflicted.

Professor F. S. Baldwin, manager of the State Insurance Fund, declared that the state fund offered very good attractions to employers large or small because they got a rate not obtainable otherwise, were relieved of all further liability, and would get the benefits of dividends and reductions for merit.

Market Reports for the Week

MARKET PRICES in general remained unchanged last week. Tin had a fluctuating week of it and closed at a loss of $.20 per 100 pounds. At the closing on Tuesday, it was slightly firmer, with an active demand for small lots of nearby positions from domestic consumers. Both coppers dropped in prices, due to considerable irregularity in the market. Lead was again steady at $3.90. Cottonseed oil rose to $7.23 a barrel. On Tuesday this product was very dull in the market, there being no interest shown by refiners and an absolute indifference on the part of speculators.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	....
Beams & Channels, 100 lbs........	1.26	1.26	1.26	1.26	1.26	1.26	....
Bessemer Steel, ton	19.50	19.50	19.50	19.50	19.50	19.50	....
Copper, Elec., lb..	.13⅝	.13½	.13½	.13½	.13⅜	.13⅖	—.00 9/40
Copper, Lake. lb..	.13¾	.13⅝	.13⅝	.13⅝	.13½	.13 5/20	—.00½
Cottonseed Oil, bbl.	7.11	7.21	7.18	7.21	7.27	7.23	+.12
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	....
Gasoline, Auto, bbl.	.14	.14	.14	.14	.14	.14	....
Lard Oil, prime...	.93	.93	.93	.93	.93	.93	....
Lead, 100 lbs.....	3.90	3.90	3.90	3.90	3.90	3.90	....
Linseed Oil......	.54	.54	.54	.54	.54	.54	....
Open-Hearth Steel, ton	19.50	19.50	19.50	19.50	19.50	19.50	....
Petroleum, bbl., Kans., crude...	.75	.75	.75	.75	.75	.75	....
Petroleum, bbl., Pa., crude.....	1.75	1.75	1.75	1.75	1.75	1.75	....
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	....
Rubber, Fine Up River, Para....	.69	.69	.69	.69	.69	.69	....
Silk, raw, Ital....	..	5.00	..	..	5.00	5.00	....
Silk, raw, Japan..	..	4.40	..	..	4.40	4.40	....
Sulphuric Acid, 60 Baume......	.90	.90	.90	.90	.90	.90	....
Tin, 100 lb......	30.65	29.80	30.00	30.00	30.38	30.45	—.20
Tire Scrap.......	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	....

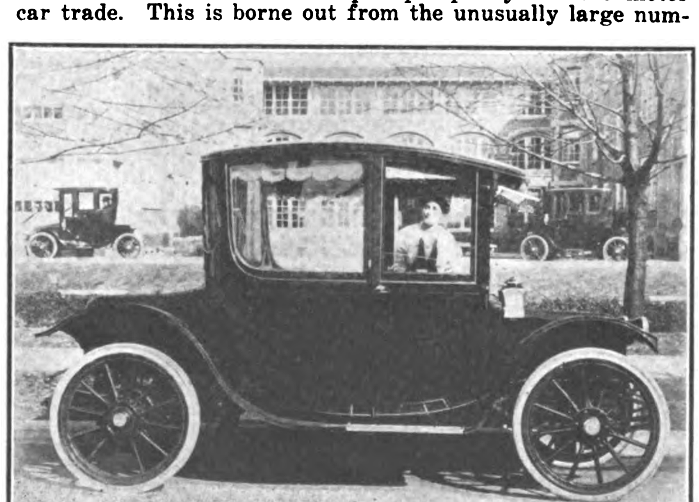
Crops Point to Indiana as Car Market

INDIANAPOLIS, IND., June 29—At the conclusion of a most successful year, the motor car industry in Indiana is looking forward to an even more successful season. In almost every instance dealers have not only sold out their 1914 allotments, but they have been obliged to call on the factories for additional cars.

The reason for the bright outlook is the fact that Indiana will have some of the largest grain crops in its history. The wheat crop, now being cut, is estimated as being twenty-five per cent. larger than that of last year and of much finer quality.

Reports from over the state are that the corn crop is in perfect condition and that a record breaking crop may be expected. Oats are not in as good condition as might be expected, but even at that the crop will be large.

These conditions seem to spell prosperity for the motor car trade. This is borne out from the unusually large num-



New four-chair brougham made by the Waverly Co., Indianapolis, Ind. Note ample window space ber of motor car sales that are now being made in the rural districts and smaller communities and in the many prospects for motor car sales in those localities during the new season.

Automobile Trade Thriving

NEW YORK CITY, June 26—It speaks well for the automobile business that the exports of motor vehicles and parts have shown a consistent increase in valuation over last year when most other manufactured articles ready for use show a marked falling off in exports and when the total exports for 10 months ended with April are less by $59,000,000, or nearly 2.8 per cent., than for the 10 months ended with April, 1913.

Bankers and investors who may have entertained doubts may find reassurance about the condition of the industry in a comparison of exports made by the National Automobile Chamber of Commerce from the current Summary of Commerce and Finance issued by the U. S. Department of Commerce.

Fisk Tire Sizes and Prices Cut

CHICOPEE FALLS, MASS., July 1—Beginning today, the Fisk Rubber Co. makes reductions in certain tire sizes. In plain tread casings the reductions apply only to 3 and 3½-inch sizes; all non-skid sizes are reduced; tubes remain the same.

The 30x3½ plain tread was $17.00; now is........................$16.55
The 30x3 plain tread was $13.85; now is........................ 12.30
The 34x4 non-skid was $36.60; now is............................ 31.60
The 36x4½ non-skid was $46.35; now is........................... 42.65

Rebates will be extended to dealers on any stock on hand at the time of the reduction, provided a serial inventory accompanies the application for rebate. These reductions are said to be due to increased production in the styles and sizes affected. The non-skid production has been practically trebled in the last 60 days.

It is the intention shortly to introduce a non-skid tire, in design similar to the present Town Car Tread, which will be known as the Fisk Red Top. This will be made only in Ford sizes and should prove an attractive seller. Salesmen will show samples and orders can be placed for delivery the latter part of July.

3,408 More Trucks in Chicago Since 1911

CHICAGO, ILL., June 29—There has been an increase of 3,408 commercial cars in this city since 1911, according to figures compiled by Edward Cohen, city collector. During the same period is noted a decrease of 1,789 in two-horse wagons. In April of this year only seventeen four-horse vehicles were in use in Chicago. The 3,408 commercial cars may be divided up into 2,012 delivery wagons of less than 1-ton capacity, while 1,396 are heavy-duty trucks.

NEW YORK CITY, June 26—The board of directors of the United States Rubber Co. have declared from its net profits a quarterly dividend of 2 per cent., on the first preferred stock, a quarterly dividend of 1 1-2 per cent. on the second preferred stock, and a quarterly dividend of 1 1-2 per cent. on the common stock of the company, to stockholders of record at 3 p. m. on July 15, 1914, payable without closing the transfer books, July 31, 1914.

Automobile Securities Quotations

NEW YORK CITY, July 1—The automobile securities market was rather inactive during the past week, a number of the stocks showing no changes whatever, while the majority of those which showed changes experienced slight declines of not over 2 or 3 points, many of them being changes of only a fraction of a point. The only gains to be noticed were: Firestone preferred, ½ point; Gray & Davis preferred, 3 points; Reo Motor Truck Co., ¼; Texas Co., ¼; Overland common, 2 points and Overland preferred, ½ point. There were two or three companies whose stocks showed a considerable drop according to the bid figures but which really remained about the same in general tone. The complete tabulation for the past week follow, giving the quotations for each day and also the 1913 figures:

Security	Wednesday Bid	Wednesday Asked	Thursday Bid	Thursday Asked	Friday Bid	Friday Asked	Saturday Bid	Saturday Asked	Monday Bid	Monday Asked	Tuesday Bid	Tuesday Asked	Week's Change	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co. com	220	..	220	..	220	..	220	..	220	..	220	..	..	155	165
Ajax-Grieb Rubber Co. pfd	99	..	99	..	99	..	99	..	98	104	98	104	..	94	99
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	97	100
Case T. M. Co., J. I.	80¾	90	80¾	90	81½	90	81½	89	80¾	90	80¾	90	—¼	..	..
Chalmers Motor Co. com	99	103	99	103	99	103	99	103	98	103	98	103	—1	135	..
Chalmers Motor Co. pfd	95	98	95	98	95	98	95	98	95	98	95	98	..	98	102
Electric Storage Battery Co	51	51¼	51	51¼	50½	51½	51	51¼	51	51½	51	51½	..	..	..
Firestone Tire & Rubber Co. com	300	305	300	305	300	305	300	305	299	304	299	304	—1	270	280
Firestone Tire & Rubber Co. pfd	108	109½	108	109½	108	109½	108	109½	108½	110	108½	110	+½	104	106
Garford Co. pfd	75	85	75	85	75	85	75	85	75	85	75	85	..	85	95
General Motors Co. com	91	91½	88	90	90	92	90	92	91	91½	91	91½	—2	26	32
General Motors Co. pfd	92	93½	92	93½	92¼	95	92	94	92	93½	92	93½	—1	72	77
B. F. Goodrich Co. com	23	23¾	23¼	23½	23⅛	24	23⅛	23½	23	23¾	23	23¾	—1½	27	28
B. F. Goodrich Co. pfd	88¼	90	85	88	86¼	87¼	87	88½	88¼	89	88¼	89	..	90½	92½
Goodyear Tire & Rubber Co. com	170	175	170	175	170	175	170	175	166	172	166	172	—4	325	332
Goodyear Tire & Rubber Co. pfd	97	99	97	99	97	99	97	99	96	98	96	98	—1	97	98
Gray & Davis Co. pfd	95	102½	95	102½	95	102½	95	102½	98	102	98	102	+3	..	..
International Motor Co. com	..	5	..	5	..	5	..	5	..	3	..	3	..	3	6
International Motor Co. pfd	3	10	3	10	3	10	3	10	3	9	3	9	..	18	25
Kelly-Springfield Tire Co. com	58	60	55	57	56	58	55	58	56	58	55	58	—3	..	..
Kelly-Springfield Tire Co. 1st pfd	74	78	70	80	70	80	73	77	76	80	70	80	—4	..	..
Kelly-Springfield Tire Co. 2d pfd	99	100	90	100	90	100	90	95	94	100	90	100	..	..	..
Lozier Motor Co. com	15	20	15	20	15	20	15	20	..	20	..	20	..	15	20
Lozier Motor Co. pfd	..	41	..	41	..	41	..	41	..	41	..	41	..	..	90
Maxwell Motor Co. com	13¾	14	13⅛	13½	13¾	14	13¾	14	13¾	14	14	14¾	—½	3	3½
Maxwell Motor Co. 1st pfd	40	41	39½	40½	40¾	42	40	42	40½	41½	40	42	—3	7½	9
Maxwell Motor Co. 2d pfd	16¾	17½	16	17	17	17¾	17	18	17¼	18	16½	18	—1	26½	28
Miller Rubber Co	139	142	139	142	139	142	139	142	138	140	138	140	—1	133	137
New Departure Mfg. Co. com	126	128	126	128	126	128	126	128	126	128	126	128	..	..	..
New Departure Mfg. Co. pfd	106½	..	106½	..	106½	..	106½	..	106	..	106	..	—½	..	..
Packard Motor Co. com	103	..	103	..	103	..	103	..	93	..	93	..	—10	..	..
Packard Motor Co. pfd	97	100	97	100	97	100	97	100	97	100	97	100	..	..	..
Peerless Motor Co. com	18	25	18	25	18	25	18	25	10	17	10	17	—8	45	50
Peerless Motor Co. pfd	..	62½	..	62½	..	62½	..	62½	..	50	..	50	..	..	96
Pope Mfg. Co. com	..	1	..	1	..	1	..	1	..	1	..	1	..	..	11
Pope Mfg. Co. pfd	..	3	..	3	..	3	..	3	..	3	..	3	..	..	36
Portage Rubber Co. com	..	40	..	40	..	40	..	40	..	30	..	30	..	30	40
Portage Rubber Co. pfd	..	90	..	90	..	90	..	90	..	90	..	90	..	96	99
*Reo Motor Truck Co	10¾	11¾	10¾	11¾	10¾	11¾	10¾	11¾	11	11½	11	11½	+¼	10	11½
*Reo Motor Car Co	18	19	18	19	18	19	18	19	17¾	18¼	17¾	18¼	—¼	19	20½
Rubber Goods Mfg. Co. pfd	100	110	100	110	100	110	100	110	100	110	100	110	..	..	..
Russell Motor Co. com	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	48	49	48	49	48	49	48	49	47½	48½	47½	48½	—½	..	..
Stewart Warner Speedometer Corp. pfd	98	100	98	100	98	100	98	100	97½	99	97½	99	—½	..	..
Studebaker Co. com	28¾	29½	28¼	29½	28	28⅞	29¼	30	28⅜	29½	28¾	29½	—2	22½	28
Studebaker Co. pfd	85	87	82	84½	80	83	80	82½	85	87	85	87	..	82	87
Swinehart Tire & Rubber Co	85	86	85	86	85	86	85	86	85	86	85	86	..	85	88
Texas Company	143½	143⅞	141½	142	142½	143½	143	144	143½	144	143½	144	+¼	..	..
U. S. Rubber Co. com	57½	57¾	57½	58¼	58	58½	58¼	58⅝	57¼	57¾	57¼	57¾	—1¼	59	59½
U. S. Rubber Co. 1st pfd	101½	102¼	101¾	102	102⅛	103	102½	103	101½	102¼	101½	102¼	—1½	102¼	103¼
Vacuum Oil Co	219	221	216	218	217	220	217	220	218	221	220	222	—1	..	..
White Co. pfd	107	110	107	110	107	110	107	110	107	110	107	110	..	102	104
Willys-Overland Co. com	80	81	79	80	79	80	80	81	79	80	82	85	+2	56	66
Willys-Overland Co. pfd	93	95	91	95	91	94	92½	95	92	95	93	95	+½	84	90

*The par value of these stocks is $10; all others $100.

Seize Automobiles Left Unattended

New York City Street Cleaning Department Enforces an Antiquated Ordinance

NEW YORK CITY, June 29—Just how far public opinion will justify the rule put into force by the Street Cleaning Department of this city on June 27, when twenty-four automobiles left on the streets unattended were seized as encumbrances, is not known, but the move on the part of this department, it seems, is marked by more zeal than common sense.

On that date eight taxicabs of the Mason-Seaman Co. were taken, together with eleven private touring cars and a motor truck. Just what right a public official has in seizing cars is not known, but it looks like confiscation for a person to deliberately step into a private automobile and drive it off to an automobile pound where it is held until the owner pays a fine of from $5 to $10. Such a regulation is obviously intolerable.

The authorities state that it is their desire to discourage the practice on the part of some garagemen of using the streets for repair-shops and wash-stands. Were their activities confined to the extent of which they speak, the opposition aroused undoubtedly would not have been so strong, but the officers seized any and every car found standing at the curb, regardless of how long it had been standing, or for what purpose it had been left, impounded them and required the owners to pay a fine before cars would be released.

Left for 5 Minutes—Car Is Seized

An instance of how far these officials overstepped their authority is shown in the case of a Ford car which stopped in front of the Cutting-Larson Co.'s Oldsmobile establishment. The owner went to the basement for parts, staying about 5 minutes. When he came out his car had disappeared. The officials had hitched a chain and a pair of horses to his car and dragged it away to the encumbrance yard.

There was a Cadillac standing back of this Ford. The owner was inside a repair shop paying his bill for a recent repair done to the car. His car was taken, and he was obliged to travel across the city and pay a fine of $5.

Another instance cited shows how a truck owner was made to pay a fine even when he accompanied the officials himself to the pound. His truck had been standing in front of the White service station and had not been there more than 5 minutes when officers came along and said they were going to hitch chains on it and take it to the pound. Rather than have the vehicle thus treated, they were informed that a chauffeur would drive it to the pound, which he did. He paid his fine, however.

Eleven taxicabs standing at officially designated cabstands were seized if chauffeurs were not with the cabs, even though they were but a short distance away, and these cars were impounded with the others.

Private owners are inquiring how it is to be possible for them to operate their cars in the downtown section and drop into business places unless they go to the expense of employing a chauffeur.

One other thing the automobile owners are kicking about is that they were given no notice of the impounding action.

Means Owner Must Have Chauffeur

With the present New York law in force, an automobile owner is prevented from driving up to an accessory house to buy a tire or anything that he needs, without having a chauffeur or competent driver in the car. Furthermore what is the man who cannot afford a chauffeur going to do? The number of private cars in this city driven by their owners vastly outnumbers either public vehicles or cars, the owners of which hire chauffeurs. Not all the garages or public parking places in the city could supply the need if there should be an endeavor to enforce the rule that cars shall not be left unattended.

J. S. Frazee, president of the Long Island Automobile Club, stated that in his opinion there had been an old ordinance which prohibited the leaving of vehicles standing in the streets without drivers or automobiles without competent chauffeurs, but that it was pretty much of a dead letter. An attempt had been made to enforce it in 1907 or 1908, but after that it was allowed to drop.

That the city officials have aroused the ire of many of the car owners is evidenced by the fact that certain of these owners have threatened to bring suit against the city for alleged confiscation. The Long Island Automobile Club has also announced its intention of entering into the fight against this latest innovation started by the municipal government. It states that should the Street Cleaning Department attempt to force a strict observance of such an ordinance, not only in the business avenues, but in the residence streets and other thoroughfares of the city, it will certainly carry the matter to the courts and have a test case made of the restriction.

Philadelphia Club Insurance Plan Saves 40 Per Cent.

PHILADELPHIA, PA., June 27—A new plan of co-operative automobile insurance restricted to owners of non-commercial cars, which has been in a formative state for about 3 months, has been perfected, the details of which were announced today by the Automobile Club of Philadelphia.

Under the auspices of the Pennsylvania Motor Federation, the Automobile Club of Philadelphia and various other similar organizations, the Pennsylvania Indemnity Exchange has been organized under the laws of this state.

The forms of insurance will cover a wide field, embracing fire, collision, theft, property damage and personal liability, the plan of operation being as follows:

Initial premiums will be based on standard rates of stock companies and a fixed portion of premiums will be set aside for all operating expenses. The balance of the premiums will go into a fund for the payment of losses, and at the end of every 2 weeks such losses will be pro-rated among the members in proportion to their premium payment. At conclusion of policy year each member's ledger account will be balanced and such saving as may have been effected will be returned to the members in cash or credited on the following year's premium, as members may choose.

Minimum expenses for operation, membership limited to the highest grade risks, elimination of stock company profits and rigid inspection of each risk are expected to save members from 20 per cent. to 40 per cent. over the rates of insurance now in force. As no taxicabs or commercial cars will be insured, the extra hazard and cost of insurance for pleasure car owners will be reduced to a minimum. Membership in the Pennsylvania Indemnity Exchange will be open to all owners of pleasure cars.

The Pennsylvania laws require that an insurance exchange of this character must have subscribers for membership the aggregate amount of whose insurance must total at least $1,500,000, thus requiring sufficient risk to produce a fair average. This, together with other safeguards provided, will put the Exchange on a sound basis.

So far the following trustees have been appointed: John B. Stetson, Jr., Alfred R. Wiggan and M. F. Littleton, Jr.

Weed Finally Enjoins Frasse Company

NEW YORK CITY, June 27—Judge Hand, in the U. S. District Court for the Southern District of New York, to-day granted a perpetual injunction in favor of the plaintiffs in the suit of the Weed Chain Tire Grip Co. against the Frasse Co. The Court found that the Frasse Co. had infringed the Parsons patent No. 723,299 covering the well-known Weed Tire Chain construction.

As the Frasse Co. had already settled in full for all damages and profits accruing by reason of past infringement when the injunction was granted no provision is made in the decree for the recovery by the complainant of costs, profits or damages.

The injunction states in connection with the infringement of patent No. 723,299:

"The defendant, the Frasse Co., has infringed upon said Letters Patent 723,299, and upon the exclusive rights of the complainant under same, without leave or license from the complainant, selling cross chains, side chains, cross chain hooks, side chain hooks, German machine chain for cross chains, Triumph chain for side chains, and other material and parts adapted or intended to be used in the manufacture or repair of chain grips covered by said Letters Patent, and aiding and prompting infringement of said Letters Patent by others by offering such parts of material to customers with the advice and recommendation that they be used and with the knowledge that they would be used in making or repairing chain grips and by displaying in connection with such parts and material advertisements that such parts and material were for use in making or repairing chain grips.

"The defendant having settled in full for all damages and profits accruing by reason of past infringement of said patent by defendant and by defendant only and for cost, no provision is made for the recovery by the complainant of costs or of profits or of damages as aforesaid, and this decree is hereby made final."

Stromberg Gets Preliminary Injunction

NEW YORK CITY, June 27—An order has been signed by Judge Hand, in the U. S. District Court for the Southern District of New York, granting a preliminary injunction to the Stromberg Motor Devices Co. against Ludwig Arnson and Alfred Michaelis, doing business as a copartnership under the name of Longuemare Carburetor Co.

The injunction was asked by Charles W. Stiger in an affidavit filed last week, the injunction to restrain the defendants from further alleged infringements of the Richard and Ahara patents pending the settlement of the suit.

Several other affidavits were filed last week as follows:

John A. Dienner deposed under date of June 24 that he was employed from June, 1910, to January 3, 1914, in the United States Patent Office as assistant examiner, and in the course of his work was unable to find the alleged French patent No. 238,392 of May 28, 1894, entitled Pour moteur à petrol à alimentation pneumatique regulable by F. B. Poerschmann. In the records of French patents in the Public Library of Chicago he was unable to find specifications or drawings corresponding to this. In the British Patent files the application by Poerschmann No. 12,390 and dated July 26, 1894, was marked abandoned. In the German files there is no patent of corresponding subject, matter and title according to Mr. Dienner. The Poerschmann patent is alleged by the defendants to antedate the Ahara and Richard patents.

Kempster B. Miller, and Raymond M. Anderson state in an affidavit that they never heard of a device in practical use called by the name of Poerschmann and that they did not believe there ever was made a practical and operative structure such as that set forth in this so-called French patent. They also aver that the Poerschmann construction certainly does not have the construction or mode of operation, nor can it secure the result of the inventions of the Richard and Ahara patents in suit. After explaining the alleged and practical features of the Poerschmann construction and their wide difference from the Richard and Ahara patents, Messrs. Miller and Anderson point out fifteen points of identity in construction and operation alleged to exist between the Ahara and Richard patents on the one hand and the Longuemare on the other, and state that not one of these essential points is found in the so-called Poerschmann patent.

Can't Sue Employers Insured Under State Fund

NEW YORK CITY, June 26—According to a new ruling recently announced by the Workmen's Compensation Commission, it is stated that employers insured under the state fund for hazardous occupations will be protected from all civil suits for damages by injured employees.

Section 53 of the Compensation act gave the employer full protection from damage suits, the commission said. By special resolution the commission set forth both the text, and this interpretation of the section:

"All employees of an employer, whose business is a hazardous employment within the meaning of the Workmen's Compensation Act, are held by this commission to come within the provisions of the act, and therefore have no right to bring action for damages against their employer on account of injuries received in the course of employment."

Asks Bill of Particulars in Shim Suit

NEW YORK CITY, June 29—In the suit of Eric G. Lindhe against the Laminated Shim Co. brought May 23, a motion for a bill of particulars has been endorsed by Judge Hand, in the U. S. District Court for the Southern District of New York. Thirty days are given to serve the bill of particulars with leave to the plaintiff to enter an order vacating the order, taking the counter claim pro confesso and to reply thereto within 10 days after the filing of the bill of particulars.

Supreme Court Finds State Law Supreme

CHICAGO, ILL., June 28—That this city cannot make regulations inconsistent with the motor vehicle act, has been held by the Illinois Supreme Court, in a suit brought by the City of Chicago against C. R. Francis. It was also held that an ordinance requiring the owner of a motor vehicle, not a motor truck or a motor-driven commercial vehicle, to display numbers other than the number of the registration seal issued by the secretary of state, is void.

Under the present motor vehicle act a city may make and enforce reasonable traffic and other regulation except as to rates of speed, provided such regulations are not inconsistent with the motor vehicle act and the conditions are such as to warrant them.

Garages Gain in Separator Case

Testimony That Little Gasoline Reaches Sewers Impresses New York Board

NEW YORK CITY, June 30—The Welfare Committee of the City Council, before which the question of oil separators for garages has been under investigation for some time, has reported favorably to the Board of Aldermen of the city on the resolution of the dealers and garagemen of New York to the effect that the section of the municipal code calling for the use of oil separators be eliminated.

The question of oil separators is a long mooted one in New York City and there are at present some seventy or eighty suits for failure of garage men to use separators in the courts. It was not until the New York dealers took the matter up actively that this Welfare Committee gave it serious attention. The dealers employed expert chemists to make analysis on the value of these separators and it was reported the value was so slight as to be negligible. The dealers' other basis of complaint was that there was not any necessity for separators. The matter will next come before the entire city council.

At the last hearing on June 26 Attorney Charles Thaddeus Terry led the forces of the New York Garage Association, the Automobile Dealers' Assn. of New York City, Brooklyn Garage Owners' Board of Trade, the Brooklyn Motor Vehicle Dealers' Assn. and the American Automobile Assn.

Dr. Russell W. Moore, the fire department chemist, testified that in 307 working days there were taken from forty-seven garages about 3,500 gallons of separator refuse, which was 40 per cent. gasoline.

Trying Out Electrics for Taxicab Service

NEW YORK CITY, June 29—Whether or not the electric vehicle will supplant the gasoline car at the taxicab station at the Grand Central Depot is not as yet determined, but there is a possibility of it so doing. Since June 19 a Rauch and Lang electric has been in regular public service at the Grand Central station. This cab is fitted with a landaulet type of body, with a seating capacity for five passengers, and facilities for carrying truck and luggage.

There is a depression on the Vanderbilt avenue side of the station, suitable for taking on passengers and also for storing the taxicabs. Some doubt has arisen as to whether gasoline cars may be kept there on account of the close proximity to the Hotel Biltmore, and also on account of a clause in the city statutes against storing or running gasoline motors underground or under an inclosure. An investigating committee has been formed consisting of Messrs. Whaley of the N. Y., N. H. and H. Railroad, Katte, chief engineer of electric traction of the N. Y. Central lines, and Miles Bronson, manager of the Grand Central Terminal Assn. This committee expects to make a definite statement in about 2 months.

New Tax Rate Proposed for D. C. Motorists

WASHINGTON, D. C., June 30—*Special Telegram*—An increased tax for District of Columbia motorists is proposed by Congressman Page, of North Carolina, in a bill introduced today. The tax funds are to maintain roads outside the city fire limits. The bill provides tax of $5 a year for cars of twenty-five horsepower and under, $7.50 for cars from 25 to 40 horsepower, and $10 for more than 40 horsepower. These rates will apply to visiting motorists who keep their cars here more than two periods of 5 days each year. Present law provides license fee of $2 per car, which is perpetual.

Hazeltine Valve Grinder Patent Upheld

NEW YORK CITY, June 26—The Hazeltine valve grinder patent No. 13,421, owned by the Specialty Machine Co., is valid and is infringed by the Ashcroft Mfg. Co., according to the opinion of the United States Circuit Court of Appeals in New York City. The patent is a reissue of No. 918,049, and the defendant had claimed that the lapse of time between the issue and the reissue barred the Specialty company from bringing a suit. The lower court agreed with this and dismissed the bill of complaint, but the appellate court held that since reissue narrowed instead of broadened claims it was valid. It also found the Ashcroft device to infringe.

Boiling Oil Petrifies Track for Sioux City Races

Drivers and Officials Arrive for 300-Mile Grind—Banked Turns Stand 90 M. P. H.

SIOUX CITY, IA., June 29.—The work of grooming the 2-mile speedway for the $25,000 race of 300 miles to be staged there on July 4, has been completed and speed tests on the dirt oval the past few days have developed the fact that some of the fast cars will be able to go into the ten-foot embankment curves at a speed of close to 90 miles an hour. It has been demonstrated that the surface in the stretches is so fast that better than 100 miles an hour can be attained by some of the speed creations.

Thousands of gallons of boiling oil have been poured upon the surface of the track during the past few days, practically petrifying the top soil. The 10-ton steam rollers are being used to level the surface and make the track as hard as macadam. Work on the enormous grand stands has been progressing rapidly and the demand for tickets has been so great that the management is arranging to erect more stands than were originally proposed.

Nearly all of the drivers entered have arrived with their cars. On Monday, June 29, practice began under official supervision. Fred J. Wagner, who is to start the race, arrived in Sioux City on Saturday; also F. E. Edwards, of the technical committee. Other out-of-town officials are expected to arrive today and the early part of the week.

Interest beyond all expectation is being shown in the race in that section of the Middle West. Automobile clubs throughout Iowa and surrounding states are arranging tours to terminate at Sioux City on the night of the 3rd, and all the railroads making connections for Sioux City are arranging excursions within distances of 500 miles.

The entries include Wishart, Mercer; Knipper, Delage; Grant, Sunbeam; Babcock, Sunbeam; Oldfield, Stutz; Anderson, Stutz; Mulford, Peugeot; Burman, Peugeot; Stringer, Peugeot; Patschke, Marmon; Keene, Beaver Bullet; Bauer, National; Le Cain, Chevrolet; Horan, Metropol; Chandler, Braender Bull Dog; Wilcox, Gray Fox; Bennett, Moon; Brock, Ray; Mason, Mason; Callahan, Stafford; Wetmore, Chalmers; Klein, King.

Twenty-five Entries to Date for Tacoma

TACOMA, WASH., June 26—To date there are twenty-five entries for the Tacoma road races, to be held July 3 and 4. A few of the cars have been out for practice spins and have reeled off some very fast laps. On June 22 Brock in his Portland-built special and Cooper in his Stutz sparred for the honor of the fastest lap yet to be run on the new Tacoma speedway, and late in the afternoon Brock won. Cooper did his lap in 1:38 and then Brock sent his car around the track for a lap in 1:36:4-5. Hughie Hughes in a Maxwell made a lap in 1:40. The entries for the Tacoma road races, corrected to June 23, read as follows:

DRIVER	CAR	DRIVER	CAR
Tetzlaff	Maxwell	Carlson	Maxwell
Hughes	Maxwell	Verbeck	Fiat
Kennedy	Chalmers	Taylor	Alco
Klein	King	Cooper	Stutz
Welch	Fiat	Croston	Chevrolet
Terrion	Regal	Pullen	Mercer
Parsons	Franz	De Alene	Marmon
Ruckstall	Mercer	Barnes	Romano
Thomas	Locomobile	Brock	Ray
McGoldrick	National	Smyley	Hupmobile
North	Mercer	Sorell	Fiat
Earl Staley	Studebaker	Dingley	Ono
Malcolm, H. L.	Hudson Special		

René Thomas Feted in Paris

PARIS, June 13—French enthusiasm ran riot when René Thomas and his teammates entered Paris after their victory at Indianapolis. Racing fans packed the inside and outside of Gare St. Lazare to such an extent that special police had to be called up to handle the crowds. Louis Delage, builder and owner of the winning car, accompanied by Madame Delage and by M. Michelat, chief engineer of the Delage company, headed the deputation. Flowers were presented, flags were waved, and men and women alike struggled to kiss the somewhat bashful and embarrassed Thomas. The new Delage racing car for the French Grand Prix next month had been driven to the depot by Bablot, and it was in this machine that Thomas was given a triumphal joy ride through Paris to the showrooms of the Delage company, where champagne flowed freely and speeches were indulged in.

All the drivers who took part in the Indianapolis race are enthusiastic over their reception and the manner in which they were treated in America. Without an exception they declare their intention of coming to Indianapolis next year.

Colorado to Salt Lake Run for August

DENVER, COL., June 25—The formal opening of the Colorado-Utah stretch of the Pike's Peak Ocean to Ocean Highway will be celebrated this summer by a 650-mile endurance and reliability run from Colorado Springs to Salt Lake City. Another run of the same kind and same distance is also being planned from St. Joseph to Colorado Springs, which is the midway point of this 1,300-mile route between St. Joseph and Salt Lake City.

Milwaukee Interclub Reliability Award Reversed

MILWAUKEE, WIS., June 27—A review of proceedings under a protest made by the contest board of the Milwaukee Athletic club has resulted in the award of the Wisconsin Motorist trophy to the Athletic club instead of to the Milwaukee Automobile Club as winner of the second annual interclub reliability to Fort Atkinson, Wis., and return on Saturday, June 20. The motor club won the plaque in the first tour in 1913 and on the face of the returns of last Saturday's run was again named winner, but evidence was dug up by the losers that several observers were negligent and the judges made a new canvass of scores, with the result that the motor club lost by a score of 44 to 2. The original score gave the motor club a victory by a score of 50 to 34.

The Athletic club was penalized originally a total of 50 points by reason of the killing of a duck by No. 14, Cadillac, Robert E. Hackett. Evidence was adduced that a motor club contestant had injured a chicken, but neither driver nor observer were aware of the fact and it was not reported. An athletic club car just behind the offender noted the violation of the rule. This canceled the 50 points against the Athletic club.

First American Cyclecar Reliability Run

NEWARK, N. J., June 26—The Cyclecar Club of New Jersey will hold the first Cyclecar Reliability Tour in America on September 2, 7, and 8, when a 300-mile tour from Newark to Atlantic City via Philadelphia, will be made. A schedule of 20 miles an hour will be enforced with ample checking stations and noon and night controls. Every car will carry an official observer and a close tally on tires and gasoline consumption in each class will be given. Twelve silver cups will be given as prizes to the perfect score cars.

SYRACUSE, N. Y., June 27—M. Burton Coe won the silver trophy in the annual run of the Automobile Club of Syracuse, June 24. The secret time decided upon for the run to Mexico Point was 2 hours and 19 minutes, and Mr. Coe's time was within 1 minute and 2 seconds of being correct. Edward W. Sparkes was the successful contestant for the Watson cup, the four winners of this trophy for the past 4 years fighting it out for permanent possession of the trophy. Sixty-seven cars took part.

Huge oil-sprinkler mounted on motor truck for Sioux City track

Poor Space for U. S. at Paris Show

Under New Rules Only Members of I. U. A. M. Get French Privileges—U. S. Not Asked to Join

PARIS, June 20—American automobile manufacturers are given the alternative of either keeping out of the Paris Salon or accepting third-rate stands under the gallery. Under the new regulations only nations belonging to the International Union of Automobile Mfrs. are allowed to have the same positions as French firms, and on condition that the firm has exhibited in three previous Paris shows. Practically every European country is represented on the International Union of Automobile Manufacturers; thus European firms draw lots for positions at the same time as the French if they have exhibited three times previously, or just after the French if they have not been in the show this number of times. This enables all Europeans to get front row stands in the Grand Palais. America has never been represented on the International Union and is therefore barred from all the better stands.

R. N. Goode, general manager of the Paris branch of the Packard Motor Car Co., declares that rather than accept an inferior stand he will keep out of the Paris show. Last year the Packard company had a big stand in the center of the hall.

F. O. Bezner, vice-president of the Hudson Motor Car Co., sees no hardship in the new arrangement. "Last year we had No. 1 stand," Mr. Bezner stated to THE AUTOMOBILE representative, "which was really better than we could ever have hoped to obtain. This year all the American firms will be grouped. In my opinion this is a decided advantage, for it will help to draw attention to American cars. We have always been well treated by the Paris committee, and I am personally very well satisfied with the arrangement to group us in a second or third rate zone. Every firm in the show gets a big amount of publicity, and if we spend the difference between the cheap and the dear stand in newspaper advertising, we shall get just as much out of the show as the man who has No. 1 stand on No. 1 row."

It is now officially announced that the show will open on October 16 and close on October 26. President Poincare recently received Louis Renault, as head of the show committee, and assured him that he would officially inaugurate the show on the morning of October 16. In addition to passenger cars, the Paris show provides classes for commercial vehicles, motorcycles, cycles, steel and foundry industries, and automobile publications. The Grand Palais will be made use of as on previous years, with a special building for commercial vehicles, if necessary. Applications for space in the exhibition hall are received until July 10. This year's show is under the control of a joint committee representing the various French trade associations, and is conducted on a profit sharing basis. Foreign firms are allowed to share in the profits, but can only secure the highest percentage by obtaining membership in one of the French associations.

C. of C. Willing To Take Space

NEW YORK CITY, July 1—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, when informed of this latest ruling on the Paris show stated:

"Our makers and our organization will gladly take any necessary steps to become members of the N. U. A. M. and will go further and agree on space for all our members, the same as we do at New York shows for all importers. We have not been approached to join the International Union."

105 M. P. H. in Grand Prix Trials

PARIS, June 20—Official trials over the French Grand Prix course were carried out four mornings this week from 3 to 5 o'clock. The course is now closed to all racing cars and will not be opened until the day of the race, July 4. It is evident from the results obtained in the trials that the 1914 French Grand Prix will be the most keenly contested automobile race ever held in Europe. There are forty-one cars of fourteen different makes, representing France, England, Germany, Italy, Belgium and Switzerland. Elaborate precautions are being taken to prevent racing secrets leaking out. The Mercedes cars are housed in a completely enclosed stone garage, with an 8-foot brick wall around it. One guardian sleeps inside and another outside the garage, while as a final precaution a heavy chain is padlocked round the bonnet when the cars are not in service.

In the trials the Delage men made laps in 23 to 24 minutes. The course measures 23.3 miles and is of a very varied nature—winding, hilly, and fast and straight. The Peugeots showed about the same speed. Mercedes did faster work, Lautenschlager going round the course in 20 minutes, and Salzer doing a lap in 19 minutes. Fiat averaged about 24 minutes and Opel was only slightly slower. Jean Chassagne did not attempt any fast work with his English Sunbeam. The drivers of the two Piccard-Pictet cars, fitted with single sleeve motor, were more interested in doing consumption tests and learning the intricacies of the course than in attaining the highest speed. On certain portions of the course a speed of 105 miles an hour was attained by Delage, Mercedes and Peugeot. Owing to the difficulties of other portions of the course, the average speed is not likely to be much above 70 miles an hour. Total distance for the race is 467.6 miles, and cars are restricted to a cylinder area of 274.6 cubic inches.

Saxon Transcontinental Car Reaches Ely, Nev.

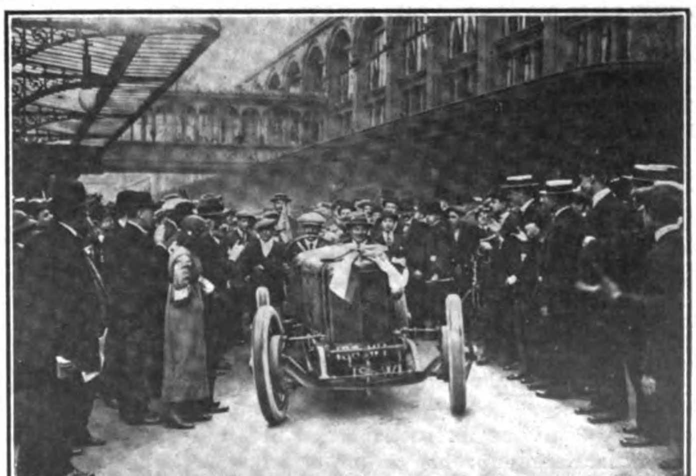
NEW YORK CITY, July 1—The Saxon car, traveling from this city to San Francisco, Cal., reached Ely, Nev., yesterday, after a 156-mile run. The car averaged around 30 miles to the gallon and is adhering to its schedule.

Detroit Electric Breaks Phila.-Boston Record

PHILADELPHIA, June 29—R. L. Heberling, of the Philadelphia Storage Battery Co., conducted an electric trip from Boston to Philadelphia last week during which a new record was made. A Detroit Electric was used. The time between Boston and Philadelphia was 33 hours 50 minutes elapsed time, and only 14 hours 37 minutes actual time, making an average of 25.4 miles an hour.

Master Carbureter Corp. Organized

DETROIT, MICH., June 27—The Master Carbureter Corp. has been organized in Detroit with a capital stock of $250,000 under the laws of Delaware with offices at 944 Woodward avenue. W. E. Burk, president of the Master Carburetor Co., Los Angeles, will reside in Detroit as vice-president and general manager of the new corporation, while W. W. Jenkins, formerly general manager of the Pacific Coast company, will act as general sales manager. The Detroit corporation is entirely independent from the Los Angeles company and has manufacturing facilties for 250 carbureters per day.



Paris fêting Thomas, Indianapolis winner, in Grand Prix Delage

Claims That Makers' Instruction Books Mislead Car Owners

The Automobile Engineers' Forum

Thinks Statements of Care Required for Car Are Exaggerated, Appall the Owner and Result in Neglect in Lubricating the Various Parts

NEW YORK CITY—Editor THE AUTOMOBILE:—In giving directions to owners for the care and especially the lubrication of their cars, manufacturers have almost universally made the mistake of exaggerating the importance of lubricating certain parts and of stating that these parts should be lubricated oftener than is actually necessary.

The purpose of exaggerating, it seems, is to make sure that the owner will not neglect his car, but the directions laid down in the ordinary instruction book are so preposterous that, instead of scaring the owner into lubricating and cleaning his car every few days, he is liable to do just the opposite. By overstating, the manufacturers evidently plan that, at best, a man will not follow the instructions exactly. If the book says the wheel bearings should be lubricated every 800 miles, then he will do it about every 1,500 and if it states that the oil in the motor should be changed every week it will not be done more than once in 2 weeks, or if it says the body should be washed without the use of hot water, soap and a hose the owner will compromise by using cold water and rather weak soap.

Makers' Requirements Too Exacting

But the manufacturers' requirements are so exacting and so different from ordinary practice throughout the country that when the owner receives his machine, instead of trying to follow the instructions given, he gives it up as a hopeless task. The owner realizes if these instructions were taken literally that life would become a burden—not at all what this same maker's catalogue pictured it to be, and the advice of the agent that sold him the car and the advice of his friends all contradict the teachings of the instruction book. Thus the car owner decides that the book is not to be relied upon since his friends' cars are running all right and they do not do all the things required by the makers.

Recently I have had the pleasure of examining several of these books and I found, on the average, that it was necessary to lubricate wheel bearings every 500 to 800 miles, that it was necessary to put grease in the steering gear housing every 300 miles, that the sediment chamber on the carbureter must be drained every 200 miles, that the rims should be graphited to keep them from sticking every 1,000 miles, that after every run the cuts in the tires should be filled, that the various grease cups around the car should be turned every 100 miles and so on.

Owner Ignores Instructions

If the owner followed all these instructions out to the letter he would be crazy in about one week. Instead, he forgets about the instructions and uses his own poor judgment in caring for his car or else he takes the advice of some friend that knows no more about it than he does. The result is that the car is neglected.

It would seem much better, in the light of practical experience, for the makers to be honest about these matters, to state just exactly when the pump shaft grease cups should be refilled and exactly when new oil should be put in the motor, etc. If this policy were adopted the owner would only be too glad to follow the instructions given, he would have confidence in the advice given and his car, instead of being neglected would get the attention it should receive.—M. T. S.

Suggests Making Place for License Plate a Part of Design

BROOKLYN, N. Y.—Editor THE AUTOMOBILE:—Standardization of number plates is a matter that has not received the attention that it should, up to the present time.

There is much to be said in favor of the standardized number plate. In the first place, it would be easier to install or to change the plates when passing into another state. Since the plates would all be the same size, better arrangements could be made for fastening the plates more securely, and at the same time the fastening could be so designed that they could be more easily detached.

A further step would be to make special provision in the design of the car body for the incorporation of the number plates and this would add to the appearance of the car. For instance, a place could be made in the rear panel, for the rear plate and the front plate could be placed at the base of the radiator in a frame that would almost make the plate part of the radiator.

In standardizing, provision should be made for two sizes of plates, one for large cars and the other for cyclecars, as the large plates now used on cyclecars look grotesque. In many cases the front plate is wider than the entire hood.—F. P. W.

Recommends Dimming or Extinguishing of Left Headlight

PHILADELPHIA, PA.—Editor THE AUTOMOBILE:—It would seem to me that the solution of the headlight glare problem lies in passing laws requiring that motorists turn out, or dim, the left headlight when approaching another car. Since the majority of cars are now steered from the left, it is the rays from the left lamp of the oncoming car that blind the operator and by turning this light out this trouble would be overcome.

The position of the headlight rays of two approaching cars, with all headlights burning, and with the left ones turned out, is shown in Fig. 1. Here it will be noted that with the left headlight lit the drivers do not pass out of the influence of the lights until they are almost past, and then it is too late to avoid an accident. However, when the left headlight is turned off the driver passes out of the focus of this light 50 to 75 feet before away from the other car.

This method is superior to using a headlight dimmer because the latter reduces the brilliancy of illumination to such an extent, and so suddenly, that for the moment it is harder to see than before, the eyes being accustomed to the brilliant light, the pupils can not distend quickly enough to enable clear vision when the lights are suddenly dimmed on the approach of another machine.

The question of glaring headlights has become especially acute since left drive has become common, as with right drive the operator passed out of the influence of the left headlight long before the cars passed each other, and therefore some such scheme as I have suggested should be adopted to overcome this evil.—J. T. L.

DETROIT, MICH.—Editor THE AUTOMOBILE:—A means of controlling the cooling of the water in the radiator would be a great advantage.

This is plainly illustrated by the fact that nearly every one resorts to a piece of newspaper or cardboard to be placed over a part of the front of the radiator in extremely cold weather. It also illustrates that a control would not be abused, inasmuch as the practice of closing off the radiator with a piece of paper has not resulted in any complications or difficulties. It would seem that some means of varying the exposed cooling surface, which could be controlled from the seat, would be very desirable and certainly would assist running of the cars in cold weather. In fact, we have foreseen this to the extent of taking out a patent on such a construction some 2 years ago.—GEORGE W. DUNHAM, Vice-president and Consulting Engineer, Chalmers Motor Co.

Finds Reliners Best for Medium-Priced and Undersized Casings

ERIE, PA.—Editor THE AUTOMOBILE:—Our reliners fit all sizes of casing from 28 by 2.5 up to and including 37 by 5 inches. We are using a special fabric in the manufacture of these reliners, which we have adopted especially for this purpose.

We recommend using reliners in casings where the fabric has been injured, also in medium-priced or undersized casings; if tires are oversized, we do not recommend putting in reliners. If used in medium-priced and undersized casings, they will enable the owner of the car to use his casing much longer and will give a large amount of extra mileage.

It is our opinion that the use of reliners saves the car owner a great deal of tire expense, for, as stated above, it prolongs the life of his casing and gives extra service and mileage, at a very small additional expense. We are of the opinion that the sale of reliners is going to show a big increase the coming year over previous years and we strongly recommend them to car owners for practical use.—CONTINENTAL RUBBER WORKS.

Increased Mileage Secured from Old Tires by Inner Liners

BATAVIA, N. Y.—Editor THE AUTOMOBILE:—We make interliners to correspond with the inside of the casing with which it is intended to be used. The material used is friction fabric vulcanized by gum.

We advise the use of liners in old casings only as the applying of liners in new casings is detrimental, both to the casing and to the inner tube. We would not advise the owner of a new tire to use interliners, from the fact that there is sufficient fabric in a first-quality tire to take care of the air pressure necessary to have the tire properly inflated, and an interliner is not at all necessary.

An increased mileage, in our judgment, can be secured from a tire that is badly worn and fabric broken by using interliner, giving quite a considerable additional mileage under those circumstances, well worth the expense of the equipment.

The demand for interliners is mostly on small tires, owing to the fact that the larger tires are used on a more expensive class of cars where the owners will not bother with interliners.—A. W. CANEY, President Batavia Rubber Co.

Thinks Inner Liners Decrease Mileage of New Tires

MILWAUKEE, WIS.—Editor THE AUTOMOBILE:—We are manufacturing reliners for practically all sizes of automobile casings from 28 by 3 to 38 by 5 inches. Reliners for each of the different sizes are built so as to permit a short lapping of the ends when the reliner is inserted in the casing and the width is sufficient to bring the edges of the reliner below the rim contact point and above the toe of the casing.

We are using only high grade fabrics of a consistent tensile strength which is sufficient to prevent the tube from blowing through the reliner even though the casing may be worn or torn so that the reliner itself is exposed.

We do not recommend the use of reliners in new tires. The use of reliners is advisable only to prolong the life of worn casings and is a sort of reinforcement in the case of worn and broken fabric where the motorist does not feel that he has had sufficient mileage from his tire to warrant the expenditure of the price of new tires. Used in new tires the friction necessarily resulting is only harmful to the carcass of the tire and a decreased mileage is bound to result. No matter how carefully reliners may be applied or how skilfully they may be cemented to the inside of new casings the union between the reliner and the fabric of the casing is such that heat is bound to generate and damage result. While it is difficult to determine just what effect the use of reliners has on new casings, we believe that the experience of all tire manufacturers is the same and that if the tire manufacturer felt that the additional plies of fabric in the casing were beneficial to the general result he would adopt a tire built with extra plies of fabric to take the place of the reliner in all casings.

We make no claims for increased mileage in the use of our reliners. The condition of the casing at the time the reliner is applied will have much to do with the mileage resulting from the use of reliners. As a matter of fact, any attempt to make definite claims regarding mileage resulting from the use of reliners is out of the question and statements regarding mileage results obtained are usually visionary rather than real.—FEDERAL RUBBER MFG. Co.

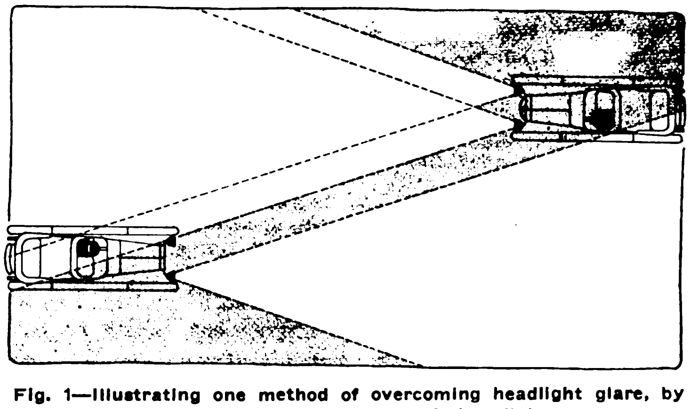


Fig. 1—Illustrating one method of overcoming headlight glare, by dimming or extinguishing left headlight

The Rostrum

Believes in Small Bore, Long Stroke Two-Cycle Motor

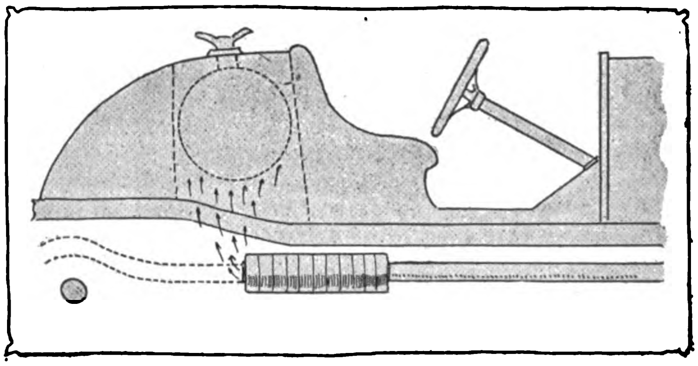


Fig. 1—How broken tail pipe caused fuel to boil and motor to miss

EDITOR THE AUTOMOBILE:—I note with interest that a number of your readers are favoring the two-cycle motor for automobiles, and I wish also to add a few words in favor of the discarded two-cycle motor.

I have a four-cylinder, two-cycle Elmore engine with cylinder compression and rotary valves.

A few days ago I made a trip of 113.5 miles, and before starting on this trip I measured my gasoline, and after arriving home found that the gasoline consumption was 8.67 gallons, or 13.09 miles per gallon.

My car weighs 2,400 lbs. and most of the mileage was between Greensboro and Lexington and from Lexington to High Point, and no doubt many of your readers have been over the National Highway from Greensboro to Atlanta, and if so will agree that the roads around Lexington are about as hilly and trying as any between Greensboro and Atlanta.

The writer is no engineer, but it seems that if an engine of this type were properly developed, a smaller bore and longer stroke used, that better results would be obtained. This type of Elmore engine has a bore of 4 inches and stroke of 3 1-2 inches, and if the bore were 3 3-4 inches and the stroke 4 1-2 inches with the cylinders offset slightly, the proper amount of compression in the lower half of the cylinder determined, an engine would be produced that would have ample power for a 2,400 to 2,600-pound car, and the gasoline economy would be better on account of the greater expansion of the gases.

Another improvement would be to increase the compression somewhat and have the gear ratio of 3.69 to 1 increased to 4 to 1, or possibly a little greater.

You will understand that this type of engine is not suitable for a racing car, but for all around work ideal results could be obtained, as a four cylinder two cycle engine is as flexible as a light six, will run with less vibration and avoid all valve troubles. I hope that some American manufacturer will develop the two-cycle engine as the French manufacturers appear to be doing, as there are possibilities in the two-cycle engine which have never been touched.

We all know what the Diesel engine is doing in stationary engine work, beating all types of engines for economy and thermal efficiency.

Another matter that would need developing with the two cycle engine, would be efficient carbureters. Practically no carbureters on the market today are entirely suited to two-cycle engines when used in automobile work, as the gasoline supply of the two-cycle engine should be decreased slightly as the engine speed increases, on account of the fact that when the engine is running partly throttled a smaller charge is admitted to the cylinders and more burnt gases are trapped than when running with a wider opening of the throttle.

I believe that there is one, possibly two French carbureters made to work on this principle, the wider the throttle is opened the smaller opening the needle valve has, but I do not know of a single American-made carbureter that works on this principle. The Schebler Model D is made with one jet and auxiliary air supply controlled with a coiled spring, and the Planhard has a ball controlled air supply with one jet, and very good results can be obtained with either carbureter, but until there is a larger demand for a carbureter that will give the two-cycle engine more flexibility than is usual in marine work, no particular attention will be given to the development of the perfect carbureter for two-cycle engine work, and ideal results will not be obtained.

Randleman, N. C. R. P. DEAL.

Wiring Lights to Ford Magneto

Editor THE AUTOMOBILE:—1—Will you please publish a diagram showing how to install a low-priced electric lighting outfit operated by the magneto on a Ford 1913 touring car? Where are the wires to be connected for installation?

2—Where can this outfit be purchased?

Allendale, N. J. W. C. TALMAN.

—1—In using the magneto for lighting purposes it is only necessary to run wires from the terminal on the top of the motor to the lamps, the return connection from the lamps being grounded. If the lamps are to be arranged in series, 6-volt lamps should be used and they should be wired up as shown at the top in Fig. 2, while if the parallel arrangement is used the wiring should be as shown at the bottom and 12-volt lamps will be required.

The complete outfit for such an installation can be purchased at almost any supply store for a few dollars together with the necessary switch, bulbs, wire, and reflectors for insertion. The reflectors are arranged to be inserted in the acetylene headlights. Detailed instructions should be obtained from the concern that manufactures or sells the system that you select.

2—If your accessory dealer cannot supply you you can obtain one from the American Auto Supply Co., Chicago, Ill., whose outfit, with kick switch, sells for $3.95; Emil Grossman, New York City, makes an outfit that is listed at $3.45 with 8-inch reflectors; the Fitzgerald Mfg. Co., Torrington, Conn., manufactures an outfit that consists of two brass reflectors, silver plated, a detachable handle switch, Ediswan sockets, oil-proof, cable-cut to the correct lengths; the Excelsior General Supplies Co., Chicago, whose outfit is listed at $7.50, as is that of the R. C. Hull Electric Co., Cleveland, O., and the Auto Parts Co., Providence, R. I., which lists a similar outfit at $3.50; the Motor Car Equipment Co., New York, at $8.50, and the K-W Electric Co., Cleveland, O., at $15, including complete lamps.

Lighting outfits are made in three types by the Vesta Accumulator Co., Chicago. These range in price from $3.80 to $13.50. The two cheaper ones include reflectors for the gas headlights together with the necessary bulbs, wire, switch, etc., ready to install. The $13.50 outfit has a pair of acorn type electric headlights equipped with bayonet lock connectors.

A new Ford lighting outfit involving a patented reflector is marketed by the A. H. Kling Co., Detroit, Mich. These reflectors are silver-plated brass instead of steel, but the special feature is that the back of the reflector is removable so that it is unnecesary to remove the entire reflector in replacing burned-out bulbs. Ease of installation is assured by a complete wiring harness. The outfit, including a flush switch, costs $5, with $1 extra for an Ediswan base tungsten bulb. The Gibson Automobile Co., Indianapolis, Ind., supplies a magneto lighting system with special headlights at $14 and outfits without headlights, but with the parabolic reflectors, from $10 to $17. Some of these comprise the Gibson regulating switch, a $5 instrument.

A complete outfit designed to be installed at small cost is made by E. A. Hammer Co., Cleveland, O. Two types of magneto lighting systems are made by the Auto Parts Co., Chicago. One system is listed at $4.30, the usual outfit of bulbs, wiring and reflectors are supplied, while in the other one listing at $14.40 special bullet type headlights are supplied.

To Keep the Headlight Bulbs from Burning Out

There is one difficulty that is met with in using the magneto as a source of current for the headlights, and that is that the magneto, being designed for ignition only has the property of generating higher voltage as the speed increases so that above 30 or 35 miles per hour the lamps often burn out. It is true also that at low speeds the magneto does not generate sufficient current to make the lamps brilliant. To get around this difficulty there have been one or two regulating devices put on the market which are intended to prevent the excess of current going to the lamps at high speed.

These devices not only prevent the burning out of the lamps, but also permit bulbs of slightly lower voltage to be used so that a good driving light may be had at lower speeds than is possible without them. One of these is the Dean regulite, which inserts a resistance to the current as soon as, and only when, the engine speed and the consequent voltage becomes too high for the lamps. The regulite provides three steps or degrees of action, thereby adapting it to generators of varying capacity. It is made by the Dean Auto Devices Co., Chicago, and is marketed by the Fulton-McCutchan Co., Chicago. An auxiliary which can be obtained in connection with the regulite switch is the Dean speedolite, which is a dash lamp that illuminates the speedometer and acts as a warning should anything go wrong with the regular lighting system. It is supplied at an additional cost of $1.50.

Regulite Has Choke Coil

A similar regulator is the Lite-Controller. The device embodies a choke coil, which generates sufficient back pressure to prevent the light from burning out. Three steps are provided. It is sold at $3 and is manufactured by the American Battery Co., Chicago. Another regulator of this type is made by D. W. McVean, Noblesville, Ind. This, it is claimed, gives a good light at 5 miles per hour, and may be installed by anyone in 30 minutes and sells for $1.50. To reduce the brilliancy of the light for city driving, the Post & Lester Co., Hartford, Conn., is making a controller known as the Dim-Down. It is operated by the driver's foot and lists at $3. A small instrument designed to dim or brighten the headlights is announced by the Suburban Lighting & Gas Engine Co., Toledo, O., under the name of Dimit. The device itself may be placed on the dash and is controlled by hand. The face of the instrument is fitted with a switch and various notches so that the headlights may be operated at full voltage or at intermediate pressure. It is especially applicable to Ford cars and sells for $2.50.

Ford magnetos generate alternating current and for this reason storage batteries cannot be used in connection with them unless some means for changing alternating into direct current is employed. A rectifier for this purpose is manufactured by the American Battery Co., Chicago.

Boiling Gasoline Makes Motor Miss

Editor THE AUTOMOBILE:—A missing motor that was caused by the boiling of the gasoline was a trouble that I had recently and yet if I had not experienced this trouble myself I would not have believed it possible. Since then I have found one other case like it and although this trouble will not visit very many owners it is so difficult to locate when it does occur that a description of my experience should prove of value to some of the readers of THE AUTOMOBILE.

The trouble was all due to the breaking of the muffler tail pipe which allowed the gas to pass directly around the fuel tank. This is clearly illustrated in Fig. 1. The rear of the car is equipped with a turtle deck and the gasoline tank is located right back of the seats and in front of a compartment for tools. The bottom of the space the tank is in, is open, and the top is not air-tight although it is covered over. There is no filler cap on the tank but there is a cover in the top of the turtle deck right close to the opening in the tank. The result was that when the tailpipe was broken off by a blow from the axle, when going over a very severe bump, the gas issuing from the muffler passed around the tank and up through the filler opening and out. Hence after running a few miles, especially on a hot day, the gasoline would boil.

When the tail pipe broke, I left it off for the reason that it did not seem to be of any use and it certainly did not make any difference in the amount of noise the motor made. After that, however, the car would develop symptoms of overheating after running a few miles. The motor would miss, the car would run hard, would not develop its full power and would therefore not climb the hills as it should. It would not run at all below 15 miles per hour on high gear.

Everything seemed to be all right. I noted, however, on stopping for lunch one day that the car ran much better after this rest.

Later, after running the car a few miles in the hot sun, I found it almost impossible to proceed. I stopped the car in a hopeless effort to find out what the matter was. With the noise of the car and engine hushed, I heard a bubbling sound coming from in back of the seats. I turned around wondering what the trouble was, pulled off the filler cap and found that the gasoline was boiling briskly.

A little thought showed what was causing the trouble and I got a large piece of sheet iron and tacked it on the under side of the body in such a way as to deflect the gases to the

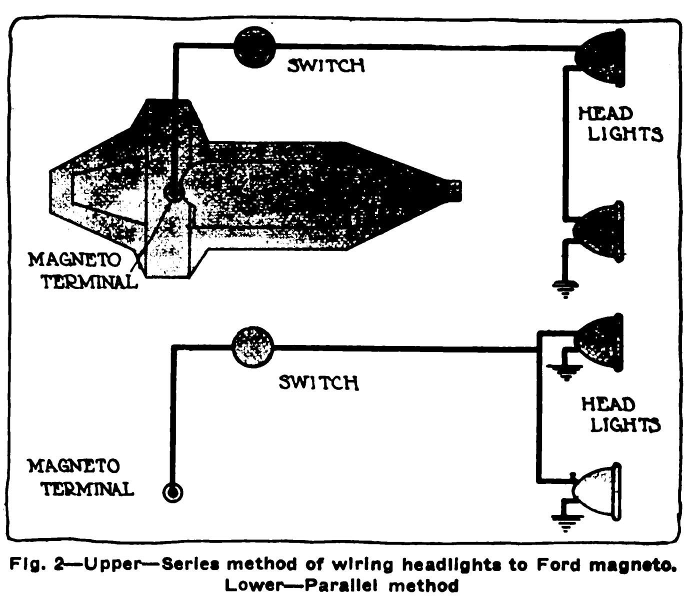


Fig. 2—Upper—Series method of wiring headlights to Ford magneto. Lower—Parallel method

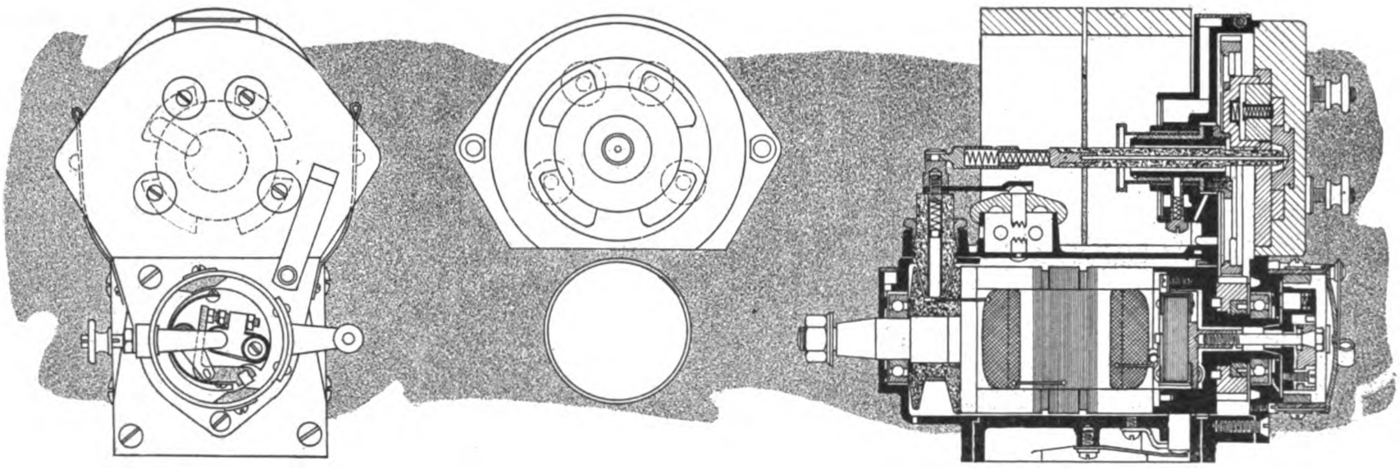


Fig. 3—Front and read, and longitudinal section of magneto showing construction of mechanism

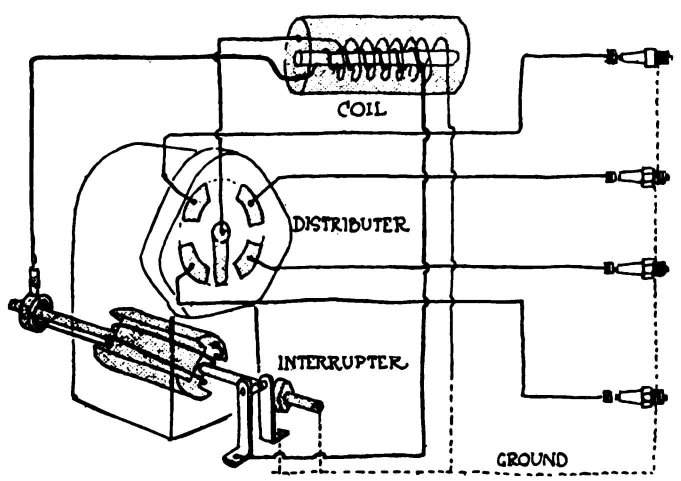


Fig. 4—Diagram showing working of low-tension magneto

rear, and I was troubled no more, the engine running perfectly.

Since then I met another owner that had the same trouble due to the gasoline pipe being close to the exhaust pipe for several inches. As soon as the fuel reached this hot place it would turn into vapor and the motor would miss and sometimes stop.

New York City. R. F. C.

Details of Magneto Construction

Editor THE AUTOMOBILE:—1—Please name each part of the magneto ignition system, and show the construction of each part.

2—What changes take place in the magneto and engine, when the spark is advanced and when it is retarded?

Beaver Falls, Pa. E. S.

—1—Before attempting to name the functions of the different parts of a magneto ignition system, it will be necessary to explain the principle on which the magneto operates.

A magneto is a device that furnishes a spark at the points of the spark plug when the piston is somewhere in the neighborhood of top dead center, between the compression and power strokes, the spark being generated by the rotation of a member called the armature. The spark produced in the armature is of low voltage and must have its voltage raised to enable it to jump the gap of the spark plug. This is accomplished in a coil which may be located right on the armature, or separately from the magneto. In the former case the magneto is known as a high-tension magneto and in the latter a low-tension magneto.

The spark generated in the armature is correctly timed by a device in circuit with the armature circuit which is known as a breaker and which is nothing more than a switch that is operated by a cam on the armature shaft.

The high-tension current as it leaves the coil is switched to the proper cylinder by a distributer.

The two types of magnetos, low and high-tension, are illustrated in Figs. 4 and 5. Turning first to the low-tension type, the current is generated by the rotation of the armature between the horseshoe magnets. The armature consists of a piece of soft iron, shaped somewhat as shown, with a few turns of copper wire around it, as indicated. Since the armature is between the ends of a magnet, it is thoroughly saturated with magnetism. Now when the armature is rotated, the turns of copper wire in the coil cut through this magnetism with the result that an electric current is set up in the windings. The iron of the armature is merely for the purpose of concentrating the magnetism so that the strength of the magnetic field through which the coil rotates is at a maximum. The denser the field the greater the voltage produced in the coil.

When the current is generated it passes through the collector ring and brush at the rear of the armature, up to the coil, where it runs through the low-tension or low-voltage winding of the coil. From thence it passes down through the breaker or interrupter back to the armature again. Ordinarily the interrupter is closed, but when the piston nears the top of the compression stroke and it becomes time for a spark to occur to ignite the charge, the interrupter cam on the armature shaft separates the points of the interrupter or breaker, thus breaking the circuit and interrupting the flow of current. This sudden interruption of the current flow produces a current of very high voltage in the secondary or high-tension winding of the coil, the latter winding being directly outside of the primary. This high-voltage current flows to the spark plug and jumps the gap and thus a spark is produced.

The high-voltage current, produced in the secondary, is diverted to the proper cylinder by a device called a distributer, as previously stated. This consists of a rotating brush that is connected to one end of the high-tension coil. This brush makes contact, one at a time, with four metal segments, 90 degrees apart, each of these segments being connected to a spark plug by means of a high-tension wire.

When the current jumps across the gap of the spark plug it passes through the engine and frame back to the coil, in other words, the return circuit is grounded.

A spark is produced for every half revolution of the armature, therefore in a four-cylinder motor the armature should be run at crankshaft speed, since a spark is required four times in two revolutions or once every half revolution.

The distributer on the other hand should be driven at half crankshaft or camshaft speed for the reason that the brush makes contact with four segments every revolution, therefore if it makes one revolution for every two of the motor, it will distribute the four sparks that are required every two revolutions of the motor.

The distributer shaft must not only run at half the speed of the armature shaft, but the two must also be connected up so that when the breaker points on the distributer separate and the current is thus induced in the secondary winding of the coil, the brush will be on the proper distributer segment.

The high-tension magneto is similar to the low-tension one with the exception already noted, that the coil is located on the armature. In this case, the low-tension winding of the coil takes the place of the armature winding and it is in this that the current is generated. The circuit is broken by the breaker just the same as in the low-tension type and then the high-voltage current is produced in the high-tension winding of the coil, this coil being outside the primary coil and on the armature.

From the high-tension winding of the coil, the current is directed to the distributer through the brush and collector ring and from thence it is distributed the same as in the low-tension system.

Now that a general idea of the principles of a magneto has been obtained the construction of a well-known high-tension magneto will be described. There are so many parts to a magneto, however, that it is impossible to name all the different members but merely the principal ones. For the same reason, it is impossible to illustrate more than the one magneto.

Figs. 3 and 6 show the construction of a high-tension magneto. Fig. 3 shows a front view and a longitudinal section and in Fig. 6 cross sections at various points from front to back are shown. The first view shows the complete magneto as seen from the driving end, and then follows sections four sections and then a rear view with and without the distributer cap.

The principal parts are named and if the principles of operation of the high-tension magneto are understood, there should be no difficulty in comprehending the functions of the different parts on this magneto.

The current is generated in the armature low-tension winding from whence it is carried to the breaker. At the proper moment, the points of the breaker are separated and the circuit is broken, the parting of the points being accomplished by means of one of the cams depressing the bell crank arm of the breaker.

When the high-tension current comes from the armature it is picked up by the carbon brush which is in contact with the slip ring on the armature shaft. From thence the current passes to the distributer brush through the long current conductor and then it is passed to the spark plugs.

Above the armature, there is a safety spark gap so that in case one of the wires leading to a spark plug is disconnected while the motor is in operation, the spark will jump across these points and thus no injury to the armature will occur. Without a gap the insulation would break down.

2—When the position of the spark lever is changed, the time at which the spark occurs in the cylinder is also changed. For example, if the lever is retarded all the way, then the explosion will probably occur a little after the piston passes top dead center or after it has started on the explosion stroke. Some time after the spark occurs, the charge is burned and maximum pressure is developed. Thus, the further the spark is retarded the later, on the explosion stroke, is maximum pressure generated, and combustion completed, with the result that the full expansive force of the gas cannot be utilized, and furthermore, when combustion is occurring, more of the cylinder space is exposed by the piston because the piston has partly completed the out-stroke and this causes overheating.

Now if the spark lever is advanced, the spark will occur before the piston reaches dead center, and if the lever is advanced all the way the spark may occur so far ahead of dead center that maximum pressure will be generated before the piston reaches the top of the stroke with the result that the pressure of the explosion will actually be working against the upward movement of the piston. This causes a loss of power and a knock.

Of course, these remarks only apply providing the magneto is correctly timed.

The ideal condition is to have the spark lever in such a position that the full force of the explosion will take place just after the piston reaches top dead center. In this way the full expansive force of the gas can be utilized and there is no knocking, which might be caused by an early spark nor any overheating, which might be due by a late spark.

The time at which the spark takes place may be changed in three ways, by rotating the breaker box housing so that the position of the cam with reference to the breaker arm is changed, see Fig. 3, by means of a helically cut sleeve inserted in the armature shaft and in this manner changing the position of the whole armature with reference to the motor; and by rotating the magneto housing and thus changing the relative position of the cam and breaker mechanism.

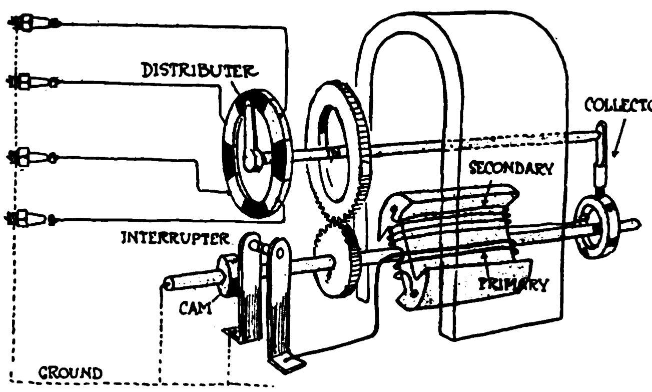


Fig. 5—Diagram showing operation of high-tension magneto

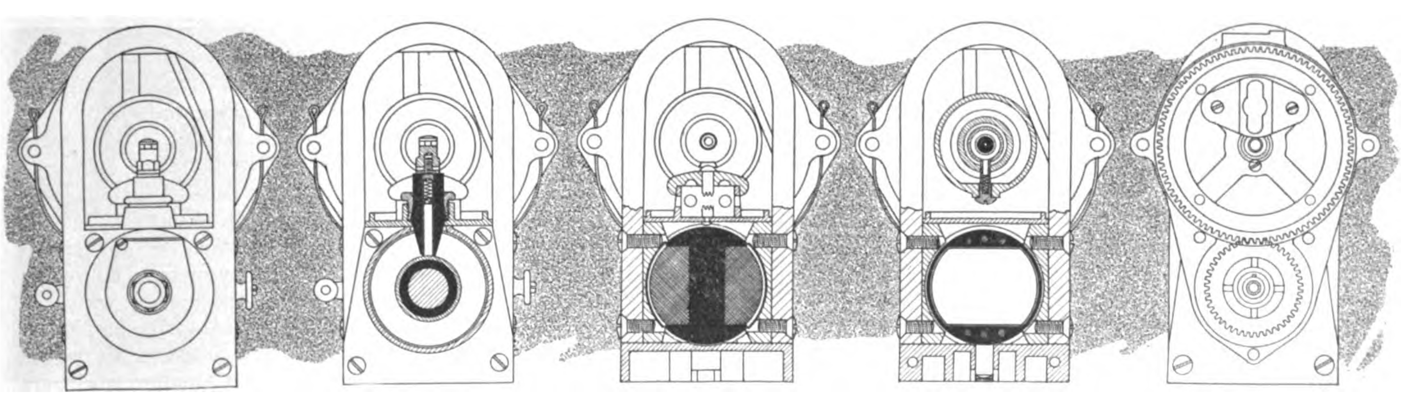
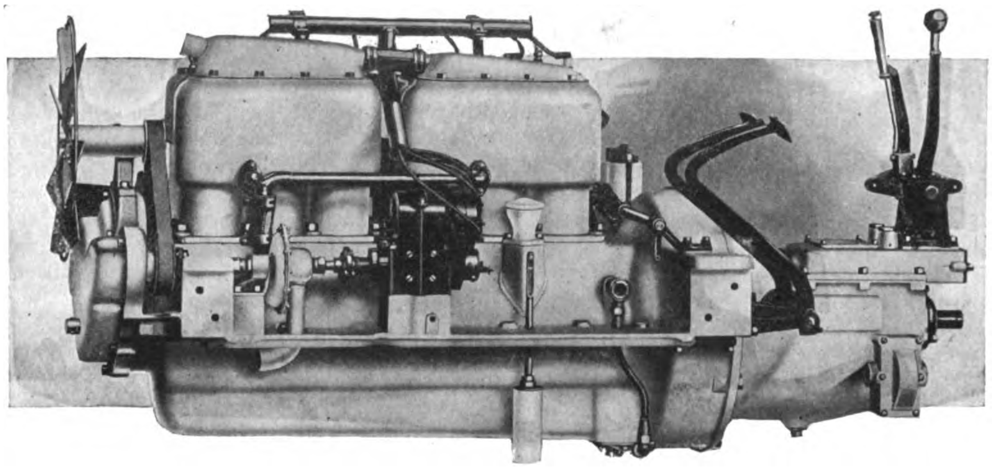


Fig. 6—Sectional views through magneto showing the construction at various points

Chandler 2,885-Pound Six Has 10 Per Cent. Power Increase



Six-cylinder motor cast in threes used on the 1915 Chandler six. A silent chain is used to drive the auxiliary shafts

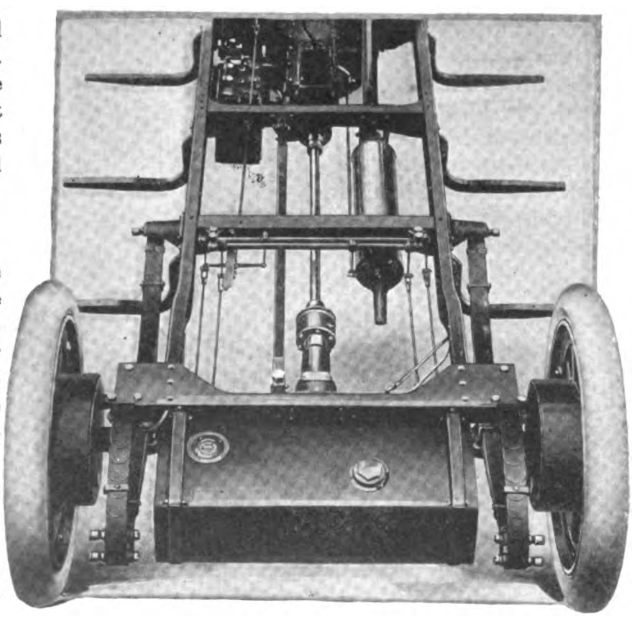
Engineers Have Added to Power Output Without Increasing Bore or Stroke—Silent Chain Camshaft Drive—Two Piston Rings Per Cylinder Instead of Three—Price $200 Lower

WITH the price clipped from $1,785 to $1,595 and with its motor refined to such an extent that 10 per cent. has been added to the power, the 1915 Chandler six has just made its début. The new product of the Chandler Motor Car Co., Cleveland, presents much the same general appearance as did the 1914 model, although several refinements have made it an even better car than its predecessor, despite the fact that its price is considerably less.

The Chandler is a light weight six, tipping the scales at 2,885 pounds fully equipped, and as such meets the growing demand among American buyers for a vehicle which will have a low fuel consumption, which will be easy on tires and which has unlimited flexibility. True, the Chandler is not the only light six in this field, but it is in the front rank. It reflects the policy of a number of well known automobile business men.

10 Per Cent. More Power

In adding 10 per cent. to the power output of the motor, the Chandler engineers have done so without increasing bore or stroke, which remain 3 3-8 by 5 inches, respectively. With these dimensions, the S. A. E. formula accords the engine 27.3 horsepower, but the maker rates it at 35, which is nominal. The motor is built by the Chandler company. In general construction, the power plant remains unchanged, but lighter pistons and a lighter flywheel have been incorporated. The cylinders are of the L-head type and cast in blocks of three. The use of lighter reciprocating parts is a growing tendency, and aids in the securing of better balance and increased speed, both of which factors are conducive to higher power.



Plan view of the 1915 six-cylinder Chandler chassis from the rear showing the new pressed steel torque arm replacing the torsion rod. Note pressure feed fuel tank in rear

The pistons on the new model are fitted with two piston rings each instead of three as formerly. This is a tendency in some of the best designs, and serves to reduce friction to the minimum and at the same time does not allow gas leakage past the pistons if the design is right.

Another change in connection with the engine is the adoption of a Rayfield carbureter. This Rayfield is specially designed for Chandler, and has only two adjustments.

The crankshaft is carried on three main bearings which are of large size and made of white bronze. Their dimensions are: Front, 1 7-8 by 2 1-2 inches; Center, 1 7-8 by 3 inches; and Rear, 1 7-8 by 3 1-2 inches.

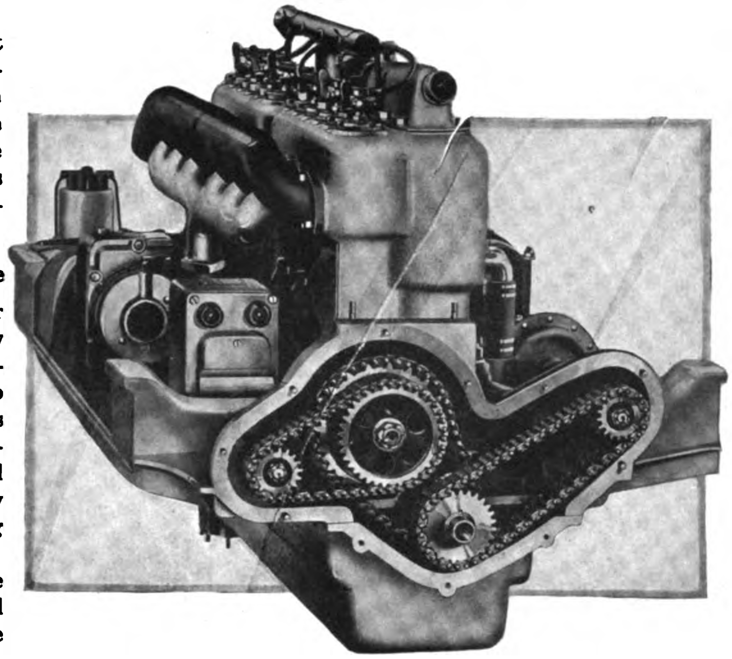
The Chandler company pays much attention to the careful balancing of this crankshaft. The crankpin bearings have the same diameter as the main bearings but are 2 inches long.

The camshaft, which is a drop forging with integral cams, is mounted on three bearings and driven from the front end. It operates the valves in the usual way through tappets. The valves have a 30-degree seat, which is flatter than ordinarily employed. Many makers prefer a 45 degree seat, but the Chandler engineers point out that the angle they employ cuts down the valve lift and the noise without increasing the gas speed. The lift is 9-32 inch. Valves are all interchangeable and are inclosed by cover plates readily removed for inspection or adjustment.

Silent Chain Camshaft Drive

A feature of the Chandler motor is the use of Coventry silent chain drive for camshaft, magneto and pump shaft, and generator. This drive is all completely inclosed at the front end, and its arrangement is clearly shown in the accompanying illustration.

The oiling system of the Chandler motor is a combined force feed and splash type within a constant level maintained under each connecting-rod. A stream of oil is forced by the oil pump to each of the three main bearings, and another lead takes a supply to the chains at the front. All exterior oil piping has been eliminated, and the pump is located in the oil base. An accessible filling tube for putting oil in the reservoir is placed on the left side back of the magneto.



Three-quarter front view of six-cylinder motor used in 1915 Chandler with timing gear case open, showing Coventry silent-chain drive

Bosch Ignition System

The ignition system makes use of a Bosch high-tension magneto in connection with Bosch plugs. The magneto is placed on the left side and back of the water pump. Its bracket is integral with the upper half of the crankcase.

The cooling is improved in that the piping has been changed and the system arranged to give better water circulation. The pump is a centrifugal type, and the radiator a Mayo honeycomb construction.

The electrical system is brought up to the minute. There are separate units for generating the current and for starting. These are of Westinghouse make, and the system used is of the single wire form. Both electric motor and generator are mounted on the right side of the engine, the generator being forward and designed to run at crankshaft speed, which tends to lessen noise and increase the life of the chain driving it.

The starting motor drives through the flywheel and is geared 15 to 1, turning the crankshaft at from 90 to 110 revolutions a minute.

In the headlights there are two sets of bulbs, one set of small size for city driving and the large bulbs for country work. The storage battery is hung alongside the gearbox on the left side and inside the frame rail.

Housed with the flywheel and in unit with the engine is the multiple-disk clutch, which has alternate disks of steel and Raybestos. The clutch mechanism has been improved throughout by the addition of a ball thrust bearing which serves to take the throw-out strain, and reduces friction. The clutch runs in oil.

The gearset, which is also in the motor unit, has three forward speeds and reverse. The gears are nickel steel and the shafts are mounted on F. & S. annular ball bearings. Gearshift and brake levers are mounted directly on the gearcase, thus giving center control.

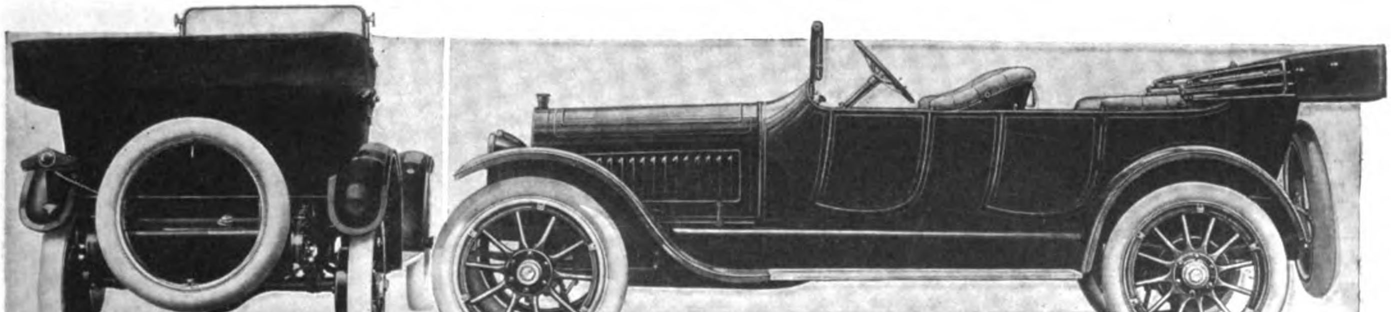
The power goes back to the rear through the medium of an open drive shaft fitted with a universal joint at either end. These are double Hartford universals. A pressed steel torque arm paralleling the driveshaft from the center crossmember back to the axle housing has been adopted. It has a ball and socket buffer construction at the front end, and is hinged at the rear in the usual manner. This type of torque arm replaces the heavier rod construction heretofore used.

The rear axle is a floating type which uses F. & S. annular ball bearings in wheels, shafts and differential. The usual means of reaching the differential unit is employed, whereby a cover plate when taken off exposes the mechanism, which may be removed as a whole without disturbing the rest of the axle after the shafts have been pulled out of engagement. The brakes are of the double internal expanding type, the shoes being faced with a heat-resisting friction material. The drums are 14 inches in diameter.

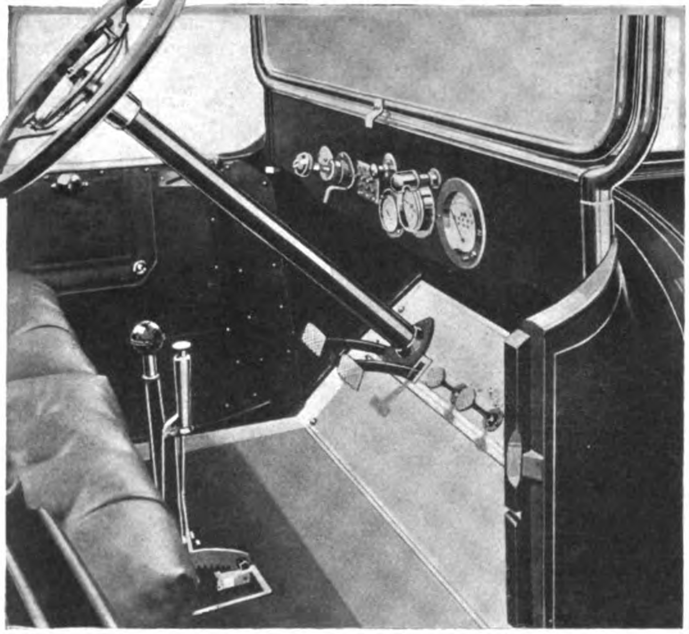
Rear springs, which are mounted outside the frame rails are three-quarter elliptic and mounted over the axle tubes. These, as well as the front half-elliptics, are 2 inches in diameter, and, due to their length, give easy riding.

Pressure Fuel Feed

The gasoline tank is also mounted at the rear and below the chassis level, feed to the carbureter being by pressure from a metal plunger pump on one valve lifter. The tank has a capacity of 20 gallons.



Left—rear view of 1915 six-cylinder Chandler, showing mounting of spare tire on new design tire carrier and also domed fenders. Right—left side of 1915 Chandler six, showing streamline body with clean running board and neatly suspended tire at rear



Control features of 1915 Chandler, showing left drive and center control as well as the arrangement of instruments on the cowl dash

The wheels are of the wood artillery type and carry 34 by 4-inch tires all around. The standard equipment calls for Firestone straight side or clincher, demountable and detachable rims.

The body, which is of streamline design, has undergone little alteration. Clean running boards are obtained through the mounting of the storage battery within the frame and the placing of the spare tire at the rear on brackets which are of a special form designed by the Chandler engineers. The width of the fenders has been increased somewhat, however, and they are of domed form, which is a touch to be appreciated by the fastidious owner.

Equipment Is Complete

The body arrangement is up to the minute. A very neat and symmetrical arrangement of the instruments on the cowl board serves to set off the front compartment, while the rain-vision, ventilating windshield adds its finishing touch. The cushions are 10 and 12 inches, and the seats, front and rear, have high backs which are a feature for comfort. The rear seat is 47 inches in width.

The equipment is complete in every respect. Among the items may be mentioned an electric motor horn, Jones speedometer, New Haven 8-day clock and Jiffy curtains.

The wheelbase is 120 inches and the road clearance 10 1-2 inches.

Beside the standard Chandler roadsters and touring cars, coupé, sedan and limousine models are also furnished or order.

$9,000,000 for Ohio Roads in 1914

COLUMBUS, O., June 26—Fifteen million dollars will be spent for good roads in Ohio this year, according to the estimate of State Highway Commissioner James R. Marker. Of this sum, $9,000,000 will be spent on contracts under the supervision of the state highway department. The remaining $6,000,000 will be spent directly by counties and townships.

A Motor Show at Indiana State Fair

INDIANAPOLIS, IND., June 27—A motor show will be held at the Indiana State Fair, just north of the city, by the Indianapolis Automobile Trade Association. The fair will be held 1 week beginning September 7, and usually attracts thousands of visitors from all parts of the state.

It has not been customary for motor car and allied concerns to exhibit extensively at the fair on account of lack of space. This will be solved by using the immense tent in which the association held a show downtown in the spring of 1912. The tent will be reserved exclusively for exhibits of members of the association.

George O. Wildhack was elected a director in the association. He will fill the unexpired term of R. P. Henderson, who recently became identified with the Regal Motor Car Company, at Detroit, Mich.

Fifth Avenue Buses Carry 1,500,000 in May

NEW YORK CITY, June 26—During May more people used the motor buses on Fifth avenue and Riverside Drive than ever before. The Fifth Avenue Coach Co. hauled nearly 1,500,000 passengers during that month, which is considerably in excess of any previous month in the company's history. The big day of the month was May 3, when 61,400 passengers were carried. This, however, is not the company's record day, as on April 19, nearly 64,000 people were carried, that day being Sunday.

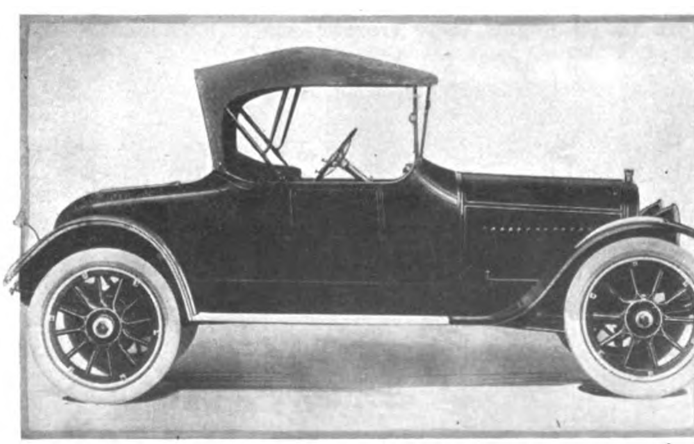
N. Y. Has 27,791 More Cars Than in 1912

NEW YORK CITY, June 26—"Another striking commentary upon the growth of automobilism in New York State," said Mitchell May, secretary of state, "is shown by the registration figures during the last 4 months, when more cars were licensed than for the entire year last past, or 27,791 more than the total number in 1912, when 107,262 were registered.

"At the end of May, 1913, 107,299 machines had been registered, while this year at the same date the number has increased 24 per cent., the total being 135,053. As might be expected, about one-half of these cars, or 62,134, are to be found in the New York district. The number of commercial vehicles in use is already far beyond the total for the whole of last year."

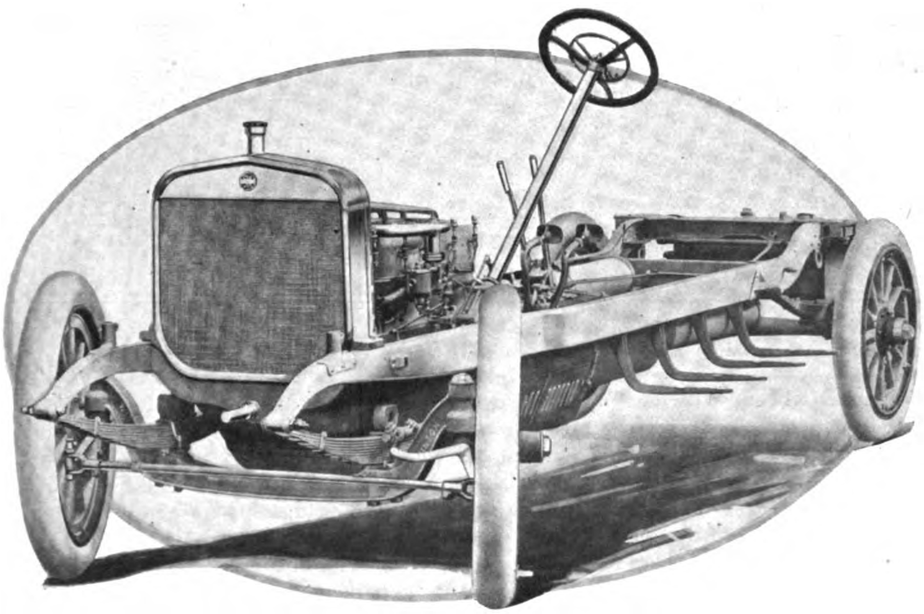
Willard Battery Branches for Europe

CLEVELAND, O., June 26—R. C. Norberg, assistant general manager of the Willard Storage Battery Co., Cleveland, O., sailed for Europe early this month to arrange for installation of a branch of the Willard company and establish service stations in the larger European cities. The company's foreign business has increased very rapidly during the past 2 years and during his stay, Mr. Norberg will visit several existing connections, manufacturers and dealers who are handling or using the company's batteries.



Right side of 1915 Chandler roadster, showing streamline design and ample space provided in rear deck

Winton Minimizes Vibration



Three-quarter front view of 1915 six-cylinder Winton, showing enlarged radiator and more resilient and improved spring construction

All Moving Parts Balanced —New Streamline Body Design—Electric Starting Optional — More Resilient Springs

THE details of the 1915 Winton six, known as model 21, have been made public and indicate that, while the car has undergone very little change mechanically, improved appearance has been obtained by complete re-designing of the body. Besides this, electric starting has been made optional with the purchaser, the Winton air system of turning the crankshaft, which method was used exclusively heretofore, being fitted instead, as desired.

The body retains its streamline effect, while a new beauty has been given it by the raised panel which outlines the upper edge of the body all around. The cowl has been sloped so as to meet the hood, and thus body and bonnet are blended into a smooth-line unit. Greater roominess in the front seat is obtained by this new body design.

Radiator Enlarged to Harmonize

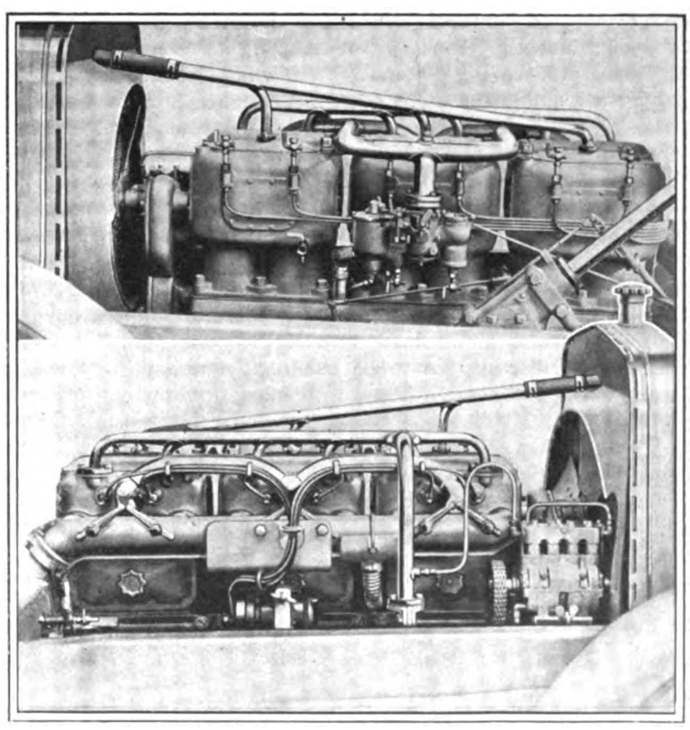
The radiator has been made 2 inches higher and 2 1-8 inches wider, which, of course, means a larger bonnet. This is in good proportion to the body size and gives a pleasing appearance to the whole.

There has been no appreciable change in the engine and its allied units. It has a horsepower of 48.6 according to the S. A. E. formula. The cylinders, which are 4 1-2 by 5 1-2 inches, are cast in pairs with the valves all on the right. The same intake manifold construction is employed, whereby the carbureter is placed on the left side and the two-branch manifold running from it passes over the tops of the cylinders to the valve side where these branches in turn run into a horizontal pipe with an opening into each cylinder block. One change in equipment is the adoption of a Rayfield carbureter.

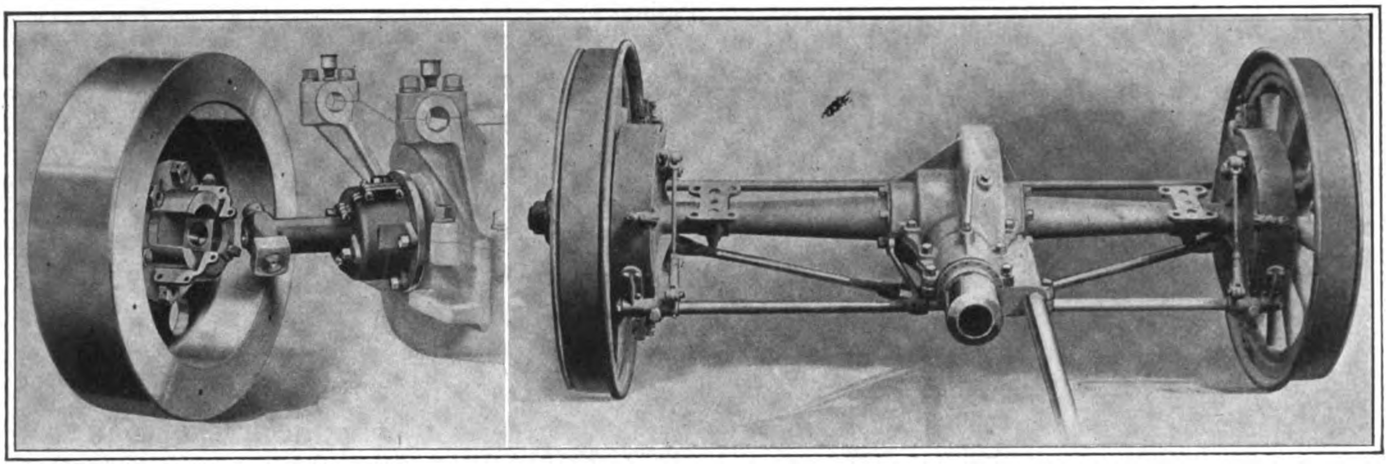
The Winton still uses the vertically split aluminum crankcase which divides into right and left halves to provide for the ready removal of the crankshaft or other working parts. The main crankshaft bearings are in the right half, allowing the other side to be taken off without disturbing them. In the left half there are three 5 by 8-inch hand holes which allow complete inspection.

The moving parts are all of careful design and balanced so as to reduce vibration to the minimum. The pistons, rings, connecting-rods, and wristpins of any one set are all of the same weight to give this balance; the crankshaft, which is carried on four Parsons white brass bearings, is made of nickel steel; the camshaft and cams are a one-piece forging, the profile of the cams being such as to give a flow of gas proportionate to piston speed. This shaft is removable through the front of the case without any of the rest of the valve mechanism. The valves themselves are 2 inches in diameter and interchangeable. The timing gears at the front are of drop forged steel, spirally cut as a noise-reducing medium and accurately finished.

The Winton system of lubrication is still unchanged. Circulation of the oil is by two pumps, operated by an eccentric on the rear end of the crankshaft. One pump takes oil from the reservoir and delivers it through tubes to the crankshaft main bearings and the timing gears from which points it runs into the crankcase. The other pump draws oil through strainers from the crankcase and returns it to the tank, where it is again strained before use. The oil tank is at the



Upper—Intake side of 1915 Winton motor, showing mounting of new Rayfield carbureter and shield for gear-driven fan. Lower—Exhaust side of Winton motor showing mounting of magneto and hot-air connection for carbureter



Left—Universal joint between flywheel and gearbox on 1915 Winton which permits of easy demounting. Right—Rear axle of 1915 Winton, showing strong construction and large brake drums

right of the engine. The cylinders, cams and camshaft bearings get their lubrication by the splash of the connecting-rods, while grooves in the pistons distribute it around the surfaces. To prevent a smoky exhaust due to excessive oil, the flow of the lubricant is regulated by a by-pass in proportion to the motor speed.

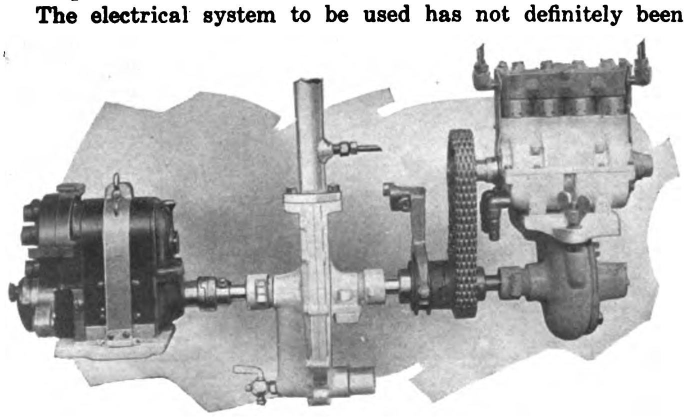
Shield Now Surrounds Fan

The ignition is by either a Mea or a Bosch dual magneto with a storage battery to supply auxiliary starting current. The plugs are still placed horizontally in the cylinders over the intake valves so that they are swept by the fresh incoming mixture. The plugs are 7-8 inch standard. The magneto is placed on the right side of the engine at about mid-distance back, and strapped down on an integral crankcase bracket. It is driven off the end of the shaft which takes care of the centrifugal water pump drive and the silent chain drive to the air pump. This driving assembly is shown in one of the illustrations.

Due to the increased size of the radiator, even greater cooling surface is presented by it, the increase over last season's being about 14 per cent. The fan is driven by gearing which is inclosed at the front end of the engine. This drive has an adjustable spring-tension clutch which is said to secure proper air suction without possibility of accident to the fan or its adjacent parts. The fan is now surrounded by a shield which directs the air to the cylinders and acts as a safety feature. This shield was not used last season.

As already mentioned, the well-known Winton air cranking system may be had, or the engine will be equipped with an electric cranking apparatus. In the air system, there is a pipe connection to each cylinder head, and the pressure from a tank is sent to the cylinders to force the pistons down. This pressure is maintained by a Kellogg air pump.

The electrical system to be used has not definitely been decided upon, several makes being tested out at this time. With the air system a Gray & Davis generator is used for furnishing current for lights. A Willard storage battery is also employed. It is probable that the same make of generator as the motor used for cranking will be installed when this part of the apparatus is decided upon.



Arrangement of magneto pump and tire pump shaft on 1915 Winton. Note the silent chain drive for tire pump

The Winton model 21 uses the same type of multiple disk clutch as its predecessor. There are sixty-three high carbon steel disks, thirty-one of which are attached to the transmission shaft and thirty-two to spiders driven from the flywheel. The unit runs on F. & S. annular ball bearings, while four springs held in pockets and spaced equidistantly around the clutch distribute the disk tension equally. Because the disks operate in oil, there is no jerky action, the oil films having a cushioning effect. The clutch unit is housed in the forward end of the gearcase and is readily accessible through a hand hole.

Four Speeds—Direct on Third

The gearset which is not in unit with the engine affords four forward speeds and reverse, with direct on third. The shifting is selective, the gears sliding. Interlocking arrangements make it possible to enter neutral when the clutch is engaged, but impossible to get any other gear combinations. The gears have wide faces, and are constructed of a special alloy steel.

There is no change in either the driveshaft back of the gearbox or in the rear axle. The shaft is fitted with a cross-type universal at the forward end and has a roller type universal at the rear. The axle is floating and made with a large factor of safety. The differential unit is readily removable, as are the shafts and bearings. Gears are of nickel steel, and Timken bearings are used throughout the rear member. Conventional internal and external brakes operating on the usual form of drums are employed. A torsion rod parallels the driveshaft to take the drive, etc.

Universal Between Clutch and Gearbox

In the transmission of the power back from the engine, there is interposed between the motor and clutch a universal joint similar to that at the rear end of the driveshaft. This is inclosed in a grease-tight metal case, removal of half of which allows the dismounting of the gearbox so far as the front end is concerned. At the same time, it takes care of any possible misalignment between gearset and crankshaft.

Dann Oil Cushion Spring Inserts

The springs are three-quarter elliptic in the rear, and made long so as to give low suspension. More leaves have been added this year, the leaves being thinner. This makes for greater resiliency. The rear springs take the place of radius rods, having no front end shackles, and being suspended outside the frame. The diameter of the shackle bolts has been increased and a new form of rebound straps supplied. A new feature of the Winton spring construction is the incorporation of the Dann lubrication cushion inserts between the leaves. These inserts have pockets of congealed lubricant and keep the springs in good shape at all times. They are standard equipment. The spring sizes are: Rear, 46 1-2 by 2 inches; Front, 52 by 2 1-4 inches.

Tires all around are 37 by 5 inches which is an increase over last season, in that 36 by 4 1-2 inch tires were then used. The wheels are of 12-spoke artillery wood type.

Left Steer and Center Control

Steering is on the left and control in the center, which is well-nigh standard in America now. Spark and throttle levers are on the wheel, which is 18 inches in diameter. A new form of spark and throttle ball joints is now used on the control rods in that they have springs to take up backlash.

The wheelbase is 130 inches on the runabout and four-passenger cars, while the larger types have this dimension increased by 6 inches. Some body dimensions of the five passenger car are: extreme width, 70 inches; distance from dash to seat, 26 inches; height of driver's seat from floor, 16 inches; width of front doors, 22 inches; width rear doors, 24 inches; distance front to rear seat, 33 inches.

The doors have all been widened and are carried on concealed hinges. Handles do not extend through them. Cars having auxiliary seats are provided with inclosed compartments where the seats may be stored when not required. The cowl board fixtures have been re-arranged to give a symmetrical appearance and ultra convenience to the driver, while a tonneau light is also a new kink that will be appreciated.

Prices Are Unchanged

Equipment is complete and includes one-man top, a new design of rain vision glass front, Waltham 8-day clock, tire carriers of a new type at the rear, tire pump, Klaxon horn under the bonnet. Prices are unchanged. The roadster and four-passenger are $3,250; the six- and seven-passenger, $3,500.

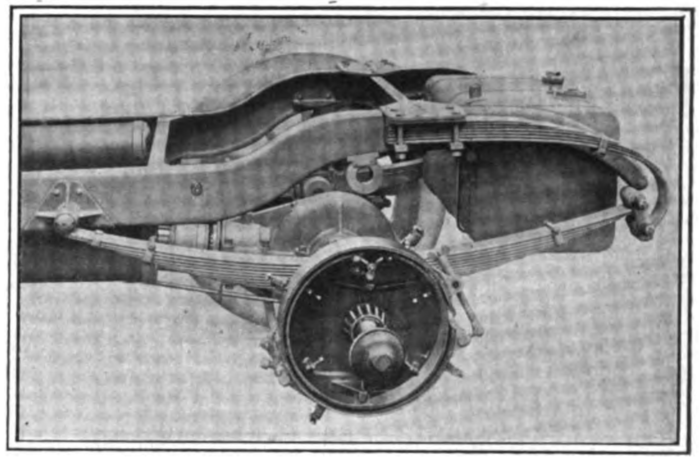
Some of the dimensions of the new Winton model 21 follow:

Length of frame rails, roadster and four-passenger cars—179¼ inches.
Length of frame rails, all other models—185¼ inches.
Width of frame front—28 inches.
Width of frame rear—31 inches.
Clearance—9¾ inches.
Optional gear ratios—3.928 to 1; 3.69 to 1; and 3.428 to 1.

The following shows the speed of the car in miles per hour at 1,000 revolutions per minute of the engine:

BEVEL GEAR ON DRIVESHAFT AND REAR AXLE

Transmission	3.928	3.69	3.428
First speed	9.00	9.59	10.32
Second speed	19.42	20.67	22.23
Third speed	28.02	29.82	32.09
Fourth speed	35.28	37.52	40.36



Rear construction 1915 Winton, showing three-quarter elliptic springs, mounting of pressure feed fuel tank and interior arrangement of brake drum

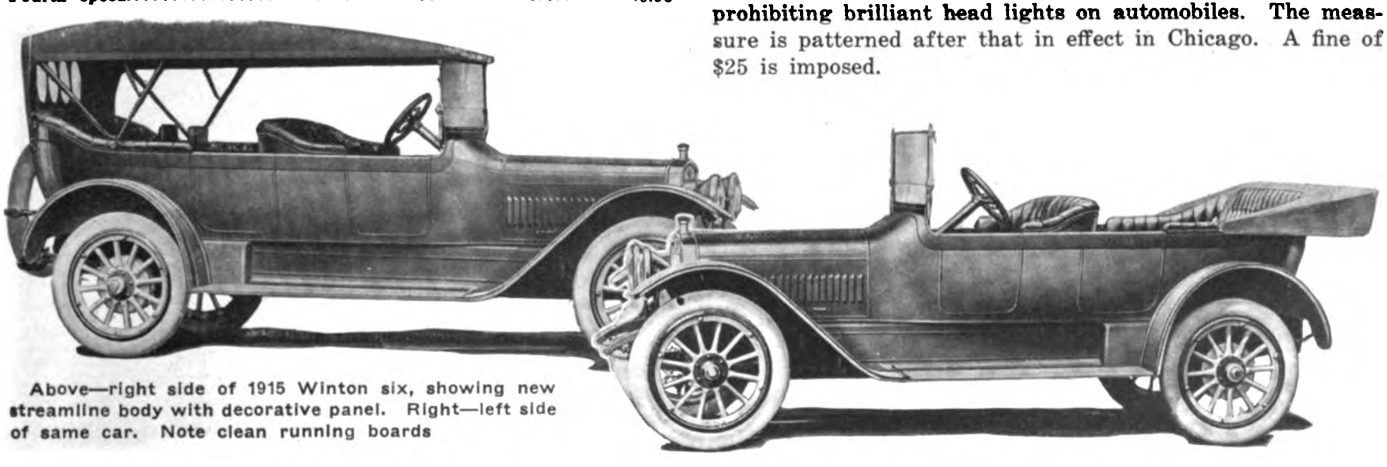
Pa. Creamery Haulage Line Must Pay Delaware License?

WILMINGTON, DEL., June 26—A test of one phase of the Delaware motor-vehicle law is being made through a case brought against two chauffeurs employed by the P. E. Sharpless Co., which has three dairy products factories in Pennsylvania and brings practically all of its products to Wilmington in motor trucks (four tons each) for shipment to Philadelphia by boat. It has no Delaware trade and claims that it is exempt for that reason from Delaware license, through the reciprocal clause in the state law. It operates its trucks on Pennsylvania licenses.

Delaware authorities evidently believe that the company should pay a Delaware license, for the operators of the cars are under prosecution in the present case, charged with operating cars in Delaware without a license, on the ground that the company is making a regular business of bringing its products here.

Philip L. Garrett, counsel for the defendants, claims that his clients are not doing business in Delaware, but are merely engaged in interstate commerce when their trucks come into the city. The court therefore has two points to decide: the extent of the reciprocal clause in the state law and whether the company is doing business here or merely engaged in interstate commerce. Mr. Garrett bases the latter contention on the fact that as Delaware reciprocates all privileges accorded by Pennsylvania it must also include the phase of the Pennsylvania law which exempts all foreign corporations except those doing business in the state.

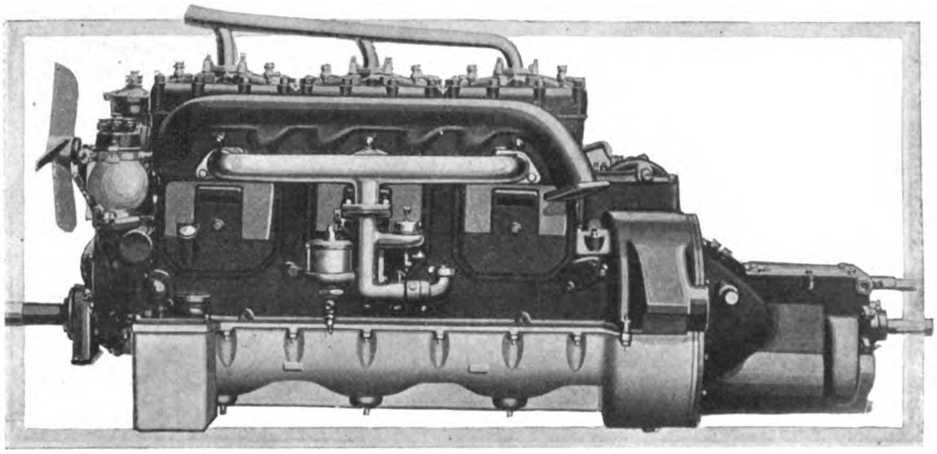
PEORIA, ILL., June 25—The city has adopted an ordinance prohibiting brilliant head lights on automobiles. The measure is patterned after that in effect in Chicago. A fine of $25 is imposed.



Above—right side of 1915 Winton six, showing new streamline body with decorative panel. Right—left side of same car. Note clean running boards

New Cole Little Six Has High-Speed Block Motor

Is Capable of 24 R.P.M. —Streamline Body—Removable Cylinder Heads in Pairs—Few Changes in Big Six Except $135 Price Reduction



Intake side of new Cole little six motor, showing mounting of carbureter on block casting

A NEW model has been added to the Series 10 Cole cars. The newcomer is a little six of practically the same horsepower and almost the same size throughout as the new four announced in April, and described in THE AUTOMOBILE for April 23. The appearance of the little six gives the Cole three chassis models, the Series 10 big six selling at $2,465, a reduction of $135, which is quite similar to the 1914 six-cylinder car, the Series 10 little six at $1,865, and the Series 10 four, at $1,665.

Removable Cylinder Heads in Pairs

The feature of the series is the little six, which has a 3½ by 5-inch I-head motor. The cylinders and the upper half of the crankcase are cast in block, although the removable cylinder heads are in pairs, so that there are three separate cylinder heads, the removal of any of which exposes two cylinders. The clutch and gearset are in unit with the engine, making a unit power plant. The crankshaft is carried on four bearings and a constant level splash-pressure system takes care of the lubrication.

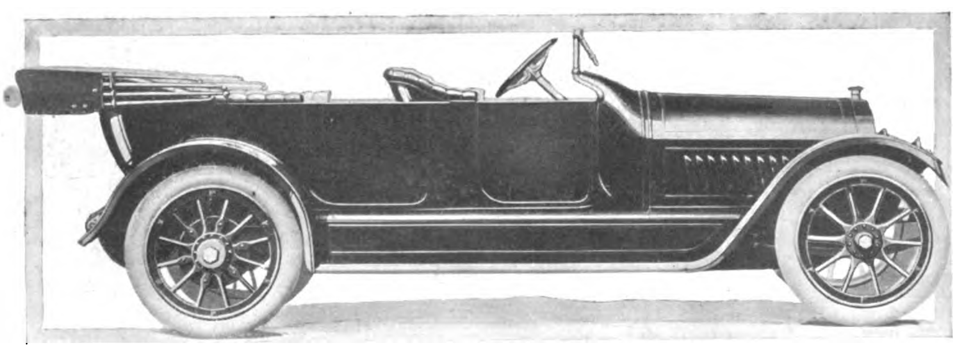
A new feature of the engine is the arrangement of the breathers. Instead of the usual type of breather pipes, an opening is provided through the cover of the valve stems and push rod housing, so that a separate breather is provided for each of the three pairs of cylinders. Carburetion is provided by the new G-2 Stromberg carbureter which feeds through a short-branched intake header. Cooling is taken care of by a centrifugal pump on the right side of the engine, a Mayo cellular type radiator, and a three-bladed aviation propeller type of fan. Ignition is by the Delco electric system with automatic spark advance. The same system supplies the lighting and starting functions.

Long-Stroke, High-Speed Motor

Along with its comparatively long stroke, the engine is of the modern, high-speed type, and is capable of running up to 2,400 revolutions per minute. Block casting of the six-cylinder engine is a departure from former Cole practice, and the little six engine differs in this respect from the big six, whose cylinders are cast in pairs. The reason for this seeming change of heart among the Cole engineers is due to the difference in the size of the engine. With the cylinders 3 1-2 inches bore, it was found that the block casting was not too bulky and heavy to be handled by the average garage, and that consequently the greater rigidity, better alignment, and freedom from vibration of the block casting could be obtained without sacrificing too much through the weight of the casting. In the big six, however, as in the four, 4 1-4 by 5 1-4 cylinders would make too unwieldy a casting, if all cylinders were a unit.

One of the features of the little six engine is the use of large diameter, flexible tubing for the exhaust pipe. This permits long, easy sweeps of the exhaust line and prevents back pressure. The timing gears on the little six engine have spiral teeth.

Aside from the engine, the little six is the same as the four, which has been described previously. The wheelbase is 120 inches instead of 118 inches, the added 2 inches being under the hood, on account of the extra length of the six engine. Briefly, the chassis comprises an improved cone type clutch and a three-speed gearset in unit with the engine, Timken axles and bearings, the rear being floating, service and emergency brakes, contracting and expanding on 15 1-2 by 2 1-2-inch wheel drums, left hand drive, center control, irreversible Gemmer steering gear with an 18-inch wheel, and a carbureter air control located on the steering wheel column.

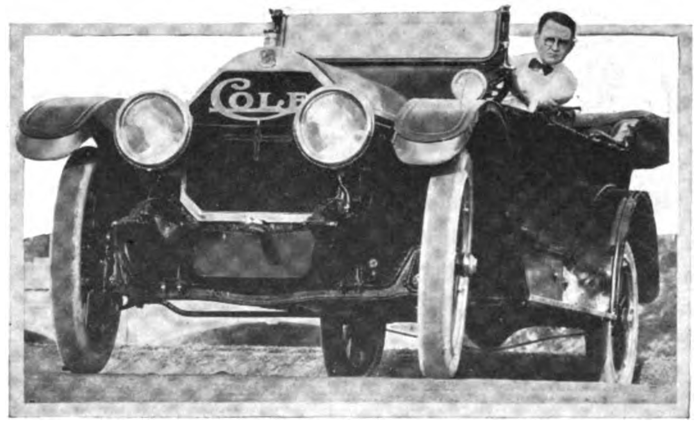


Side view of new Cole little six, showing harmonious streamline design

The frame is a channel section, double drop, pressed steel, extended in the rear to carry the gasoline tank and the tire irons. The fuel tank is a Janney-Steinmetz pressed-steel seamless tank with a circular section. The fuel is fed to the carbureter by the Stewart-Warner vacuum system. The tires are 34 by 4½ inches, mounted on Firestone demountable rims with Firestone tires as regular equipment. The springs are three-quarter elliptic in the rear and are of oil tempered steel. They are the Detroit self-lubricating springs.

Bodies include a two-passenger roadster, four and five-passenger touring and a coupé. The design is streamline with a cowl extended several inches back, 24-inch doors with concealed hinges and locks, straightline splashers and fenders, and long clear running boards. The equipment includes quick-acting curtains, Stewart-Warner speedometer, oil sight feed, all the instruments being set flush in the cowl. The windshield is of the automatic ventilating, rain-vision type. The Delco electric unit cranking, lighting and ignition system is so arranged that the generator cuts in at 300 revolutions per minute, or, at a car speed of under 10 miles per hour. Above that speed it supplies a constant voltage to the Exide battery. The headlights are of the double bulb type, providing a powerful lamp in focus for country driving and a 4-candlepower bulb, out of focus, for city driving. A slight change has been incorporated in the Delco starting system, in that the starting pedal is now separate from the clutch. One of the features which will be appreciated is the adjustable pedal for clutch and brake. These can be adjusted to any length for greatest comfort of the driver.

There has been very little change in the Cole big six, as compared with the construction of the earlier series. The price has been reduced $135, so that it is now $2,465. The chief alteration is in the adoption of the vacuum feed fuel system and the consequent cleaning up of the dash. This eliminates two leads from the carbureter to the reservoir, and does away with the pressure gauge and hand pressure pump on the dash. The motor is an L-head six-cylinder type, 4 1-4 by 5 1-4 with cone clutch and three speed gearset as a unit, the power plant being suspended at three points. The wheelbase is 136 inches and tires are 36 by 4 1-2 inches.



The Cole big six, which is practically unchanged from last year, making a difficult turn

Aside from the equipment as mentioned on the little six, there is added to the big six a Taylor Noil motor driven tire pump. An oil sight feed set flush in the cowl board and the outfit of tools is carried in a drawer under the front seat. The rear doors in this car are 26 inches wide. The bodies include a two-passenger roadster, six and seven passenger touring, a coupé, and a seven-passenger limousine.

New Kissel Kar Six Has Two-Door Touring Bodies

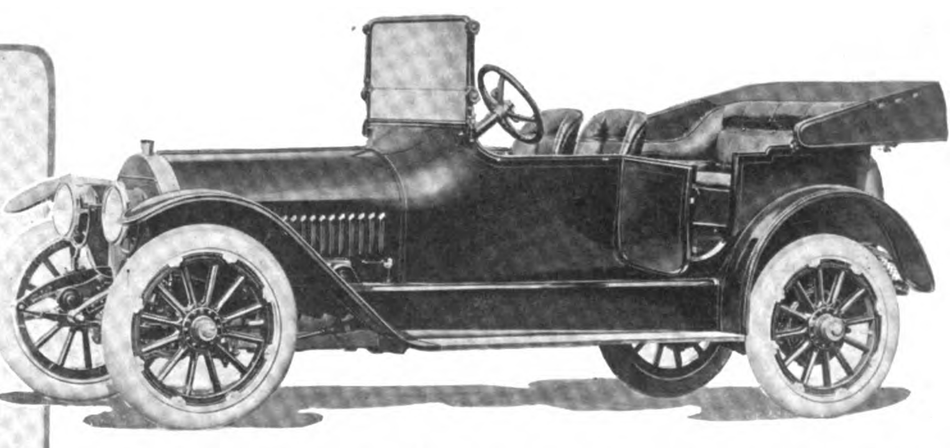
UNUSUAL body design and greater accessibility are the features of the new six-cylinder model recently announced by the Kissel Motor Car Co., Hartford, Wis. This new car will be a part of the 1915 production.

Adoption of a two-door, single-compartment body design is the unique feature of the six. Both four- and five-passenger bodies will be fitted to this new chassis, the four-passenger car differing from the five in that a dividing arm is used between the rear seats.

The two-door body is made possible by the use of individual seats for the driver and his side-passenger, thus making an aisle between. This single-compartment feature allows passengers to exchange seats without leaving the car.

To those preferring a four-door body, two models are offered, one for five and another for seven passengers.

The power plant of the new six consists of a 4 by 5.5-inch motor equipped with a leather-faced cone clutch and a four-speed gearset with direct on third. A noteworthy feature is the position of the push rod which is clamped inside of the valve inclosure. Instead of being pressed into the cylinder the guide, as well as the rod, is accessible for removal without lifting the cylinder from the crankcase.



At the left is a plan view of the new Kissel Kar six two-door streamline body showing the seating arrangement with the aisle between the two front seats allowing the passengers to change seats. At the right is a side elevation of the same car showing the only door on this side of the car open

The Engineering Digest

Minor Innovations in European Cars, Accessories and Parts

ACCESSIBILITY, NEW TOOL, PUMP, LAMPS, MOLDINGS

DISMOUNTING the pistons and adjusting the connecting rod bearings without taking the motor apart otherwise is a mechanical feat which can be accomplished in the case of the British Maudsley motor by virtue of the large gates in the sides of the upper half of the crankcasing and by the method indicated in Fig. 1. By turning the crankshaft to a suitable position, the nuts can first be removed from the connecting-rod knuckle, and by turning the crankpin to the position shown the piston can thereafter be pulled down and out through the gate. The cylinder is chamfered at the bottom to make it easier to get the piston back again.

Pincers have been devised the jaws of which are turned outward and are adapted for holding the free ends of a piston ring a certain distance apart. An adjustment screw serves to fix this distance at just the point at which the ring can be slipped over the piston. By this means all accidental and unnecessary violence to the frail ring is avoided.

According to a 1913 design by Bugatti the water pump is mounted in tandem with the magneto on a prolongation of the crankshaft and draws water directly from the lower

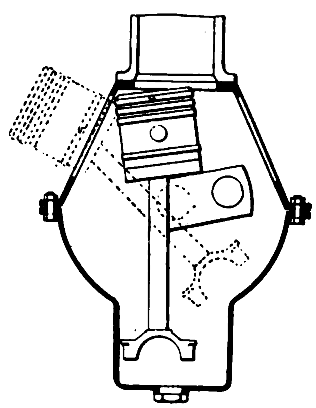


Fig. 1—Mandsley motor

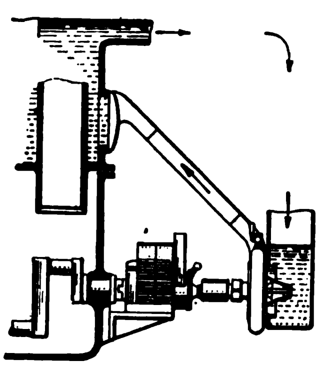


Fig. 2—Pump arrangement

reservoir of the radiator in the manner shown in Fig. 2. The arrangement presupposes special design features for the magneto and other means than the ordinary crank for starting the motor.

In a 12-horsepower Darracq the headlights are carried each in a fold of the sheet metal curtain of the fender, as indicated in Fig. 3, and the street lamps in the forward dip of the fender. Both headlights and lamps are of course electric.—From *La Vie Automobile*, June 6 and 13.

A French firm has conceived and executed the idea of turning out moldings for automobile bodies in ebonite, and Fig. 4 shows a variety of the shapes so far placed in the market. While ebonite is more expensive than wood as a material and its natural black lustre is suited mainly for carriages finished in black, it can easily be bent to almost any desired curvature when softened in warm water and will hold the shape given it; it requires no varnish and holds its finish without much caretaking.—From *Omnia*, May 16.

SAVING HIGH-SPEED STEEL—The Rosner method, developed in this country, for making high-speed tools by welding a tip of the expensive high-speed steel to a shank of ordinary mild steel, while accomplishing the hardening of the tip by the same operation as the welding, is favorably commented upon in *Werkstattstechnik* of June 1 and is credited with a saving of about 40 per cent over full-length tools of the costlier material. The advantage over short tools used with toolholders lies in a better radiation of heat through the shank and the better preservation of the cutting-edge which is the result. The high-speed tip, if long enough from the beginning, can be reforged and rehardened as if there were no weld.

Carbureter Throttled by Varying Area of the Venturi Port

IN most carbureters the narrowest place of the Venturi tube remains in the same place and is supposed to regulate the siphon action upon the gasoline in the jet. But when the throttle is closed so much that the sectional area which it leaves for the passage of the gas mixture is smaller than the sectional area of the Venturi channel around the jet, the location of the greatest suction is changed to the smaller area, and this, according to the idea of the designer of the Jann carbureter, causes disturbances in the continuity of the gas flow, which result in irregular and jerky accelerations.

The principle of the Jann carbureter, Fig. 5, is therefore that of throttling always at the same level around the jet, and this is done by substituting for the ordinary butterfly throttle a piston-like body with a succession of conical rings D which can be moved up and down concentrically with the jet. As the intervals between these cones and the central openings in them are graduated progressively, there corresponds to each position of the throttle: (1) a certain air section around the jet, determined by the size of the opening in the nearest higher cone, (2) a certain section for the passage of the gas mixture, determined by the sum of the circumferential openings of all the cones above the level of the jet, and (3) a certain orifice of the jet, determined by a needle *a* which moves up and down with the throttle body and enters more or less deeply into the bore of the jet.

In the extreme low position of the throttle-body, the sleeve K, surrounding the jet enters the central opening of the smallest diffuser-cone, almost blocking the passage of air, and this is the position for still-running.

The butterfly valve A noticed at the top of the device is not, according to the description, in itself a control member, but, being spring-connected with the throttle-body whose down-movement causes it to turn against the spring-resistance, it exerts a steadying influence and reduces the suction acting against the throttle-body, especially when this suction is at its maximum, in the position for still-running.

Other features of the Jann carbureter are the relatively capacious chamber J in the jet, which serves as a reservoir for accelerations, the calibrated bore *j* by which the carbureter is regulated to different motor sizes and the hot-air pipe H which can be removed if desired. [The description states that the sleeve K can be adjusted by means of a knurled nut, but the illustration does not show a construction rendering this feature possible.]—From *Omnia*, June 6.

Bonecourt Surface Combustion System with Liquid Fuel

WHILE the Bonecourt-Schnabel system for burning gas with a minimum of waste of the heat units contained in the fuel is of immediate interest mainly for economizing stationary steam engine practice and for use in mines and tunnels, where the very small amount of combustion gases from the flues and their coolness constitute features of great practical value, it continues to claim attention in wider circles on the strength of its scientific peculiarities which suggest that the principle may eventually be applied to small power plants for motor vehicles and in other now unforeseen directions. The combustion of gas, in the fire flues of a steam boiler on the Bonecourt system, was originally flameless and took place in the interior of a porous fireclay or chamot lining or filling of the tubes, but (as reported in THE AUTOMOBILE of May 21) practical difficulties led to modifications, after which the system can no longer be designated as strictly flameless, at least not so far as its development in Germany is concerned. *The Engineer* (London) now gives in its issues of May 15, 22 and 29 an account of the most recent experiments with the system in England, from which it appears that considerable headway has been made with the use of liquid and solid fuels, especially the former. The process employed is illustrated diagrammatically in Fig. 6 and consists in injecting the liquid fuel together with the amount of air required for its combustion into a chamber of small dimensions in which a partial gasification of the liquid takes place.

A fireclay sleeve in the front end of the boiler tube serves to conserve a certain amount of heat within the chamber thus formed. The chamber is closed at the same end by means of a fireclay plug, through an aperture in which the oil and air supplies are introduced. At its further end it is closed by a perforated septum, through which the gaseous products pass from the gasification chamber into the refractory packing in the boiler tube. Each boiler tube carries its own gasification chamber and porous refractory packing for the acceleration of the combustion. The dimensions marked on the diagram are those of a boiler erected at the London works of the Bonecourt company, and this boiler has been successfully fired for the past few months on the principle described, being in operation every day and supplying the works with power. The air required for the combustion is supplied by means of a fan developing a pressure of 35 inch water column, and the oil is fed to the tubes by gravity with a 12 foot head. Spraying of the oil in the gasification chamber is effected by the rapid flow of the air.

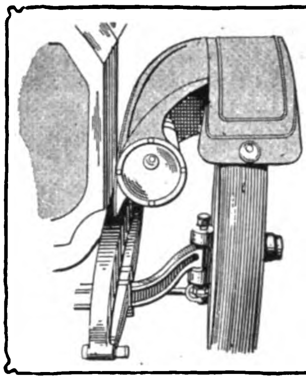


Fig. 3—Disposal of lamps

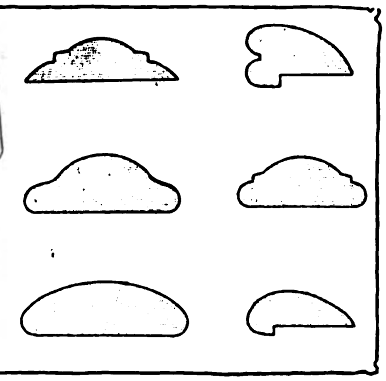


Fig. 4—Ebonite moldings

This boiler evaporates 25 pounds of water per square foot of heating surface per hour and, in doing so, utilizes 92.5 per cent. of the calorific value of the oil burned.

The nature of the refractory porous material naturally makes it difficult to apply the system, as it stands today, to boilers with fire tubes of the small dimensions which alone can be of interest from the automobile viewpoint; yet it is noticed that in another boiler which has been installed at the Bonecourt works the diameter of the tubes is reduced to 6 inches, and in the German experiments practically all the troubles arose from the presence of impurities, notably sulphur compounds in the gas used, which caused clogging of the porous material. As economy is at present the chief object in view in the development of the process, no data have as yet been offered based on the use of gasoline for fuel and small dimensions of the tubes and linings.

Rotary Pump and Hydraulic Transmission with Gear Wheels

THE working principle of a new rotary gear pump is indicated in Fig. 7. The mechanism consists of a rotatable elliptical spurwheel, an internally geared ring almost square in elevation and six circular spurgear pinions meshing between the ellipse and the square. As the ellipse is revolved, the space between any pair of the pinions increases from a minimum to a maximum and then decreases from the maximum to the minimum again. While each space is increasing it is in communication with a suction port, and while decreasing it communicates with a delivery port. The device is the invention of H. Dock of Westerly, Rhode Island, and can be used also as a hydraulic motor by letting the working fluid in at one set of ports and out at the other. A motor and pump combined have been constructed in the form of a hydraulic transmission with variable speed. For this

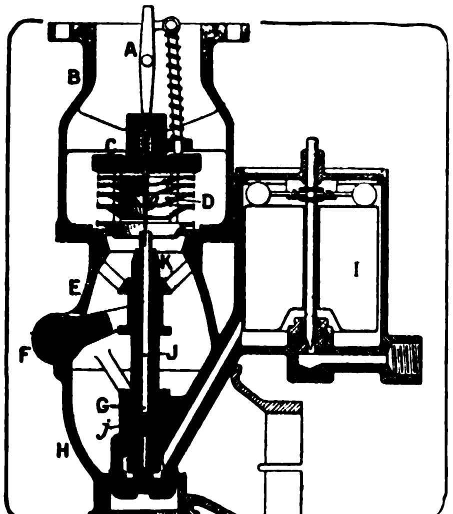


Fig. 5—Jann "Integrale" carbureter

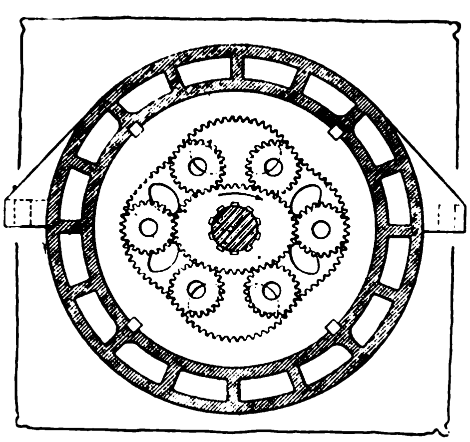


Fig. 7—Rotary pump and hydraulic gear

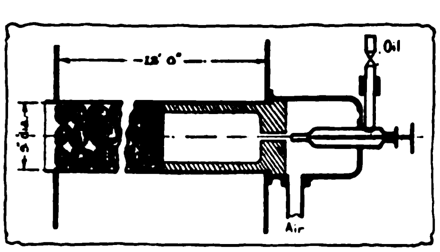


Fig. 6—Bonecourt system for liquid fuel

purpose the pump portion is in duplicate. The deliveries of the two pumps can be arranged to oppose each other or to assist each other to any desired extent up to the full maximum, by moving the relative positions of the internal and the elliptical gears of the two parts, and in this manner variations of the motor speed from zero to maximum is obtained in both directions.—From *The Engineer* (London), June 5, after *American Machinist.*

Number of Electric Vehicles Used in European Countries

ACCORDING to a private census taken in March of this year a considerable increase is noted in Europe in the use of electric vehicles for municipal utility purposes, and the distribution of the vehicles in the different countries is given as in the appended table. Sixty street sprinkling and flushing carts in use in Berlin, some of them since 1907, are said to have demonstrated a yearly saving of about $400 over the cost of the same work with horses as the motive power, and the use of electric tricycles for mail collections is being expanded yearly in Berlin, Vienna, Copenhagen and other large cities.—From *Allgemeine Automobil-Zeitung,* May 30.

ELECTRIC VEHICLES OPERATED IN EUROPE, MARCH, 1914

Countries	Pleasure Vehicles	Freight Vehicles	Pleasure Tricycles	Business Tricycles	Totals
Germany	862	554	3	270	1689
Holland	70	38	1	6	115
Denmark	2	21	....	5	28
Sweden	2	2	....	2	6
Austria-Hungary	132	117	1	15	265
Belgium	1	....	....	....	1
France	100	190	....	28	318
Russia	3	4	....	1	8
England	201	62	....	25	288
Switzerland	131	69	....	....	200
Roumania	....	....	....	1	1
Spain	12	....	....	1	13
Italy	60	173	....	5	238
Totals	1576	1230	5	359	3170

Races for Improving the Springs of Ordinary Cars

ON THIS subject, now coming to the front, *The Motor* (London) writes substantially as follows: "There is one particular in which there is still much to learn and room for much improvement—the springing. The course over which the Tourist Trophy Race is to be held is not an easy one on springs at best, and it will certainly provide a good test at high speeds of both springs and tires. Naturally every entrant firm has taken the greatest care to make the springing of its cars as nearly perfect as may be, and various expedients in the nature of shock absorbers and rebound dampers will be universally resorted to; but, so far as we are aware at present, there is to be no radically new or different system of suspension tested, which is rather a matter for regret in view of the undoubted great scope for improvement in this direction. One has but to note the number of palliatives offered in the advertising pages of the motor journals to realize how far from perfection is the suspension of cars, and the use of such fittings on racing cars should provide valuable information for those who are in a position to obtain first-hand knowledge of how they operate in practice. Here again, though, racing and everyday conditions are at variance, and the lessons of racing cannot be applied to touring cars without the most careful consideration and weighing up of fancies and sorting out of facts."

[A contribution in the matter of answering the question, whether a spring suspension found superior for racing cars should also be suitable for ordinary driving speeds, is perhaps supplied through the tests made by Dr. Bobeth in Germany, who found that, so far as the two vehicles at his disposal were concerned, the worst oscillations of the chassis occurred at a speed of about 22 kilometers per hour. This result was of course due to the fact that at higher speeds the forward movement enters as a stronger factor to change the resultant of the forces due to spring action and gravitation and flattens out the trajectory described by the car body, so that its movements are felt in lesser degree as a succession of shocks. On the other hand, it apparently does not mean that the violence of the shocks absorbed in the springs was not greater at the higher speeds. Also, Dr. Bobeth's observation did not apply to shocks received from abnormally great road obstructions. Taking the two facts together, that high speed makes riding easier on a road of average roughness but increases the shocks which the springs must endure, there seems to be some good reason for believing that the spring requirements are sufficiently alike for high and medium speeds to make the results of racing experience in this respect almost directly applicable to ordinary cars.—ED.]

Russian Development of Aeroplanes Makes History

THOUGH the current technical details in the evolution of aviation lie beyond the scope of these columns, a note on the large lines of division which are becoming visible in this devêlopment in Europe may be of interest. So far the French monoplanes, according to Herbert Hinderscheidt, one of the engineers at the German aviation camp at Adlershof, have excelled in speed, reaching an average of 120 kilometers per hour, while German monoplanes of the very reliable but heavier "Taube" type do not get far beyond 90 kilometers. On the other hand, German biplanes have now been so perfected that their speed about equals that of the light French machines while their carrying capacity is much superior. During the Balkan war these biplanes proved themselves far more useful than the monoplane. But, after all, no great principle is involved in the relative merits of these types. It is the mammoth aeroplanes of the Russian army, designed by Sikorsky, that have taken the technical world by surprise. An entirely new type was here created, and the first machine showed wonderful results, despite the designer's lack of experience in building and operation. It worked much more economically than any previous aeroplane, left the ground at first trial and turned curves and spirals with perfect ease. Immediately thereafter Sikorsky, assisted by the government, built a second model which showed such qualities that the government at once ordered six more at a price of $500,000. This type is called the Ilija Murometz.

It has 4 motors of 100 horsepowers each and weighs 3,500 kilograms. At first trials it caried 15 persons and a payload of 1,300 kilograms. Its speed with this load was 100 kilometers per hour.—From *Der Motorwagen,* June 10.

SPOTWELDING IS NOT YET PRACTICAL, according to Otto Fuchs of Brünn, Austria, a specialist in welding and riveting, for uniting two metals of widely different fusion points; it is not yet developed for use with aluminum, though frequently good welds can be accomplished, and in practice autogenous welding is used for aluminum at the same factories where spotwelding is used for iron and steel. As an improvement on riveting, spotwelding is far more economical, speaking about sheet steel and iron, and gives greater average strength, but the results depend somewhat more on the ability and care of the workman.

The Cyclecar vs. the Light Car

Cyclecar Movement Not Absorbed by Light Car Activity—A Definite Field

By William B. Stout

THERE is a very much growing idea that the cyclecar movement is going to emerge as a light car enthusiasm, and that the cyclecar, so called, will thereby be a thing of the past.

This feeling is not without foundation, for those in touch with cyclecar developments see a great change coming over the whole movement, a reaction from the first burst of enthusiasm, which was predicted long before it came.

The idea of the cyclecar movement was to produce the cheapest possible motor vehicle, and it has been superseded because the cyclecar in its first forms has proved itself worthy of better constructions than had been given it at the start and because mechanisms of few parts have not proved as reliable nor as cheap to build and buy as more standard and more complicated parts.

Public Slow to Buy

Another point having a decided bearing has been the slowness with which the public accepted the cyclecar idea to the extent of actual buying. They enthused, they gathered in crowds to watch, they expressed enthusiasm, and they predicted wonderful things, but those who bought went to cars of automobile standards, and of those who enthused on cyclecars the most had little money to buy.

As a result, makers are taking to four-cylinder water-cooled motors, shaft drive and gearsets and live axle constructions. They are entering the light car field, with its sociable seating and its higher first cost and the public thinks the cyclecar movement has perhaps failed.

Cyclecar Movement Has Hardly Started

As a matter of fact the cyclecar movement has hardly started. Makers started to experiment with cyclecars and yet could not forget the automobile. They added this and they added that, and when all was done the cars weighed 800 pounds instead of the 450 they started out to reach, and this weight was to be driven by a motorcycle motor. The wonder was that motorcycle motors did handle this weight and are handling it to-day. The best of these V-motored cars are running satisfactorily, but only on those cars where there has been real workmanship. Some of them were so cheaply built that they did not last at all. These are the ones which have harmed the cyclecar movement and have set it back.

The cars produced were to sell at under $400, and did. They did not sell in the quantities expected, however, as when this price was paid the buyer wanted a motor car, and as light cars at this figure were produced at about the same time, the public bought the light car first. The cyclecar is still in embryo.

V Motors Cost Too Much to Build

A great reason for the change to four-cylinder plants was that the V motors available were too costly to build to enable their makers to make a price on them consistent with the performance. They were fast but they would not run slow; they had low fuel consumption and great noise, and the public was afraid of air cooling. All of this hindered sales, while in fact the motors were doing wonderful work. Only recently the writer drove a V-motor cyclecar on a straight stretch of concrete road near Detroit in a race with a car which was an exact duplicate except that it was fitted with a four-cylinder, much larger motor, and beat it easily. On a hill or in sand, however, the V motor would have been the loser, as it was pulling 950 pounds.

Cyclecars Should Weigh Under 500 Pounds

There is but one field for the cyclecar, and that is in the simple light class. The car should not weigh over 500 pounds, and should have a low gear ratio to the motor. This motor can be back of the rear seat and connected to the solid axle by a chain and motorcycle clutch on the motor shaft, without gearset. If there is a gearset it must be friction or its equivalent, light and very cheap; but exceptionally well built. The body should be very light, and be a single seater with perhaps a spare folding seat for a passenger when wanted. All of this must be on the basis of ultra simplicity and the selling cost must not be over $275, preferably to be paid on the installment plan. It would then appeal to a class between the motorcycle and light car and have a niche to fill.

To build this car certain things must be done, however. In the first place motors must be simplified. A V-type motor should be simpler than a four-cylinder, but at present they have more complication instead of less, due to the built-up crankshaft and the crankcase constructions. If the extreme of simplicity is sought the two-cycle motor should be thought of in the single-cylinder or two-cylinder type, as this is the cheapest of all to build and with friction drive should be flexible enough for a $250 car.

Simpler types of car are possible, and probable, and will have as wide a field of sale as the motorcycle and probably much wider.

Large Registrations in Indiana and Ohio

INDIANAPOLIS, IND., June 27—The Indiana Secretary of State is now issuing motor car licenses at the rate of 150 a day, and most of these are going to rural districts and small towns. There were 53,511 motor-car licenses issued from January 1 to June 15, inclusive. In 1913 there were about 45,000 licenses issued. Licenses on second-hand cars are being transferred at the rate of from ten to twelve a day.

According to a report issued by J. A. Shearer, state registrar of automobiles of Ohio there were 102,000 automobiles registered up to June 16. Chauffeurs to the number of 3,700 had been registered. Registrar Shearer estimates a registration of 115,000 automobiles, 25,000 motorcycles and 10,000 chauffeurs.

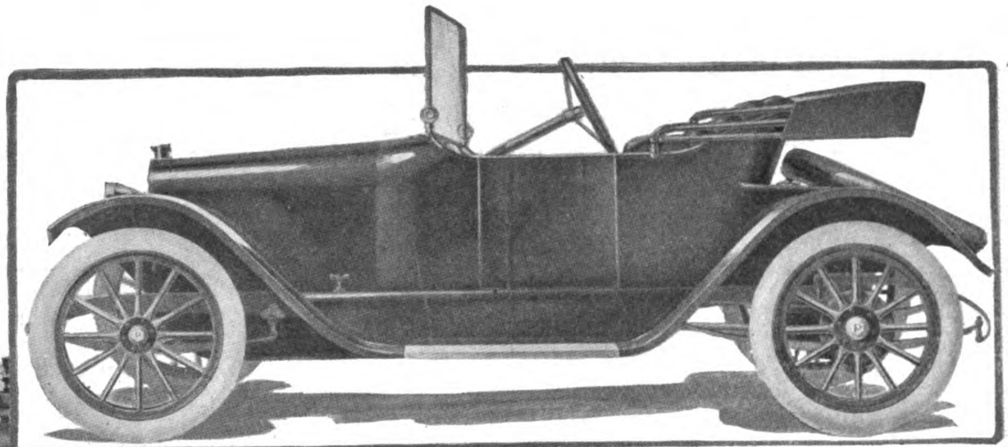
Iowa's 1914 Car Valuation, $115,000,000

DES MOINES, IA., June 27—Iowa will have $115,000,000 invested in automobiles at the close of the year 1914. This is the estimate of the state automobile department from figures compiled on the basis of registration to date. This will mean that the automobile wealth of the state will be just twice as great as it was in 1913. Over 86,000 automobiles already have been registered in Iowa this year. The entire registration for last year was only 65,000. Thus the number already registered for 1914 is 21,000 in excess of the total for 1913. State officials make a conservative estimate based on former years that the total registration for this year will be 115,000. If the average valuation is $1,000 the total value of all the cars in the state will be $115,000,000.

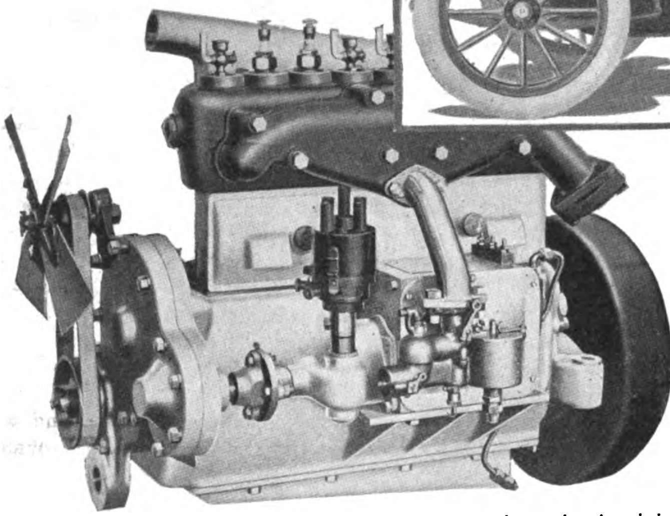
PONTIAC, MICH., June 27—J. Ward Robbins, formerly with the General Motors Co., of Detroit, and Pontiac, will open the first garage in Clarkson, Mich., this week. He will secure the agency for a medium price car.

$495 Partin-Palmer Has Generator

New Streamline Roadster Has Full Equipment, Three-Speed, Gearset and Self-Starter for $75 Extra



New Partin-Palmer two-passenger roadster



Right side of motor, showing generator, unisparker, simple piping and suspension arms

FOUR hundred and ninety-five dollars is the rather astonishingly low price of the new Partin-Palmer runabout with two-passenger body, considering that this figure includes a Gray & Davis lighting system, electric horn, windshield, top, tire case and tools. The car is equipped with a graceful streamline body, has a four-cylinder motor rated at 22 horsepower and it is stated that the machine will travel from 30 to 35 miles on a gallon of gasoline. It is to be known as model 20 and is designed for the 1915 season. It is made by the Partin Mfg. Co., Chicago, Ill.

Left drive and center control are used and another feature is the listing of a Gray & Davis self-starter at $75 additional. Double electric headlight bulbs, controlled from the cowl board are used and the tail light has a small electric bulb.

The motor is a clean-cut design with the four cylinders, which are of the L-head type, cast in a block. The bore is 2.75 inches and the stroke 4 inches. The intake and exhaust manifolds are, however, cast separately. The valves are inclosed and the piping is simple, which not only gives a neat looking motor but allows easy access to the valves. Three-point suspension is used, one point at the front and two at the rear.

Ignition is furnished by an Atwater Kent Unisparker that is supplied with current either from the generator or the storage battery. The Unisparker and generator are both located on the valve side of the motor and are driven from a single lay shaft. The shaft of the Unisparker is vertical and it is driven from the lay shaft by means of a pair of bevel gears.

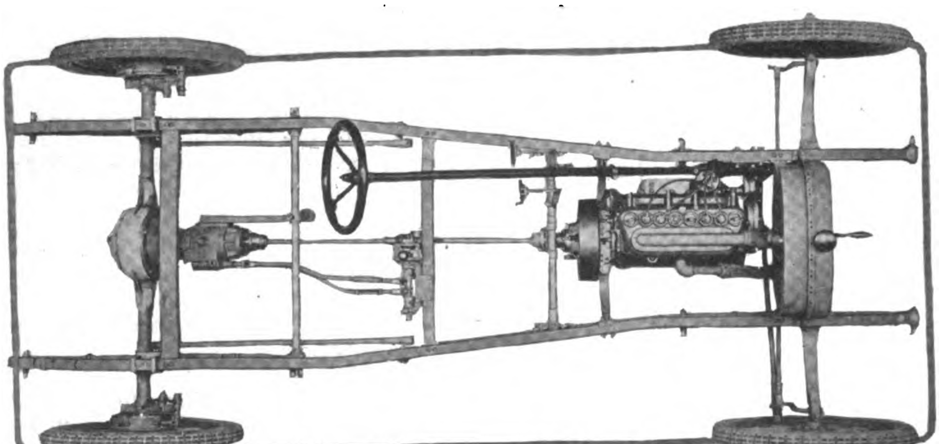
The crankcase is an aluminum casting and carries the crankshaft which is a drop-forging, made from heat treated carbon steel. The camshaft is also a drop forging, made in one piece. All reciprocating parts are carefully balanced to reduce vibration to the minimum.

Lubrication is by a combination splash system in which oil is provided by a plunger pump.

Cooling is effected by the use of a thermo-syphon system in connection with a honey-comb radiator and ball bearing belt driven fan.

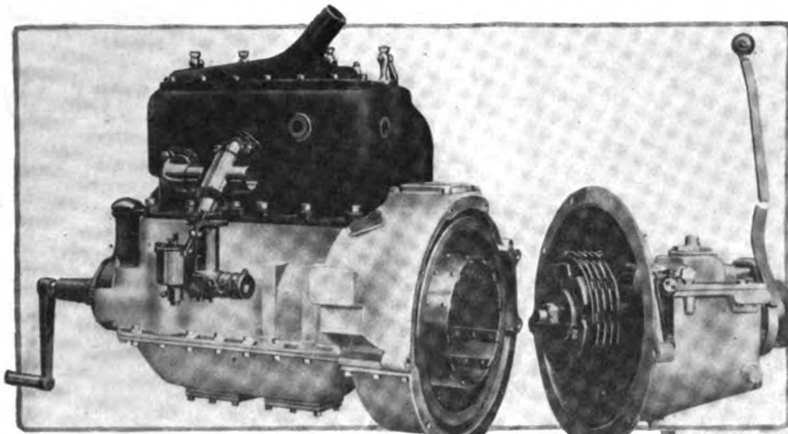
Drive from the motor is taken by a leather-faced cone clutch which is held in engagement by four coil springs. Access to the gearset on the back axle is readily had through removable side covers. Chrome nickel gears are employed and the shafts turn on annular ball bearings. An adjustment is provided for setting the driving pinion into proper mesh with the big bevel gear and there are adjusting nuts on the shifting rods.

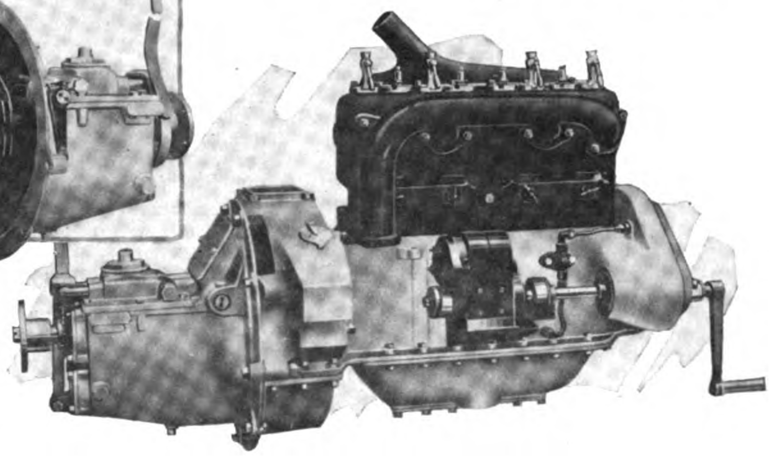
As already stated, the rear axle is a full-floating design the weight being carried entirely on the axle housing and the drive shafts merely turning the wheels. The drive shafts are made from nickel steel and heat treated. Annular ball bearings are supplied at the outer ends of the rear axle, while Hyatt rollers are used on either side of the differential. The end thrust is taken care of by ball bearings.



Plan view of chassis, showing suspension of motor, cone clutch and integral gearset and rear axle

Stewart Has Unit Power Plant





Intake side of motor used in new Stewart truck, showing unit power plant construction, center control and multiple disk clutch. At right, exhaust side

IN bringing out its 1915 model, 30-horsepower, 1500-pound delivery truck, the Stewart Motor Corp., Buffalo, N. Y., has simplified it in many ways, made it lighter yet stronger, and more economical to operate.

To begin with there are 500 less parts and by the use of refinements in the general motor and chassis design 25 per cent. more mileage for the same amount of gasoline and oil is obtained.

A unit power plant with three-point suspension is now used, this construction embracing a four-cylinder motor, inclosed disk clutch and sliding gearset. Left drive and center control are continued. The frame side members have been made perfectly straight so that their strength is a maximum and the fitting of the body is also facilitated by this change. Thermo-syphon cooling has been substituted for pump-circulation and fuel economy and increased power are the result of water-jacketing the intake manifold.

One other change is noted in the cooling system. Last year the circulation of air through the radiator, which is mounted on the dash, was aided by fan spokes in the flywheel, but suction is now produced by a belt-driven fan. A glass windshield has been added to the regular equipment, thus not only giving protection to the driver, but adding to the appearance of the car. Aluminum panels have displaced wood in the body construction. A Westinghouse electric starting and lighting outfit is furnished as extra equipment.

A feature of the new truck is that all important units are quickly and easily removable.

Only one chassis model is manufactured, but it is equipped with many styles of bodies. The price of the chassis is $1,500 and the bodies are extra, varying from $125 to $850.

The motor is a Continental with the cylinders cast in a block and the valves are on the right side. The bore is 3.5 inches and the stroke 5 inches, and it is rated at 30 horsepower. The exhaust manifold is separate and has individual passages leading from the four cylinders. The carbureter is a Zenith and is situated on the left side of the motor, the intake passage being cored through the cylinder casting.

The oiling system is a force-feed, constant-level type. A plunger pump operated by an eccentric cam on the camshaft forces the oil to the various motor parts. Ignition is supplied by a Bosch DU4-2 situated on the valve side of the motor.

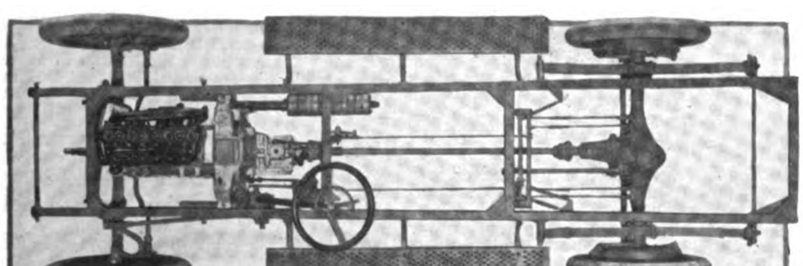
The clutch is a dry plate, multiple-disk type, contained in the flywheel, with one set of steel plates and another set of Raybestos-lined steel plates. There are nine plates in all and the surface is 230 square inches.

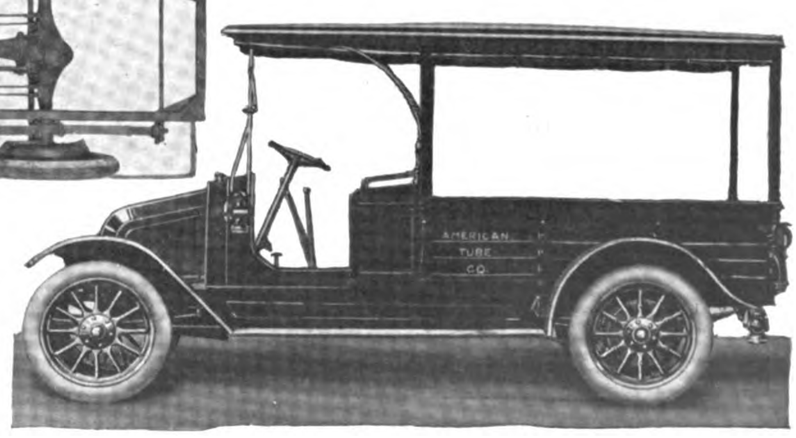
The gearset is a sliding type, affording three speeds forward and one reverse. It bolts directly to the bell-shaped housing that incloses the flywheel and clutch.

There are two universals in the drive shaft and the rear axle is a floating construction of Timken make. The gear ratio is 5.5 to 1. The front axle is also of Timken design.

The steering gear is a worm and sector which permits of bringing a new quarter of the worm wheel in contact with the worm when it becomes worn. A feature of the steering mechanism is a ratchet control on the steering post to prevent slipping due to road shocks and vibrations.

Semi-elliptic springs are used front and rear, and 34 by 4.5-inch pneumatics fitted with Firestone quick-detachable, demountable rims are standard. An extra rim with a carrier is included and also a tool kit, tire pump, jack and repair outfit.





Above—Plan view of chassis used in new Stewart truck, showing unit power plant, left drive and center control and simple construction. The new truck is said to have 500 less parts than the old model. At the right is shown the truck fitted with an open express body. Note housing of radiator in extension of dash cowl

Factory Miscellany

NEW Million-Dollar Factory—Work has begun on the $1,000,000 plant on Thomson avenue, Long Island City, for the American Ever Ready Co., a branch of the National Carbon Co., Cleveland, O., and it is expected to have the building completed and ready for occupancy by February, 1915. The structure will be 200 feet by 300 feet, and eight stories in height. It will be of reinforced concrete throughout with concrete floors, metal doors and window frames and will have over 500,000 square feet of floor space. The plant will give employment to 2,000 persons. The company's output of batteries, lamps, flashlights, speedometers, automobile starters and other automobile supplies amounts to about $5,000,000 per year. The company's plot, which is on the Degnon Terminal Co.'s improvement tract, occupies an entire block, 600 feet front on each Manley and Orton streets and 200 feet on Thomson avenue and Manley street. It is expected the plant will before many years be enlarged to take in the entire block. The plant at Long Island City will be made a distributing center as well as a main factory for the company's goods.

Auto Body Co. Adds—The plant of the Auto Body Co., Lansing, Mich., will be enlarged, permission having been granted for the erection of a three-story brick building.

Blood Bros. Will Enlarge—The plant of the Blood Bros. Machine Co., of Kalamazoo, Mich., will be enlarged, the addition to be used as the assembling plant for the cyclecars which the concern is now making.

Three Crescent Cars Built—The Crescent Motor Car Co., St. Louis, Mo., who about six months ago opened a factory there, has three stock cars ready for delivery. The name of the car has been changed from Crescent to Superior.

American Metal Products Co. Working—The American Metal Products Co., Milwaukee, Wis., organized recently to engage in the manufacture of bronze die castings, has started operations in part of the brass foundry of the defunct Wambold Mfg. Co.

Detroit Tire Plant in Springfield—The Detroit Pneumatic Tire Co. has been organized in Detroit, Mich., and will manufacture tires. The plant is now being erected in Springfield, Ill., but headquarters are for the time being at 915 Ford Bldg., Detroit.

Will Manufacture Rims—The Lookout Bending Co., Chattanooga, Tenn., recently organized, will soon be ready to commence operations near Sulphur Springs, Ga. The factory is now being erected in which automobile wheel rims and spokes will be manufactured. F. S. Baumgartner is president.

216,056 Goodyear Tires in April—During the month of April the Goodyear Tire & Rubber Co., Akron, O., produced a total of 216,056 pneumatic tires. Of this number 186,491 were automobile tires and 29,565 were motorcycle tires. The total number of automobile tires for the fiscal year, to the first of May, was 699,342.

Baltimore Co. Will Move—The Baltimore Hub, Wheel & Manufacturing Co., Baltimore, Md., has leased the Hitchens storage warehouse at Saratoga and Holliday streets, to which it will remove its factory for carriage, wagon and automobile wheels from its present location on Harford avenue, which it sold to the McShane Bell Foundry Co.

Miller Rubber's New Factory—The Miller Rubber Co., in Akron, O., has purchased the factory of the Frantz Body Co., which is located just to the north of the present factory. It is the plan to tear down the old buildings and erect a modern fireproof factory building. It is planned to build a new warehouse in the rear of the present factory building also.

Will Manufacture Springs—Springs for automobiles and other vehicles will be made by the Pallau Steel Co., which has been organized in Mt. Clemens, Mich., with a capital stock of $75,000, of which $60,000 has been subscribed. A. T. Donaldson is president of the new concern; A. J. Pallau, vice-president, and Clifton D. Jackson, secretary-treasurer. Mr. Pallau was during many years an official of the Detroit Steel Products Co.

Continues Ford Belt Manufacture—The C. & B. Hinson Co., Liddell and Grove streets, Cincinnati, O., has recently been purchased by E. P. and M. A. Zachman, who will continue to operate the company under its old firm name of the C. & B. Hinson Co. at 2717-2719 Webster avenue. The above parties will continue to specialize in Ford endless fan belts, which are made of linen and cotton fabric tape, put together by special machinery. They have equipped their factory with machinery that will enable them to not only make a four-ply but also a five-ply belt.

The Automobile Calendar

July 2, 3, 4.......Denver, Colo., 270-Mile Consistency Race.
July 3-4.........Tacoma, Wash., Montamara Festo Races, Tacoma Speedway Assn.
July 3-5.........Denver, Colo., All-Colorado Auto Derby. Denver Motor Club.
July 4...........Utica, N. Y., Hill Climb, Auto Club of Utica.
July 4...........Visalia, Cal., 150-Mile Road Race.
July 4...........Prescott, Ariz., Road Race, Prescott Auto Club.
July 4...........Sioux City, Iowa, 300-Mile Race, Sioux City Auto Club and Speedway Assn.
July 4...........Lyons, France, French Grand Prix.
July 4-5.........Chicago, Ill., Track Meet, Hawthorne Track.
July 13-14.......Seattle, Wash., Track Races, Seattle Speedway Assn.
July 25-26.......Belgium Grand Prix Road Races.
July-August.....French Army Truck Subsidy Trials.
Aug. 1-3.........Galveston, Tex., Beach Races.
Aug. 2-9.........Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16..........Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17..........Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22.......Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23..........Auvergne, France, Coupé de l'Auto Race.
Aug. 27..........Brooklands Track, England; Annual Automobile Race.
Aug. ....Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug. ....Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7.........Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8.......Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14........Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9..........Corona, Cal., Road Race, Corona Auto Assn.
Sept. 10.........Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15.......Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11..New York City, Commercial Tercentenary Celebration.
Sept. 26.........Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6...Berlin, Germany, Automobile Show.
Oct..............Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 7-17........New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2....S. A. E. European Trip.
Oct. 16-26........Paris, France, Automobile Salon.
Oct. 17-24.......Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21....Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26........Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31........Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
November ....El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14........London, England; Olympia Show.
Nov. 8-9.........El Paso to Phoenix, Ariz., Automobile Race.
November 8-11..Shreveport, La., Track Meet, Shreveport Auto Club.
November 15.....Paris, France, Kerosene Motor Competition.
Jan. 2-9.........New York City, Annual Automobile Show, Grand Central Palace.
Jan. 23-30.......Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in  the Industry

Motor Men in New Roles

MILLHOFF General Sales Manager—F. C. Millhoff, formerly tire sales manager of the Miller Rubber Co., Akron, O., has been appointed general sales manager.

Lynch General Manager—Leigh Lynch has become general manager of the American Top Co., Jackson, Mich., and Tilbury, Mich.

Booth with Universal Truck—N. Booth, formerly general manager of the Studebaker Corp., Detroit, Mich., is now with the Universal Motor Truck Co., Detroit.

Roark Appointed District Manager—J. F. Roark, formerly with the Cole concern, has been assigned as district manager of the St. Louis, Mo., district for Dodge Bros., of Detroit.

Spencer Gets Promotion—J. E. Spencer, of the Studebaker Corp., has been appointed assistant to First Vice-President A. R. Erskine, of the Studebaker concern, with headquarters in Detroit, Mich.

Willis Leaves National—P. P. Willis has resigned as advertising manager of the National Motor Vehicle Co., Indianapolis, Ind. He became a member of the advertising firm of Thompson-Carroll-Tripp of Cleveland July 1.

Arbogast Cole Manager—E. E. Arbogast has been appointed manager of the Cole Motor Co. of Missouri, St. Louis, to succeed Nelson W. Gotshall, resigned to take active charge of other personal interests. Mr. Arbogast formerly was connected with the Cole company at Indianapolis in both engineering and sales capacity.

Wagner with Century Electric—E. Wagner, an old-timer in the electric vehicle trade, has become associated with the Century Electric Co., of Detroit. He will direct his efforts in building up the efficiency of the sales and service branches in the national field and will organize a department for assisting dealers.

Clifford Sails July 8—J. E. Clifford, for the past 2 years representative of the General Motors Export Co. at the Buick factory at Flint, Mich., will sail from Vancouver July 8 on the steamer "Makura" for Sydney, Australia, to take general management for Australia and New Zealand. Buick business in this territory last year was about 1,000 cars.

Buffalo Electric's New Appointments—W. A. Zimmerman, formerly secretary and general manager of the Mercury Mfg. Co., has been made director of sales and publicity for the Buffalo Electric Vehicle Co., Buffalo, N. Y. F. C. Brown, formerly district manager for the Chase Motor Truck Co., has been made sales manager of the truck department of the same company.

Leaves for International Rubber Congress—Dr. K. J. Thompson, chief chemist of the Federal Rubber Mfg. Co.'s laboratories at Cudahy, Wis., recently left for Europe to attend the rubber auctions in Liverpool, Antwerp, Hamburg and London, also to attend the International Rubber Exhibition and Congress to be held in London June 24 to July 9.

Kiesewetter Houk Advertising Manager—The Geo. W. Houk Co., Buffalo, N. Y., announces the appointment of H. M. Kiesewetter, formerly of the Michelin Tire Co., as advertising manager and manager of its New York branch, located at the northeast corner of Fifty-eighth street and Broadway, from which office all Houk wire wheel business in Greater New York is being handled.

Jarrard on Western Trip—T. E. Jarrard, vice-president of Apperson Bros. Auto Co., Kokomo, Ind., is engaged in an extensive business trip through the West, visiting the largest distributers west of the Mississippi River. His desk at the main offices in Kokomo is being occupied by W. Carl Parker, of the Chicago branch. James Apperson, traveling representative of the company in the Great Lakes district, has assumed Mr. Parker's regular duties in the meantime.

Johnson Remy's Foreign Representative—The Remy Electric Co., Anderson, Ind., has closed negotiations with W. H. Johnson, 60 Haymarket, London, England, who will represent the Remy company in the capacity of manufacturer's agent in Europe. Mr. Johnson will also open a completely equipped service station to take care of all users and dealers of Remy products on the Continent.

Henderson Leaves Baker Co.—O. B. Henderson, sales manager of the pleasure car department of the Baker Motor Vehicle Co., Cleveland, O., on account of personal interests on the Pacific Coast which demand his constant attention will sever his connection with this company. Mr. Henderson leaves the latter part of this month to take up his permanent residence in Los Angeles.

Garage and Dealers' Field

King Co. Entertains Manufacturers—The King Motor Car Co., Detroit, is entertaining during two days at its cottages at Lake Orion, Mich., seventy parts manufacturers and other officials of the King company.

American Distributing Co. Moves—The headquarters of the American Distributing Co., general sales agent for automobile parts manufacturers, have been removed from Jackson, Mich., to the Goldberg Building, Woodward avenue, Detroit.

Bids on Richard Plant Opened—Bids will be opened soon by the Richard Automobile Co., Cleveland, O., for the erection of a large plant just off Broadway near the belt line railroad. The structure will be almost completely enclosed with glass. It is planned to have the plant completed in 3 months.

Michigan Building at Exposition—The Reo Motor Co., Lansing, Mich.; the Paige-Detroit Motor Co., the Fisher Body Co. and the Metal Products Co., all of Detroit, have each contributed $250 toward the fund for the construction of a Michigan building at the Panama exposition. These were the first large contributions received for the purpose.

Montreal's Record Shipment—What is believed to be the record for the number of automobiles taken on a single ship from Montreal will be exported on the Anglo-Egyptian steamer of the New Zealand Shipping Company when she cleared from Montreal on June 20. She took no less than 400 cars, including both runabouts and touring machines.

New Ford Service Bldg.—The Ford Motor Co., of Canada, Ltd., will build a general service building which is now in the course of construction in Montreal, Que. The building is of concrete construction, four stories in height, occupying a lot approximately 160 feet square, which would give a floor space of something over 100,000 square feet. It is expected that it will occupy the new building about the first of October.

Service Station to Be Opened—The Twombly Car Corp. is about to convert its four-floor experimental laboratory, which it has maintained at 258 West Sixty-ninth street for several years, into a service station. The experimental laboratory will be moved to the new Twombly factory at Nutley, N. J., at an early date. This laboratory is solely devoted to the inventing and testing of improvements for Twombly cars.

Westinghouse System on Dorris—The Westinghouse Electric & Manufacturing Co. announces that the Dorris Motor Car Co., St. Louis, Mo., has adopted the Westinghouse electric equipment for starting, lighting and ignition on 1915 cars. This equipment consists of a combination ignition and lighting generator together with a complete complement of switches, fuse boxes, junction boxes, and starting motor with switch and ammeter.

Co-operative Motor Delivery—Merchants of Waukesha, Wis., have decided to give a co-operative motor delivery system a 60-day trial. Charles Hamm, a dealer at Waukesha, who operates a motor truck line, is behind the scheme and has assured the merchants that he can effect a saving of 20 per cent. in their delivery costs. A central distributing station will be established and three deliveries will be made in the morning and two in the afternoon. This will be the first attempt in any Wisconsin city to test the merits of the co-operative system.

Oldsmobile Agent's Three Branch Stores—C. H. Larson, New York City, dealer in Oldsmobiles, has ordered a large number of the small four-cylinder cars from the factory, and in order to sell them he has hit on a plan new to Automobile Row. This is to establish three temporary showrooms in addition to his own in West Fifty-eighth street, where sample cars may be seen and where orders may be taken. One store is at the southwest corner of Fifty-seventh street and Broadway. Another is in the Hudson Terminal Building and the third is to be on a busy and prominent corner in the Bronx.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BOSTON, MASS.—L. M. Cotton; capital, $50,000; to deal in automobiles. Incorporators: F. E. Crowford, A. M. Cussen.

BOSTON, MASS.—Motor Economy Co.; capital, $10,000; to deal in automobile supplies. Incorporators: Philip K. Farrington, Newton, John W. Smith.

BROOKLYN, N. Y.—John P. Agnew; capital, $5,000; to deal in automobiles and supplies. Incorporators: Robert B. Agnew, John P. Agnew, Annie T. Maude.

CHATTANOOGA, TENN. — Forstner-Shackelford Co.; capital, $5,000; automobiles. Incorporators: Ernest W. Forstner, Chas. C. Shackelford, Chas. A. Ryerson.

CHICAGO, ILL.—Danielson Engine Works; capital, $50,000; to manufacture automobile parts and accessories. Incorporators: F. Danielson, E. T. Runyan, R. Williams.

CHICAGO, ILL.—Duryea Motor Sales Co.; capital, $100,000; automobiles. Incorporators: A. P. Cambell, V. H. Stackwell, J. E. Packer.

CHICAGO, ILL.—Flex-Spring Co.; capital, $5,000; to manufacture automobiles and sell automobile parts and accessories. Incorporators: Thomas R. Beman, Albert F. Mecklenburger, Ward B. Sawyer.

CHICAGO, ILL.—R. H. Lyon Co.; capital, $2,500; to deal in and repair automobiles. Incorporators: Franc D. Mayer, Selma G. Mayer, Walter Herschman.

CLEVELAND, O.—Jiffy Jack Co.; capital, $50,000; to manufacture and sell automobile parts and accessories. Incorporators: J. P. Engle, E. K. Harpster, M. F. Thompson, E. A. Edwards, N. B. Wildman.

CLEVELAND, O.—Packard Cleveland Motor Co.; capital, $40,000; to deal in automobiles. Incorporators: J. L. Cannon, C. W. Fuller, W. A. McIlrath, H. E. Werner, E. E. Linden.

COLUMBUS, O.—Swarts Carbureter Co.; capital, $50,000. Incorporators: M. A. Corbett and others.

INDIANAPOLIS, IND.—Comet Cyclecar Co.; capital, $20,000; to manufacture and sell cyclecars. Incorporators: F. P. Mertz, L. F. Mertz, W. H. Ogborn.

GREENSBORO, N. C.—R. G. Sloan Motor Co.; capital, $25,000; to deal in automobiles. Incorporators: R. G. Glenn, F. P. Hobgood, R. G. Sloan.

HAMILTON, ONT.—Wentworth Motors, Ltd., capital, $40,000; to manufacture motor cars and trucks. Incorporators: D. B. Wood, C. W. Heming.

HARTFORD, CONN.—Greenlief Mfg. Co.; capital, $35,000; to manufacture automobile parts. Incorporators: George J. Long, W. H. Greenlief, John R. Hays.

HUBBARD, O.—Hubbard Auto Repair Co.; capital, $2,000; to deal in and repair automobiles. Incorporators: S. D. L. Jackson, H. T. McCarthy, A. H. Howatt, N. S. Logan, J. Boshin.

INDIANAPOLIS, IND.—American Underslung Co.; capital, $50,000; to manufacture and deal in automobiles. Incorporators: O. M. Brown, A. W. Ogborn, E. Duncan.

NEWARK, N. J.—Boaræm-Nicholas Motorcar Co.; capital, $100,000; to deal in automobiles. Incorporators: R. R. Boaræm, Louis B. Thedand, J. Dykers Nichols.

NEW YORK CITY—Cook & MacConnell; capital, $1,500; automobiles. Incorporators: John MacConnell, Eugene T. Scudder, Benj. N. Scudder.

NEW YORK CITY—J. & P. Sales Co.; capital, $5,000; to manufacture motors. Incorporators: Jos. J. Miller, Walter L. Perley, Grace Feeney.

NEW YORK CITY—Physicians Automobile Co.; capital, $70,000. Incorporators: Geo. Maschke, Milton Elkan, Harry Elkan.

NEW YORK CITY—Meder-Staudt Co.; capital, $10,000; to manufacture and deal in engines, motors, etc. Incorporators: Philip F. Meder, Charles Meder, Charles Staudt.

NEW YORK CITY—William Woop Co.; capital, $25,000; to manufacture auto bodies, etc. Incorporators: Fernando Woop, Maurice A. O'Connell, Glenn M. Congdon.

NINEVAH, N. Y.—Ninevah Coach and Car Co.; capital, $15,000. Incorporators: George B. Raymond, Wm. A. Hyer, Frank L. Horton.

ORANGE, N. J.—Coppinger Motorcar Co.; capital, $5,000; to deal in automobiles. Incorporators: F. W. Coppinger, J. R. Monroe, Harry G. Dechant.

PERTH AMBOY, N. J.—New Era Auto Co.; capital, $50,000; automobiles. Incorporators: Alexander Conquest, Richard Henderson, Thomas Conquest, Perth Amboy.

RIPLEY, N. Y.—Burrows Cyclecar Co.; capital, $30,000; to manufacture cyclecars and novelties. Incorporators: J. W. Burrows, R. P. Burrows, Robert Burrows.

ROSSLYN, VA.—Carter Car Sales Co.; capital, $15,000; to deal in automobiles. Incorporators: Oscar A. Reed, W. C. Balderson.

SARANAC LAKE, N. Y.—Gray-Bellows Motor Co.; capital, $5,000. Incorporators: Earl L. Gray, Elbert E. Bellows, Fred T. Tremble.

ST. LOUIS, MO.—Car-Nation Motor Car Co.; capital, $10,000; to deal in automobiles and accessories. Incorporators: Odon Guitar, Frank B. Ottofy, Robert L. Guthrie.

ST. LOUIS, MO.—Champion Motor Car Co.; capital, $50,000; automobiles. Incorporators: A. R. Walton, O. A. Peters, F. D. McMahon.

ST. LOUIS, MO.—Vesper-Buick Auto Co.; capital, $50,000; automobiles. Incorporators: F. W. A. Vesper, Fred Campbell, F. E. A. Brock.

TORONTO, ONT.—Kel-Kee Cyclecar Co.; capital, $40,000; to manufacture power propelled vehicles, etc. Incorporators: J. J. MacLennan, J. N. Black, A. Adams.

WILMINGTON, DEL.—Cycle Car Co.; capital, $100,000; to deal in cyclecars.

GARAGES AND ACCESSORIES

BOSTON, MASS.—Motor Economy Co.; capital, $10,000; to deal in automobile supplies. Incorporators: Philip K. Farrington, John W. Smith.

BROOKLYN, N. Y.—Miller & Van Winkee; capital, $150,000; to manufacture metal springs and auto accessories. Incorporators: Clarence Miller, Edward M. Miller, Gilbert P. Brush.

BROOKLYN, N. Y.—Spencer Garage; capital, $5,000. Incorporators: James O. Spencer, Jr., Anne E. Spencer, Paul M. Weldmann.

BROOKLYN, N. Y.—Standard Garage; capital, $10,000. Incorporators: Domenico Saladino, August Quick, Auguste M. Quick.

BUFFALO, N. Y.—M. & M. Delivery & Garage Co.; capital, $20,000. Incorporators: George Roughhead, Reynold MacDonald, Maud MacDonald.

CHICAGO, ILL.—Alladin Electric Co.; capital, $10,000; to deal in electric and automobile merchandise, supplies, etc. Incorporators: Samuel P. Marmly, Jr., Norman C. Croshaw, Joseph Bonomo.

CLEVELAND, O.—Jiffy Jack Co.; capital, $50,000; to manufacture automobile accessories. Incorporators: J. P. Engle and others.

COLUMBUS, O.—Hubbard Auto Repair Co.; capital, $2,000; to deal in auto repairs. Incorporators: S. D. L. Jackson, H. T. McCarthy, A. H. Howatt, E. S. Logan, J. Boshim.

COLUMBUS, O.—Swartz Carbureter Co.; capital, $50,000; to make automobile accessories. Incorporators: E. A. Corbett, F. E. Stevens, R. J. Corbett, T. A. Swartz, L. S. Corbett.

DETROIT, MICH.—Johnson Co.; capital, $30,000; to manufacture automobile accessories. Incorporators: Walter R. Johnson, Chester T. Johnson, Irvin Long.

ELYRIA, O.—Cook Taxicab Co.; capital, $2,000; general taxi business. Incorporators: C. B. Cook, H. W. Ingersoll, F. N. Stetson, F. Vandermark, Frank Beebe.

E. ORANGE, N. J.—Reiss Starter Co.; capital, $200,000; to manufacture automobile starters. Incorporators: Charles Reiss, W. B. Riley, A. G. Causland.

JERSEY CITY, N. J.—Mutual Oil Co.; capital, $125,000; to deal in oils and other supplies for motor vehicles. Incorporator: E. B. Ryder.

JERSEY CITY, N. J.—Pell-Mello Horn Co.; capital, $3,000; to deal in automobile accessories. Incorporators: W. S. Myers, Helen Myers, F. T. Wentworth.

MOUNT VERNON, N. Y.—Jacob Norden Inc.; capital, $10,000; to deal in auto supplies, etc. Incorporators: Max Jaeger, Jacob Norden, Sarah J. Forden.

NEWARK, N. J.—Washington Park Garage Co.; capital, $125,000. Incorporators: Gussie Devine, Arthur Devine, Jr., Paul F. Devine.

NEW YORK CITY—Anthony Benofrio & Co.; capital, $2,000; taxicab and garage business. Incorporators: Giovanina Benofrio, Anthony Benofrio, Jr., Antonio DeFio.

NEW YORK CITY—Equitable Garage; capital, $1,000. Incorporators: Harry Thal, Elizabeth Selnick, Henry Selnick.

NEW ORLEANS, LA.—Acme Automobile Co.; capital, $18,000; to deal in and repair automobiles.

NEW YORK CITY—Motor Gasket Co.; capital, $10,000; to manufacture motor gaskets, auto accessories. Incorporators: Clarence H. Loewenthal, Paul H. Loewenthal, Ralph M. Loewenthal.

NEW YORK CITY—National Auto Repair Co.; capital, $3,000. Incorporators: Edw. N. Grossman, Albert F. Tins, Walter Peppin.

NEW YORK CITY—Safety Taxicab Co.; capital, $1,000. Incorporators: Francis W. Russell, Grace U. Una, Francis Rosenblum.

NEW YORK CITY—Spartan Tire and Rubber Co.; capital, $100,000; to deal in automobile tires. Incorporators: H. L. Graffe, H. Feuchwanger.

PONKA, OKLA.—Ponca City Garage; capital, $10,000. Incorporators: W. H. McFadden, J. B. Hinkle, B. L. Hobbs.

ROCHESTER, N. Y.—Independence Tire & Rubber Co.; capital, $5,000. Incorporators: L. Walter Lissberger, Henry L. Lewis, Frank H. Gross.

ROCHESTER, N. Y.—Fox Taxicab Co.; capital, $6,000. Incorporators: P. Rothenbuescher, C. F. Buehlte, J. T. Fox.

SEATTLE, WASH.—Pacific Rubber & Tire Mfg. Co.; capital, $25,000; to manufacture automobile tires and tubes. Incorporators: B. L. Gates, C. A. Kilbourne and others.

ST. LOUIS, MO.—Airplex Inner Tire Co.; capital, $3,000; to deal in automobile tires, etc. Incorporators: Richard M. Howe, James H. Howe, Stanton Palmer.

YOUNGSTOWN, O.—Auto Gas Service Co.; capital, $10,000; to deal in automobile supplies. Incorporators: J. P. McCombs, S. A. Daniels, W. R. Ludt, M. J. Daniels, A. K. Len.

CHANGE OF NAME AND CAPITAL

CHICAGO, ILL.—Motor Devices Co.; increase of capital from $3,000 to $25,000.

JACKSON, MICH.—E-C Clark Motor Co.; capital increased from $15,000 to $265,000.

JACKSON, MICH.—Lewis Spring & Axle Co.; capital increased from $350,000 to $750,000.

TOLEDO, O.—Universal Machine Co.; capital increased from $125,000 to $200,000.

Automobile Agencies Recently Established

PASSENGER CARS

Place	Car	Agent
Belvidere, Ill.	Maxwell	J. W. Fox & Son
Boston, Mass.	Lyon-Knight	F. H. Gross Co.
Corsicana, Texas	Maxwell	A. R. & M. J. Lewis
Denver, Col.	Havers	Auto Livery Co.
Elizabethtown, Ky.	Hupmobile	J. Hayden Igleheart
Flemingsburg, Ky.	Ford	Dudly Garage
Forest City, Ill.	Maxwell	J. H. White
Franklin Grove, Ill.	Haynes	W. L. Sheap
Green Bay, Wis.	Haynes	Conley-Judd Motor Co.
Hattiesburg, Miss.	Maxwell	Hunter's Auto Rep. Wks.
Holbrook, Ariz.	Maxwell	Chas. L. Rhoton
Hopkinsville, Ky.	Ford	Ideal Motor Co.
Manitowoc, Wis.	Haynes	Marcus J. Rappe
Meridian, Miss.	Maxwell	Payne & Stevens
Merrill, Wis.	Haynes	Norman Chilsen
Milbank, S. D.	Maxwell	R. A. Berkner
NewPhiladelphia, O.	Lewis	Herbert Urfer
Paris, Tenn.	Maxwell	D. L. Burton
Pontiac, Ill.	Haynes	J. P. Cook & Co.
Providence, R. I.	Lyon-Knight	Elmwood Garage Co.
Shelbyville, Ill.	Maxwell	M. O. Finks
Tupelo, Miss.	Maxwell	Tupelo Implement Co.
Waynesville, Ill.	Maxwell	James & E. L. Dagley
Winchester, Ky.	National	W. Gardner Redmon

COMMERCIAL VEHICLES

Place	Car	Agent
Alliance, Neb.	Hercules	Lowry & Henry
Alma, Neb.	Hercules	Frank R. Furse
American Falls, Idaho	Hercules	A. W. Davis
Auburn, Me.	Koehler	Chas. A. Kimball
Anaconda, Mont.	Hercules	F. M. Osbourne
Antigo, Wis.	Hercules	P. F Kelly

Place	Car	Agent
BerkleySpgs., W.Va.	Hercules	E. L. Johnson & Co.
Big Timber, Mont.	Hercules	Baily & Severance
Billings, Mont.	Hercules	Jas. L. Markham
Bottineau, N. D.	Hercules	Jacob Ohmart
Boulder, Col.	Hercules	Boulder Auto Co.
Brantford, N. D.	Hercules	Pattee & Prall
Bridger, Mont.	Hercules	W. E. Pinkney
Brush, Col.	Hercules	O. B. Fawcett & Son
Buford, N. D.	Hercules	W. W. Corbett
Cameron, W. Va.	Hercules	H. H. Pipes
CapeGirardeau, Mo.	Hercules	Jos. Lane
Carrington, N. D.	Hercules	G. C. Olsen
Casper, Wyo.	Hercules	Casper Mch. Shop & Gar
Chinook, Mont.	Hercules	J. C. Duff
Clark Summit, Pa.	Hercules	G. W. Secor
Cody, Wyo.	Hercules	Cody Trading Co.
Deer Lodge, Mont.	Hercules	Cockrell Com'l Co.
Denver, Col.	Hercules	Timpte Bros.
Dillon, Mont.	Hercules	T. J. Mulany
Dublin, Ind.	Hercules	John Newbold
Falmouth, Mass.	Koehler	Crocker Garage
Ft. Benton, Mont.	Hercules	McGinley & Allen
Ft. Collins, Col.	Hercules	George Campbell
Ft. Morgan, Col.	Hercules	O. H. McGrew
Florence, Col.	Hercules	H. M. Fox
Forsyth, Mont.	Hercules	L. W. Robinson
Frazee, Minn.	Hercules	Frazee Imp. Co.
Glendive, Mont.	Hercules	W. B. Smalling
Grand Junc., Col.	Hercules	William Murr
Grant, Ky.	Hercules	G. S. Walrath
Greeley, Col.	Hercules	Van Seckle & Co.
Havre, Mont.	Hercules	Havre Auto Co.
Helena, Mont.	Hercules	C. H. Fortman
Holyoke, Col.	Hercules	J. A. Paterson
Howard, S. D.	Hercules	S. T. Radcliff
Humboldt, S. D.	Hercules	A. S. Olsen
Jersey Shore, Pa.	Hercules	John C. Irvin
Kemmerer, Wyo.	Hercules	Up-to-Date Auto Co.
Kutztown, Pa.	Hercules	J. H. Stump
Lander, Wyo.	Hercules	Cole & Co.
Lavina, Mont.	Hercules	Phillips & Krueger
Le Sueur, Minn.	Hercules	Laurie Marx
Lock Haven, Pa.	Hercules	Ed. Bagley
Lone Wolf, Okla.	Hercules	Warren & Jamison
Loveland, Col.	Hercules	J. A. Benson
Lykens, Pa.	Hercules	S. G. Morton
Manchester, O.	Hercules	McCormick Auto Co.
Marble Rock, Iowa	Hercules	L. M. Smith
Mead, Col.	Hercules	Kitts & Ballinger
Miles City, Mont.	Hercules	Myers & Lindeberg
Mitchell, S. D.	Hercules	J. A. Naeve
New Orleans, La.	Koehler	Acme Automobile Co.
New Plymouth, Idaho	Hercules	A. Meyer
Paynesville, Minn.	Hercules	Witt Auto Co.
Peckville, Pa.	Hercules	Mid Valley Garage
Pine Bluff, Wyo.	Hercules	C. E. Carlstrum
Plains, Mont.	Hercules	C. C. Willis
Point Marion, Pa.	Hercules	A. S. Maple
Red Lodge, Mont.	Hercules	Edward Olcott
Rockport, Ind.	Hercules	Richards & Agnew
Rocky Ford, Col.	Hercules	C. J. Lackey
Sistersville, W. Va.	Hercules	Diamond Garage
Shinston, W. Va.	Hercules	Richardson Bros. Gar.
Springfield, O.	Koehler	Springfield Millwright Co.
Strattenville, Pa.	Hercules	M. M. Fairman & Son
Three Forks, Mont.	Hercules	E. C. Waddell

Accessories for the Automobilist

Mayo Electric Garage Pump—The Mayo Mfg. Co., Chicago, has put on the market a new design of electric garage pump, Fig. 1. The equipment consists of a two-cylinder pump, driven by .25-horsepower electric motor through silent chain drive. The pump is kept cool by a constant flow of water around the water-jacketed cylinder supplied from the water tank located over the electric motor. To eliminate any chance of burning out the electric motor by starting against too heavy a resistance an auxiliary tank is located under the pump. This is fitted with a check valve outlet with a hose which connects with the tire valve. It also is fitted with a pet cock which opens automatically when the starting switch is turned off. Consequently the motor is always started up against the pressure of the empty tank, permitting it to speed up before it encounters the heavy tire pressures. The outfit is mounted on a heavy oak base fitted with castors and the long handle is required for moving it about. Ten feet of electric wire, 12 feet of hose and a gauge are supplied. The oiling system is designed to prevent oil getting into the tire so that strainers or oil separators are not necessary. The outfit sells for $75.

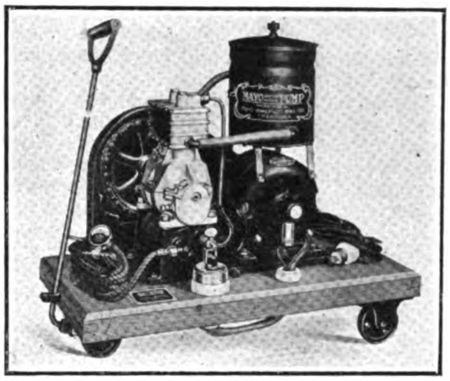


Fig. 1—Mayo electric garage pump

Auto-Comfort Robe.—There is no time that a good robe is more appreciated by the experienced motorist than in the heat of summer, for there is always the possibility of running into rainy weather or experiencing a cold spell, especially in the mountains, that will make a robe almost a necessity.

An interesting all-the-year-round robe is manufactured by L. W. House & Co., Gloversville, N. Y., and illustrated in Fig. 2. As a study of the illustrations will show, this robe can be used in many ways: as a foot warmer, lap robe, or chest protector, and in cold or rainy weather it can be made to completely cover the occupants so that it is not necessary to carry any other wraps.

When the robe is used as a chest protector, the hands, arms and chest as well as the lower part of the body are thoroughly covered and protected from the wind and cold, yet a slight jerk will instantly free each individual.

This robe, which is patented, is manufactured from fur, velour and mackinaw cloth.

In addition spring and summer weight comfort robes for dust protection, as well as warmth on cool evenings, are manufactured by this concern.

St. Louis Battery Charger—To make it possible to charge batteries from an alternating circuit such as is supplied to the ordinary incandescent lamp, the St. Louis Electrical Works, St. Louis, Mo., has announced a mechanical device, Fig. 3, which changes the alternating current into direct at a lower voltage.

Its operation is very simple. The plug provided with the battery charger is screwed into a convenient lamp socket and the current switched on and then the battery is connected.

The advantages claimed for it are that it will charge a dead cell in the proper direction, will not harm the battery by an overcharge, automatically gives the battery a tapered charge, is small and light, will operate on circuits of wide variation of voltage and frequency and does not cost much to run.

It is guaranteed to give satisfactory service and it may be returned if it does not do so.

The price for the 6-volt, 6-ampere size without ammeter to operate from a 100-volt, 60-cycle circuit is $20.

Smooth Cut Grinding Powder—The Smooth Cut Powder Co., Flint, Mich., is manufacturing a grinding and lapping powder for grinding automobile valves, lapping pistons and rings into cylinders and making gas and watertight joints. It contains no emery or metallic substances and does not adhere to the metal so that it can readily be washed off with gasoline or kerosene.

A particular advantage claimed for this compound is that only one grade is required for roughing and finishing. It retails for 40 cents per can.

Automatic Monkey Wrench—The Automatic Wrench Co., Boston, Mass., is manufacturing the Barnsley automatic wrench. This is a quick-acting wrench, which can be quickly adjusted to size and can be used with one hand. It opens automatically, locks automatically and is instantly adjusted. There are no screw adjustments of any kind. There are no teeth and no ratchet. The Barnsley is operated by placing the object to be turned between the jaws and pressing the jaw in until it strikes the object. The patent automatically locking clutch locks it in position. A slight pressure on the clutch and the jaw springs open.

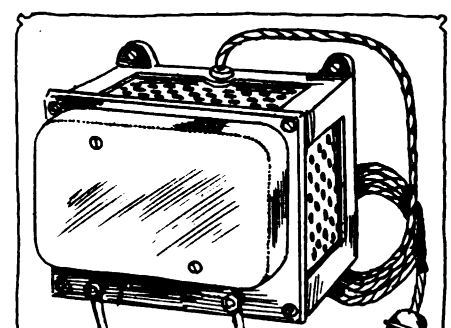


Fig. 3—St. Louis battery charger for charging storage batteries from alternating current lighting circuits

Fig. 2—The Auto-Comfort robe, showing from left to right, the foot pockets, its use as a lap robe, and method of making it into a chest protector

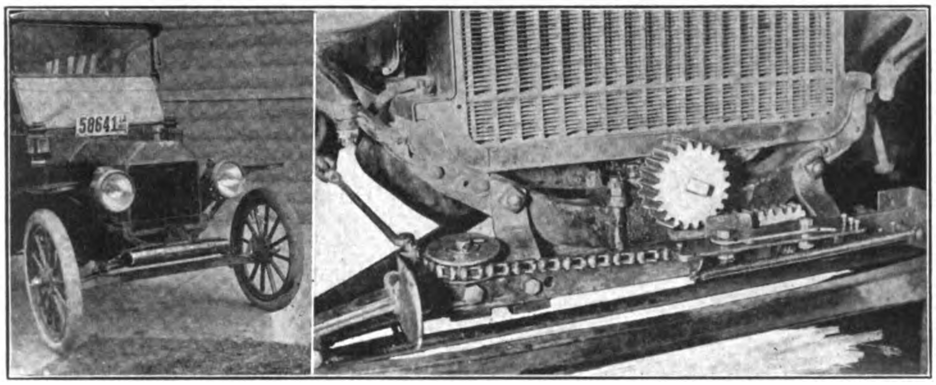


Fig. 4—Two views of Murphy starter, the left one showing its appearance on a Ford, and the right the rack and pinion mechanism which is actuated by a pedal on the foot boards

It is stated that it can be adjusted to one-thousandth of an inch. It is made in four styles, one of which is the S type.

Murphy Starter—For small cars, and especially Fords, a new starter, Fig. 4, is being put upon the market by the Murphy Starter Co., Ida Grove, Ia. It is a mechanical type in which the cranking force is supplied by the foot through a pedal located within easy reach of the driver's feet. Pressure on this lever operates a rack and pinion, the motion being transmitted from one to the other by means of a cable and a chain. The pinion replaces the ordinary starter handle and engages the crankshaft in the same way that the starting handle is engaged. The price of the device for Ford cars is $35 and for larger cars, up to $45.

One-Ton Electric Hoist—The Pawling & Harnischfeger Co., Milwaukee, Wis., is making a 1-ton electric hoist, Fig. 5, that operates on a mono-rail and which is designed to be propelled either by motor or by hand, as desired.

It is stated that it will replace from three to ten men and can be used with great advantage in handling motor and chassis assemblages, etc. It can be quickly installed as it is only necessary to attach the rail to the ceiling.

Another great advantage of the mono-rail system lies in its flexibility. It may be extended indefinitely and it can be made to reach out of the way corners and to cover irregular areas. Different tracks may be connected by means of switches and turntables.

M. P. Motor Tire Pump—The National United Service Co., Detroit, Mich., is marketing a two-cylinder power pump, designed to be connected to the motor car engine. The cylinders are 1⅛ by 1⅝ inches in size. The oil is prevented from getting to the tire by means of a patent air trap. The pump can be mounted by any garageman in any car at small cost, it is stated. Including hose and coupling, the pump costs $25.

Fuller Unit Gearset—Fuller & Sons Mfg. Co., of Kalamazoo, Mich., are now making deliveries of their new Model LV two-speed and reverse, unit power plant, sliding gearset and dry plate multiple disc clutch for cyclecars and similar light vehicles.

The transmission, complete with clutch, weighs only 24½ pounds, and will handle four-cylinder motors 2¾ by 4 and cars weighing up to 1,200 pounds. It has an aluminum case made of the best quality of No. 2 aluminum alloy, hardened 3½ per cent. nickel steel gears, hardened and ground main and countershafts, single row annular ball and Non-Gran phosphor bronze bearings. A drop-forged yoke and hardened and ground yoke bar operate the sliding gear.

The six-facing clutch has the best grade of Raybestos facings which are riveted to saw blade steel discs. The discs are hardened and run with hardened steel pins. A ball thrust bearing with hardened and ground steel plates is used.

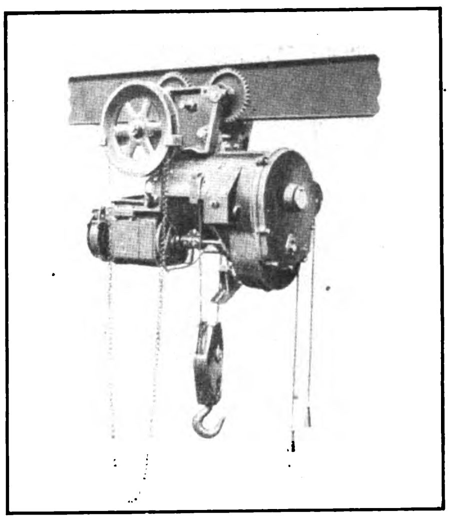


Fig. 5—One-ton electric hoist, which operates on a monorail. The one illustrated is propelled by hand, but the hoist can be motor-driven, if desired

The clutch has large wearing surface, which means long life with no trouble.

The transmission may be taken from the motor by taking out twelve bolts. Clutch and transmission covers may be removed with a screw driver.

With a 2 to 1 gearing on low speed the motor does not have to be raced in order to get into high speed. Also, on average hills this gives a good reduction, which allows a good car speed with a moderate motor speed. This adds much to the comfort of passengers. It also saves wear and tear on the motor and saves gasoline. By having a clutch with large slipping area, a start can be made from either high or low speed under nearly all road conditions. Low speed is used only for starting and in very bad places or on steep hills.

Koklip Mats—F. Cortez Wilson & Co., Chicago, Ill., has recently put on the market a high grade fiber door mat, Fig. 6, that is readily attached to any running board by means of strong tempered steel springs which project underneath and clamp tight. It can be readily removed when desired. Another style with a heavy steel frame all around is also manufactured.

The mats are made in three sizes: 8 by 14, 9 by 16 and 10 by 14 inches, and the price with heavy steel frames is $3.50 each and with clips and spring ends, leaving sides exposed, the price is $2.50.

For preserving the appearance of running boards on demonstrating cars clips and springs for rubber matting are sold for $1.25.

Zone Asbestos Brake Lining—Brake linings by mail is the novel method the Zone Asbestos Brake Lining Co. has adopted for marketing its product. In this way the brake lining goes right from factory to owner and can thus be retailed at a minimum price.

The brake lining is closely woven and is composed of 95 per cent. asbestos. It is stated that it is oil, water, grease and heat proof. Brake linings, complete with rivets, for Ford cars, with postage prepaid, sell for 70 cents, and an idea of the prices of the other linings can be obtained by quoting the 2 by 3/16-in. lining as an example. This sells for 30 cents a foot.

Miller Safety Always Book—A small booklet has recently been issued by the Miller Rubber Co., Akron, O., on the interests of safety, the title of the book being "Safety Always," and the rules to be observed for safety in various cities are given.

Connected with traffic ordinances covering cities in Ohio, New York, Pennsylvania, Indiana, Michigan and Illinois there are special pages devoted to care in driving, rules covering road rights, hints on the prevention of nuisance committed by joy riders and thieves, police traffic signals and the "Twelve Commandments" of driving.

Harwood Cigar Lighter—A combination cigar lighter and cutter for use on motor cars is being marketed by C. F. Harwood, Boston, Mass.; this lighter requiring slight pressure with the thumb for cigar clipping and turning on of the current. The burner then is ready to light the cigar. When the finger is released current is automatically shut off. The lighter, as it is marketed, comes equipped with hook and eye for fastening and 6 feet of cord with plug attachment. It sells for $2.50.

Sturges Shock Absorbers for Fords—The Pacific Leather Works, Oakland, Cal., is marketing a special coil spring type of shock absorber for Ford cars. This consists of a barrel type absorber interposed between the engine spring and the axle. It is constructed with steel drop forgings and the smoothers add 36

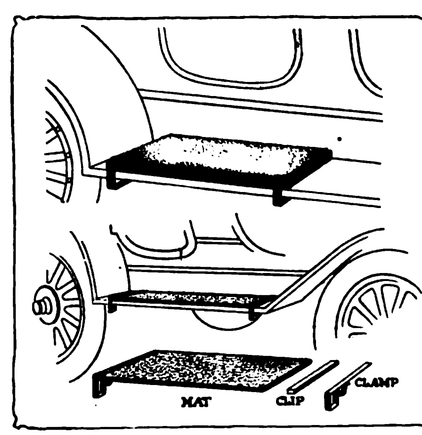


Fig. 6—Koklip mats. The upper view shows a mat with a heavy steel frame running all around it, the middle one shows the mat held by clips, and the lower illustrates the various parts comprising the clips

feet of chrome vanadium ribbon spring to the Ford suspension. It is said to be very easy to apply as no drilling or fitting is necessary. Twenty-five dollars is asked for a set of four.

Abco Lite-Controller—A device, Fig. 7, that serves to prevent an excess of current passing to the lamps whenever the motor is raced on those cars wherein magneto current is used for lighting, has been brought out by the American Battery Co., Chicago, Ill. It is called a Lite-Controller. This device is especially adapted to Ford machines.

In its construction a choke control is employed which generates a back pressure, low in amount at normal speeds but sufficient under high speed to prevent the burning out of the lamps by automatically choking the volume of the current. Under normal operation the device, due to its low electrical resistance absorbs but a nominal amount of current and the brilliancy of the light is not affected.

Means for controlling the current within a considerable range are provided for the reason that some magnetos are stronger than others, and it is not feasible to have the same adjustment for all. When the lever is at the extreme left, or on the first button, the current is entirely off. Normal operation is secured and proper control maintained when the button is at the extreme right. On the second button the maximum checking effect is had and when the magneto current is to be conserved or the headlights dimmed the lever may be put on this button. To meet all magneto conditions three additional steps are provided.

The Abco Lite-Controller is simple in construction, all-metal and is neatly finished. It takes up 3.375 inches on the dash board or cowl and is mounted the same as the ordinary two-point lighting switch which it supplants. The connection posts pass through the dash and to these the connections should be made, one wire running to the magneto and the other to the lights.

J-M Shock Absorber—An inclosed spring type of shock absorber, Fig. 8, that is designed to replace the spring shackles has recently been brought out by the H. W. Johns-Manville Co., New York City. These shock absorbers are to sell at $15 per pair and are made for cars up to 3,500 pounds. For use on Ford cars, the shock absorber will be supplied with a special spring perch to take the place of the Ford spring perch. At a little later date a J-M shock absorber for cars of over 3,500 pounds will be announced.

The construction of this device is extremely simple, employing a unique telescopic, volute compression spring of vanadium steel housed in a cylinder, the upper end of the cylinder being attached to the lower spring eye bolt and the telescopic member of the shock absorber, to which the spring is attached, being fastened to the upper spring eye bolt.

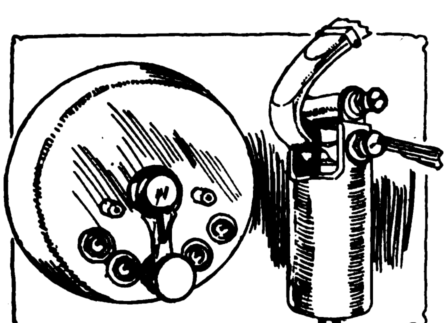


Fig. 7—Left—Abco Lite-controller for regulating the brilliancy of the headlights when the magneto is used as a source of current

Fig. 8—Right—J-M shock absorber for cars up to 3,500 pounds

Gould Storage Battery—Several detail improvements have recently been made in the storage battery manufactured by the Gould Storage Battery Co., 30 East Forty-second street, New York City. The new battery is illustrated in Fig. 9, in two forms.

The plates are of a special type which assures low internal resistance and the active material of the positive plate is said to be harder than that ordinarily used, thus wearing more evenly and making it possible to use a battery with little excess capacity.

A large settling chamber at the bottom of each jar provides for long use without cleaning and thick, rugged separators guard against short circuits. The pillar posts are copper reinforced and the connectors are of copper imbedded in lead so as to reduce the resistance between the cells. The arrangement of the cover is clearly illustrated. Each cell is inclosed by two hard rubber covers and an intermediate layer of sealing compound in adhesive contact with the sides of the jar. Sleeves of corrugated rubber provide some flexibility at the pillar posts, yet make an air-tight joint with the sealing compound.

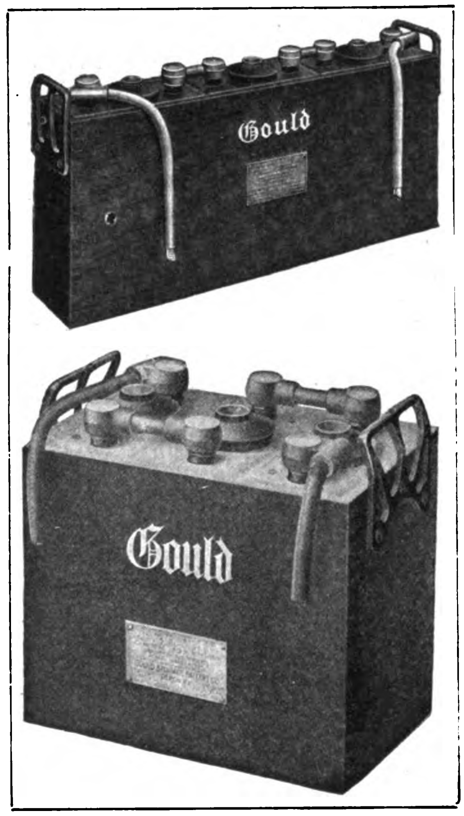


Fig. 9—Two types of storage batteries manufactured by the Gould Storage Battery Co., New York City

Integral with the lower cover is a large expansion chamber communicating with the interior of the cell and provided with a threaded cover. Leakage through the vent is guarded against by the inverted conical shape of the cap, and the removal of the cap provides for inspection and testing of the electrolyte.

The Gould battery boxes are made to the dimensions recently adopted as standard by the S. A. E. and are coated with acid-proof paint. An end-to-end arrangement is available which reduces the thickness to 4.5 inches in the largest size permitting the battery to be suspended between the chassis frame and the running board, concealed by an apron.

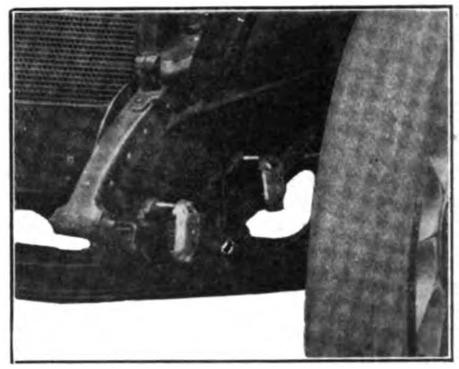


Fig. 10—Brown oil boxes attached to a half-elliptic spring

Brown Oil Boxes—To provide for the proper lubrication of the springs of the car the Brown Trafilog Co., Rose Building, Cleveland, O., has recently brought out a device called an oil box, which is designed to be attached to the springs, as shown in Fig. 10. One box is bolted on each side of each clip, and therefore on a three-quarter elliptic there would be three boxes.

The boxes contain pads which are saturated with oil and this works into the spaces between the leaves of the springs, loosens the rust and stops the squeaks, and also makes the car easier riding, it is stated. If the springs are very rusty the pads should be saturated with one-fourth kerosene, otherwise any ordinary light-weight oil should be used undiluted.

The clamps are attached to the sides of the leaves with the oil holes up and from 6 to 9 inches from the clip. Various sizes are made to correspond with the different sizes of springs.

Icy-Hot Bottles—Increased strength is the feature of the latest bottles manufactured by the Icy-Hot Bottle Co., Cincinnati, O. These bottles are insulated by a vacuum between the outer casing, which is made of metal, and the inner part, which holds the liquid, and is made of glass. The neck of the bottle is held in the metal casing by a rubber ring and at the base of the glass bottle there is a padded spring which absorbs the jars and jolts due to falling over and dropping.

Every Icy-Hot is guaranteed to keep hot liquids hot for 24 hours or cold liquids cold for 3 days, regardless of outside temperatures. Several convenient styles are made for the automobilist. A tourist style sells for $2.50 and $3.50 in pint and quart sizes when finished in nickel plate, and when leather trimmed they cost $1.25 and $2.25 extra. There are many other types, and in addition convenient cases for carrying two or more bottles are made.

Hinson Endless Fan Belt—At the low price of 25 cents the C. & B. Hinson Co., Cincinnati, O., is marketing an endless fabric belt for Ford cars. This belt is made of linen and cotton fabric tape, put together by special machinery. It is wound into a four-ply endless belt, then stitched with six rows of linen thread. It is said to be proof against oil, heat and water and will not stretch, and, furthermore, that it is three times as strong as a leather belt of the same thickness.

Search Sign Lamp—Every motorist knows how hard it is to read signs along the road at night, it generally being necessary to dismount from the car and grope one's way to the sign post and then read the directions by the uncertain light of a match.

To overcome this difficulty a lamp, Fig. 11, that can be clamped to the windshield or any other convenient place has been brought out. It has an adjustable swivel action and thus can be moved in any position and clamped there. A handle on the back facilitates its movement. It is lighted by electricity. The price is $10.

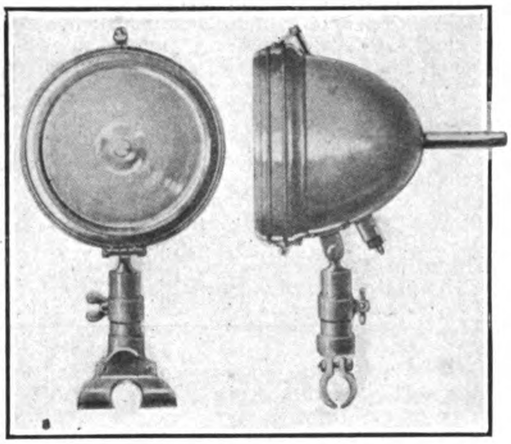


Fig. 11—Search sign lamp, which is for reading signs along the road

Isometric Sketching Paper—A specially ruled paper, Fig. 12, to enable the designer or draftsman to make sketches or drawings in isometric perspective without difficulty and without the necessity of understanding the principles of free hand drawing has been brought out by the N. W. Henley Co., New York City.

Shop details and assembly drawings can be quickly drawn on it and thus a great deal of time can often be saved because one drawing can be made to take the place of three. It also has the advantage that it is easier to understand a drawing in perspective.

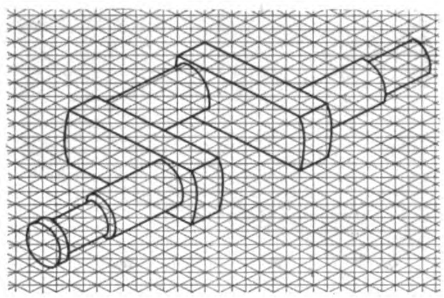


Fig. 12—Isometric sketching paper to enable a draftsman to make drawings in isometric perspective

Houdaille Shock Absorbers—Houdaille shock absorbers, made by Leuaous, Paris, France, and distributed in America by the Benz Automobile Sales Corp., New York, N. Y., operates on a principle identical with that of the recoil absorbing device used on cannons. The compensating suspension is made positive by a rotary paddle piston compressing castor oil and forcing it through by-passes provided for the purpose, the oil thus forced by abnormal pressure through the by-pass automatically deadens the jar. The recoil is eliminated by action of the oil being returned from the compensating reservoir by means of such. These list at $90 per set of four.

Spare Tire Holder—Patent papers have just been issued to Wilbur N. Urskine, Evansville, Ind., on a locking spare tire holder, Fig. 13, and is to be put on the market by him, manufacturing arrangements having been practically completed. The tire holder consists of a Y-shaped standard, which is bolted in an upright position to the running board or to the rear of the car, the ends of the wire taking the tire or demountable rim. A feature of the device is the locking arrangement by which a clamp is placed over the lower portion of the rim and held by a pin to the standard, which in turn carries the padlock, thus preventing theft of the tire.

F. & H. Drip Pan—A drip pan that need never be cleaned and therefore is especially adapted to garages and showrooms is announced by the Foss-Hughes Co., Philadelphia, Pa. This pan is in the form of a wooden retainer which holds a number of sheets of detachable oil-proof paper, as shown in Fig. 14. As each sheet becomes soiled it is removed the same as a sheet is torn off of a pad of paper, and in this way a clean surface is obtained without the necessity of cleaning the pan. The pan sells for $5.

Chicago Dimmer—To eliminate the glare of the headlights, and thus allow the motorist to use his headlights in the city without breaking the law and also to make driving in the country more safe for approaching cars and other vehicles and pedestrians, the Chicago Dimmer Co. has brought out a simple shutter device made of translucent material which can be easily attached to any lamp in 15 minutes by simply unfastening the reflector from the lamp door, inserting the Dimmer back of the glass and fastening the reflector in place again.

The Dimmer is opened and closed by a slight movement of a handle placed within easy reach of the driver and when closed gives a perfectly diffused light. The device has been approved by the Board of Motor Headlight Inspection, Chicago, Ill., and is sold for $7.50, f.o.b. Chicago.

El Arco Radiators—A pointed, V-type radiator for the Ford car is one of the specialties of the El Arco Radiator Co., New York.

Stickalite—Repairs or adjustments at night by the roadside are greatly facilitated when there is a good light to work by and acting on this idea the Premier Electric Co., 4048 Ravenswood avenue, Chicago, Ill., has put on the market an electric lamp with a magnetic base. The lamp is designed to be operated from the ordinary 6-volt circuit and will stick to any iron or steel surface. It weighs 3 ounces and the magnet has a pull of 50 times this amount so there is no possibility of the lamp not staying where it is placed. A sufficient amount of cord is furnished with the lamp and a standard Ediswan socket is provided. The price is $1.

Gray & Davis Book—A Little Journey Through a Great Factory, is the title of an interesting and instructive book that is published, for private distribution by Gray & Davis, Inc., Boston, Mass., manufacturer of starting and lighting systems, and electric lamps for automobiles. The book consists of 40 pages of half-tone pictures of the company's factory and presents in an interesting way the details of electrical instrument manufacture and in addition it shows the care that has been taken in providing a pleasant and healthful place for its employees.

Quick-Tite Patch—A patch, in the form of a roll 15 inches by 3 inches, placed in an air-tight, oil-proof, fibre case with a pair of shears, making a complete repair kit for inner tubes, is made by the Quick-Tite Patch Co., Amsterdam, N. Y.

To use the patch, clean the tube with gasoline in the same manner as when any patch is applied. Then cut off the proper sized patch and clean the prepared side thoroughly and press it into place with the fingers. Place the tube in the shoe and inflate to the required pressure. A permanent repair is the result and the hotter the tire becomes the tighter the patch sticks, it is stated.

The patch and the outfit that goes with it retails for $1.

M & M Bodies—The M & M Co., Cleveland, O., has for sale a limited number of new four-door, streamline bodies, already painted and upholstered. It is stated that it cost $350 to make these bodies and they are offered at $85.

The bodies are painted maroon, dark brown and dark green and are upholstered with genuine first quality leather, it is said. There is room under the front seat to accommodate a large tank and the cowl is arranged for the insertion of electric lights, speedometer, etc.

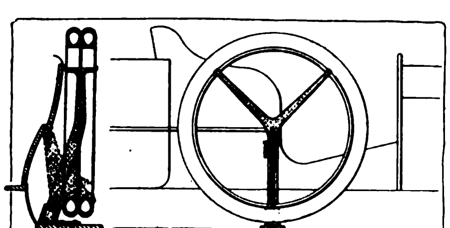


Fig. 13—Urskine spare tire holder

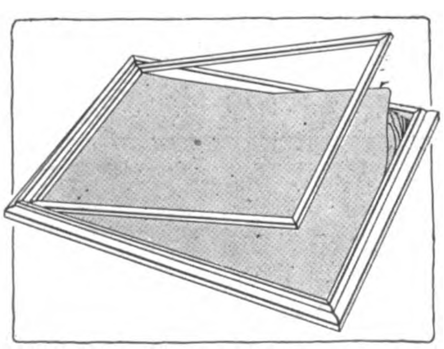


Fig. 14—F & H drip pan

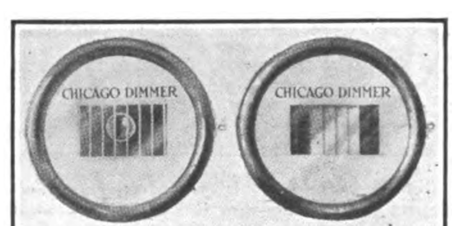


Fig. 15—Chicago headlight dimmer

VOL. XXXI — NEW YORK—THURSDAY, JULY 9, 1914—CHICAGO — No. 2

The AUTOMOBILE

Germany 1, 2 and 3

Mercedes Wins Grand Prix—Takes First Three Places—France Gets Fourth with England Fifth —Boillot Leads but Goes Out in Last Lap

By W. F. Bradley

LYONS, FRANCE, GRAND PRIX RACE COURSE, July 4—*Special Cable*—Germany today won positions one, two and three in the Grand Prix race, the road classic of Europe, defeating a dozen others of the greatest builders of racing machines in Europe and lowering the colors of France, which have floated victorious in French road racing for so many years.

Rarely before, in spite of its historic significance, has the name of Mercedes been higher in the motoring heavens than tonight, for three Mercedes cars flashed winners across the finishing line at the end of the 467.5-mile race over the tortuous 23.3-mile circuit located a few miles out of the city of Lyons.

Lautenschlager, who 8 years ago wrested the Grand Prix race from France in a Mercedes, today was winner, covering the distance in 7 hours, 8 minutes and 18 seconds, a speed of 65.55 miles per hour. His teammates, Wagner, one-time winner of the American Grand Prix race on the Savannah course, and Salzer were second and third. Peugeot was fourth, and the English sunbeam fifth.

The Race

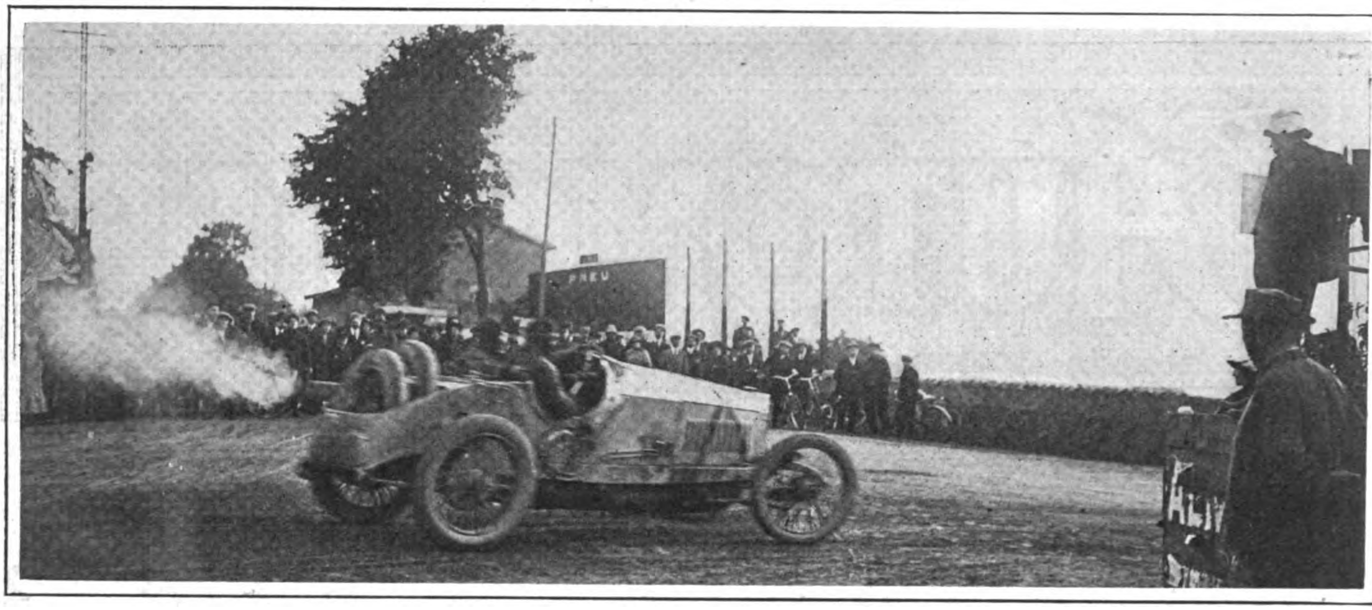
CAR	DRIVER	SPEED
Mercedes	Lautenschlager	65.55
Mercedes	Wagner	65.40
Mercedes	Salzer	64.8
Peugeot	Goux	64.4
Sunbeam	Resta	62.6
Nagant	Esser	61.0
Peugeot	Rigal	60.6
Delage	Duray	59.7
Schneider	Champoiseau	57.7
Opel	Joerns	56.5
Fiat	Fagnano	55.5

LAUTENSCHLAGER and Mechanician in Winning Mercedes

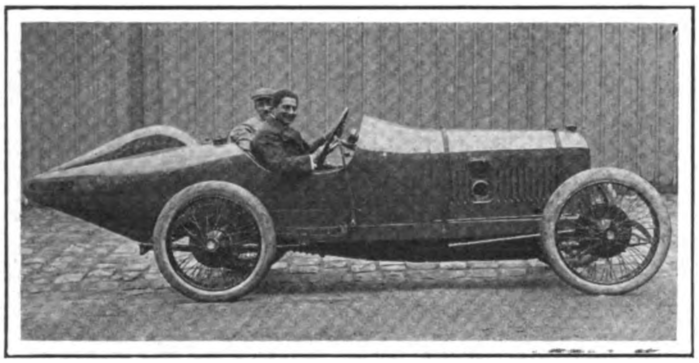
Today has been a clean sweep for the German eagle; in fact, never before has any one maker captured the first three places in so important a racing event.

The best France could do was to have Jules Goux land his Peugeot in fourth place 9.5 minutes back of Lautenschlager and a good 4.5 minutes back of the third Mercedes. It was no case of victory by a few seconds but by a clear margin of several minutes.

But if Mercedes cleared the slate, winning first three places it was not until after the eleventh hour that victory was hers and it was not until a few minutes before the finish that the 300,000 spectators around the course realized that the



Lautenschlager, the winner, sending his Mercedes around the Grand Prix course at top speed



Boillot on 1914 Grand Prix Peugeot

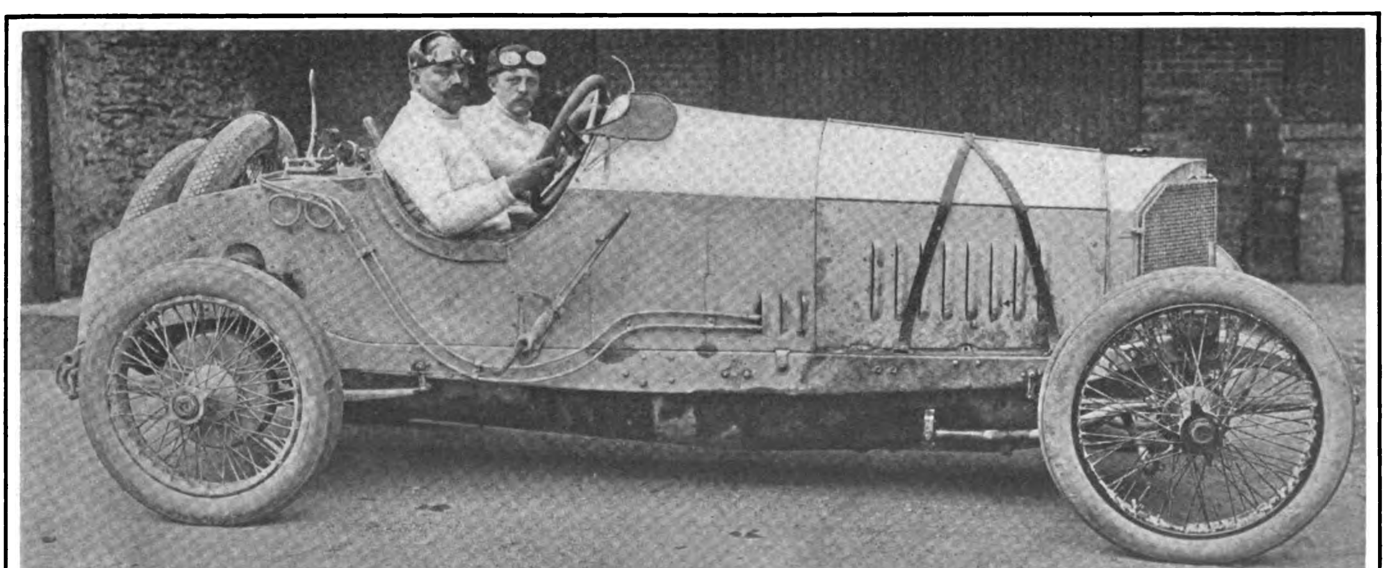
Tricolor of France was lowered and the banner of Germany floating in the zephyrs of victory.

Boillot, winner of the French Grand Prix last year and the year before, was looked upon as the hero today to again carry France to the fore, and his performance justified such expectation, but when half a lap, a short 10 miles from the finish, his Peugeot failed him, the motor broke down, and, heart-broken, he threw up both hands and withdrew.

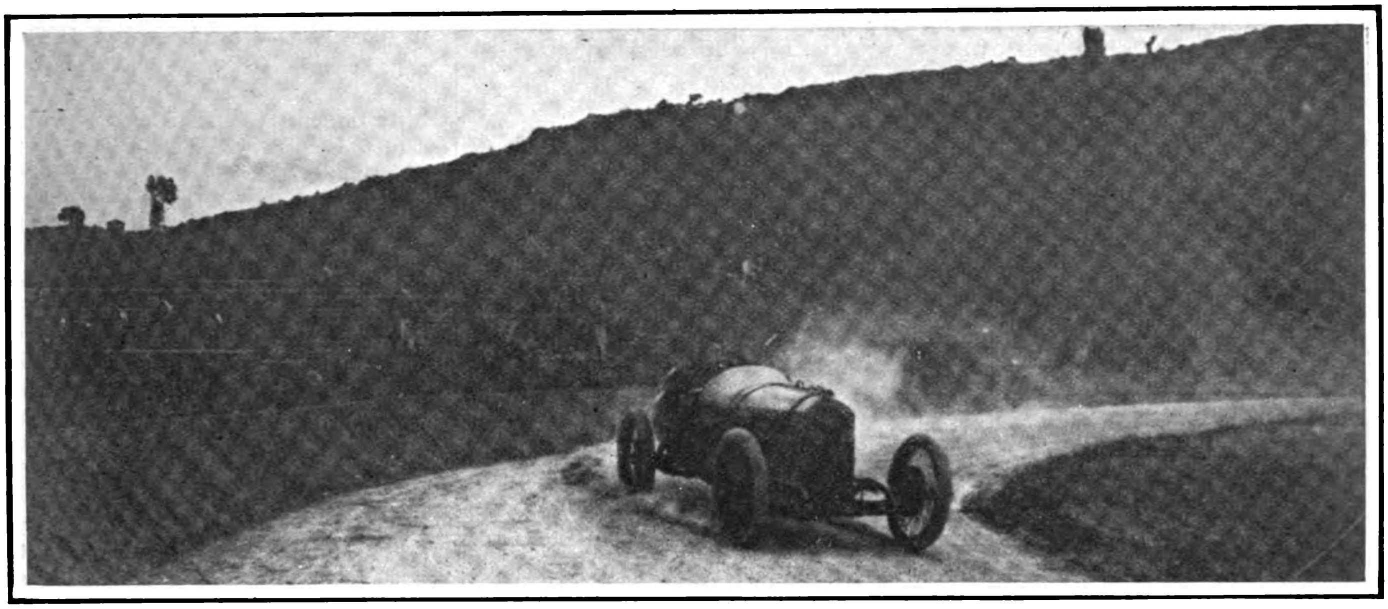
Boillot had fought with the desperation of a demon from start to finish, for not during a single moment was he free from the terrific onslaught of the five Mercedes cars. Every moment they used German wiles and German force to wear out the greatest road driver that France has produced since the days of Thery, who won three Gordon Bennett races in successive years. Boillot, a man of magnificent stature, and incomparable driving ability, fought the Germans off one by one only to fail when nearly through.

From the start Sailer, driving a Mercedes, set out to maintain a gruelling pace that would wear out any ordinary driver. For five laps, or over 110 miles he kept up the pace and led the field with less than 2 minutes lead on Boillot, who was third, and Duray in a Delage, second. Then Sailer dropped out and Boillot leaped into the lead, having passed the Delage in a few minutes.

When the race was half over, at 230 miles, Boillot was 1 minute and 14 seconds ahead of Lautenschlager, and his team-mate Goux had his Peugeot in third place a good minute ahead of Wagner in another Mercedes and Salzer in the third. At this time Pilette, driving the fifth Mercedes, was out, leaving the trio of Lautenschlager, Wagner and Salzer to worry Boillot and Goux.



Lautenschlager, the winner, in a winning Mercedes, photographed just before the beginning of the French Grand Prix on July 4



Boillot taking one of the sharp turns on the winding descent to the grandstands on the French Grand Prix course

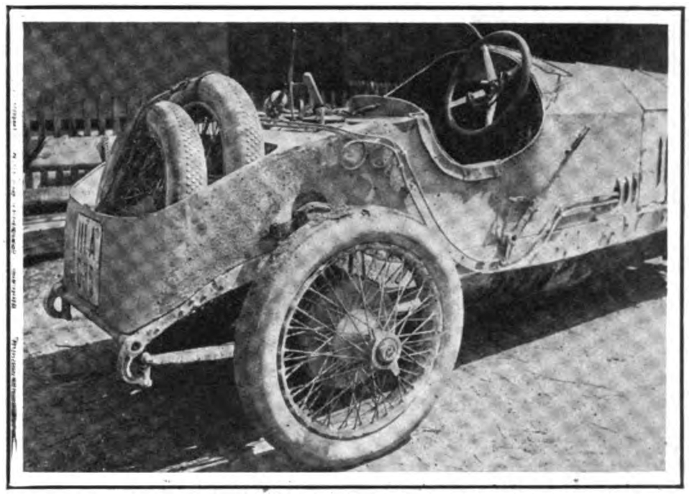
Still Boillot held the lead. Soon after the halfway point, Lautenschlager stopped for gasoline and oil, but instead of Goux stepping into second place as Boillot had hoped his teammate would do, it was the wily Wagner who had passed Goux and was second. A lap later when Wagner had to stop for gasoline and oil, as arranged, it was Lautenschlager who jumped into second position instead of Goux.

There was not a second of letup to the pressure of the German combination. The Mercedes trio fought along lines of a well-laid out plan.

Still Boillot hurled his Peugeot along, maintaining the lead lap after lap until the seventeenth arrived, and but three more had to be covered. For the first time in the race the situation of France became alarmingly critical. Boillot had but 14 seconds' lead on Lautenschlager, Wagner and Salzer were leading Goux, the other hope of France, and Delage, Schneider and other French cars were further to the rear. Peugeot must save the day or France be crestfallen.

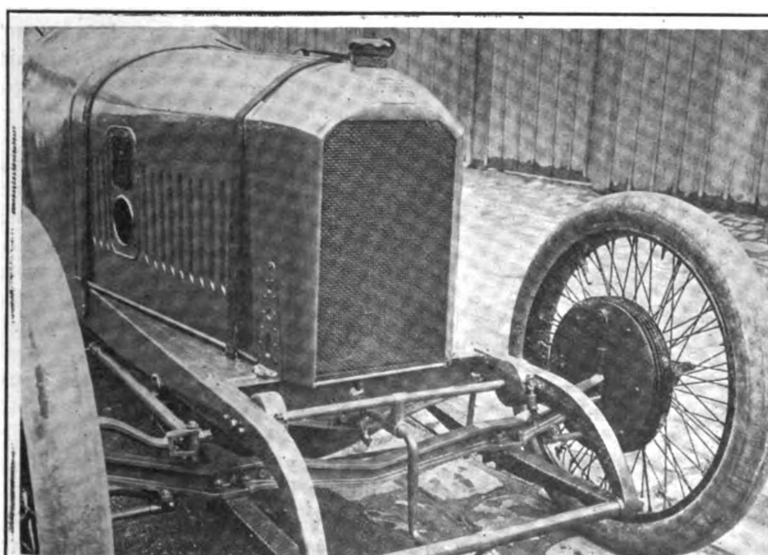
From the Peugeot pits was sent out the signal to Boillot to drive still harder: "Drive like hell" was the order. Boillot and Goux responded, but their herculean efforts failed.

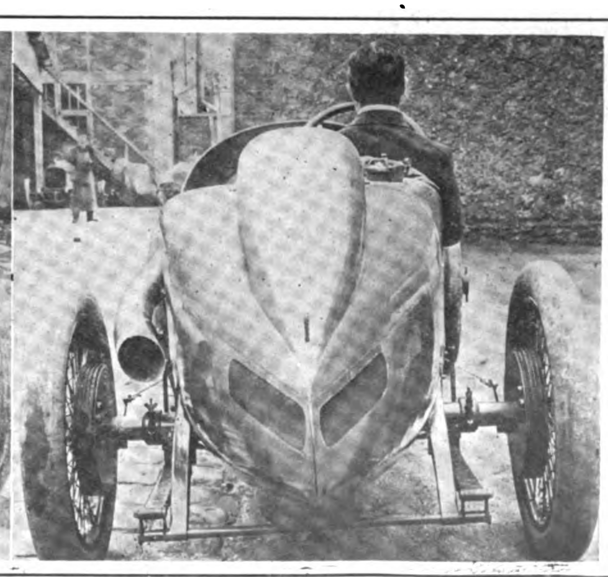
When the eighteenth lap was over Lautenschlager had pushed his Mercedes to the fore and had a clear lead of 33 seconds on Boillot.



Location of fuel tank and cradle for tires on Mercedes

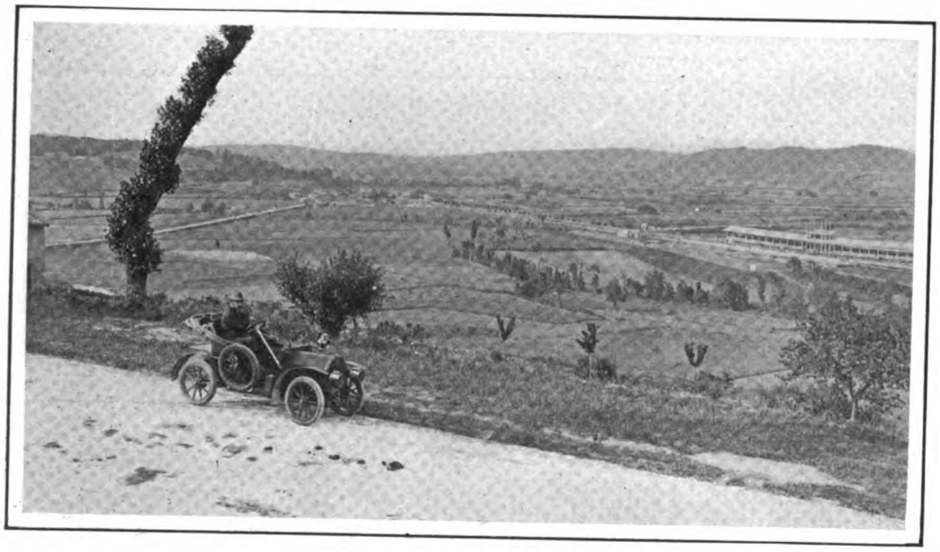
Once again the signals flashed from the Peugeot pit to Boillot to drive still harder. Boillot started into the nineteenth in good shape, but soon signals of distress came. His speed was failing, the motor was not up to par.



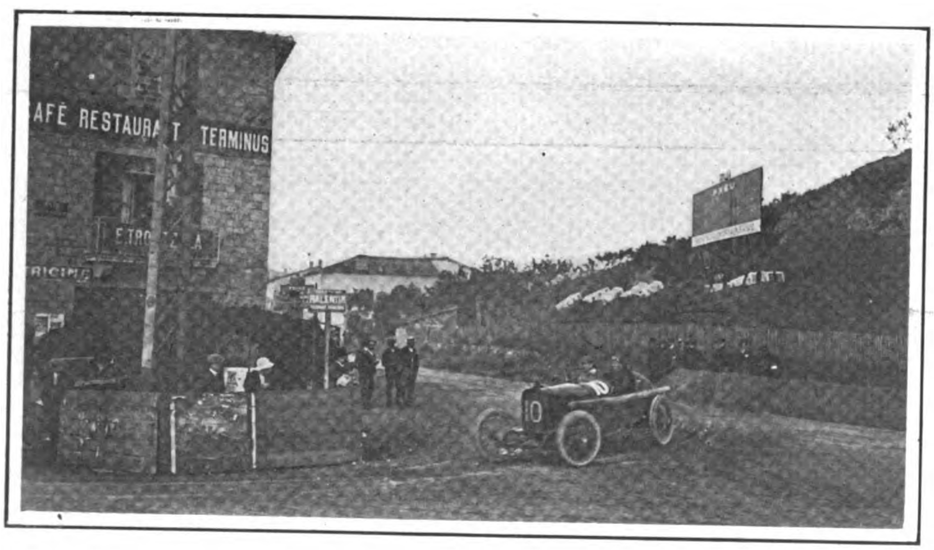


Left—Grand Prix Peugeot. Note underslung springs, front wheel brakes and false radiator fronts. Right—Rear of Goux's Peugeot

Fagnano in the Flat swinging around Death Corner on the Grand Prix course



View of Grand Prix course near end of third leg, and grandstand stretch



Jean Chassagne on the hairpin turn on the grandstand stretch

Lautenschlager was gaining. He jumped his lead to 77 seconds at the end of the nineteenth lap.

But one hope remained for France: "Would the Germans have tire trouble?" But the tire troubles did not come. Boillot, when half through his twentieth lap, was out. His motor broke down, nobody at this writing knows exactly why. Boillot withdrew to the side of the road and France's last hope was dashed to earth.

At the outset of the race it was evident that there would be a keen struggle between the Mercedes and Peugeot cars, and that the Delages would not be factors, although Duray was piloting one of the fastest of them.

Although victors tonight, the Mercedes team of five met two foemen in Boillot and Goux well worthy of their steel, and had the two Peugeot pilots been backed by three such other teammates as comprised the German team, it is questionable if the world would ever have seen a greater struggle. The Mercedes and Peugeot cars behaved admirably and their relative abilities on the road are well illustrated by the struggle which the grandstand witnessed between Lautenschlager and Goux in the fifteenth lap.

A Neck-and-Neck Race

Lautenschlager and Goux were almost neck and neck on the winding descent opposite the grandstand. Goux was slightly behind, but with his front wheel brakes he could approach the curves at a higher speed than the Mercedes. At Death Corner he was afraid to take the risk. At 150 yards farther on at the second bend he was within arm's length of Lautenschlager, but again he dared not pass him. The same thing happened on the third bend of the course. Finally the two racers reached the straightaway down stretch approaching Sept Chemins hairpin turn. Here Goux opened up the Peugeot to the full, and after running wheel to wheel for a few yards got ahead of Lautenschlager 20 yards before the turn was reached. Goux thus passed in front of the grandstand a couple of seconds ahead of Lautenschlager, but although he was leading in road position, he was still behind the German on elapsed time. It was not long before Lautenschlager again passed the Peugeot.

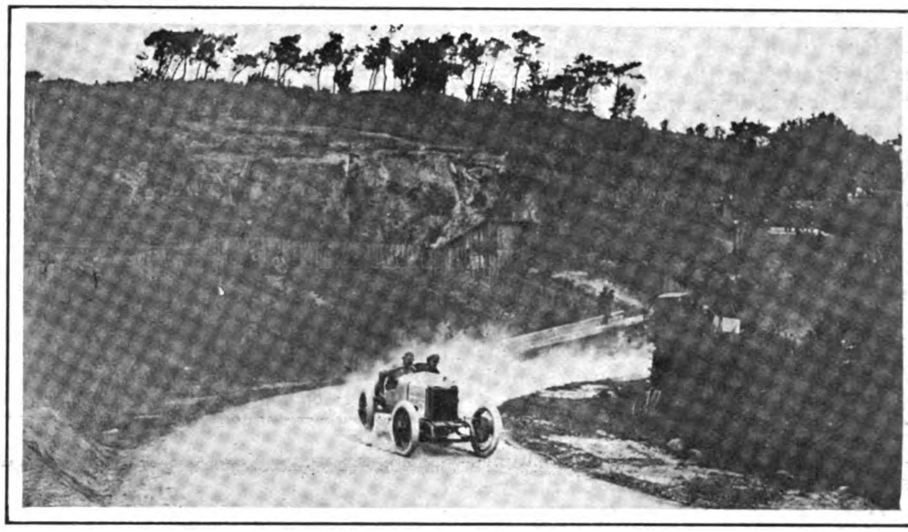
Germany Prevails

The three Germans drove a hounding race like this from start to finish, and by sheer might wore down Boillot and Goux, who were pushed as never before in a road race. The Mercedes drivers with three of them running so strongly could afford to take chances of which Boillot was afraid.

But little better fortune awaited Goux in the other Peugeot. On the last lap but one he lost third position to Salzer, driving the Mercedes, and finally came in fourth, exactly 9.5 minutes back of the winning Lautenschlager.

That but eleven of the thirty-eight cars to start were able to finish proved the gruelling nature of the struggle. Over 300,000 spectators watched the contest which was remarkably free from accidents from start to finish, only two drivers suffering slight injuries. One of these was Sisz, familiar to American readers as having won the first French Grand Prix in a Renault and having competed in American Grand Prize races on the Savannah course in a similar make of car. Today he drove an Alda and raced in hard luck throughout. He changed a radiator early in the race and later was working on a tire by the roadside when he was struck by one of the Opels. His shoulder was dislocated and he was severely bruised. The mechanician brought the car to the pits where it remained.

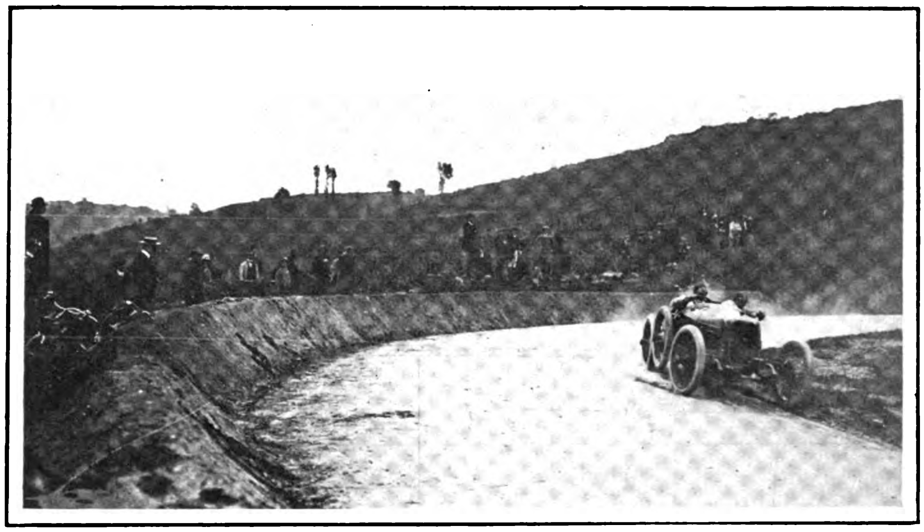
Tabuteau, in another Alda, overturned on a difficult winding stretch of the road, but was not severely injured.



Opel on hairpin turn near the grandstands on French Grand Prix course

Delage Fast in Trials

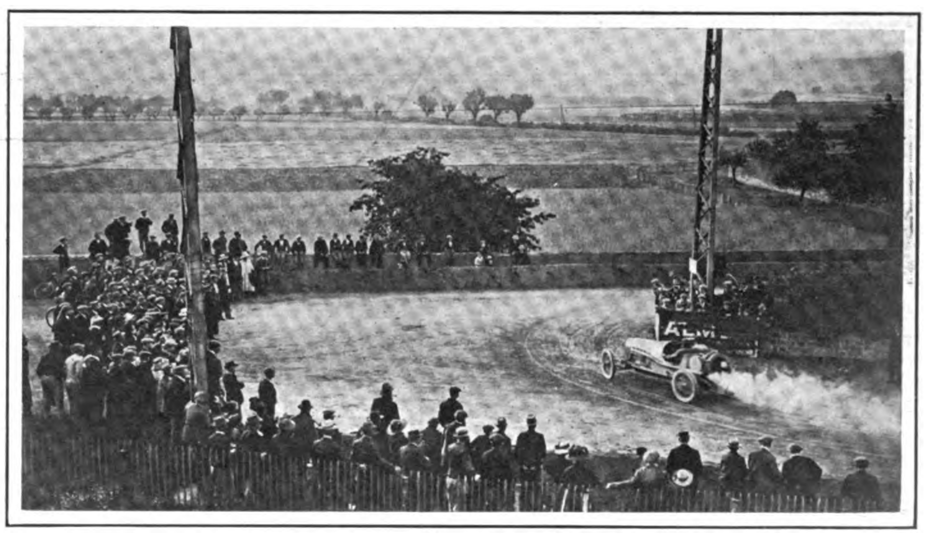
In the trials the Delage cars had shown themselves faster than the Peugeots and quite the equal of the Mercedes. They had been prepared with minute care. The race was scarcely started when it was seen that Bablot, one of the drivers, and the most reckless of the trio, had comparatively little speed. Guyot, one of the other Delage pilots, who recently won fourth place at Indianapolis, could not make more than a commonplace showing.



Bablot on the Delage swinging around the turn near the grandstands

Before the race all three of the Delages had experienced trouble with backfiring into the carbureters, and thinking to obviate this defect, which was supposed to arise from a slightly imperfect seating of the positively operated valves, which are opened and closed by cams, rather than the closing being effected by a spring, a new adjustment was made a few hours before the start of the race. This proved a costly error, for immediately the speed of the engine dropped and the engine power was cut down considerably. Bablot never got better than twelfth place, and Guyot once reached eighth position. Finally both Bablot and Guyot withdrew disheartened, two laps before the finish of the race rather than come in tail-enders.

This was the first occasion in which the Delage in a French race has failed to finish a complete team of three cars.

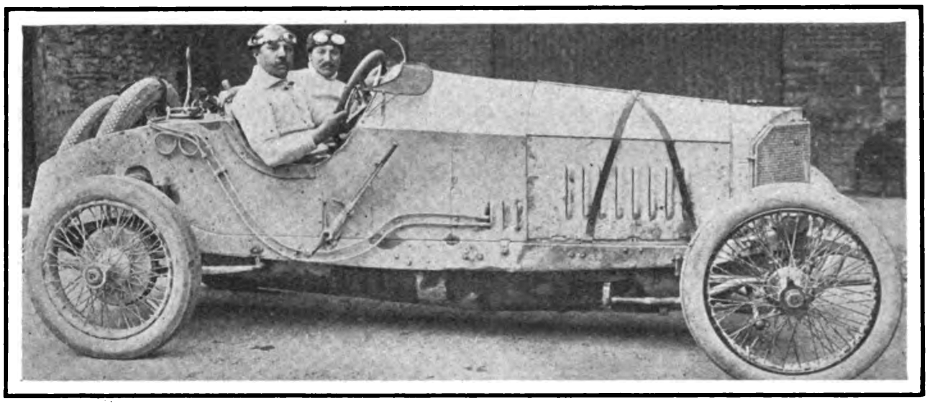


Scales on the Flat hugging the pole on Death Turn

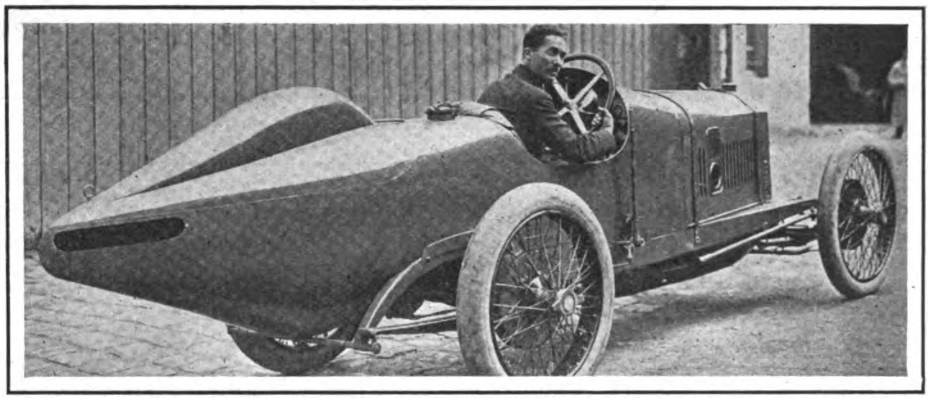
One English Finisher

England, represented by six cars, three Sunbeams and three Vauxhalls, had but one finisher of the eleven starters, Resta finishing in a Sunbeam in fifth place. The Vauxhall cars are considered the finest racing productions and represent the most up-to-date design, but they were too green for a contest of this nature. The cars and drivers were altogether unprepared for the race, and it was with difficulty that the cars were ready in time to be weighed in, and only 24 hours before the start of the race all three were completely dismounted. Ralph DePalma, the American driver, pilot of one machine, realized before starting that he had little chance of finishing. Hancock, driving one of the Vauxhalls, was more than 2 hours making the first lap, at the end of which he abandoned the race. Watson, one of the other drivers, required about the same time to complete the circuit and withdrew, leaving only DePalma, who struggled hard against fate, covering the first lap in 26:29, as compared with 21:11, the best time for the initial circuit, made by Sailer in the Mercedes. DePalma completed the second circuit in about the same time, was a little faster in the third and fourth, and after he had completed the fifth he pushed his car off to the side of the road.

The three Sunbeam cars made a better showing, and although Resta was but able to get fifth place, the Sunbeam was the third make of car to finish. When five laps, or the first quarter of the race was over, Guinness, driving a Sunbeam, and the winner of the recent Isle of Man road race, was in fourth position, scarcely 2 minutes behind Sailer, the Mercedes that was leading at that point, and ahead of Lautenschlager, Goux and Wagner. Chassagne, driving another Sunbeam, was in twelfth place, and Resta was further back. With the race half over, Guinness withdrew with a broken piston head, having held fourth position from the fifth lap until that time. Chassagne was forced out on the thirteenth lap when running in seventh place, due to a broken bolt on the end of a connecting-rod. The performance of Resta was a consistent one from start to finish. At the end of the first quarter he was below fifteenth place; when the



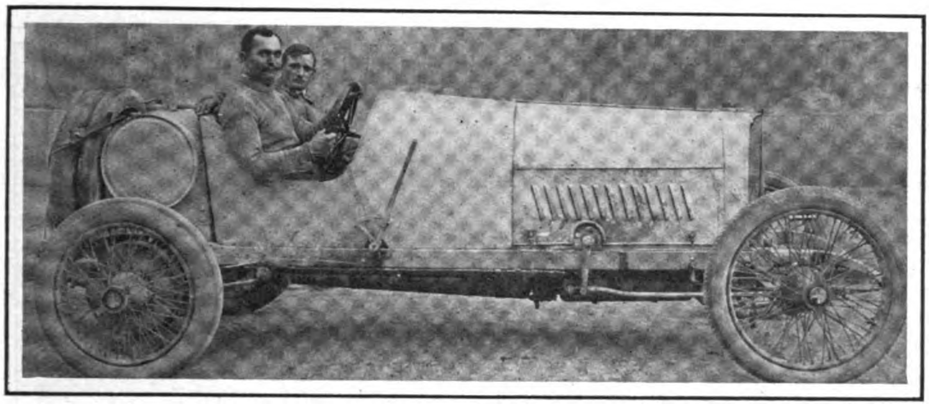
Salzer on the Grand Prix Mercedes before the race. Note cross strap on bonnet



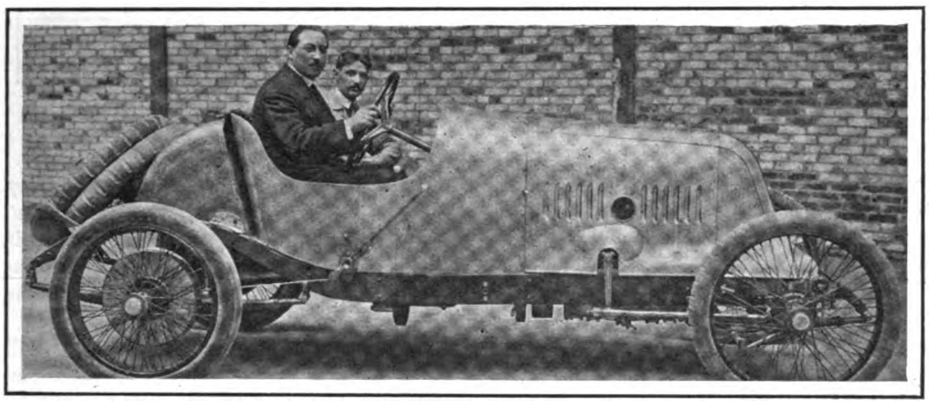
Goux on Peugeot Grand Prix racer. Note streamline tail to minimize wind resistance

Characteristics of Cars Entered in the French Grand Prix Run

Make	Drivers	Bore and Stroke	Valves	Main Bearings	Oiling	Ignition	Carburetor
Alda (France)	Tabuteau Pietro Sisz	94.5x160 3.7x6.3 Four-cylinder monobloc	Sixteen overhead	Five plain	Variable splash	Bosch double	Zenith
Delage (France)	Paul Bablot Albert Guyot Arthur Duray	94x160 3.7x6.3 Four-cylinder monobloc	Sixteen overhead, two camshafts	Five ball	Centrifugal	Bosch single	Claudel
Peugeot (France)	Georges Boillot Jules Goux Victor Rigal	92x162.5 3.6x6.4 Four-cylinder monobloc	Sixteen overhead, two camshafts	Three ball	Pump circulating	Bosch single	Zenith
Th. Schneider (France)	Champoiseau Gabriel Juvanon	94x160 3.7x6.3 Four-cylinder monobloc	Eight inclined in head, one camshaft	Roller	Centrifugal and pump	Bosch	Claudel
Sunbeam (England)	Jean Chassagne Darius Resta K. Lee Guinness	94x160 3.7x6.3 Four-cylinder monobloc	Sixteen overhead two camshafts	Three ball	Pump circulating	Bosch	Claudel
Vauxhall (England)	A. J. Hancock Ralph De Palma W. Watson	101x140 3.9x5.5 Four-cylinder monobloc	Sixteen overhead, two camshafts	Five plain	Pump circulating	High tension	Zenith
Aquila-Italiana (Italy)	Beria d'Argentina Marsaglia Constantini	85x130 3.3x5.1 Six-cylinder monobloc	Eight overhead, inclined	Three ball	Pressure	High tension	Zenith
Fiat (Italy)	Cagno Fagnano Scales	100x143 3.9x5.6 Four-cylinder monobloc	Eight overhead, one camshaft	Three plain	Pressure	Bosch double	Fiat
Nazzaro (Italy)	Felice Nazzaro Porporato Cenisio	94x160 3.7x6.3 Four-cylinder monobloc	Sixteen overhead, inclined	Three ball	Pressure	Bosch double	Zenith
Piccard-Pictet (Switzerland)	P. Tournier Th. Clarke	97x150 3.8x5.9 Four-cylinder monoboc	Single sleeve	Five plain	Pressure	Bosch	Zenith
Nagant (Belgium)	Leon Elskamp D. Esser	94.8x158 3.7x6.2 Four-cylinder monobloc	Sixteen overhead, two camshafts	Three ball	Splash, pressure hand pump	Bosch single	Nagant
Mercedes (Germany)	Lautenschlager Louis Wagner Pilette Salzer Sailer	93x165 3.6x6.4 Four separate steel jackets	Sixteen overhead, inclined, one camshaft	Five plain	Circulating	Two Bosch doubles; four plugs per cylinder	Mercedes
Opel (Germany)	Joerns E. Erndtmann F. Breckheimer	94x160 3.7x6.3 Four-cylinder monobloc	Sixteen overhead, one camshaft	Five plain	Pressure	Bosch single	Ope



Carl Joerns on the Opel, photographed before the French Grand Prix race July 4



Champoiseau on Schneider. Note form of bonnet with radiator in front under hood

race was half over he was in eighth place, and at the finish he was fifth with his car working perfectly.

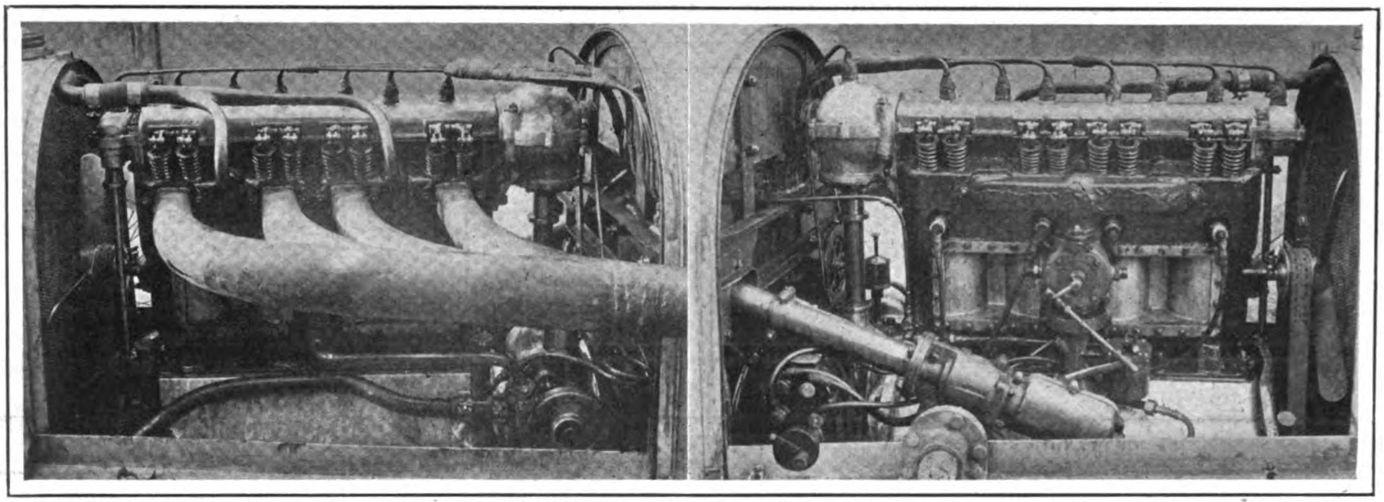
The three new Fiat cars made a favorable impression, and one of them, driven by Fagnano, finished eleventh, 34 minutes back of the leader. Cagno, one of the Fiat drivers, had trouble with pre-ignition from the start of the race, and this trouble also delayed Scales, driving the third Fiat. Fagnano drove a consistent race and was in ninth position at the end of five laps with his teammate, Scales, in eleventh place. At the halfway point Fagnano was seventh.

Felice Nazzaro, an Italian race driver, well known in America, from the days when he piloted Fiat cars, had three of his new Nazzaro machines entered, none of which was ever important factors in the race. Nazzaro, himself piloting one, was forced to abandon the contest early.

Switzerland was represented by two Piccard-Pictets, which are single sleeve motors, built under the Argyll license. Each sleeve has a double movement, a reciprocating one and a part rotating one. The sleeves gave no trouble, but both cars were withdrawn, due to chassis defects.

at Lyons, July 4, 1914. Cylinder Capacity 274.6 Cubic Inches.

Cooling	Clutch	Gears	Drive	Drive Taken Through	Brakes	Wheelbase and Track, Inches	Wheels	Tires
Pump	Cone with Raybestos	Four and reverse	Shaft	Central tube	On differential and rear wheels	106 53	Rudge-Whitworth	Pirelli 34.4x4 34.6x4.7
Pump No fan	Multiple disc	Five; direct on third	Shaft	Springs	Front wheels Differential Rear wheels	106 53	Rudge-Whitworth	Pirelli 34.6x4.7 35x5
Pump No fan	Cone, leather faced	Four; direct on fourth	Shaft	Springs	Front wheels Differential Rear wheels	106 53	Rudge-Whitworth	Dunlop 34.4x4 34.6x4.7
Pump No fan	Cone	Four; direct on third	Shaft	Torque member	Differential Rear wheels	110 54	Rudge-Whitworth	Dunlop 34½x3.5 34.6x4.7
Pump No fan	Cone	Four; direct on fourth	Shaft	Springs	Differential Rear wheels	106 53	Rudge-Whitworth	Dunlop 34.6x4 34.6x4.7
Pump No fan	Cone	Four; direct on fourth	Shaft	Tube and spherical joint	Differential Rear wheels	111 54	Wire	34.6x4.7
Pump	Multiple discs	Four; direct on fourth	Shaft	Central tube	Differential Rear wheels	106 56	Rudge-Whitworth	Pirelli 34.4x4 34.6x4.7
Pump No fan	Multiple discs	Four; direct on fourth	Shaft	Springs	Front wheels Differential Rear wheels	110 52	Rudge-Whitworth	Pirelli 34.4x4 34.6x4.7
Pump	Dry discs	Four; direct on fourth	Shaft	Central tube	Differential Double on rear wheels	107 54	Rudge-Whitworth	Pirelli 34.4x4 34.6x4.7
Pump	Discs	Four; direct on fourth	Shaft	Springs	Front wheels Differential Rear wheels	104 52	Rudge-Whitworth	Continental 34.4x4 34.6x4.7
Pump	Discs	Five; direct on fourth	Shaft	Springs	Differential Rear wheels	110 53	Rudge-Whitworth	Dunlop 34.6x4.7
Pump	Cone	Four; direct on fourth	Shaft	Tube and torque member	Differential Rear wheels	111 53	Rudge-Whitworth	Continental 34.6x4.7 35x5
Pump	Cone	Four; direct on fourth	Shaft	Springs	Differential Rear wheels	118 53	Rudge-Whitworth	Continental 31.8x4 34.6x4.7



Left—Exhaust side of Opel sixteen-valve motor. Right—Intake side Opel motor. Note drive of overhead camshaft

All Cars Are of Special Design

Participants in Grand Prix Embody Latest European Engineering Developments

LYONS, FRANCE, June 24—Of the thirty-eight cars to start in the Grand Prix race here on July 4, which represent thirteen different European makers, two restrictions have been kept in mind:

First: The piston displacement is 4 1-2 liters, in other words 274.6 cubic inches. This means a four-cylinder motor of approximately 3 13-16 x 6-inch bore and stroke. In reality the majority of the cars entered are 3.7 x 6.3 inches, which in millimeters is 94 x 160. Some of them are 93 x 165. In not a single case is the stroke-bore ratio 2 to 1. It is 1.4 to 1 in Fiat and Vauxhall, 1.83 to 1 in Peugeot and 1.7 to 1 in practically all of the others.

Second: These thirteen manufacturers have had to build to a weight not exceeding 2,425 pounds total. This has meant a careful selection of material, using the best steels and proportioning weight to strength.

Six Nations Represented

For the first time since France has held a Grand Prix, this race is really international, in that France has twelve cars, representing four companies; Germany has eight, representing three companies; England has six, representing two companies; Italy has nine, representing three companies; and Switzerland and Belgium two each representing one firm. Mercedes has five cars entered, and the majority of the other makers three each.

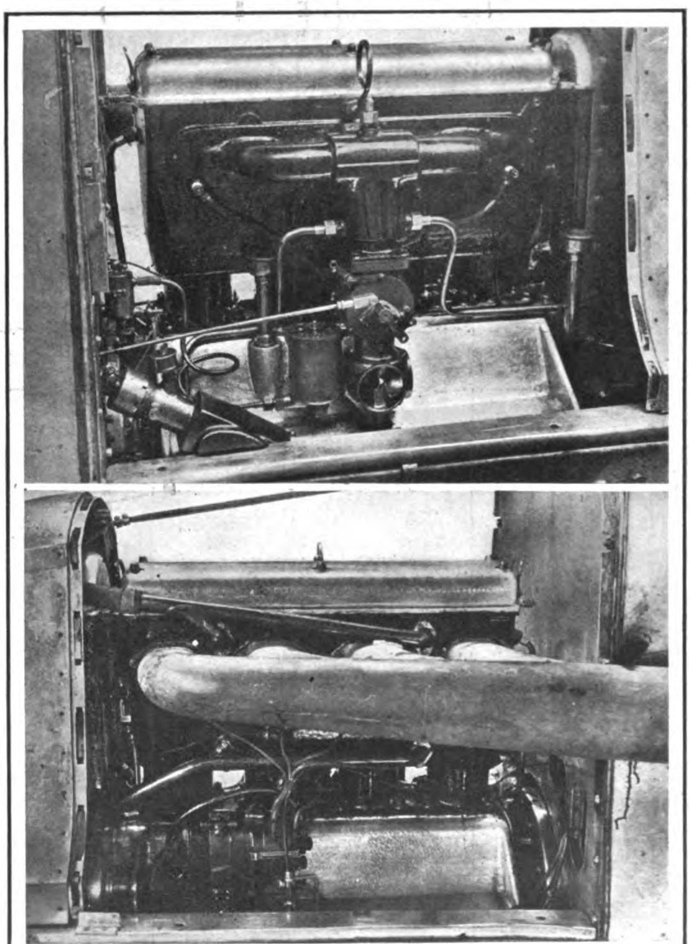
All of the cars without a single exception have been built to meet the requirements of the rules, and it is impossible to find a single car that has been assembled from stock parts and has been entered with the view of cheap publicity. All are the epitome of the best that Europe can provide in design and construction. Their secrets are vigilantly guarded and Mercedes has refused to give any information on its motors.

Four-Cylinder Motors Supreme

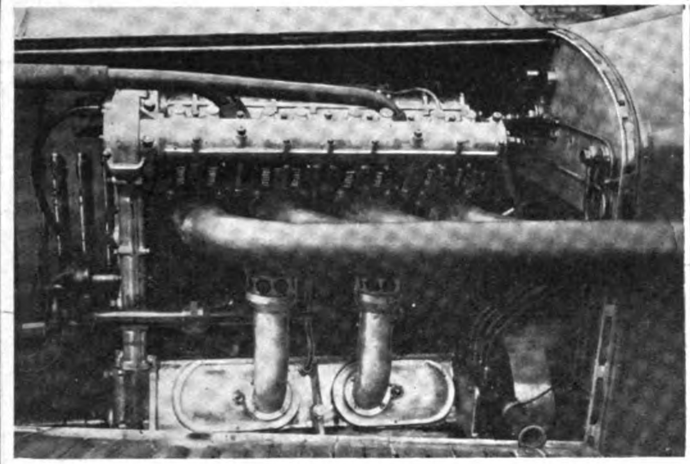
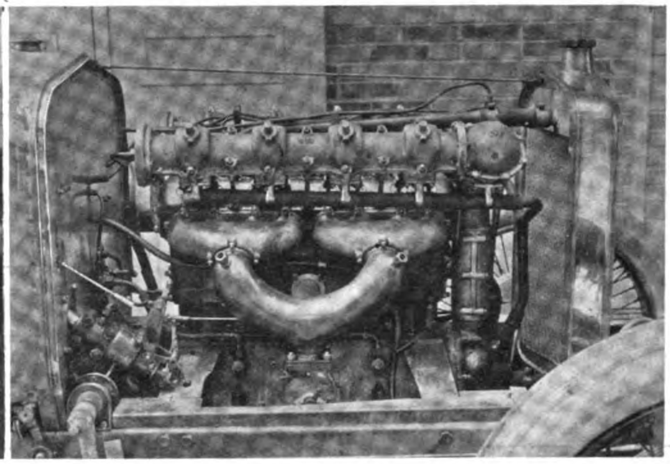
All of the motors are four-cylinder types with the single exception of the Aquila-Italiana, which uses a six, and which may not start in the race.

With but the single exception of the Mercedes, block castings are used on all the motors, the Mercedes company using separate forged-steel cylinders to which the water-jacket is welded. Mercedes built two sets of cars for this race, one with six-cylinder motors, the other with four cylinder ones, and after long road tests decided in favor of the fours.

All cars show a decided trend towards the use of ball bearings for the crankshaft, 6 of the 13 makes using them. Six others employ plain bearings and one uses roller. Built-up crankshafts made from two or more pieces are frequently necessary in order to properly fit the ball bearings.



Upper—Intake side of Alda motor. Lower—Exhaust side of Alda motor with sixteen overhead valves

Left—Exhaust side of Peugeot motor. Right—Intake side Delage sixteen-valve motor without valve springs

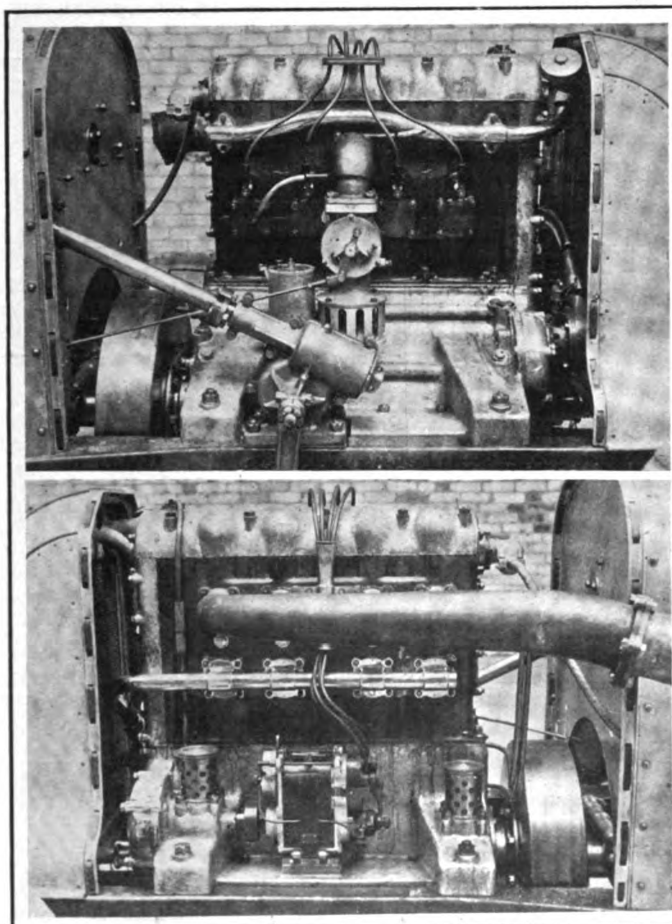
At this date it is impossible to get the exact valve sizes, but in several of the best cars where there are four valves per cylinder the diameters range between 1.7 and 1.8 inches.

Valve Timing Figures

Valve timing is also difficult to obtain and the following may be taken as approximately that of three of the leading makes:

Intake opens 12 degrees after center; intake closes 45 degrees after center; exhaust opens 45 degrees before center; and exhaust closes 18 degrees after center.

Great attention has been given to details of lubrication, and there is a tendency towards the use of a system in which all oil is pumped out of the base chamber, being delivered to the bearings from a tank set elsewhere in the frame. Thus isolated from the heat of the motor the oil cools before being circulated through the bearings.



Upper—Intake side of Schneider motor. Note radiator filler cap under hood Lower—Exhaust side of Schneider motor

Double Magnetos in Vogue

Single and double high-tension magnetos are equally employed. By double ignition is meant one magneto with two distributors, firing two plugs in synchronism in each cylinder. Mercedes has gone further, firing four plugs in synchronism in each cylinder, by means of fitting two double magnetos.

Pump circulation of the water is used in every case, even where stock models use thermo-syphon. Two firms that have carried the radiator on the dash in stock productions have fitted it in front in their racers.

Four-Speed Gearbox Essential

The nature of the 23-mile course has made a four-speed gearbox essential. There are some straightaway stretches of a switchback nature where the limit of speed is the ability of the car to hold the road. Because of this several makers are using a geared up fourth with direct on third. Delage uses 5 forward speeds with fourth and fifth geared up. Nagant uses 5 speeds with fourth direct and fifth geared up.

Every car is shaft driven with a bevel rear axle. In general springs are relied upon to take the drive and the torque.

Brakes have received much attention because of the many curves on the course, Delage, Peugeot, Fiat, and Piccard-Pictet fitting front wheel brakes. Every car in the race has wire wheels, which is ample proof of the merit of these wheels when the tortuous nature of the course is considered.

The keynote of all the motors is the hemispherical type of combustion chamber together with overhead valves and some form of overhead valve mechanism. This design is found on every car in the race, excepting the Piccard-Pictet, which is a single-sleeve type built on the Argyll patents with the sleeve reciprocating and also giving to and fro rotary motion.

Sixteen Valves the Rage

Some of the leading valve arrangements are illustrated on these pages. Of the thirteen different makes of cars, nine are designed with four valves in the head of each cylinder, two intakes and two exhausts, the only two companies of note using but two valves per cylinder being Fiat and Schneider. Where the valves are inclined at 45 degrees or thereabouts, two camshafts are generally used, but where the valves are mounted vertically in the cylinder head, one overhead camshaft suffices.

All entrants have recognized the superiority of the overhead valves and firms which a year ago raced with L or T-head motors have been obliged to come out boldly for the

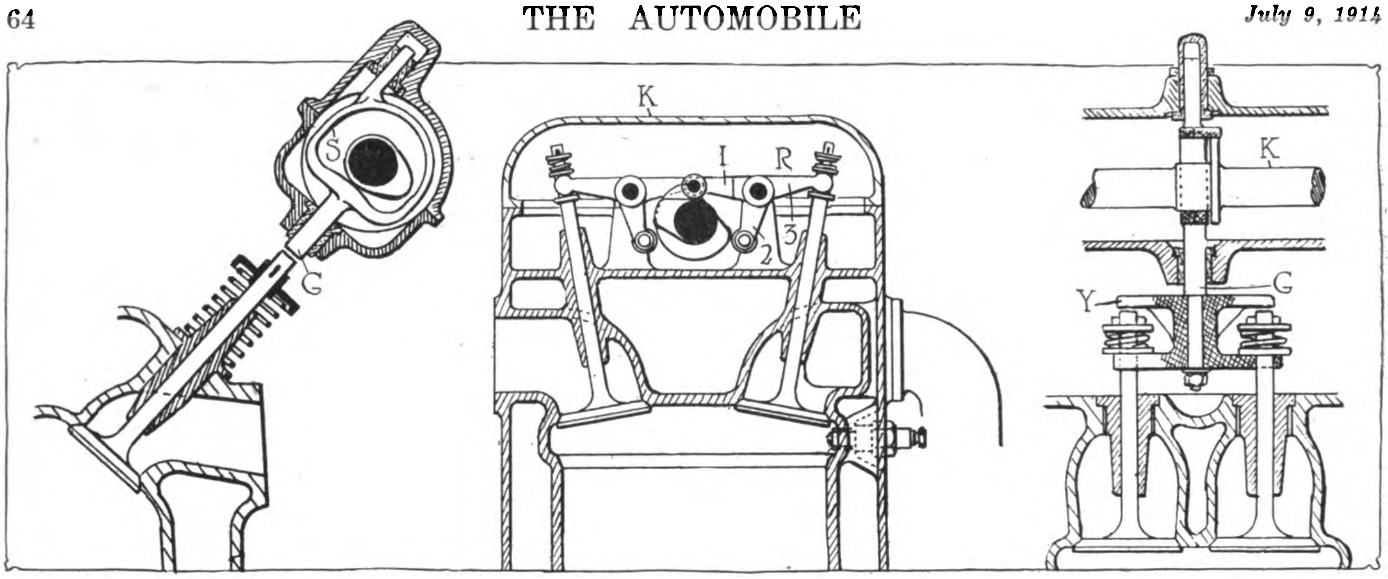


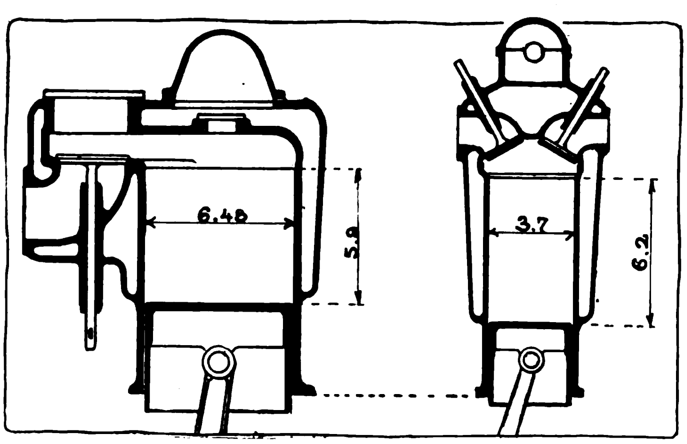
Fig. 1—Left—Peugeot valve arrangement, sixteen inclined valves with direct cam operation for motor head camshaft. Same design is found on Sunbeam, Vauxhall and Nagant. Fig. 2—Center—Schneider, eight valves inclined, double cam. No springs. Fig. 3—Right—Delage, showing pair of valves positively operated without springs

overhead type. Examples are Sunbeam, Vauxhall and Alda.

The ever-increasing question of motor speed has demanded greater attention to valves, and this has been particularly necessary this year with the piston displacement reduced to 274.6 cubic inches. The average crankshaft speed in a race may be put down at 2,600 to 2,700 revolutions per minute. Not a few motors will run at 3,000 revolutions per minute and over, and it is quite the exception to find motors to run below 2,500 revolutions per minute.

Peugeot Valve Scheme

These high speeds have caused prolific valve troubles as well as troubles with the valve-operating gear. Either valves refused to operate correctly above a certain speed, or the heavy springs employed to secure a quick seating of the valve wore away the cam. The type of valve-operating gear which the Peugeot used has found considerable following. This provides practically a direct operating cam, there being two overhead camshafts, each inclosed in an independent aluminum housing and located nearly above the valve stems. The two camshafts are driven by a single train of spur gears. Fig. 1 shows the Peugeot scheme, the cam operating in what may be termed a stirrup S, having a couple of projections to serve as guides. The lower of these guides G is in direct contact with the valve stem. This piece is unusually light and is the only intermediary between the cam and the valve. Peugeot designed its type of valve mechanism and used it in last year's race and has continued it this year. It appears in general design on Sunbeam, Vauxhall, and Nagant.



Left—Winning motor 1906. 778 cubic inches, 1200 r.p.m., 105 horsepower, 90 m.p.h. Right—Winning motor 1914. 274.6 cubic inches, 3000 r.p.m., 130 horsepower, 108 m.p.h.

Delage in his latest type of valve gear has abolished valve springs entirely, each of the sixteen valves being positively opened and positively closed. Figs. 3 and 4 show a section of the cylinder head of the Delage with a valve mounted at approximately 45 degrees and using two camshafts mounted in line with the valve stem. There are sixteen valves and the camshafts are driven by bevel gearing through a vertical shaft and set of bevel gears, all being inclosed in oil-tight aluminum cases. In order to give additional rigidity to the overhead structure the two camshaft housings are united at the rear by an aluminum cross-member.

Valve springs are not used, that is to say, springs are not relied upon primarily to bring the valves back to their seats. The cam operates within the stirrup-shaped member S, with its two projecting stands, one outward and the other G towards the valve stem, where it passes into and is securely attached to a very light double-yoke Y. The valve stems for the two intake or exhaust valves for each cylinder are received in this yoke, and as the yoke has a positive reciprocating motion it opens the valves on the downward movement and closes them on the return. There is a very light coil spring on each valve stem between the arms of the yoke, but this spring is in no way responsible for the return of the valve, but merely serves to secure the final seating of the valve, in view of the clearance which must be left between the push member and the valve stem.

Schneider Without Valve Springs

The Schneider like the Delage has abolished valve springs, making use of double cams, Fig. 2, which give a positive return or closing movement to the valve. There are only two valves per cylinder and these are inclined but 10 degrees from the vertical. They are operated by a single camshaft driven by an inclosed train of spur pinions at the front of the motor. The rocker arm R for each valve has three arms, designated respectively 1, 2 and 3. The double cams operate on arms 1 and 2 to respectively open and close the valve and the arm 3 has a yoke N which spans the valve stem and operates between collars on the stem. The entire valve mechanism is compactly hidden under a single aluminum cover K which completely encases the top of the motor. The spark plugs are located on the side just below the intake valve.

Alda Has Hollow Camshaft

In the Alda motor the sixteen valves are inclined at an angle of approximately 30 degrees to the vertical and are operated by a single hollow camshaft carried in plain bearings in a separate compartment of the cylinder head. There is a separate rocker arm for each valve, this rocker arm having a roller on the inner end where it bears on the cam and another on the outer end where it bears on the valve stem. An aluminum cover extending the full length of the motor incloses the entire valve mechanism. The camshaft is driven by a train of spur pinions in front.

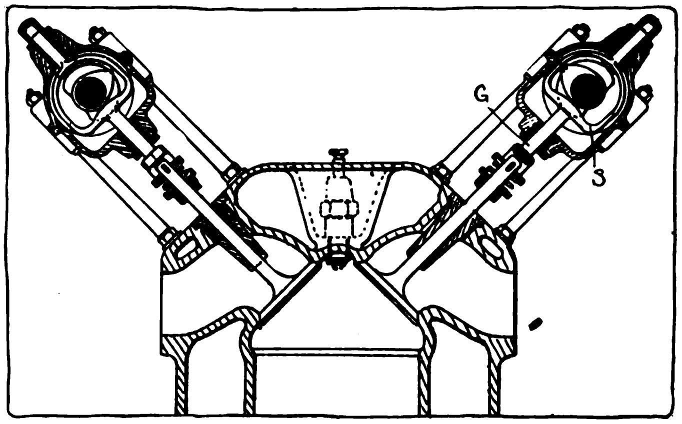


Fig. 4—Delage arrangement with sixteen inclined overhead valves operated by cams.

Opel's Overhead Valves

The overhead valve mechanism of the Opel with its sixteen inclined valves is much similar to that on the Alda, excepting that the valve springs are not inclosed, although the camshaft is encased in a compact compartment. The valves, Fig. 5, are inclined approximately 35 degrees from the vertical, and there is a rocker arm for each valve, the rocker arm having a roller on its inner end and an adjusting screw on the outer end where it bears on the valve stem. The camshaft is driven from the rear by a vertical shaft with double gearing.

Fiat's High-Speed Début

This is the first year that Fiat has come out with a small high-speed racing motor, having heretofore been an exponent of large type power plants. Double intakes and exhausts are used in each cylinder and these are mounted at approximately 40 degrees from the vertical and are operated by a single camshaft, Fig. 7, mounted centrally in a compartment over the cylinder head. There is a separate rocker arm for each valve and the camshaft actuates these rocker arms through vertical push rods, or plungers P with rollers on their lower end contacting with the cams. Each rocker arm carries an adjustment on its inner end and an arch-shaped outer end for contacting with the valve stem. Camshaft is supported in a hollow of the cylinder head which takes a steel covering, this cover carrying the plungers for the rocker arms.

The Silent Mercedes

Evidently the Mercedes men are sworn to absolute silence for it is impossible to get from them any statement regarding their cars. In general the motors used in all five are alike, and are similar to the aviation type used a year ago. They use separate steel cylinders which are forgings, not castings, and are turned from the solid stock. To these the aluminum jackets are autogenously welded. There are sixteen overhead valves, four per cylinder, operated through rocker arms from a single camshaft. Two Bosch double magnetos are used, thus giving four synchronized sparks per cylinder. The cylinders are 93 x 165 mm. which is 3.6 by 6.4 inches bore and stroke. The crankshaft is carried on five plain bearings, the gearset gives four speeds with direct and fourth, and a cone clutch is used.

The cars have that type of streamline body developed a year ago and use a V-type radiator. The spare wire wheels are carried in a rear compartment instead of being strapped on, the streamline effect of the body being carried out in this.

The new Peugeot racers have more external changes than internal features, as the engineers responsible for them have been content to carry out last year's design with reduction in cylinder size to meet the new rules. No essential modifications have been made in the motor, and the gearbox and the rear axle are the same with the exception of ratio. Externally the cars are much lower than formerly owing to the front springs being under the axle.

Latest Peugeot Design

From the question of streamline body design these cars are the finest entered in the race. The radiator is narrow and of W-cross section although this cannot be noticed by the casual observer as the wire guard is set in the radiator frame, and its V-form might be mistaken for the radiator itself.

The bonnet, with the usual hand-hole for reaching the carbureter is continued rearward by a scuttle dash nearly up to the height of the steering wheel. A streamline tail is used which entirely encases the gasoline tank and the spare wheels. There is a hump on the top of the tail and a similar one on the base of it to accommodate the wheels. The whole of the rear portion of the body back of the tank forms a hinged cover with an eyebolt set in the extremity so that the mechanism can open the lid, thus exposing the tires while the car is being brought to a standstill. Even the under pan has received close attention and narrows as it extends rearward so that it just encases the driveshaft and forms a continuation of the tail broken only enough to allow the passage of the axle.

Braking is done on all four wheels, there being internal expanding bands operating in ribbed drums. In addition the usual brake is carried on the rear of the gearbox.

(*Continued on page* 103)

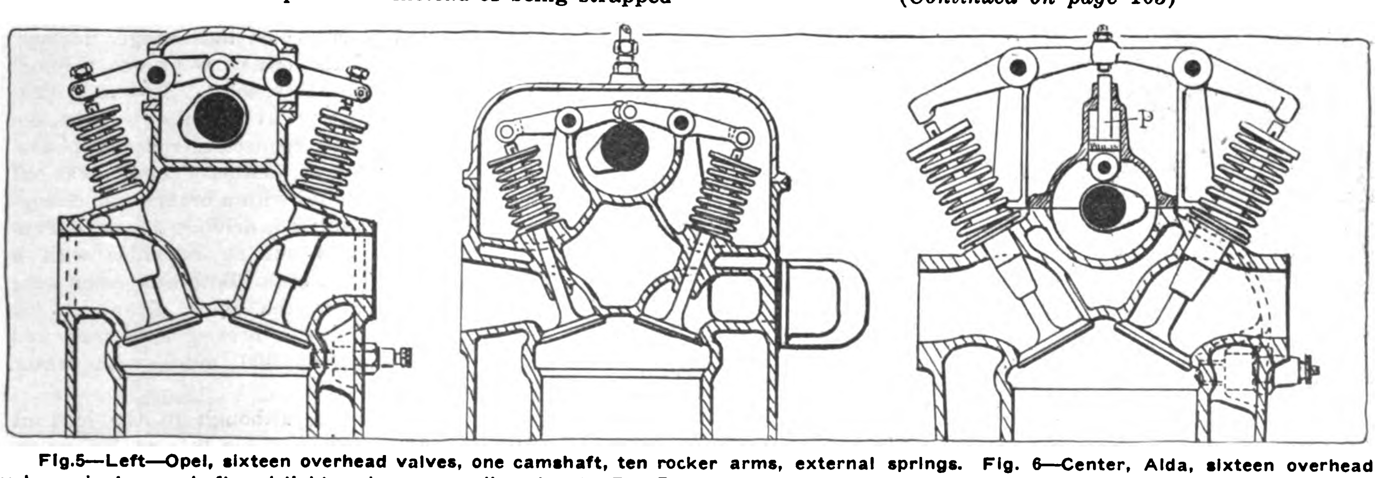
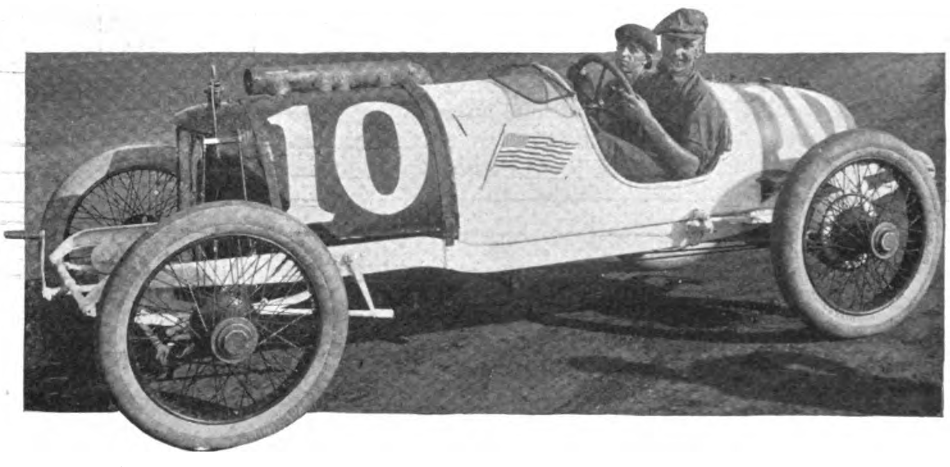


Fig. 5—Left—Opel, sixteen overhead valves, one camshaft, ten rocker arms, external springs. Fig. 6—Center, Alda, sixteen overhead valves, single camshaft and light rocker arms, all enclosed. Fig. 7—Right—Fiat, single camshaft push rod, rocker arms and eight inclined valves

Rickenbacher Wins 300-Mile Race At 78.6 Miles Per Hour

THE FINISHERS

Car	Driver	Speed
Duesenberg	Rickenbacher	78.6
Mercer	Wishart	78.3
Duesenberg	Alley	74.4
Marmon	Patschke	74.1
Stutz	Anderson	74.0
Delage	Knipper	66.3
Gray Fox	Wilcox	63.8
Braender Bull Dog	Chandler	Running at Finish
White	Shrunk	Running at Finish
Chalmers	Wetmore	Running at Finish



Rickenbacher, in the Duesenberg, who won the Sioux City 300-mile race

SIOUX CITY, IA., July 4—The State of Iowa has made good today. Rickenbacher, driving an Iowa car, the Duesenberg, today won the 300-mile race on the Speedway at this city, averaging 78.6 miles per hour, and leading Spencer Wishart in a Mercer by the narrow margin of 48 seconds for the three centuries on the new 2-mile dirt oval, otherwise known as the Sioux City Speedway.

Although but seventeen of the twenty-two cars came to the starting line, today's race was one of the greatest interest, and until the 200-mile point was reached it was anybody's race. Rickenbacher, the winner, was not in the lead until at 180 miles, at which point the race had practically settled down, and it was apparent that the remaining 100 miles would be a duel between Rickenbacher and Wishart.

Frequent Position Changes

Rarely in a speedway race has there been such change of positions in the first 200 miles. Burman, driving a Peugeot, which Jules Goux piloted at the recent Indianapolis meet, jumped to the front at the opening of the race and held the lead until 33 miles, when Wishart put his Mercedes to the fore, and Rickenbacher was working up into third place. At 80 miles Wishart and Rickenbacher were practically tied for first place, and they ran neck-and-neck to the 100-mile post.

At 120 miles Tom Alley, driving another Duesenberg, was leading with Wishart second and Rickenbacher third.

At 140 miles there was another shift in position, Wishart taking the lead with Rickenbacher second and Alley third.

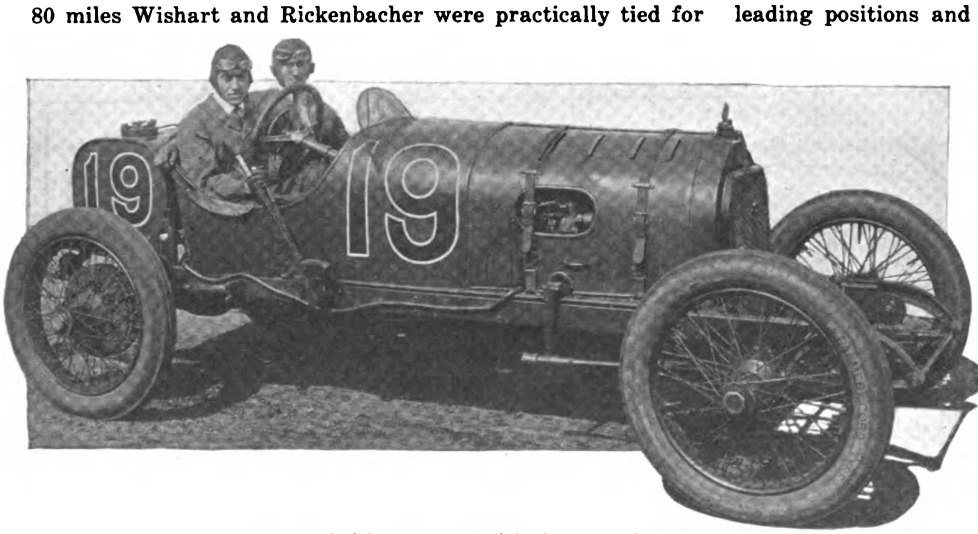
There was still another shift at 160 miles, when Knipper, driving the Thomas Delage which won at Indianapolis, was in first position with Patschke in the Marmon second, Rickenbacher third and Wishart fourth.

Rickenbacher Takes Lead

When 20 miles more were covered, there was still another shift, Rickenbacher getting into the lead. At 200 miles the Delage was disposed of through a cracked jacket, the Marmon was delayed by carbureter trouble, and Rickenbacher had a slight lead on Wishart.

Although seventeen cars started, seven actually finished the race, and three others running at that time were flagged off.

Today has been a sad one for the foreign cars, six of which were entered and handled by American pilots, and only one of which finished. The day's results are in strong contrast with May 30 at Indianapolis when foreigners carried off the four leading positions and America was content with fifth place.



Spencer Wishart, who finished second in the Mercer

In today's race of three Peugeots, two Sunbeams and the Thomas-Delage entry, only one, the Delage, finished. All of the others went out through mechanical troubles. Burman's Peugeot was out at 160 miles with broken crankcase, connecting-rod and piston. Stringer, in another Peugeot, was out at 172 miles with a broken connecting-rod. Mulford, driving the third Peugeot, was out at 30 miles with a broken oil tank. Both Sunbeams were out before the finish, Grant at 262 miles with a broken universal, and Babcock at 200 miles with water troubles.

Knipper, although in the lead at 160 miles, met his fate at 196 miles, when the jacket of No. 4 cylinder was cracked and he had to stop every 10 miles thereafter to take on water.

But there were more upsets in favorites today than those that fell to the lot of the foreigners. Oldfield, the American hero at Indianapolis, was out at 146 miles, with a cracked cylinder. There were one or two local entries, notably the White and Chalmers, which had serious trouble early in the race, the White with bearings, and the Chalmers with valve and carbureter difficulties.

Duesenberg driven by Alley and Mulford, which took third place

The race started at 11 o'clock. There had been three cars which had failed to qualify by averaging 70 miles an hour—the two Chevrolets and the Moon. The Metropol was out with a broken crankshaft and the Stafford with a broken crankcase.

At the outset it looked as if the race would be a runaway for Burman in the Peugeot. He made his bid right at the outset. Being in the first row of starters he soon jumped away from Anderson and Mason and swung by the tape for the first time with a fairly comfortable lead. The second time around saw this increased to almost a half mile, for as he crossed the tape the closest to him was Anderson in the Stutz, who also had opened up on the others, leading Wishart by a few car lengths, while trailing were Mulford, Shrunk, Oldfield, Knipper, Patschke, Stringer, Mason, Grant, Wilcox, Babcock, Alley and Chandler, strung out for a mile. At this point Mason had to stop.

Burman Takes Lead

Burman, once out in front, settled down to a steady grind, while Wishart became runner-up, leading Mulford by about 100 yards. Anderson, Oldfield and Patschke were in the next group, while the others were well spread out, with Chandler bringing up the rear. Burman had the satisfaction of leading at the first 20-mile post, but Wishart had been sticking to his task and he was gradually eating up the distance that separated him from Burman. The Peugeot driver apparently was not getting as much speed out of his mount as he had at the outset. It was noted that there was a miss on the Peugeot that slowed it, and the Mercer took advantage of this and Wishart caught his man when Burman stopped in the thirty-second mile to change a tire and to make a carbureter adjustment.

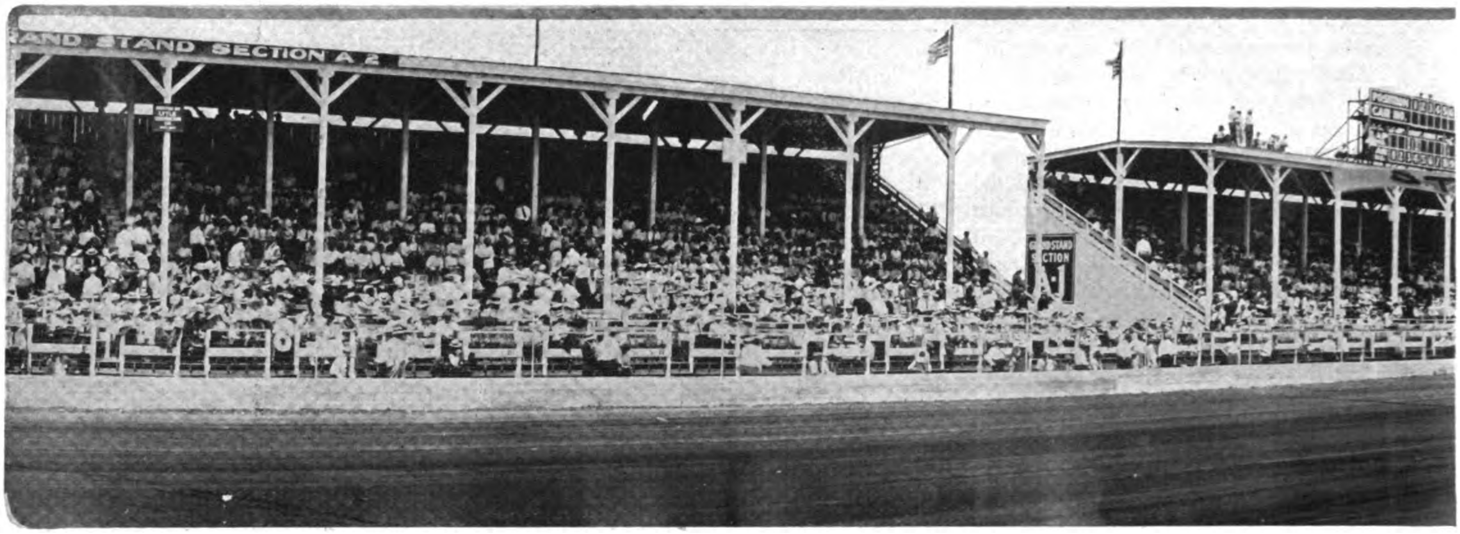
Wishart was the leader at 40 miles with Stringer runner-up and Rickenbacher in third place. Grant was fourth and Patschke fifth. The Mercer star also led at 60 miles, but Rickenbacher had gone to second and Anderson to third. There were only 17 seconds between first and second, however. At 80 miles Wishart and Rickenbacher were tied and Alley in the other Duesenberg was third, with Anderson fourth. The same order prevailed at 100 miles, with Wishart being just 1 second to the good.

Tom Alley, who has been Ralph DePalma's mechanic for several years and who was given his first chance as a driver when No. 12 Duesenberg was turned over to him, had the joy of leading this field at 120 miles, with Wishart second and Rickenbacher third. Wishart got to the front again, however, at 140 miles, with Rickenbacher still sticking to him and Alley back in third place. The next 20 miles, though, saw a general shaking up among the leaders. Knipper, in the Delage, who had been running fourth for 40 miles, went into the lead, with Patschke second, Rickenbacher third and Wishart fourth.

At 180 miles Rickenbacher climbed out in front, and

Time for Each 20 Miles of the Sioux City 300-Mile Race

No.	Car	Driver	Miles: 20 Laps: 10	40 20	60 30	80 40	100 50	120 60	140 70	160 80	180 90	200 100	220 110	240 120	260 130	280 140	300 150	M.P.H.
10	Duesenberg	Rickenbacher	15:59	31:34	46:58	1:02:36	1:18:19	1:34:03	1:49:40	2:06:43	2:21:48	2:36:40	3:00:00	3:02:28	3:18:45	3:33:47	3:49:02	78.6
19	Mercer....	Wishart....	15:22	31:09	46:41	1:02:36	1:18:18	1:33:49	1:49:20	2:07:35	2:23:09	2:38:35	....	3:04:30	3:19:38	3:36:19	3:49:50	78.0
12	Duesenberg	Alley...... Mulford	16:31	32:46	47:37	1:03:31	1:19:11	1:33:15	1:50:33	2:08:43	2:24:12	2:44:41	2:57:02	3:12:47	3:28:50	3:44:53	4:02:10	74.9
1	Marmon...	Patschke...	15:50	31:42	49:00	1:04:25	1:19:50	1:35:37	1:51:17	2:06:42	2:26:31	2:48:30	....	3:08:32	3:24:57	3:44:09	4:02:56	73.0
16	Stutz.....	Anderson...	16:19	32:48	47:33	1:03:44	1:19:40	1:35:36	1:51:41	2:07:30	2:25:40	2:47:11	....	3:13:19	3:29:37	3:45:49	4:03:34	74.6
22	Delage....	Knipper....	16:14	32:23	48:14	1:04:14	1:19:57	1:35:26	1:50:53	2:06:19	2:22:00	....	3:10:29	3:32:40	3:52:22	4:12:44	4:31:07	66.3
21	Gray Fox..	Wilcox.....	16:23	32:19	48:10	1:05:35	1:21:18	1:51:52	2:07:46	2:23:56	2:45:12	....	3:20:19	3:37:08	3:59:32	4:21:24	4:42:32	63.8
20	Braender..	Chandler...	17:11	34:19	51:25	1:09:03	2:12:19	2:21:12	3:20:46	3:37:58	3:54:48	4:48:14	Finishe	d 126 la	ps. Tim	e 4:58.1	9	
2	White.....	Shrunk.....	16:19	36:13	52:59	1:13:48	1:30:23	3:30:29	3:55:16	4:17:17	Ran 98	laps. Ti	me 4:58	.42				
5	Chalmers..	Wetmore...	18:22	39:07	1:03:08	2:05:59	2:34:05	3:28:07	4:13:06	4:39:23	Ran 88	laps. Ti	me 4:56	.21				
15	Sunbeam..	Grant......	19:25	36:00	52:32	1:09:13	1:25:49	1:42:30	1:59:06	2:17:17	2:33:06	2:44:37	3:00:00	3:17:03	3:33:51	Out, 13 broken	1 laps univers	al
14	Sunbeam..	Babcock....	15:20	31:38	48:03	1:04:42	1:23:13	1:39:20	1:55:54	2:11:31	2:32:46	2:44:20	Out, 10	8 laps, s	tripped	driving	pinion	
17	Stutz.....	Oldfield....	16:06	33:45	49:44	1:05:47	1:22:03	1:38:08	1:54:27	Out, 74	laps, br	oken cy	linder					
6	Peugeot...	Burman....	15:21	32:12	49:26	1:05:10	1:20:40	1:37:50	1:53:43	Out, 80	laps, br	oken co	nnectin	g-rod d	ue to bu	rned be	aring	
7	Peugeot...	Stringer....	16:27	31:18	52:43	1:09:11	Out, 44	laps, br	oken co	nnectin	g-rod							
9	Peugeot...	Mulford....	15:40	Out,	13 laps,	oil tank	broken											
11	Mason....	Mason.....	Ran 3	laps, b	roken d	riveshaf	t											



The Sioux City Speedway before the start of the 300-mile race, held July 4, showing arrangement of the grandstands

once there he never relinquished his advantage. Knipper was back to second, but at 200 miles Wishart had ousted him, and from there on to the end it was a duel between the Rickenbacher-Duesenberg and the Wishart-Mercer. The two pulled away from their rivals and each was waiting for something to happen to the other fellow. Rickenbacher's knowledge of the track, where he has raced for the last 2 years, stood him in great stead and the way he took the turns picked up many seconds for him. Both men were in the same lap when Starter Fred Wagner took his collection of flags across the track. Rickenbacher got the checkered bunting first, then had to go two more laps to play safe on the scoring.

Duesenberg Gets Third

With the two leaders out of the way, the balance of the field settled down to fight for the rest of the prize money. No. 12 Duesenberg, the Anderson-Stutz and the Patschke-Marmon were running so closely that any one of them might have landed third, but the Duesenberg was the one to gain the position, and back of it were the Stutz and Marmon in the order named. Then there was a long wait until Knipper and Wilcox could finish. They were far in the rear and back of them were the White and the Chalmers, all striving to finish because there were ten prizes. The officials waited on Knipper and Wilcox, but the other three were so far behind that in kindness to both the drivers and the spectators the officials flagged them.

The ten prizes were awarded as follows: Rickenbacher, $10,000; Wishart, $5,000; Alley-Mulford, $2,500; Patschke, $1,750; Anderson, $1,500; Knipper, $1,100; Wilcox, $900; Chandler, $800; Shrunk, $750; Wetmore, $700.

That Rickenbacher should have won this gruelling grind is not surprising when one reviews his record. He has driven in more races on the Sioux City track than any other man; he has broken several records there, including the 50-mile mark; he had a car that is surprisingly fast and built for just this sort of work, while his knowledge of the speedway gave him a great advantage. In addition, Rickenbacher had comparatively little trouble, making only two stops in the 300 miles. His first one was at 144 miles when he lost 35 seconds changing a tire; again at 254 miles he stopped at the pits.

While there were no accidents during the race, still there were several drivers injured by being struck by flying clods of dirt. It seems to be a peculiarity of this track, and Referee Kneedler, realizing it, forced every pilot to equip his car with a wire screen, placed at the steering wheel.

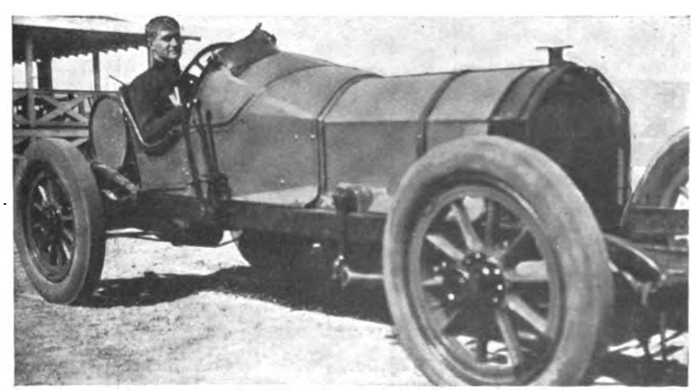
The two Duesenbergs that came in first and third have 4.4 by 6-inch motors, the piston displacement being 360.5 cubic inches. The wheelbase is 106 inches. Rudge-Whitworth wire wheels with Riverside tires were used. Thirty-three by 4.5-inch tires were used on the front and 35 by 5 on the rear. Ignition was supplied by a Bosch and the spark plugs were K. L. Gs. The carbureter was a Schebler and the gear ratio is 2.6 to 1. Oilzum oil was used.

The car to finish second, which was Spencer Wishart's Mercer, was equipped with a 4.8 by 6.2-inch motor having a displacement of 445 cubic inches. Both magneto and plugs were Bosch made and a Rayfield carbureter was fitted. The wheelbase is 112 inches, the gear ratio 2.5 to 1. Rudge-Whitworth wheels with Palmer tires, 35 by 5 inches all around were employed. Castor oil was used for lubrication.

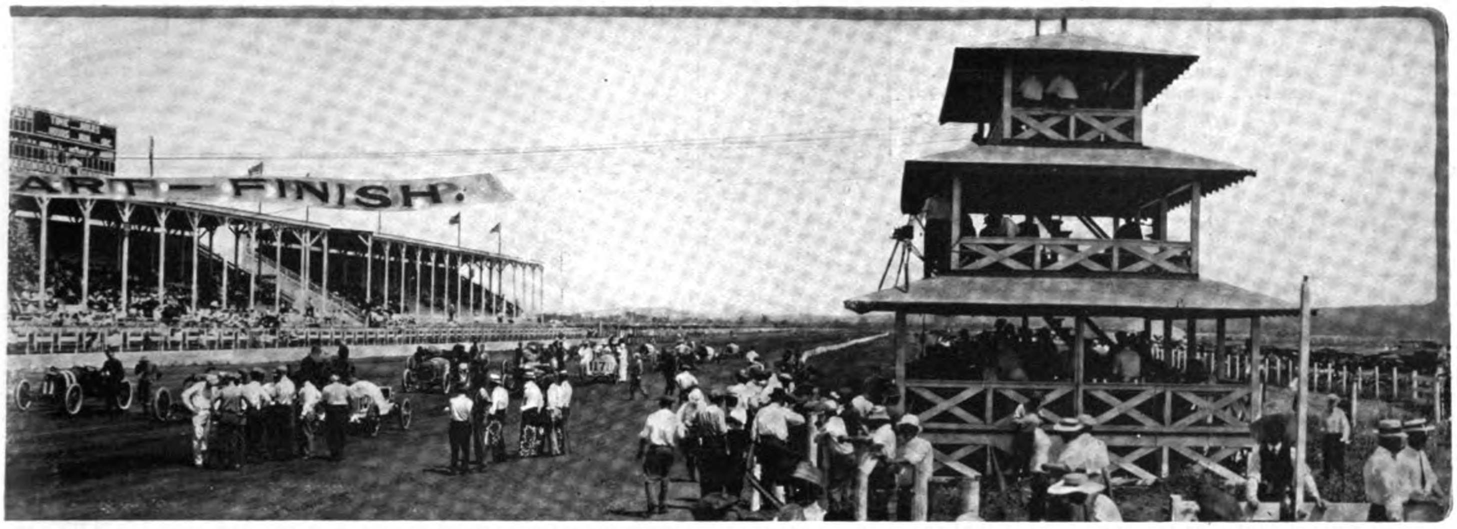
Complete specifications of all the cars will be found on page 104.

The track, though, stood up wonderfully. It had been predicted that it would be cut to pieces before 200 miles, but outside of a few rough spots on the turns it looked as good at the finish as it did at the start. It had been so well oiled that there was no dust and the speed of the big oval was shown by the fact that Rickenbacher averaged 78.6 miles per hour for the 300 miles.

So encouraged are they by the results of their efforts that they have decided to have a real speedway before another year is past. They propose to either resurface the present track or let the present gumbo stay and bank the turns so they will permit of greater speed. To get the flyers they intend hanging up a $50,000 purse and to retain the same day they had this year—the national holiday. At the present time they are handicapped by lack of really good transportation between the City of Sioux City and the track, which is located just over the state line in Union County, S. D.



Patschke in the Marmon, who was awarded fourth prize



at the start and finish line. The officials propose to resurface the present track and to hang up a $50,000 purse for 1915

Right Rear Tires Most Trouble

SIOUX CITY, IA., July 4—If right rear tires could have been eliminated from today's race the winning pace of 78.6 miles per hour would have been considerably exceeded. Every car that changed a tire changed the right rear, and five of the drivers had to change two right rears.

Next to tire troubles there came many examples of general breaking of car parts, which seemed to prove that after a racing car has been through two or three gruelling tests it must be rebuilt to give satisfaction. For example, Knipper, driving the winning Delage from Indianapolis, cracked a waterjacket after he had driven 200 miles. Oldfield, driving a Stutz, was out with a cracked cylinder at 144 miles. Burman, in one of the Indianapolis Peugeots was out at 160 miles with a broken crankcase, connecting-rod and piston, undoubtedly due to the seizing of a bearing. Stringer, driving another Peugeot, broke a connecting-rod at 172 miles. Mulford, in a third Peugeot, was out at less than 30 miles with a broken oil tank and other oiling trouble. Grant's Sunbeam, which behaved so admirably at Indianapolis, was out at 262 miles with a broken universal. One of the Masons broke a drive-shaft at 4 miles, and Babcock, driving the other Sunbeam, had a hose connection burst at 200 miles.

Many of these troubles can be traced directly to the severe punishment that the cars have previously received.

Rickenbacher made two stops during the race with a total loss of time of 1 minute and 3 seconds. He changed the right rear at 144 miles, doing the work in 35 seconds, and at 254 miles he stopped for gasoline and oil, consuming 28 seconds in taking these on. Spencer Wishart made three stops with his Mercer. At 150 miles he took on gasoline and oil in 40 seconds; at 196 miles he took 8 minutes changing a broken valve spring and at 260 miles he blew a right rear and took 50 seconds for the replacement.

Tom Alley, who brought No. 12 Duesenberg into third place, had a narrow escape from severe injury when he made his first stop at the end of the 78th lap. The car was filled with water and oil and as soon as the pit man started to fill the tank with gasoline the car caught fire and a merry blaze continued for about 15 seconds and was extinguished with three Pyrene extinguishers.

While Mulford held the wheel he made but one stop, at 208 miles, for oil and water and to change a right rear tire which had blown out.

Short Stops at Pits

Anderson stopped twice during the race, having a total delay of 3 minutes and 9 seconds. First he took on gasoline and oil and at 224 miles changed the right rear, and replenished with gasoline. He had no mechanical troubles.

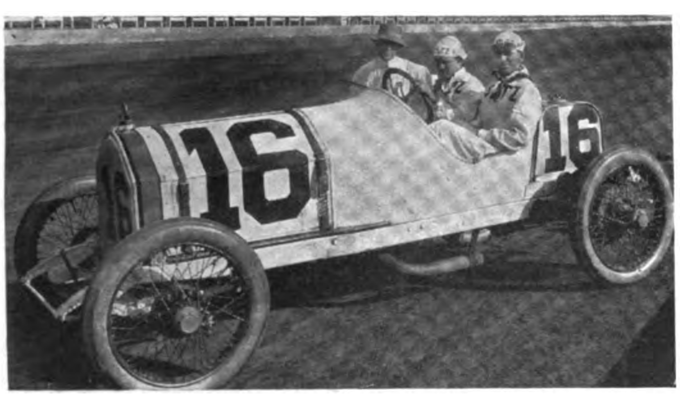
Patschke had a total loss of 4 minutes at the pits with his Marmon, having to make four stops. At 12 miles he took on gasoline and oil. At 178 he changed a right rear. At 256 he stopped for carbureter adjustment and to take on water, and at 294 miles he was compelled to stop again for water.

Knipper, driving the Delage which won the Indianapolis race, had eleven stops, totaling 19 minutes and 15 seconds. His trouble started at 198 miles, when No. 4 cylinder cracked, allowing the water to run out. He decided to continue and stop frequently to add water. After changing the right rear tire and changing a spark plug in No. 4 cylinder, he was started after a delay of 10 minutes. He stopped for water at 214, 222, 232, 242, 252, 260, 268, 270 and 280 miles.

Wilcox drove the Gray Fox the last 10 miles without oil, doing this to finish in seventh place, although he had sufficient leeway to finish seventh and stop for oil. His first stop was made at 100 miles for oil and water; his second was at 116 miles for gasoline, oil and water. He made a long stop a few laps later to change 3 valves and later had push-rod trouble, causing 3 delays at the pits. A push-rod broke at 238 miles, and there was more valve trouble at 260 miles.

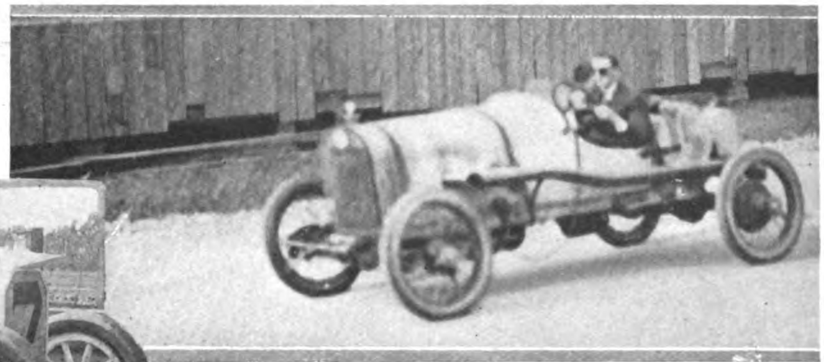
Five stops had to be made by Chandler in the Braender Bull Dog, the total time being 1 hour 39 minutes 3 seconds. The longest was at 80 miles, when the oil line broke, and after being repaired it gave much trouble, necessitating stops at 100, 122 and 130 miles. At each of these the line was

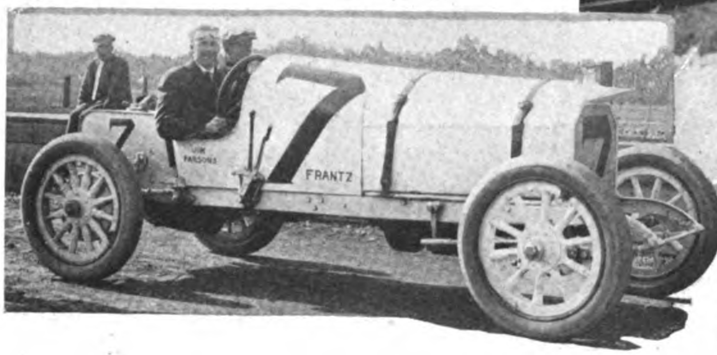
(*Continued on page* 104)



Gil Anderson in the Stutz, which finished fifth

Right—Klein in King car going past Tacoma grandstand at 90 miles an hour





Left—Jim Parsons' Frantz, 100-mile winner

Stutz and Maxwell Star at Tacoma

Former Wins 250 and Latter 200-Mile Event—100-Mile Race Won by Frantz Special

TACOMA, WASH., July 4—*Special Telegram*—The 2-day racing on the 2-mile Tacoma Speedway yesterday and to-day evolved three popular winners in the three races scheduled for the Montamara speed carnival, Cooper in a Stutz winning the 250-mile event, Hughes in a Maxwell the 200-mile one, and Parsons in a Frantz the 100-mile race.

Earl Cooper, driving a Stutz, won the 250-mile race to-day for the Montamarathon trophy, averaging 73.44 miles per hour and defeating his nearest challenger Ruckstall, in a Mercer, by 12 miles. Cooper's time was 3:24:34 4-5 seconds. There were five other finishers, the Ruckstall Mercer, second, averaging 70.57 miles per hour. Klein, driving the King, third, averaging 69.89; Parsons, driving the Frantz, with an average of 66.57; and Taylor in an Alco, fifth, averaging 64.8. Nine other cars started, making a total of fourteen, and of these only one was running at the finish, this being the Hupmobile, which was flagged off when the race was called.

Cooper Breaks Records

Cooper, the meteor of the speed constellation who in 1913 won the American championship through his consistent driving on the coast, never before shone so brightly as he did to-day in the race for the Montamarathon trophy. Lying back he shot the Stutz to the front after covering 84 miles and was never headed thereafter. His victory was decisive.

With Cooper so far in front, interest in the race centered in the battle for second place between Ruckstall, the Mercer pilot; Klein, the King driver; and Dingley, at the wheel of the Ono. Until Dingley's car was wrecked at 248 miles he had a slight advantage on the other two contenders as he was leading them by half a lap. With the Ono eliminated, the fight for second money narrowed down to a last lap spurt between the Mercer and King, and the Mercer got the decision by 2 minutes.

Six cars that were nominated failed to appear when the field was sent away at 2 o'clock—the Romano, Chalmers, P. C. Special, Hudson, Italia and de Alene's Marmon. With the exception of the Marmon, which was wrecked in the Potlatch race of yesterday, no reason was given for the withdrawal of these entries.

Maxwells Dangerous Contenders

Seven of the starters suffered mechanical trouble. All three Maxwells were eliminated before Cooper got the checkered flag, although two of them were in dangerous positions for the greater part of the race. Hughes, one of the Maxwell team, was overcome with the heat and was relieved by Carlson who completed 103 laps before he was forced to withdraw his mount with a broken valve spring. Tetzlaff's Maxwell was a contender for 90 laps when it suffered a broken steering gear. Teddy crawled up to the pits with his mechanician, Benedict, astride the hood and holding the parts together.

Brock's Ray also looked dangerous and showed a world of speed until it was eliminated on the eighty-fourth lap with a broken frame. The two Fiats, driven by Verbeck and Sorrell, were the first to give up the chase, Sorrell driving but three laps and Verbeck withdrawing after making thirteen circuits of the course.

Intercity Trophy Race 100 Miles

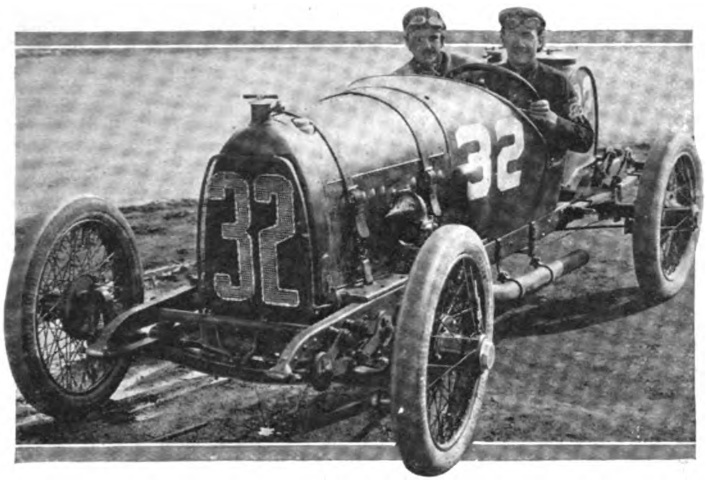
Position	Car	Driver	Time	M.P.H.
1	Frantz,	Parsons	1:21:29 2-5	73.6
2	Ray,	Brock	1:31:22 2-5	65.72
3	Lozier,	Latta	1:32:33 1-5	64 8
4	Studebaker,	Staley	1:39:37 2-5	60.23
5	Chevrolet,	Croston	———	——
6	Hupmobile,	Smyley	———	——
	Mercer,	Thomas, out on 34th lap with burned-out bearing.		
	Romano,	Barnes, out on 31st lap with broken air line.		
	P. C. Special,	Terrien, out on 13th lap, engine trouble.		
	Hudson,	Schneider, out on 9th lap with broken crankcase.		
	National,	McGoldrick, out on 7th lap with burned-out clutch.		

Potlatch Trophy Race 200 Miles

Position	Car	Driver	Time	M.P.H.
1	Maxwell,	Hughes	2:41:32 2-5	74.28
2	King,	Klein	2:41:36 4-5	74.25
3	Stutz,	Cooper	2:44:01 2-5	73.26
4	Ono,	Dingley	2:50:13 3-5	71.81
5	Mercer,	Ruckstall	———	——
6	Frantz,	Parsons	———	——
	Marmon,	DeAlene, out on 73rd lap, car wrecked		
	Chalmers,	Kennedy, out on 33rd lap with broken spring hanger.		
	Mercer,	Pullen, out on 24th lap with broken rear axle shaft.		
	Maxwell,	Tetzlaff, out on 17th lap with broken valve spring.		
	Ray,	Brock, out on 11th lap with bent rear axle.		
	Maxwell,	Carlson, out, engine trouble.		
	Fiat,	Verbeck, out, engine trouble.		
	Italia,	Welch, out with two cracked cylinders.		

Yesterday, the festival opened with two curtain-raiser events, one at 100 miles for cars of 450 cubic inches and under, in what was known as the Inter-City Century. This was won by Parsons driving a Frantz, who drove the Century in 1 hour, 21 minutes, 29 2-5 seconds, averaging 73.6 miles per hour for the distance. By his victory Parsons repeated his triumph of last year and got permanent possession of the Perpetual Challenge Trophy presented by the Tacoma Automobile Club, as well as $750 in cash.

In this race there were eleven starters, four of which finished the distance, two others were running at the finish, and five withdrew for mechanical troubles during the race.



Hughes at wheel of his Maxwell

Brock, in the Ray, was second, almost 10 minutes behind the victor. Latta, driving a Lozier 100 miles without a single stop for tires or fuel, was a close third. Staley, in a Studebaker, was fourth, and Croston's Chevrolet was fifth. The Chevrolet also completed the entire century without a stop. The only other car to finish was Smyley's Hupmobile, which took sixth money.

The Intercity race was a battle between Parsons and Brock which reached its height in the last 40 miles. Near the finish the Ray suffered from rear axle trouble.

Hughes Wins Potlatch

The major event on yesterday's program was for the Golden Potlatch trophy for cars not exceeding 600 cubic inches, the distance being 200 miles. Hughey Hughes in a Maxwell was winner, after a sensational struggle with Arthur Klein in the King, and finally won by the scant margin of 4 2-5 seconds. Hughes' time was 2 hours 41 minutes 32 2-5 seconds, and Kleins' time 2 hours 41 minutes 36 4-5 seconds.

Montamarathon Trophy Race 250 Miles

Position	Car	Driver	Time	M.P.H.
1	Stutz,	Cooper	3:24:34 4-5	73.44
2	Mercer,	Ruckstall	3:32:33 4-5	70.57
3	King,	Klein	3:34:22 1-5	69.89
4	Frantz,	Parsons	3:45:20 1-5	66.57
5	Alco,	Taylor	4:17:12	64.8
	Hupmobile,	Smyley, running when race was called.		
	Ono,	Dingley, out on 124th lap when car overturned.		
	Maxwell,	Hughes-Carlson, out on 103rd lap with broken valve spring.		
	Maxwell,	Tetzlaff, out on 90th lap with broken steering gear.		
	Ray,	Brock, out on 84th lap with broken frame.		
	Mercer,	Pullen, out on 27th lap with broken axle shaft.		
	Fiat,	Verbeck, withdrew after completing 13 laps.		
	Fiat,	Sorrell, out on 3rd lap with broken air line.		
	Maxwell,	Carlson, out, engine trouble.		

Hughes averaged 74.28 miles per hour. By his victory Hughes gets possession of the Challenge Trophy and $1500.

Hughes took the race by a garrison finish. The triumphant Maxwell shattered Earl Cooper's record of 71.07 miles an hour established in the 1913 event.

At the finish, Cooper was almost as close to Klein as the King driver was to Hughes and was a close third. Dingley's Ono was fourth, Ruckstall's Mercer fifth and Parsons' Frantz sixth.

Until it was eliminated on the seventy-third lap, de Alene's Marmon was showing the way to the field. It went to the front at the end of the twenty-third lap and was in front for 100 miles, having an advantage of two laps when it blew a tire and rolled over in the ditch. Cooper then assumed the role of pacemaker and was not overtaken until the ninety-eighth lap when Hughes thundered by the Stutz. On the ninety-ninth lap, seconds only separated the Maxwell, Stutz and King. When almost on top of Hughes, Cooper blew a rear tire and this misfortune gave the Maxwell the race and the King second money.

Ed. Pullen, winner of the 1914 grand prize, failed to finish, but to him go the honors for driving the fastest lap. Pullen sent the Mercer around the 2-mile course in 1 minute 22 2-5 seconds, an average speed of 87 miles per hour.

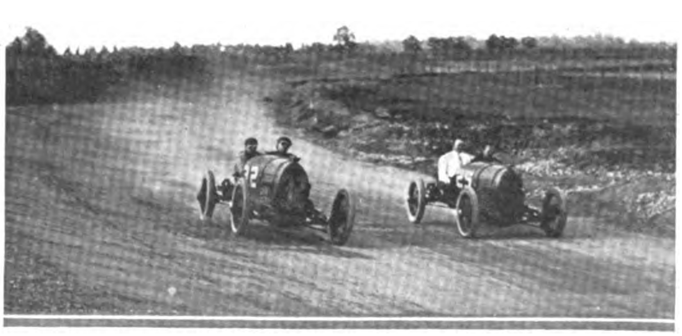
35,000 People at the Races

Speed fans of the northwest turned out in throngs to witness the races. Twenty thousand people were attracted to the speedway yesterday and the holiday crowd that packed the stands today numbered 35,000.

Two accidents marred the 2 days of exciting sport. In today's race, Bert Dingley at the wheel of the Ono and his mechanician, Swanson, were injured when on the next to the last lap, the car plunged from the course and threw its occupants 60 feet before overturning in a ditch. Both were severely injured and it was announced tonight that Dingley is not expected to survive.

In the Potlatch trophy event of yesterday, de Alene, the Marmon driver, and his helper, Scanlon, were hurt.

Parsons pushing his Frantz


A brush between Hughes and Carlson in Maxwells

Development of Automobile Trade Abroad

Good Sale for Low-Priced Cars—Latest Consular Report Gives Suggestions to Exporters—Our Cars Popular

THE Department of Commerce and Labor has issued the third special consular report in the form of a supplement to that issued last year and which appeared in THE AUTOMOBILE for May 1. The first of these publications appeared in this magazine in August 22, 1912.

American exporters of automobiles have made an excellent start in many foreign markets and as a rule occupy a good position wherever there is an extensive sale of cars.

Fourteen consuls general, comprising the local supervising officers in the district of Europe, covering all of Europe except European Russia, the Balkan States, and Greece, have rendered to the U. S. headquarters a series of statements showing what has been done in their respective countries to extend the American export trade in automobiles.

These reports are of great interest as they give exceptional value to the American manufacturer who wishes to obtain accurate information relative to the conditions of trade and other requirements of contemplated fields for the exploitation of his product.

Cyclecar in United Kingdom

In the United Kingdom, one of the chief foreign markets for low-priced American automobiles, the most prominent feature of the trade at present is the development of the cyclecar, which is considered an important competitor of the less expensive automobile. It is shown that Europeans in general will buy low-priced cars if the cars are properly exploited, regardless of local conditions. It is essential that the exporter show a real economy in operation of his car, because of the higher price of gasoline in Europe. Attention to this item has already yielded large results to the Americans who are now putting large numbers of cars on the Continent.

There is a wide sale of American cars in England. The excellence of the construction of the American car has been widely and generously acknowledged. While there are some British cars selling at about the same or even slightly lower prices, the introduction of the low-priced car was due to American initiative, and American manufacturers have not spared expense in judicious advertising and in demonstrating the real value of their product. As a result, the low-priced British cars are not as widely known as those of American manufacture.

It is characteristic of the English buyer to purchase an automobile which he expects to use for a long time, so that durability is one of the considerations that influence him most strongly. The slightest deterioration in the quality of a single American make which is sold to any extent abroad will not only affect the particular manufacturer disastrously but will cause definite injury to the prestige of all American manufacturers selling automobiles in foreign countries.

There is only one point that the American car lacks and that is finish. There are a large number of English automobilists who are willing to make an additional outlay of $100 to $250 for an American car if they can obtain a car that satisfies their requirements in the way of finish. Such purchasers are now either buying British cars, at an extra cost of perhaps 25 to 50 per cent., or else are adapting a British body to an American chassis.

British Make 200 Types of Machines

The sixty firms in Great Britain manufacturing automobiles offer to the public nearly 200 types of machines. The total output is now probably well over 20,000, although exact figures are not easily obtainable. It is calculated that two-thirds of the home demand is supplied by the British automobile manufacturers. German and Italian cars are increasing their hold in England, but French imports have dropped almost $2,500,000 in the last 4 years.

Official records show that in November, 1912, there were registered in France 76,771 automobiles, an increase of 12,562 since the same date in 1911. The value of the automobiles imported into France from this country in 1911 and 1912 was respectively $416,687 and $871,685.

According to official statistics, the value of the automobiles imported into France from the rest of the world in the 3 years, 1909, 1910 and 1911, was respectively $1,453,483, $1,677,556 and $2,235,230. In 1912 the imports amounted to $2,738,035. The increase in 1911 was due almost wholly to the increased popularity of the moderate-priced American car.

Belgium Makes Many Bodies

It is estimated that there are more than 17,000 automobiles in use in Belgium. There are now twenty automobile factories in this country. This country does not seem to offer a very profitable field for the American manufacturer. The manufacture of automobile bodywork is an important industry in Belgium. The total annual production of the country is in the neighborhood of 3,650 cars, valued at nearly $6,176,000.

Spain Buys Small Cars

In this country cars of European manufacture, of 15 to 20 horsepower, Spanish rating, with closed bodies holding four people, and costing from $3,000 to $6,000 seem to be most in demand. There is at present absolutely no demand for medium or high-priced cars of American manufacture. There is a certain prejudice in the Spanish mind against being known as the owner of a cheap car, although the sale of American cars of this class is increasing rapidly.

One of the causes for the small market in cheap American cars is the big profit exacted by the local agent from purchasers which brings the selling price to almost double that asked by the agent in the United States.

Although France dominates the Spanish market the U. S. is becoming a keen competitor. As showing that there is a better market in Spain for the lower-priced automobile the import figures for the years 1910 and 1911 provide an interesting contrast. In the first of these years the total number of cars exported was 393 at a value of $739,230. For the following year the number of cars reached 612, but the actual value represented a decrease, the figure being $565,422. Imports from France into Spain during 1911 totalled $392,973, while those from the United States represented $68,723. The figures for 1912 are not yet available.

Russia Is a Growing Market

The Russian market for automobiles is increasing more rapidly than any other country in Europe for the reason that it has been backward up until very recent years and now there is a real demand for automobiles of all classes, particularly of the cheap but strong car.

There is a good market for American cars. Many American manufacturers have already arranged for agencies in the principal cities and are breaking down the prejudice that has existed against American cars for a number of years.

Italy Importing More American Cars

The first 11 months of 1912 showed continued increases in the sales in Naples of low-priced, well-made American automobiles of a good appearance. There are fifteen automobile manufacturers in this country with a total output in 1911 of nearly 5,000 pleasure automobiles and trucks. Although the 1912 output is not completed, from information recently gathered, it would appear that the output will show figures reaching at least 8,000 machines. For the 11 months ending November 30, 1912, there were imported into Italy 227 automobiles of American manufacture, as against 145 for the calendar year 1911, only 25 in 1910, and 7 in 1909. The American cars imported are practically all of the cheaper grades.

Argentina Buying Cars Fast

There have been 10,000 automobiles imported into Argentina since 1900. Demand has created supply, and today every class of automobiles can be obtained for hire. Eighty per cent. of the imports of automobiles for the first 5 years were of French manufacture. In 1911 the value of the American imports into this country were valued at $330,126. During the first 9 months of 1912 no less than 3,067 cars were imported, valued at $3,575,740. The U. S. imports during that period amounted to $392,917.

India

The increase of 37 per cent. in the importation of automobiles into India is one of the interesting features of the trade returns for the official year ended March 31, 1912. Bombay continues to be the principal port of entry; of the year's imports, amounting to $3,255,785, cars to the value of $1,668,099 were received here. The value of the imports from the United States were valued at $195,925, four times the amount of 1910-11. It puts the United States in the second place and shows that our manufacturers are taking a serious interest in the Indian market. Returns covering the 6 months April to September, 1912, show automobile imports amounting to $1,305,111, as against $980,111 for the corresponding period of 1911. While it is acknowledged that American manufacturers are able to sell low-priced cars of good quality in every detail of construction, the Bombay buying public is inclined to think that the American is not yet able to compete with the European manufacturer in the highest-grade models. It is claimed that if American agencies in high-grade cars were established, many sales could be made. The American car sold at prices up to $2,000 has won its way absolutely on its merits and with the assistance of very little advertising.

Prices of Various Foreign Cars

The following list shows the prices of various less expensive cars of Continental and British make with which American cars have to compete:

Description of Car	Horsepower	Price
AUSTRIAN		
Four cylinders, interior-driven coupé, bore 80 mm. (3.1 inches), stroke, 110 mm. (4.33 inches), four-speed gears	16-18	$2,798
GERMAN		
Four-cylinder, inclosed valves, leather clutch, four speeds and reverse, bevel drive, chassis only	12-20 15-25	1,582 2,190
Four cylinders, engines en bloc, inclosed valves, chassis inswept in front and upswept at back, fitted with long springs, chassis only	5-12	973
Same, with torpedo double phaeton	6-16	1,460
Same, limousine or landaulet	8-20	2,190
Four cylinders, engine 75 by 88, thermo-siphon cooling, four speeds and reverse, forced-feed lubrication by pump, multiple-disk clutch, tires 750 by 88 mm. (29.5 by 3.5 inches), chassis	10-16	1,073
FRENCH		
Torpedo two-seater, four speeds, with hood and screen	8	1,022
Same, with interior-driven coupé	8	1,192
Four cylinders, four speeds, worm drive, two-seater, torpedo body.	11	1,679
Same, chassis only	11	1,294
Complete torpedo body or two-seater with dickey seat behind, four speeds, hood and screen	11 14	1,460 1,752
Same, with standard body	16	1,874
Same, with five seats	16	1,995
Four cylinders, tour-seater torpedo, with hood, screen, all lamps, horn, etc.	12	1,606
Four cylinders, engine 65 mm. (2.5 inches) bore, trough lubrication, high-tension magneto, thermo-siphon, cylinders cast in one, chassis price	8-10	1,216
ITALIAN		
Polished chassis, mono-bloc engine, four speeds	15-20	1,776
Four cylinders, Captain fixed wire wheels with detachable rims, dynamo electric installation, auxiliary engine-starting magneto, horn and speedometer, chassis complete	30	2,677
BRITISH		
Two-seater, bore and stroke of engine 69 and 130 mm. (2.7 and 5.1 inches), with hood, wind screen, lamps and horn	10-12	1,095
Same, four-seater	10-12	1,240
Four cylinders, bore and stroke 80 and 140 mm. (3.1 and 5.5 inches), 9-foot wheel base, four speeds forward and reverse, four-seater, worm or bevel drive, with hood, screen, etc.	16	1,703
Four-seater, torpedo model, complete	14	1,124
Two-seater, complete	10	894
Four cylinders, victoria two-seater, hoods, screen, lamps, etc.	12-14	1,168
Four cylinders, five-seater torpedo phaeton, with hood, screen, lamps, etc.	16-20	1,411
Two-seater torpedo body, two cylinders, cape cart hood, wind screen, engine 85 by 85 mm. (3.3 by 3.3 inches), chain drive, two speeds, Dunlop tires	8	803
Four cylinders, four-seater, complete with Dunlop tires	12	1,387
Four cylinders, two-seater, car complete	20	730
Two cylinders, safety three-wheeler, two-seated torpedo	10-14	584
Four cylinders, chassis with tires.	10 13-16	706 1,022
Two-cylinder victoria seating three abreast, engine 102 by 115 mm. (4 by 4.5 inches), cylinders cast en bloc, Dunlop tires, with hood, screen, lamps, etc.	13	1,071
Four cylinders, torpedo two-seater.	12	1,095
Same, four-seater	12	1,183
Two cylinders, two-seated victoria, V-type engine, 85 by 88 mm. (3.3 by 3.4 inches), three speeds, worm drive, complete car	7-8	633
Four cylinders, four-seated double phaeton torpedo, with hood, screen, etc., spare tire and wheel.	11	1,509

Oldfield Bill Again Menaces Inventors

By Gilbert H. Montague

The revised Oldfield bill, House of Representatives 15,989, which was introduced on April 24, 1914, and the hearings on which are now in progress before the House Committee on Patents, of which Mr. Oldfield is chairman, follows closely on the original Oldfield Bill of 2 years ago, in that it virtually abolishes license restrictions by providing that no action for infringement may be brought for their violation, and cuts down, from 17 to 3 years, the patentee's absolute control over his patent, by providing that if after 3 years the patented invention is not put into use, the patentee may be compelled to grant a license to anyone applying therefor.

This bill proposes to deprive the patent owner of the right to sue pirating dealers and manufacturers as contributory infringers and to relegate the patent owner to separate actions for breach of contract against an army of small users whom these pirates instigate to break their agreements. This proposal leaves the patent owner virtually without remedy. Even if a thousand such suits were successfully prosecuted the damages would be small in each, uncollectible in most and less than the expense of litigation in all. Meanwhile, the patent owner would be practically helpless before the instigator.

The opponents of this bill declare that no aid which the existing law gives to the merchandising of patented articles can be called unfair. It has been shown repeatedly that the difficulties of merchandising are enormously increased in the instance of novelties. All patented articles are novelties at first and most of them continue to be novelties to most of the public until the 17-year patent period has expired. Considering the natural handicap thus imposed on the selling of patented articles, and the further fact that the patent owner must reap the benefit before the expiration of the 17-year period no aid which the existing law lends can be called unfair.

By the same token license restrictions agreed to by owners when they obtain patented articles, solely upon the condition that they use them only with supplies that are specially prepared for them, is to be countenanced. Mr. H. Ward Leonard, of the Ward Leonard Company, Bronxville, N. Y., maker of electrical apparatus for automobiles, says in this connection: "It certainly is a fact that in some instances a man's market for a good article would be completely destroyed if he could not insure himself in seeing that it was properly used after it left his hands."

The notion that such license restrictions might give patent owners a practical monopoly of the market for unpatentable products used with a patented device, is disposed of by the fact that such a practical monopoly, far from offending the public policy actually promotes the general welfare because the patent owners can attain it only by cheapening the cost of manufacture of the patented article and can continue only so long as their invention is not superseded by subsequent inventions, still further cheapening the cost of manufacture.

Some amendments in the patent law are certainly needed. Few will disagree that some legislation other than that proposed in the Oldfield bill is required. Changes should be made in the equipment and organization of the Patent Office to increase its efficiency and to secure for the public and inventors, whom it serves, the best possible service. By changes of this sort, rather than by the radical innovations proposed in the Oldfield bill, will the patent system of the United States be improved.

Makers Save by Using S. A. E. Standards

Opinions from Representative Makers Indicate That Economy of Time in Design and Manufacture and in Cost of Material Are Salient Features

ECONOMY in every branch of the industry is the direct result of the use of the standards that have been set by the S. A. E., is the consensus of opinion according to the various representative manufacturers. First of all there has been a cash saving in the purchase of raw material because the steel mills make comparatively few steels according to the S. A. E. specifications where heretofore the demands of each individual manufacturer had to be satisfied. A saving in time of delivery has also been effected here, as it is quicker to get a standard article than a special one. Less misunderstanding, fewer mistakes and economy of time in ordering the material have also resulted.

In the drafting room, a great deal of time has also been saved, as now in designing many small parts the draftsman merely refers to the S. A. E. handbook. Reduction in the stock of repair parts is another result as the same size of yoke ends are often used on several models.

Economy in time and trouble to the owner has also been effected. For instance, a spark plug can be purchased at any supply store. But if it were not for the standardization of this part, it probably would be necessary to send to the factory for it.

Expressions of opinion as to the value of the work the S. A. E. Standards Committee has done are given below.

Wheel Rims Most Important

"We have followed very closely the work of the Standards committee of the Society of Automobile Engineers and this work has been of great value to our company. If there is any one thing that is more valuable than the others, it is, perhaps, the standardization of truck wheel rims. The writer would consider this to be of great value to the wheel builder, tire maker, manufacturer of trucks, as well as the user. It is not necessary for the wheel builder to carry special stock for each different order of wheels; it is not necessary for the truck manufacturer to carry special wheels for different makes of tires and the customer can very easily purchase any type of tire that he might fancy and be assured that it would properly fit the wheels on his truck.

"The standardization of carbureter fittings, magneto bases, brake clevises, etc., are of very great value to the manufacturer as well, and we feel that the work of the Standardization committee has been of great value and should be carried out farther."—C. B. Rose, Chief Engineer, Velie Motor Vehicle Co.

Advantage Is Unquestioned

"The advantage of the automobile industry of the standardization of parts, as worked out by the S. A. E., can hardly be questioned. It is equivalent to having a large force of the best engineers in the country working out details in your factory. This advantage begins first with the designing engineer and saves him considerable annoyance and time. In the drafting room it saves a number of special drawings and the time required in working out these details. As making parts in large quantities cheapens production, the purchasing department finds that it is much easier and cheaper to buy parts which have been standardized by the Society of Automobile Engineers.

"Also time of delivery is very materially shortened, which often prevents costly and wasteful delays. In the machine shop standard tools can be used for making these parts. This materially reduces the tool room force. There is a saving on the assembling and erecting floors, as standardization has a tendency to reduce a large number of small parts of different types to a fewer number of the same type. The stock keeping and cost departments can also be run more cheaply."—W. G. Wall, Chief Engineer, National Motor Vehicle Co.

Packard Uses Standards

"In designing new parts, we are working to the S. A. E. standards wherever possible. For instance, we have changed all our bolt heads, nuts, lock washers and what you might call standard parts to the S. A. E. standard, with the exception of threads. The Packard company, realizing the necessity for a fine thread on automobile work, standardized a set of fine threads at a very early date before the A. L. A. M. took the matter up. This means that our service departments all over the country are stocked up with our standard threaded parts and we could not make a change at this point without making it necessary to carry in stock an entirely duplicate set of parts.

"We have, however, adopted S. A. E. standards in a great many places where it would not affect our interchangeability list. Among other things, we have adopted the S. A. E. carbureter fittings.

"While we will not benefit from S. A. E. standards as much as people that buy a lot of their material finished, we know that such standards are a move in the right direction and we will gradually work into these standards wherever it does not affect our interchangeability to too great an extent.

"We know that it does simplify work, as draftsmen are always prone to invent something unless they are absolutely held down to a standard.

"We know it has saved us something, but as we had our parts pretty well standardized before this move, we have not saved as much as other companies probably have. We know of no way to get at even an approximate figure of just how much we have saved.

"We certainly favor standardization along sound lines to a degree that will not hamper the individuality of the engineer. There is no use in discussing this point, however, as I believe that practically the entire Society is agreed on this point."—J. G. Vincent, Chief Engineer, Packard Motor Car Co.

Room for More Work

"S. A. E. standards have been of most assistance to us in widening the market for readily available material and parts. The fact that certain materials are carried in stock by supply houses and by more than one supply house elimnates the uncertainty of delivery as well as reducing the cost. I find supply houses willing to carry in stock standard parts when they would not before carry similar parts or material at all, before standardization.

"I regret, however, that there are not more standards directly benefiting the electric vehicle and hope the trend of society in this respect will result in work of value to electric vehicle manufacturers. This is not to say that there are not already some standards which are of great value to both the gas and electric types of vehicles. I believe, however, that there is room for a great deal more standardization and I think that more work along this line is going to be speedily accomplished."—H. H. KENNEDY, Chief Engineer, The Waverley Co.

Saves Trouble—Pierce-Arrow

"The true value of the work of the Standards committee of the S. A. E. combined with the work of the technical branch of the A. L. A. M. can only be fully appreciated by those automobile manufacturers who were in the business prior to the time of such standards. The Pierce-Arrow Motor Car Co. had to design from the very first special screws, nuts, bolts, etc. With a finer thread than the U. S. standard, difficulty was experienced in purchasing special taps and dies, gauges, etc. All these had to be made by us. The tapping hole for spark plug was always a source of misunderstanding and annoyance. The Pierce-Arrow Co. adopted the metric as that was about the only standard at that time. Other manufacturers used a gas thread and there were quite a number of other sizes in vogue. It was difficult to get a correct metric thread from the American spark plug manufacturers.

"In regard to specifications for materials, the Pierce company had to formulate its own steel, cast iron, bronze and aluminum specifications. Frequently these conflicted with the steel manufacturers and foundries, endless correspondence resulted, frequently a compromise had to be accepted, as few of the large producers cared to cater to individual requirements unless the tonnage involved was very great. Where a steel mill consented to work to special specifications, they charged excessively, and frequently we were delayed in manufacturing by the material not being delivered on time. This led to purchasing some of the alloy steels abroad and we frequently could get more prompt shipments from the foreign houses. Most of the drop forge companies had never heard of heat treatment as applied to forgings.

"Now the S. A. E. standards are recognized. We scarcely ever need go outside the S. A. E. material specifications to find the grade of material we desire to use, and we have the assurance that these can be supplied promptly by a dozen different houses.

The S. A. E. standard threads for nuts, bolts, etc., are a great boon, especially in case of any equipment purchased from outside sources. Spark plugs can be had anywhere that will be a fairly good fit in the cylinders. The S. A. E. limits on ball and roller bearings are already tending towards a better product at no additional cost."—D. FERGUSSON, Mechanical Engineer, The Pierce-Arrow Motor Car Co.

Timken Uses Three Standards

"The S. A. E. Standards which affect our work peculiarly are only three at the present time, namely, the finish of brake lever eyes, the finish of pinion shaft for the universal joint flange and the dimension of splines for shaft fits.

"Regarding the latter, this company had already adopted its own standard before the S. A. E. adopted theirs. We shall, however, on new work adopt the S. A. E. standard for this class of work in every case.

"On the matter of pinion shaft finishes, the adoption of the S. A. E. has been of very considerable benefit to us. One of the most annoying things in connection with axle construction is the different finishes on pinion shafts which individual motor car manufacturers have in the past insisted upon. Within the last year or more our policy has been to urge, and insist upon—as far as possible—the use of the S. A. E. Standard taper sizes, and we are pleased to say we have gotten very nearly all of our customers over to this construction.

"In the matter of brake lever eye sizes there has in the past years been a great deal of confusion, but it is growing constantly less because of the adoption of S. A. E. standards by motor car manufacturers. We throw all of our influence in that direction and the adoption by the car builder of S. A. E. Standards has enabled us to reduce the number of parts to manufacture and to carry in stock, in the way of brake levers particularly. We are heartily in accord with this work of the Society, and while it is a difficult matter to figure out in dollars and cents the actual saving to us, it is very easy to notice the saving in confusion and complication of parts going through the plant, and we sincerely hope that this standardizing activity of the Society will continue.

"It really has been of unquestionably very great advantage to us and we would welcome a reasonable extension of standards to other parts of our axles, as experience and occasion will make possible."—H. W. ALDEN, Chief Engineer, The Timken-Detroit Axle Co., Detroit, Mich.

"The work of the Standards committee of the Society of Automobile Engineers to the Cunningham factory has certainly leveled off a lot of knotty points, both from the standpoint of design and manufacturing.

"We have followed the policy of adopting S. A. E. standards at every point where we have been able to work them in. Manufacturing conditions in some instances have delayed the adoption of some of these standards, but we work them in as fast as possible.

"One of the great advantages from the manufacturing standpoint is that we are able to write our specifications, calling for certain material, and simply note that it is to be of S. A. E. standard. This is then indicated on the orders of our purchasing department, and when the goods arrive they are invariably found to be what we want. Without the S. A. E. standards many goods would necessitate considerable description, which might be misinterpreted by our purchasing department, and in turn by the concerns from whom we buy, with the result that many errors would creep in, as they actually did in days before the S. A. E. standards were made, and no end of trouble was the result.

"We most heartily recommend the work of the Standards committee, and certainly trust that the good work will go on for there are many other features about automobiles which could be taken up by the committee without in the least curtailing originality of design."—V. E. LACY, James Cunningham, Son & Co., Rochester, N. Y.

Facilitates Work in Drafting Room

"The standards recommended by the committee have been of assistance because of the fact that manufacturers of carbureters, spark plugs and small fittings are making their products to conform to the standard. Also the metal standards, having to do with composition and heat treatments of steel as well as bearing metals greatly facilitate work in the drafting room and purchasing department. We are also much interested in the standardization of motor mounting dimensions and transmission flanges and our newer models conform to the standards recommended as closely as possible.

"The work of the society has been of great value to the manufacturer who has taken advantage of it and should receive the hearty support of all people engaged in this line of work."—PITTSBURGH MODEL ENGINE Co., Pittsburgh, Pa.

Benefit to Industry—Lozier

"The value of standardizing certain parts entering into the construction of motor cars, both from the stand-

(*Continued on page 77*)

Proposes Standardization of Car Sizes

The Automobile Engineers' Forum

Such a Plan Would Render Possible Thorough Standardization of All Parts, Would Reduce Manufacturing Cost and Selling Price and Facilitate Repairs and Replacement

DETROIT, MICH.—Editor THE AUTOMOBILE:—President Leland's address before the Society of Automobile Engineers is to be admired for its sentiments, but I beg to take exception to his quotation from Bailey, in which he says:

"He most lives who thinks most,
Feels the noblest, acts the best."

This statement, as with everything else in the world, depends on conditions. For instance, there are many inventors or so-called inventors who have thought a lifetime on a subject and never accomplished anything, for the simple reason that they had not been thinking along the proper lines.

The Public Neglected?

Here is, to my mind, another practical illustration:

The S. A. E. has begun to create standards that to all intents and purposes assist the manufacturers, but the public and user, the main issue, have been entirely eliminated. Their thoughts have been all on the saving in manufacture and in doing so have confined their thoughts to the standardizing of parts instead of cars, with the result that there have been two thoughts most of the time when one would have produced greater benefits.

Standardize Car Sizes

You will notice I said standardizing cars instead of parts. At present there are about ten grades of cars, according to price. To be plain, we will say there are $500, $750, $1,000, $1,200, $1,500, $1,800, $2,000, $2,500, $3,000, $3,500, $4,000 cars. There are more, of course, but this is by way of illustration, and these cars all have different weights, different models, to the number probably of 100, these then have parts to the number of 4,000, and the S. A. E. has begun to standardize these parts, which to me is like having 4,000 beans and ten peas mixed up and starting to pick out the beans. What I would suggest is to pick out the ten peas from the beans, or in other words to set a standard of weight for cars. A 500-pound car, a 750-pound car, 1,000-pound car, a 1,500-pound car, an 1,800-pound car, a 2,400-pound car or chassis—from these six sizes a man can get any kind of a car he wants; each of these shall be standard length of wheelbase for each weight; each will have a standard engine support, standard cross members, standard radiator setting or support.

Standard Wheel Sizes

Having decided the weight of chassis in designing we know we could have standard size wheels for this chassis; therefore we would have standard size tires, for example: a 500-pound car would have 28 by 2 1-2; a 750-pound car would have 28 by 3; a 1,000-pound, 30 by 3; a 1,500-pound, 32 by 3½; 2,000-pound, 34 by 4; 2,500-pound, 36 by 4½. We would then have six standard tire sizes instead of forty-six according to a catalog I have at hand, and, mind you, the tire companies are in a position to give you much better service than you are now getting; competition will be more uniform and manufacturers can offer no excuses for putting on any but the proper size tire. While we are on the tire question let us take up the rim question. A great source of unnecessary weight and expense to both maker and user alike is the demountable rim, which should be abandoned as well as the old solid clincher. The quick detachable is a good, simple and efficient arrangement and cannot be improved upon, provided you have a good mechanically operated air pump.

Ordering Parts by Car Size

Having standard wheels we may now have standard hubs and bearings as well as standard spindles and axles so that it would be only necessary to go to a first-class supply house and ask for a front bearing for a 1,500-pound car or a front left hand steering knuckle for a 1,000-pound car. We could have standard springs, standard shackles, standard front axles, of which about six sizes would take care of every car made; the design could differ for the different ideas of different makers but their dimensions would have to be standard. We could have properly designed brake runners that would fit one and all standard brakes, shoes, etc.; the same principle applies to all; why not standardize them?

Standardize Fuel Feed

We have now three methods of feeding gasoline to carbureter, gravity, vacuum and pressure, and three or four places to put them. Why not standardize these? Make one size for each of the different size cars, one place to put it and have pressure feed. This is the best when properly applied. We can now put our carbureter as near the cylinders as necessary and instead of a standard flange for the carbureter we might standardize the intake, whether it be cast in the cylinder block or not. This would give standard gas pipe connections and fittings and standard throttle connections on steering gear and accelerator. We could also standardize a place for the steering column and have manufacturers mark their product to fit the car in place of making the car to fit their products.

Dropping Fads and Fancies

Automobile designers in the past have had too many fads and fancies; they think they must change something or they are not doing anything. They want to do now what foreign makers have done to a certain extent—to find out what really and positively is best, like the ideal car which was discussed at the meeting of the S. A. E. On some subjects there is a chance for endless argument; these must be taken up in a scientific manner and if properly thought out will be of inestimable value.

I have here only touched on a subject of gigantic proportions. The details I have mentioned form the foundation of my reasoning and it is only through discussion and criticism, and I might add, tests, that the Ideal car shall ever become a reality. In the same manner we might treat the horsepower of chassis; for a 500-pound chassis we could use a 10-horsepower engine; for 750 pounds, a 15-horsepower; 1,000, a 20-horsepower; 1,500 pounds, a 24-horsepower; 2,000 pounds, a 30-horsepower; 2,500, a 40-horsepower. This would equalize racing, making it easier to judge the merits of cars and place cars in the proper class. It is only through an organization such as the S. A. E. that this work can be accomplished, after which, I believe, the industry will be on a better manufacturing and commercial basis.—WILLIS A. SWAN.

Thinks Brakes on Cars and Trucks Are Often Inefficient

WILKES-BARRE, PA.—Editor THE AUTOMOBILE:—It pleases us to note that you are giving attention to the question of brakes on automobiles as mentioned in your editorial June 18 issue of THE AUTOMOBILE.

We have been laying a great deal of emphasis on the question of reliable brakes in our advertising the last 2 years, and, in this portion of axle equipment, have always considered safety as the first and foremost consideration. Our brake equipment for motor trucks has been developed here in the mountains, and we believe that we have the most efficient brake as the result of this, of any equipment on the market.

Some of our customers have been inclined to think that we demand more of the brake than we should, but we believe that is not true as it will only be a question of time when the city fathers will exercise and take steps towards an examination and testing of brake equipment on automobiles and trucks especially in the congested districts. It is surprising to see what a large number of equipments are in operation in various parts and dangerous parts of the cities with brake equipments that will hardly stop the truck in its length without load, to say nothing of what would happen if the truck were called upon to stop suddenly with its full load. All of our brake equipment is designed to safely handle a truck with its full rated load, and lock the wheels without difficulty.

We believe that you are doing a lot of good for the motor truck industry in particular if you continue to lay emphasis on this subject of Safety First in brake equipment.—THE SHELDON AXLE CO.

Makers Save by Using S. A. E. Standards

(*Continued from page 75*)

point of production and economical purchase of material, has been proven by the extensive adoption among automobile manufacturers of the various standards evolved by the Society of Automobile Engineers.

"The Lozier Motor Co. has been specifying S. A. E. standards for some time, covering such parts as lock washers, yoke ends, spark plug threads, shaft tapers, copper tube fittings, bolts, nuts, screws, studs, etc., and contemplates the adoption of further S. A. E. standards as soon as they may be advantageously worked in.

"The use of such standards not only enables the manufacturer to obtain prompt deliveries on a stock article, thus eliminating the long delays consequent on a special parts proposition, but also tends towards rapidity and economy in production. Also the matter of standardization from a service standpoint is a most important item.

"From our own experience we believe the work of the Standards committee of the Society of Automobile Engineers has resulted in much good to the industry generally, and their continued efforts along these lines should prove beneficial to all concerned."—J. G. PERRIN, Chief Engineer, Lozier Motor Co., Detroit, Mich.

S. A. E. Standards—Best Practice

"The value of the work of the Standards committee of the Society of Automobile Engineers is imperative to every manufacturer of automobiles. The greatest value in the work of the Society of Automobile Engineers' Standards committee is the fact that they have created standards for parts, which represent the best accepted practice for the particular kind of work which these parts have to perform, the design of which is accepted by all of the engineers of the automobile industry.

"The creating of the S. A. E. standard of bolts, nuts and lock washers, yoke ends and I-rod ends has placed every manufacturer of automobiles in a position to purchase these articles from practically any manufacturer of screw machine parts, and a great many of the manufacturers carry these parts in stock for immediate delivery at a very small increase in price over the less desirable article which they replace.

"The recommendations made by this committee have caused the steel manufacturers to produce and carry in stock alloy steels in special sizes and shapes to meet the requirements of work these particular parts have to perform in the construction of automobiles.

"The above, to my mind, represents the greatest advancement in automobile manufacturing and has been of great benefit to the engineers of the various factories in their ability to obtain material which is best suited for their requirements."—R. S. FEND, Chief Engineer, Woods Motor Vehicle Co., Chicago, Ill.

Standards of Value—Cadillac

"We are heartily in favor of standardizing the various parts that go to make up an automobile, and we know that standards thus far established have been helpful.

"Perhaps the reason that we have not used more of the S. A. E. standards up to date is because we were manufacturing automobiles many years before the S. A. E. was active in formulating standards, and our management was not entirely satisfied with the then existing standards, or rather lack of standards. Therefore we established some systems known as Cadillac standards, that seemed to meet our requirements much better than anything available at that time. And because of establishing certain standards which have been incorporated and are interchangeable in our various machines, we have been quite reluctant to adopt some of the S. A. E. standards until we might be designing something entirely different from our previous construction, so that we could afford to ignore our past standards, in which case we give careful consideration to the S. A. E. standards and adopt them as far as possible.

"We believe that eventually the S. A. E. standards will be of great value to the automobile industry."—E. E. SWEET, Consulting Engineer, Cadillac Motor Car Co., Detroit, Mich.

Interchangeability of Parts Increased

"We use S. A. E. standards on all yoke and rod assemblies and on all bolts and nuts with the exception of such bolts as are used in aluminum. We find the standards of the S. A. E. satisfactory in every respect and will continue to enlarge on our use of them.

"We think the Standards committee is entitled to a great deal of credit for the work they have done and we trust that they will pursue the subject in the future with the same amount of vigor that has been displayed in the past as we feel sure that nothing but good will come of it."—W. J. PECK, Chief Engineer, Bartholomew Co.

Center Steer on Buffalo Electrics

Motor Acts as Brake in New Five-Seater—Cantilever Rear Spring Used

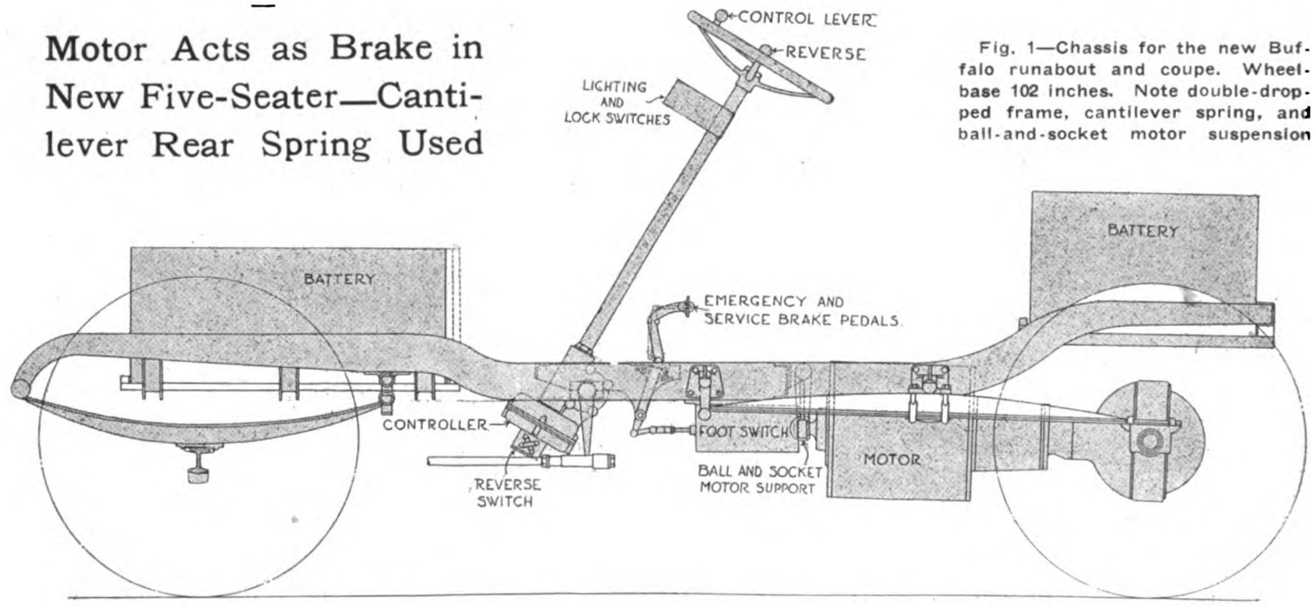


Fig. 1—Chassis for the new Buffalo runabout and coupe. Wheelbase 102 inches. Note double-dropped frame, cantilever spring, and ball-and-socket motor suspension

THE Buffalo Electric Vehicle Co. comes forward this year with a model that not only differs in many important features from the Buffalo electrics of previous years but one which possesses characteristics that distinguish it from the general field,

Most pronounced of these radical changes is the introduction of a central contiol system, that is, the central position of the steering wheel and brake pedals, the driver occupying a seat strictly in the middle of the floor. The vehicle seats five, two swivel seats being in front with sufficient space between them to allow an unobstructed view for the driver, while the remaining two seats are located at each side and slightly to the rear of the driver, Fig. 2.

Other changes over last year's models are the use of cantilever springs at the rear, a double-dropped frame, and a ball and socket front end support for the motor. The body has also been entirely redesigned to streamline principles and as shown in Figs. 6 and 7 the result is highly satisfactory. The method of regulating the motor by means of a lever on the steering wheel in addition to a foot controller operated in conjunction with the service brake pedal is retained.

Motor Acts as Brake

The motor used is again of Diehl manufacture but it is a special design so wound that the driving speed of the car is largely automatic irrespective of the grade over which the vehicle is traveling. This feature is obtained by using the motor as a brake on down grades, the braking effort being controlled automatically by the speed at which the car attempts to run. The current generated at this time by the motor in its capacity of a generator passes as charge into the battery. In this way a considerable extension of mileage per battery charge is obtained. The winding is shunt and the control is arranged so that the armature is never broken while changing speeds, the variation being effected only through resistances inserted in the fields.

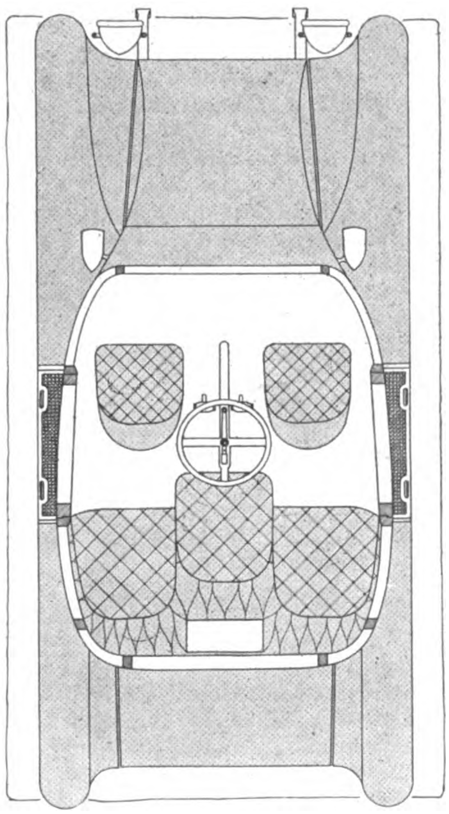


Fig. 2—Plan of the latest Buffalo electric, showing streamline body and central position of driver's seat

The controller is of the circular type and is remarkably compact. It occupies a position at the base of the steering column and operates by a radial brush arm actuated directly through the steering column by a short lever, Fig. 4, on the handwheel. Immediately beneath it and attached to the base is a reversing switch of the sliding contact type. This switch is operated by a knob in the center of the steering wheel. By means of a key at the top of the reverse switch rod sliding into a keyway in the boss of the control lever it is impossible to use the reversing switch except when the control lever is in the neutral position. The small size of the reversing switch is possible by the method of reversing the motor on the field instead of on the armature. The current passing around the field of a shunt wound motor being small the copper parts of the switch can of course be made correspondingly light.

Pedal Control Continued

In addition to the hand controlling device the Buffalo Co. still make use of the pedal operated switch which is capable of controlling the car within speeds of 9 to 20 miles per hour. The foot switch is located under the floor, Fig. 1, and is connected by linkage to the emergency brake pedal. It is a three-point regulating switch affording all necessary resistance for starting, stopping, and speeds up to 9 miles per hour. It will thus be seen that the car can be started by the pedal without the hands being used for other purposes than steering.

A distinct departure from ordinary practice in electric design is the support of the motor on a single point at the front end in place of the double-trunnion suspension used last year. The new suspension consists of a bronze ball in a steel socket hung from a cross member. No universals are used and therefore the torque is taken directly by the drive shaft casing which connects the motor solidly with the rear axle housing. The axle used is of Timken manufacture with the new curved bevel differential by which it is claimed extreme quietness of running is obtained. There is no other reduction that the differential, which has a ratio of 5.13 to 1 with the motor shaft. Both brakes act on 14 by 2.25-inch drums on the rear axle.

Several interesting details of body design are noticeable in the new coupé, besides the seating arrangement. All angles have been removed from the outline which is streamline as much as possible. The hood over the battery is hinged where it meets the curved cowl, but the joint is practically invisible by the employment of specially designed concealed hinges, Fig. 5. By the construction of this hinge a close butt joint is always made when the hood is lowered, but to make it absolutely impossible for moisture to work into the battery compartment a curved gutter shown in the illustration is provided to carry off water to the side and through underneath. The battery space this year is large enough to accommodate any make of standard battery, including the Edison. There is no particular battery specified. When the Edison is used 70 A4 cells are carried, being disposed 40 in front and 30 behind. In the plan, Fig. 2, it will be seen how the rear battery space is

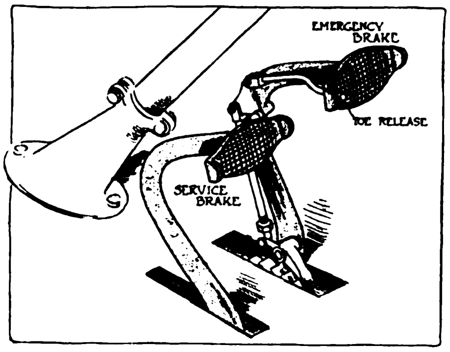


Fig. 3—Brake pedals at the foot of the steering column. The service brake also operates a control switch

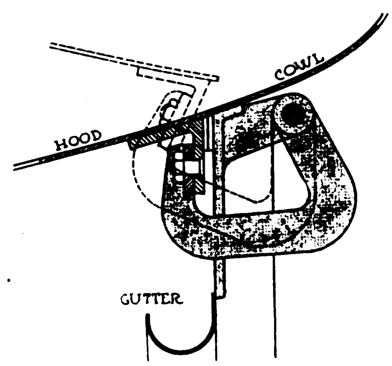


Fig. 5—Special concealed hinge for hood over battery. A gutter is provided to collect any moisture passing through the joint

much lessened externally by placing several of the cells in the center tray between the rear seats. When lead cells are installed the battery consists of 42 15-plate cells with a capacity of 140 hours.

A double-rain vision shield is fitted and sashless windows in felt runways are used. The door window is operated by a mechanical lifter. The door is 26 inches wide and on opening it a step light is automatically turned on. The double-dropped frame lowers the floor about 3 inches and makes for easier entrance.

In the coupé the front seats are of the swivel type but in the runabout model which also seats five,

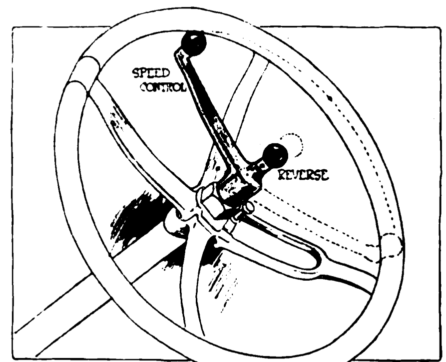
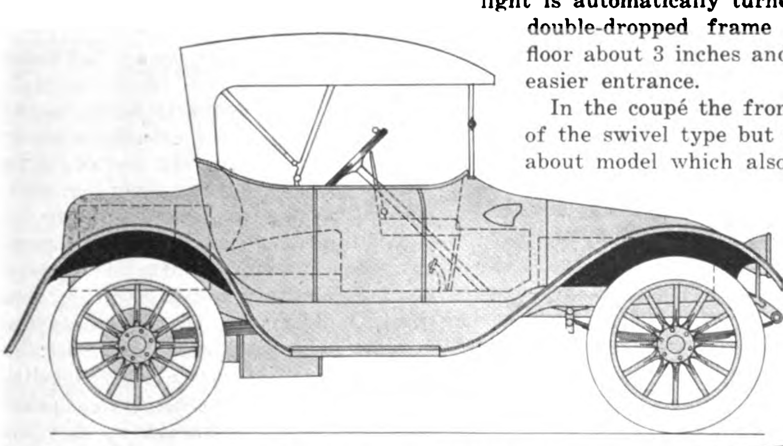


Fig. 4—Showing simplicity of control mechanism on steering wheel. A swing wheel is used for ease of entrance

hinged seats which fold under the cowl are fitted. In both models the lighting switch is mounted conveniently on the steering column as is also a lock switch which cuts off the entire current and prevents the car from being started. An instrument board containing an ammeter, voltmeter and clock is located in the center of the dash. The space at either side is handy for luggage. Between the rear seats of the coupé there is further accommodation for packages, so that the interior can be left unencumbered. For the comfort of the driver the pedals are made adjustable through a range of several inches, the change being easily effected by a telescopic link just under the pedal. The bodywork is designed and made at the Buffalo Electric factory, including the hoods which are in hammered aluminum fitting flush without beading against the cowl.

In actual road tests made with the new vehicle the economical result of 63 watts per ton-mile has been obtained.

Preparations are in progress for increasing the factory facilities. At present only two models are on the market though the coupé can be fitted with a folding landaulet back if desired. The price of the coupé is $3,200. The price of the runabout is not yet fixed but it will probably be in the neighborhood of $2,600.



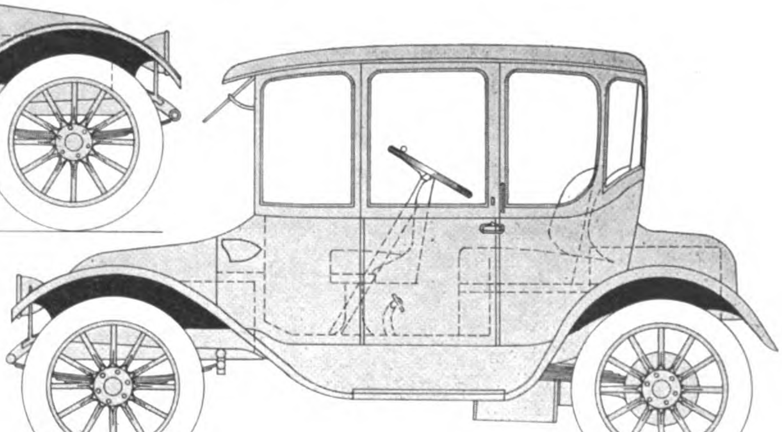


Fig. 6—The new Buffalo electric runabout is built on the same chassis as the coupé. Note low, speedy appearance obtained by smooth exterior lines and the adoption of the double-dropped frame

Fig. 7—Side view of the latest Buffalo coupé, showing arrangement of seats and the use of the interior space behind the central driving seat to accommodate part of the battery

Economy Is the Truck Tire Issue

Light Loads, Low Speeds and Tires of Good Materials and Solid Construction Mean Satisfaction for Owner and Maker

From a Paper Read at the Summer Session of the Society of Automobile Engineers at Cape May by James E. Hale, Experimental Engineer, Goodyear Tire & Rubber Co.

TAKEN in a broad sense undoubtedly economy of truck operation is the real issue. It follows, therefore, that if an economical tire could be evolved an ideal solution would be at hand.

Solid tires in service under certain operating conditions give certain results in the performance of their functions. These results are dependent on the tires themselves and on the conditions under which the tires are used; consequently we may propose an equation which indicates a balancing condition as follows:

The results of service performance, which may be termed "commercial properties"	$=f$	Operating conditions	&	Tire details or physical properties of the tires	&	Selling cost

Expanding the terms in parenthesis by itemizing the features pertinent to this discussion we have:

Cost per tire-mile Durability (Total Mileage) Resiliency (Power Consumption) Cushioning-effect Reliability Service cost Tractive grip	$=f$	Loading Speed Spring-suspension Road surfaces Topography Weather Driver	&	Structure Diameter Width Shape cross-section Tread rubber Toughness Attrition-resistance Plasticity Scheme of attachment Weight	&	Selling cost

The commercial properties, representing as they do the results of service performance, are of particular interest as they are a measure of the satisfaction received. Cost per tire-mile, durability, tractive grip, service cost, and power consumption are all capable of being expressed by exact numerical values. Cushioning effect and reliability are indefinite but none the less important.

The operating conditions, loading, driver, and to some extent, choice of road surfaces are under the control of the truck owner. The spring suspension is wholly and the loading to some extent under the control of the truck designer. Topography, weather, and in part the road surfaces must be accepted as they are. Of the operating conditions, loading and speeding alone

Haleisms on Truck Tires

1—**The value of the finished tire is largely in the materials which enter into its fabrication.**

2—**A tire which runs its mileage guarantee without developing any distressing symptoms is satisfactory.**

3—**A tire that exceeds its mileage guarantee will get the business in the future.**

4—**A tire that fails to give the mileage guaranteed gets a black eye.**

5—**Service helps to sell tires.**

6—**Extremes of heat or cold have a detrimental effect on the rubber and increase cost per ton mile.**

7—**The lighter the load and the slower the speed the lower the cost per ton mile.**

8—**Resiliency will presently occupy a decidedly more prominent position in the list than it has in the past.**

9—**Truck operators should recognize the possibility of greater economy from the use of efficient tires, just as does the electric truck owner.**

10—**The resiliency of the tire is largely dependent on the compounding of the tread rubber.**

may be expressed in numerical values.

The items under tire details pertain to the physical properties of the tires themselves and are self-explanatory.

In this discussion it may be noticed that cost or money value is mentioned only in connection with the commercial properties of the tires. Of course the item of cost is present on the other side of the equation in the various subdivisions of the tire details.

Value Is in Materials

Without being specific as to the precise relation between cost and tire details, let it suffice to say that the value of the finished product is largely in the materials which enter into its fabrication.

This equation is explained as representing a balancing condition. Of course this is true enough if we have been careful to include all the component subdivisions relative to the main parentheses of the equation. It will shortly be pointed out that practically all the terms on both sides are variables between rather wide limits and that broadly speaking the whole situation centers about what we do not know and what we want to know about the effect produced on the "commercial properties" by changes or alterations of the various "tire details" or "operating conditions."

To take an example, we might accumulate data upon a certain tire of average physical properties and which had been in service under average "operating conditions" (Chicago for instance) and for commercial properties we would find the cost per tire-mile to be ¼c. The mileage given, 10,000, the power consumption, 9/10 horsepower-hour per ton-mile per tire, the tractive grip represented by an average coefficient of friction of .40, a service cost of 1¾ hours interruption of service in changing tires, and the cushioning in its effectiveness to reduce destructive vibration while not capable of definite expression in figures is nevertheless a very important and definite quantity.

Cost per Ton Mile Increased

Now, if we change any of the variables on the right-hand side of the equation this will naturally result in a change in one or more of the commercial properties. Assuming for instance that the speed (that is the average speed at which the truck is driven) be diminished, we will find the cost per tire-mile decreased, the durability increased, the resiliency altered, the cushioning effect increased, the reliability increased, the tractive grip probably increased and the service cost unaltered. On the other hand suppose we change one of the physical properties of the tire, say stiffen the compound. The cost per tire-mile would probably be reduced, the total mileage probably increased, the cushioning qualities decreased, the reliability unaltered, the tractive grip diminished, the service cost unaltered, and the power consumption decreased or increased according to road surfaces.

The Feature Tire

ALTHOUGH THE CIRCUMSTANCES ARE FAMILIAR TO EVERYBODY, LET US ENTER HERE AS A MATTER OF RECORD AND COMPARISON THE EXISTING SCHEME OF JUDGING THE SATISFACTION OBTAINED FROM THE SERVICE OF SOLID TIRES. IN A FEW CASES, NOTABLY AMONG THE LARGE OWNERS, COST OF TIRE-MILE RECEIVES CONSIDERABLE ATTENTION, BUT IN GENERAL IT MAY BE SAID THAT A TIRE WHICH RUNS ITS MILEAGE GUARANTEE WITHOUT DEVELOPING ANY DISTRESSING SYMPTOMS IS SATISFACTORY, A TIRE THAT EXCEEDS THE MILEAGE GUARANTEE GETS THE BUSINESS IN THE FUTURE, AND A TIRE THAT FAILS TO GIVE THE MILEAGE GETS A BLACK EYE. ALSO IT OFTEN HAPPENS THAT SERVICE HELPS TO SELL A TIRE.

The "commercial properties" should be discussed more or less in detail since they represent the satisfaction obtained from the use of the tire, and also the possibilities of choosing the best possible combination of component operative conditions and tire details to fulfill the requirements of the "economical tire." In what follows it should be borne in mind that economy of truck operation taken as a whole determines for our discussion the actual values of the commercial properties of the "economical tire."

Cut Tire-Mile Cost

Obviously it is desirable to have the cost per tire-mile as small as possible consistent with the complete qualifications for economical truck operation. This is one of the most important of the commercial properties in the matter of economy and it happens that it is dependent on practically all of the subdivisions of the operative conditions and physical properties of the tires. The better the road surfaces and more nearly level the country, the lower the cost per tire-mile. Likewise the tires will show up better under a careful driver than a careless one.

Factors in Wear

As for weather, extremes of heat and cold have a detrimental effect on the rubber, consequently increasing the cost per tire-mile. Spring suspension is mentioned as one of the operating conditions. This may seem a little farfetched, yet we know that the efficiency of the springs in performing their functions has a very decided effect on the life of a tire.

Considering now the load on the tire and the speed at which the truck is operated, *all will agree that the lighter the load and the slower the speed*, the lower the cost per tire-mile, but returning to our fundamental idea of economical operation of the truck there is undoubtedly one combination of load and speed (assuming tire equipment of specific "physical properties") which will give a maximum effect in the matter of truck operating economy, yet the cost per tire-mile will be greater than were the speed to be slower and the load less. Again by simply altering one of the tire details, say stiffening the compound, an entirely new set of relations will be established, with the result that the economical load and speed will differ from those of the preceding case. Change the structure, diameter, width or shape separately or collectively and our economical load and speed have to be sought anew and also a new cost per tire-mile.

Tire Durability

Strictly speaking durability is a property which is closely allied to that of cost per tire-mile and there is a strong temptation to believe that they are inversely proportional.

The principal exceptions to this are to be found in the details of the tires themselves. Thus it is perfectly possible to compound the tread rubber to give a very low cost per tire-mile and at the same time produce a tire which would give but small total mileage. The same idea could apply in the case of the structure of the tire under certain circumstances. Apparently the predominant attitude of the wideawake truck owners is decidedly favoring the choice of tires which run long mileages. The importance of uninterrupted operating schedules is undoubtedly largely responsible for this condition; moreover it is probably true that many owners would feel justified in sacrificing, if necessary, a slight saving in tire cost if it came to the point of choosing between the two properties.

Resiliency in Future

Resiliency will presently occupy a very decidedly more prominent position in the list than it has in the past. The requirements of electric vehicle practice have for some time demanded the most efficient tires possible; some manufacturers even make the other commercial properties secondary to this one. Surely gas truck operators should recognize the possibility of greater economy from the use of efficient tires just as does the electric truck operator.

AN EXAMPLE WILL EMPHASIZE THIS POINT. IT IS VERY EASY TO PICK OUT FROM AMONG THE BRANDS AND TYPES OF TIRES ON THE MARKET THOSE WHICH WILL ABSORB 25 TO 40 PER CENT. MORE ENERGY THAN THE MOST EFFICIENT; CONSEQUENTLY IF A 3-TON TRUCK CONSUMES SAY FROM $400 TO $500 WORTH OF GASOLINE A YEAR, A VERY CONSIDERABLE CASH SAVING COULD BE MADE BY USING MORE EFFICIENT TIRES. AS THE RUBBER IS "LIVELY" OR "DEAD" (BY VIRTUE OF THE NATURE OF THE COMPOUNDING) SO WILL IT BE EFFICIENT OR INEFFICIENT WHEN MEASURED FOR POWER CONSUMPTION. THE STIFFNESS OR PLASTICITY OF THE COMPOUND ALSO PLAYS AN IMPORTANT PART IN THE DETERMINATION OF EFFICIENT PERFORMANCE.

EFFICIENCY IS VERY DEPENDENT ON THE CHARACTER OF ROAD SURFACE OVER WHICH THE VEHICLE IS OPERATED, PARTICULARLY AS TO THE DISTINCTION BETWEEN ROUGH AND SMOOTH ROAD SURFACES. OTHER THINGS BEING EQUAL THE SOFT TREAD RUBBER WILL GIVE GREATER EFFICIENCY ON THE ROUGHER ROADS.

From the foregoing it will be seen that the resiliency of the tire is largely dependent on the compounding of the tread rubber. To what extent it is dependent on the other physical properties of the tire is somewhat uncertain, but surely not to any marked extent. The efficiency varies slightly with extremes of heat and cold; also with different loads and speeds.

Cushioning Effect

The invention and especially the perpetuation of the India rubber tire were possible because of the benefit derived from the cushioning properties of the rubber as a lessener of uncomfortable and destructive vibrations. How many times has it been remarked that automobiles are possible because of the pneumatic tire? It is not true that motor trucks would not be possible without rubber tires? Just think of a 3-ton truck equipped with steel-shod wheels rattling over the average pavement at 8 to 12 miles per hour—and the poor pavement!

Soft-Tread Tires

Of course the plasticity or stiffness of the tread rubber is by far the most important item affecting this commercial property and it goes without saying that a soft yielding compound will protect the mechanism of a vehicle better than a hard stiff one.

The remaining items of tire detail each influence the cushioning effect in minor ways. It is rather unfortunate that up to the present time the tire companies have found no way of making a tread rubber of exceptional cushioning qualities and at the same time of low cost per tire-mile. We find that the softer and more yielding the stock the better its quality must be to give reasonable service, and quality represents price. This fact is also particularly noticeable: Tires made of soft compounds are very much more liable to fail structurally under heavy loading. It might be interesting to remark that there is one critical load for each size tire and for each speed where the cushioning is most pronounced; that is, a lightly loaded tire will bounce and thereby exaggerate vibration; on the other hand a heavily laden tire will show less response in cushioning due to its already highly distorted condition. Tires are similar to springs in this respect.

Factor of Reliability

The reliability of a solid tire in performing its functions needs very little comment. It is listed as one of the commercial properties because it is a property which is of considerable importance to truck operation as a whole. In the case of truck tires this property is practically entirely dependent on the tire details themselves.

The remarks concerning reliability apply equally well as to service cost; in addition there is of course the question of attention on the part of the selling house.

Tire's Tractive Grip

The effectiveness of the traction of a tire is dependent on the coefficient of friction between the tread rubber and the road surface. Consequently compound, width, weather (wet or dry), loading and the character and condition of the road surface are the principal elements affecting traction.

On dry surfaces there is no advantage to be found from the use of a notched or broken tread over the use of a continuous tread, for in either case the grip of the tire is dependent on the simple phenomenon of friction between the rubber and road surface. Wet or greasy pavements are well known to be annoying and often dangerous. The coefficient here is exceedingly low, ranging from .11 to .15 or .20, whereas it would be from .50 to .60 on dry pavement. I believe that under certain conditions the coefficient of friction between the tire and the surface can be greater than 1.00. This seems conceivable in the instance of a soft yielding tread compound on a firm rough surface.

Why Tires Wear

So far nothing has been mentioned about the ways in which tires wear out or fail. This should be outlined briefly as several of the commercial properties are directly dependent on the wearing qualities of the tires. You will notice that the various items under each main subdivision are enumerated as forms of legitimate wear or as forms of abuse. The significance of this is suggestive rather than absolute, the idea being to convey the distinction which one would observe in the case of perfect service.

A—Abrasion of tread rubber, due to
- 1—Tractive effort — Legitimate wear
- 2—Natural wear of rolling friction
- 3—Skidding — Abuse
- 4—Spinning wheels by quick starts
- 5—Sliding with brakes set
- 6—Wheels out of alignment

B—Cutting, chipping, or spreading of read rubber, due to
- 1—Sharp stones, glass, etc. — Legitimate wear
- 2—Poor road surfaces in general
- 3—Car tracks — Abuse
- 4—Use of anti-skid devices

C—Disintegration or deterioration of tread rubber, due to
- 1—Sun and heat — Legitimate wear
- 2—Allowing tires to freeze
- 3—Oil on garage floor — Abuse
- 4—Heating by excessive speeding

D—Failure of the tire structurally, due to — Abuse
- 1—Overloading
- 2—Speeding
- 3—Shocks and impacts from reckless driving over uneven road surfaces

E—Premature failure or wear due to imperfections of manufacture.

The foregoing is an exposition of the relevant elements entering into the determination of the proper tire sizes. This method of elaborating on the situation is apt to leave the inference that the situation is so hopelessly complicated that there is nothing in particular to be done except make the best of it.

On the other hand, I realize that there are many who, although they will not dispute the truth of the facts presented, will be tempted to depreciate their significance, preferring to dispose of the matter by insisting that "tires are tires" and that it is up to the tire companies to produce the goods. Before us is a summary of the items by which the service performance of the tires are judged and an exposition of the factors on which these various items depend, and finally the possibilities to be taken advantage of in the way of attempting to regulate the tire problems toward more satisfactory ends.

You gentlemen know to what extent operating conditions can be controlled and regulated. As for tire details those having a knowledge of tire design and manufacture realize that with proper attention to compounding and fabrication methods a wide variety of constant results is possible. I wish to bring out one point very emphatically, however: While it is possible to alter tire details so that results shall vary through a wide range, it is also true that if these details be altered with the idea of highly perfecting one commercial property, this may be at the sacrifice of some other property or properties of nearly equal importance.

WHAT DOES THE MOTOR TRUCK INDUSTRY WANT AS QUALIFICATIONS FOR A SATISFACTORY MOTOR TRUCK TIRE?

In other words what is the relative importance of the commercial properties?

Are we getting all the cushioning effect desirable consistent with economy of truck operation?

Should not more stress be laid on the property of power consumption for the ultimate benefit of economic truck operation?

How much should we sacrifice in the cost per tire-mile property and the durability to balance the other properties for the good of economical truck operation?

Manifestly all are not of equal importance. For instance if the cushioning effect be highly developed with the idea of decreasing the truck repair expenses by lessening the destructive vibration, this much is certain, the tread rubber will necessarily be of a soft yielding compound in such an idea. But we will find the cost per tire-mile increased and the durability diminished very materially unless we diminish the load which the tires carry, which in turn will raise the ton-mile cost of truck operation. To a slight extent, with the introduction of additional cushioning effect, the resiliency and tractive grip may or may not be altered.

Uniform Cushioning

If the stiffness or plasticity of the tread rubber of the various brands and types of tires be compared, it will be found that there is a wide variation. In spite of this, well-known makes of trucks in any locality, equipped with competing tires which exhibit these marked differences, will be found running side by side.

Surely so important a property as that of cushioning effect should be more or less uniform under similar conditions. I often ask engineers, owners, and drivers whether they want a hard stiff tire which will give almost no cushioning to the truck, or a tire which will protect the truck even if the tire-mile cost is a little higher. Some have never given the idea any thought, some (users particularly) do not care anything about the tire so long as it wears, some are looking for information, and a few have such decided convictions in favor of proper cushioning effect that they will not use solid tires of any description and choose the more expensive pneumatic.

This illustration of the relations between cushioning effect and the plasticity of the tread rubber is typical of a multitude of combinations of properties and conditions which might be portrayed. It would be an endless and wearisome task to enumerate and discuss all these combinations.

At the present time the formalities of truck tire merchandizing are limited to a guaranty of perfection in workmanship and a certain maximum cost per tire-mile. Also, each tire company has its own special list of permissible loads which each size of tire may carry.

Without dwelling on the shortcomings of this happy-go-lucky method of dealing in tires, permit me to call to your attention that in the iron and steel world it is customary to buy and sell material which fulfills the requirements of certain chemical or physical specifications. The art has been perfected to such an extent that the measurement of the elemental subdivisions is now a matter of every-day routine in the up-to-date office, and moreover it is recognized that buying on specifications is the only sane policy—fair to both purchaser and seller. Standardization is not by any means limited to steel; Portland cement, paints, chemicals, electrical apparatus, boilers, etc., are all more or less thoroughly standardized.

The Tire Equation

In outlining the solid tire situation I have proposed an equation representing a balancing condition between the results which the tires give in service on one side, and the details of the tires themselves, the cost of marketing and the conditions under which they are used on the other. By developing this equation in detail I have attempted to emphasize:

1. *The complexity of the solid tire problem due to the innumerable variables into which the whole may be subdivided.*
2. *The importance of recognizing that economy of truck operation in its broadest sense should be the guiding motive behind any solid tire considerations.*
3. *The fact that the performance of solid tires in service has never been given the proper attention in the matter of criticism from the angle of economic truck operation as a whole.*
4. *The logic of recognizing the "commercial properties" and the desirability of discovering their relative importance.*
5. *The limitations encountered in bringing about ideal conditions due to practically positive inability to regulate or control the operating conditions which are included under road surfaces, topography, weather, and driver.*
6. *The facts that the solid tires are still capable of considerable development and that this development is essentially a process of evolution and elimination; also that there are certain practical limitations in the production of the tires themselves which permit the attainment of high degrees of perfection of certain commercial properties only at a sacrifice of others.*

Standard to Attain

In conclusion I simply venture a general summary. The ideal disposition of truck tire standardization would be to prescribe standards of commercial properties to be attained when the tires are in service under standard road surface conditions; the variables under this scheme would be the tire details. However, inasmuch as it would be impracticable, to say nothing of being cumbersome, to test each tire for the values of the commercial properties, to determine whether they come up to standards or not, it would develop that once we have arrived at and defined a satisfactory condition in the matter of service performance, the simplest proposition would be to take cognizance of the physical properties of the tires themselves and standardize them together with the loadings, speed, and spring suspension.

Recent Court Rulings—Woman Driver Loses

By George F. Kaiser

THE fact that a chauffeur made a statement after an accident between a car which he was driving and a horse and buggy, practically admitting that the accident occurred through his fault and saying that he had been discharged 2 days after the accident, could not be held to bind his employer, was decided by Massachusetts Court recently.

A chauffeur was driving along a road; he came to a horse and buggy; the horse became frightened, shied and dragged the buggy over a bush against a stump; the buggy upset and the woman who was driving was thrown out and injured. She sued for her injuries and her husband also sued the motorist for the loss of her services. The Court decided that the accident was not due to the negligent way in which the automobile was being driven and gave judgment for the motorist.—*Gillett vs. Shaw*, 104 *N. E.* (*Massachusetts*) 719.

Dealer Liable for Rented Car

Arkansas Court holds that a person letting an automobile and a chauffeur for hire is liable for the chauffeur's negligence when he causes injury to passengers, when the latter exercise no authority over the chauffeur, except to direct him where they wish to be driven.

A man rented an automobile for himself and his guests in Little Rock, Ark., by telephone. When the car arrived he and his guests entered and told the chauffeur where they wished to be driven. On the way the car ran into an express wagon and the man who had rented it was killed and one of the women passengers was injured. There was some doubt as to whether the accident was caused by the negligence of the express man or the negligence of the chauffeur, but it finally was decided that the chauffeur had been negligent. The dealer proved that the chauffeur was an experienced chauffeur; that he had been in his employ for several years and never had an accident but that he had always been careful and skillful and further that the car cost $3,500 and was in perfect condition at the time of the accident. The dealer won out in the lower Court, the Court holding that his only duty was to furnish a safe automobile and a reliable chauffeur. The other side appealed the case, however, and the higher Court said that he must not only furnish a safe automobile and a careful and reliable chauffeur, but the dealer, or his agents, must use ordinary care for the safety of passengers in order that they may be carried safely to their destination and that as the car was exclusively in charge of the chauffeur, and the passengers had no control over him, except to tell him where to drive, the dealer was liable for damages for the injuries caused by the chauffeur's negligence. —*Forbes vs. Reinman & Wolfert*, 166 *S. W.* (*Arkansas*) 563.

Killed Through Negligence

Pennsylvania Court says that motor car company is liable when one of its cars driven by one of its chauffeurs runs down and kills a man.

A woman brought an action for the death of her husband which was caused by the negligent operation of the dealer's automobile which collided with a delivery wagon driven by the husband. The chauffeur was employed by the company and had as a passenger the company's cashier who was returning after depositing some money in the bank. The Court held that as the chauffeur and cashier were engaged in the company's business at the time of the accident, the company was liable and said that they were engaged in the company's business even though they had gone three or four blocks out of their way for personal reasons on returning from the Bank.—*Witte vs. Mitchell Lewis Motor Company*, 90 *Atlantic* (*Pennsylvania*) 528.

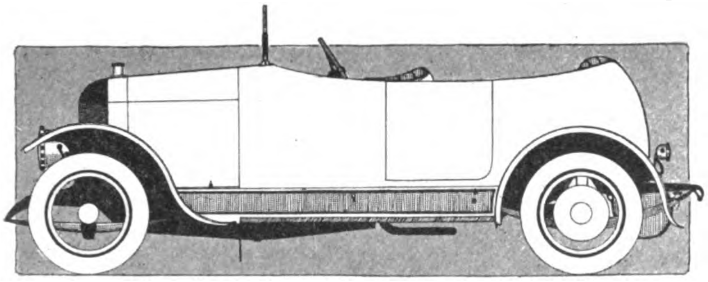


Fig. 1—Ideal car with two-door streamline body

The Rostrum

Ideal Automobile Has Six Cylinders

EDITOR THE AUTOMOBILE:—A few years ago some automobile makers got the idea that the ultimate type of car had been achieved and for one or two reasons they announced that their machines would incorporate no improvements since they were already as nearly perfect as it was possible to build them. This state of affairs did not last long, however, since the ever increasing number of improvements compelled these builders of perfect cars to change their models or get out of the game.

Today we have many different types of motor cars which resemble each other only in the kind of motive power used. By far the larger number of automobiles are propelled by the internal combustion engine and it seems reasonable to assume that this will be the motive power of the future. Dr. Steinmetz thinks the electric will be the most popular car of the future but surely the electric has not as yet reached as high a degree of development as the gasoline car and there would seem to be several obstacles to be overcome before the electric can become the universal car.

Starting with the premise that the internal combustion engine will be the motive power permit me to give my ideas as to what the car of the future will be like.

First, it will have six cylinders because this is the only type of motor which eliminates vibration and vibration spells death to any piece of machinery.

Second, it will have no hood or radiator as these parts are entirely unnecessary to the successful performance of an automobile. The motor will be air-cooled and all moving parts will be inclosed thus rendering the hood useless.

Third, it will have a simple gearset of two speeds only. More speeds on a very light, powerful six are superfluous. Possibly some form of electrical transmission such as the Entz may find favor.

Fourth, it will have some kind of wood plaster body such as has been brought out in France recently. This body will be plated with some metal, probably aluminum. One of the worst features of present day cars is the noisy, easily dented, metal bodies with their coats of perishable paint and varnish. The metal plated plaster body would overcome all these drawbacks. It would be handsome, durable, noiseless, easily cleaned and repaired.

Fifth, the car of the future will be much lighter than anything we have at present.

The present light six craze is only the beginning of automobile improvement and we have hardly begun to realize what the ultimate car must be like. Of course various other parts of the complicated piece of mechanism called an automobile will be constantly improved and no one can predict with much confidence what manner of vehicle our grandsons and great-grandsons will ride in. However, the above ideas are respectfully submitted for what they are worth.

East Canaan, Conn. D. C. CANFIELD.

A True Streamline Car

Editor THE AUTOMOBILE:—Since the word streamline seems to pervade the majority of the late automobile advertisements, it is an opportune time to remark about this wonderful new departure in motor car building.

In the first place there is only one American car made that can be called a true streamline car and the price of it is away beyond the pocketbook of the average buyer, this in no way meaning that this particular car is not worthy of the price asked for it,—but why cannot a good substantial car be built around $2,000, that is strictly up to date and embodying the features of the higher-priced cars?

There are many so-called streamline cars on the market, each and every one a perfectly good car, but the interpretation of the meaning of streamline has been misunderstood or is being withheld to be classed in 1917 or 1918 improvements. The accompanying illustration, Fig. 1, gives a clear idea of the *true* streamline body and I see no reason why this clean cut, luxurious style of body cannot be built into a $2,000 car. The industry is flooded now with cars that look too much alike, and because of the enormous production they will be on the wane before long. For this reason it behooves the manufacturers to develop the best automobile type possible, for this is the only type that will stand the reaction that is bound to come in the industry.

The car here shown is, I think, a fine example of a true streamline car. It has a four-cylinder, long-stroke motor with worm drive. The radiator is of the rounded V-type and the bonnet is quite high, which allows the use of a high-sided body yet in no way spoiling its long, sweeping horizontal lines. The upholstery is put in the car so as to be hardly noticeable, and is very thick and comfortable, the cushions of the seats resting on the floor of the body. The body is of the two-door type with the front seat divided and as a very wide body is used it makes this new feature a real comfort. The windshield is built into the cowl which joins the bonnet in a perfectly straight line. Note that there are no side lights, they being placed in the head lights so as to give the car a perfect streamline. The springs are very long and are half elliptic. Wire wheels are used.

This is a clear example of the undeveloped possibilities of body building and it is time some manufacturer grasped the situation and produced a strictly automobile type of car at a moderate price. He will be able to sell all of his product and then some.

Chicago, Ill. JULIAN F. BRASOR.

Champions Two-Cycle Motor

Editor THE AUTOMOBILE:—I noticed in THE ROSTRUM in THE AUTOMOBILE for June 18, a letter entitled Believes Two Cycle Motor Has a Future. I believe it has a "present" if the tendency in Europe means anything. The two-cycle engine has been adopted by Sulzer Brothers, Switzerland, Krupp of Germany, Carrel Grius, Belgium, Kind of Italy, Vickers of England, all reliable concerns, who have decided that a cylinder can work every stroke instead of loafing half the time, and the funny part of it is they did not make the charge to avoid valves in the combustion space either. It is also evident in the Sulzer case, that no attempt was made to eliminate parts as it has more to it than any four-cycle I ever saw. The writer has a design for an engine with features that go to raise the standard for high speed work as to power, efficiency and control and has several patentable features that will be shown soon. With only a partial test and the simplest form of motor without one change a three-cylinder, 4 by 4-inch motor developed 28 1-2 at 1,250 revolutions per minute and it can throttle to speeds as low as 185. It is a regular bull dog in power.

Cleveland, Ohio. JAMES MCINTOSH.

Reader Condemns Muffler Cutout

Editor THE AUTOMOBILE:—I was sorry to see in The Rostrum for June 25, page 1335, that the use of the muffler cutout was advocated. I have been engaged in the manufacture of automobiles for some years and have also driven them for 8 years and can see no excuse for them for any reason. The cutout is almost always abused in use and the car can be tested out just as well without it. Much of the prejudice against the automobile is due to the abuse of the cutout, and there is a large number of people whose nerves are in such a state that they are completely upset by the noise. Many of the states have a law forbidding its use on motorcycles and restricting its use on other motor vehicles; also, several of the leading makers do not equip their vehicles with them. The average driver of a car is not familiar with horses and in consequence the use of the cutout as a signal is dangerous. As a driver who is familiar with all kinds of traffic and in touch with people who use the roads I can only condemn the use of the cutout from all points of view. Another point which is least considered is the dust nuisance which is much aggravated by the cutout and also by the pipe from the muffler being directed downward.

Rockville, Conn. ALLEN HAMMOND.

—If you had read the article in question a little more carefully you would have noted that the following was said: "The unmuffled sound of a well-running motor is very pleasant to the ears of the average motorist, and this alone is sufficient excuse for its (cutout's) use, provided that the motorist does not use the device in towns or cities where the noise would be a nuisance."

We do not believe that the motorist should use the cutout anywhere that it will cause annoyance, but out in the country it does no harm and gives not only a pleasant sound, but is of some value as a signal.

Mud Pan Hard to Remove

Editor THE AUTOMOBILE:—Many motorists and repairmen will agree with me, that it is not an altogether easy job to remove and replace the dust pan of the car. For instance one manufacturer of cars fastened the pan with 8 machine bolts to the frame, and it took me and another man over an hour to remove and replace same. I would suggest that manufacturers would do away with the pan entirely and just protect the flywheel from the dirt when a leather-faced cone clutch is used.

I have noticed that manufacturers of cars do not pay the necessary attention to the construction of the universal joint. Some makers protect it with a leather cover fastened with a wire, which is quite insufficient for the wire works loose and does not keep the grease in, and every time you want to grease the joint you have to cut the wire and pull the leather back.

Some others have a metal housing which is very good but the plug hole in many cases is so located that it is impossible to reach it with a grease gun, and a grease gun is absolutely necessary to get the grease all over the wearing surfaces of the universal joint. In many cases I have fitted an elbow to bring the plug hole within easy reach. If a universal joint does not get proper attention it will wear rapidly and cause a dull knock and finally break. Manufacturers should not overlook this important feature.

DelMonte, California. FRANK H. LUMPE.

Wants Small, Powerful Car

Editor THE AUTOMOBILE:—In your issue of June 18, in which you gave an account of the Isle of Man race, a car of French design, a D. F. P., with four-cylinder motor 2.8 by 5.1 inches and rated at 15 horsepower, proved that it was fast, good on the hills and well-built.

Will you please tell me the name of the American car that answers the above description best?

Yonkers, N. Y. PROSPECTIVE PURCHASER.

—We know of no American car that resembles to any great degree the car that you mention. The best we can do is give you a list of machines equipped with four-cylinder motors of 3.5-inch bore or less, together with the names and addresses of the manufacturers and the prices of the cars.

Make and Model	Bore	St'ke	Manufacturer	Price
Carnation	3.375	3.75	American Voiturette Co., Detroit, Mich.	$ 495
Cartercar, 7	3.5	5	Carter Co., Pontiac, Mich.	1,250
Continental, 30	3.5	5	Martindale & Millikan, Franklin, Ind.	1,000
Davis, 35	3.5	5	G. W. Davis Carriage Co., Richmond, Ind.	1,335
Detroiter, A	3.5	5	Briggs, Detroiter Co., Detroit, Mich.	900
Grant, 21	2.75	4	Grant Motor Car Co., Detroit, Mich.	495
Hupmobile	3.25	5	Hupp Motor Car Co., Detroit, Mich.	1,050
Marathon, Runner	3.5	5	Marathon Motor Works, Nashville, Tenn.	925
Monarch, 4	3.19	5	Monarch Motor Car Co., Detroit, Mich.	925
Oakland, 36	3.5	5	Oakland Motor Car Co., Pontiac, Mich.	1,200
Partin-Palmer	2.75	4	Partin Mfg. Co., Chicago, Ill.	495
Paterson, 33	3.5	5	W. A. Paterson Co., Flint, Mich.	1,200
Read, 30	3.5	4	Read Motor Car Co., Detroit, Mich.	850
Saxon	2.625	4	Saxon Motor Co., Detroit, Mich.	395
Studebaker, 4	3.5	5	Studebaker Corp., Detroit, Mich.	1,050
Vulcan, 27	3.375	5	Vulcan Mfg. Co., Painsville, Ohio	750

To Attach Hartford Shock Absorbers

Editor THE AUTOMOBILE:—1—Please explain how I could place Truffault-Hartford shock absorbers on my Hupmobile 32? Use sketch showing where to attach them on rear spring.

2—Would you advise installing them on this car? Do you know of a shock absorber that would give better results than the Truffault-Hartford?

Cleveland, Ohio. THOMAS LINLEY.

—1—Drawings showing the method of attachment of these shock absorbers to the Hupmobile 32 are given in Fig. 2. At the left the installation of the shock absorber on the rear of the car is illustrated, and at the right the front shock absorber is shown attached. The front shock absorbers are attached in the ordinary way, that is, lengthwise of the car,

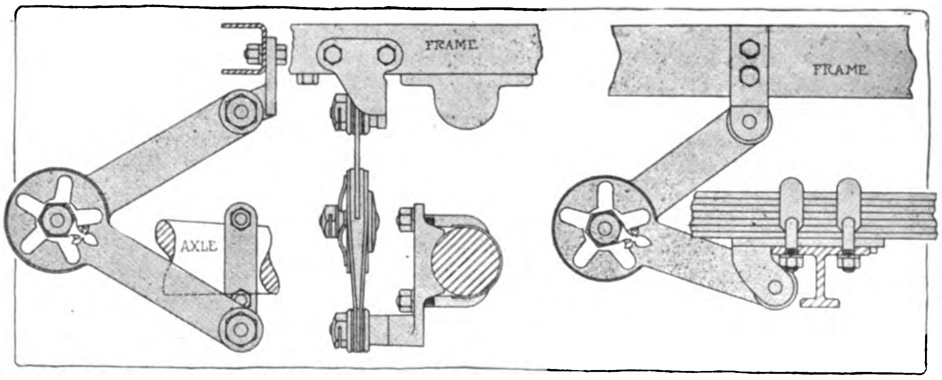


Fig. 2—Method of attaching Hartford shock absorbers to Hupmobile 32. The attachment of the rear pair is shown at the left and the front pair at the right

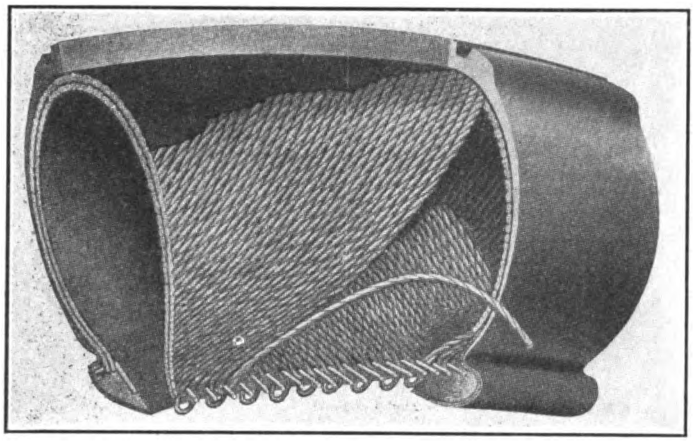


Fig. 3—Construction of Goodrich Silvertown Cord tires

but in the rear they are attached cross-wise because a transverse spring is used in the rear.

It will be noted that in putting on the rear shock absorbers two holes are drilled in each side member of the car frame and that a bracket on the upper arm of the shock absorber is bolted to the frame at this point. The lower arm of the shock absorber is clamped around the axle as indicated.

Likewise, the upper arm of each front absorber is attached to the frame by a bracket held by two bolts while the lower arm is attached to the axle by means of a bracket that goes between the spring and the axle.

While the attachment of these shock absorbers is a simple matter, there is no reason why you should attempt it as this will be attended to by the agent that sells you the shock absorbers.

2—Just as we have stated many times before we cannot advise any of our readers as to what is best and what is not best. In order to give authoritative opinions on such questions as this one you have asked we would have to exhaustively test every automobile and accessory brought out, and obviously this is impossible. Yet it would not be fair to either our readers or the manufacturers if we based conclusions on anything less than the results of long and careful tests. It certainly would not be right to give advice based on our own opinions after seeing these devices in action, or after reading the catalogs or on somebody's unreliable advice.

Cord Tires Take Less Power

Editor THE AUTOMOBILE:—I notice in June 4 issue you mention that cord tires were used in the big race, at Indianapolis. How do they differ from the ordinary tire and how much higher priced are they? Would it be an advantage to use them for country roads?

2—On page 1170 of the same issue you mention a 13 to 37 gear ratio for a Ford. Would not this be much stronger and also give a car more power? Where could I buy it?

Plentywood, Montana. JOE A. KAVON.

—The Cord tires differ from the ordinary tire in that instead of using a fabric of canvas cloth to hold the pressure a cotton cord construction is employed. Fig. 3, shows the construction of the Goodrich Silvertown cord tire.

It is claimed for these tires that they are more resilient, flexible and stronger, and less liable to rim-cutting. The greater flexibility means that less power is required to drive the car and the increased strength augurs more life and less liability to blowouts. It is claimed that a saving of 25 per cent. in fuel is possible.

As will be noted in the figure, the carcass of the tire is made up of a number of individual, long fiber cotton threads thoroughly impregnated with rubber under high pressure; these threads are then woven into a cord which is also impregnated with rubber. The finished cord is then woven over a form, in two layers, each layer of cord being separated by a layer of rubber. Every part of the cord is made and wound into the tire under equal tension by specially designed automatic machinery in such a manner that all internal strains are conveyed throughout, with no slack threads and no overworked parts. Every part of the tire carries its share of the load and all parts work together as a unit.

The cord tire costs about 25 per cent. more.

2—We do not quite understand what you mean by the gear ratio being stronger. There is little difference in the strength of the pinions and gears but this gear ratio will give the car greater speed but less hill-climbing ability.

This gear ratio will have to be made specially. Any first class machine shop should be able to do this work.

Route from Bethlehem, Pa., to Boston

Editor THE AUTOMOBILE:—Will you please tell me what is the best road, scenery considered, from Bethlehem, Pa., to Boston, Mass

South Bethlehem, Pa. E. CIARLO.

—Probably the best way is through New York City. Drive through Easton, Clinton, Whitehouse, Bound Brook, Plainfield, East Orange, Newark, Hoboken to New York City. Then turn north, following Broadway to 207th street, then turn to right and cross the Harlem. Keep straight ahead until Fordham road is reached and follow this into Pelham Parkway, which is a continuation. Follow main road passing through New Rochelle, Larchmont, Mamaroneck, Rye, Portchester, Greenwich, Stamford, Darien, Norwalk, Westport, Southport, Fairfield, Bridgeport, Stratford, Milford, Woodmont, Savin Rock, New Haven, Meriden, Berlin, Hartford, Springfield, Palmer, Worcester, Marlboro, Waltham, Boston.

How to Make a Keyway Quickly

Editor THE AUTOMOBILE:—So few mechanics, not to mention amateurs, know how to cut a keyway properly, that I believe it would be worth while to note these simple operations. After laying out the keyway, Fig. 5, with a scratch awl, rough out the keyway with a cold chisel which should be just a trifle narrower, in width, than the finished keyway. This can be done very quickly with a good sharp cold chisel. The angle at which the chisel should be held is indicated in the figure. The keyway is then finished with a sharp, square cornered file. The points to be most careful about are to file to uniform depth and to maintain a uniform width from one end to the other.

New York City. W. F. SCHAPHORST.

Weight of Car Increases Tire Pressure

Editor THE AUTOMOBILE:—1—Is it easier to pump up a tire with the wheel jacked up when the weight of the car is resting on the wheel?

2—If a gauge shows a certain number of pounds with the wheel jacked up, will it show differently when the weight of the car is resting on the wheel?

Macon, Miss. M. H. HARRISON.

—1—Theoretically it is slightly easier to pump up a tire when the weight is removed but the difference is so small that it is doubtful whether any ordinary gauge would measure it. The extra work required represents the amount of work to lift the weight on that wheel through the distance that the inflated tire lifts the rim off of the ground, this distance being approximately 3 inches. But this is divided up among so many pump strokes that the extra work is not felt, and it is probably just as economical of energy to do it this way as to jack the wheel up.

2—When the weight of the car is placed on the fully inflated tire the pressure increases slightly, but not enough to register on the ordinary gauge. In considering what happens when the tire is let down off the jack it is well to keep in mind that under these conditions the pressure of the air in the tire at any time multiplied by the volume of the air in the tire at the same time is equal to a constant quantity. Therefore if the pressure in the tire when it was up on the jack was 70 pounds and the volume 1,000 cubic inches then when the tire is made to support its part of the weight of the car, the tire bulges slightly, Fig. 4, and this reduces to a slight extent the cross-sectional area of the tire at the bottom and therefore reduces the volume slightly, possibly not more than 1 cubic inch.

Since the volume has been reduced 1-1000 the pressure will be increased the same amount or to 70.07 pounds.

Definition of Piston Displacement

Editor THE AUTOMOBILE:—1—Please explain in your next issue what piston displacement is, how to measure it and

2—What is the displacement of the Chalmers 30?

St. Louis, Mo. A. F. K.

—1—Piston displacement means the actual number of cubic inches displayed by the movement of all the pistons from one end of the stroke to the other. Considering just one piston, it equals the area of the piston head in square inches multiplied by the length of the stroke in inches, and in a four-cylinder motor, for instance, the total displacement would be four times this amount.

The area of the piston head is equal to the bore of the cylinder squared and then multiplied by .7854 and the volume is then given by multiplying this by the stroke. This gives the displacement of one cylinder, and therefore to get the total displacement, it is necessary to multiply by the number of cylinders.

Expressed as a formula:

Piston displacement $= \text{bore}^2 \times .7854 \times \text{stroke} \times \text{number of cylinders}$.

2—The dimensions of this motor are 4 by 4.5 inches and applying the above formula, we have,

Piston Displacement $= 4^2 \times .7854 \times 4.5 \times 4 = 228$

Spark Retarded May Heat Motor

Editor THE AUTOMOBILE:—It has been suggested to me by a reader of your publication to write regarding the heating of my automobile engine. It seems that the motor heats too much and that the thermo-syphon system does not do its work properly or that the heating is caused by another source. I believe my carbureter is adjusted properly, there is no slipping fan belt or loss of compression, but still the engine overheats. As the car has not been run over 3,000 miles, I doubt as to whether carbon could be the cause.

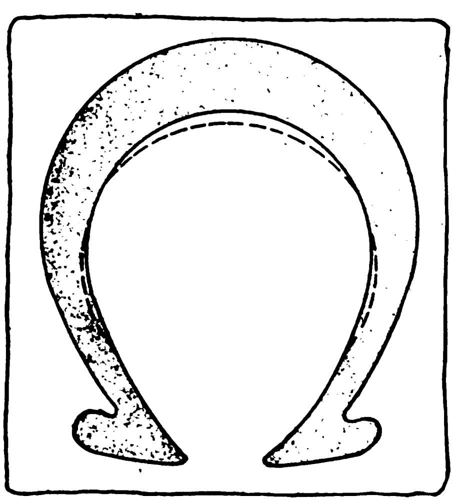


Fig. 4—Section through tire, showing decrease in cross-section when it is carrying the weight of the car

W. F. DEHNERT.
Newark, N. J.

—It is most likely that your trouble is due to driving with the spark retarded too far, although it is impossible to say with certainty that this is so.

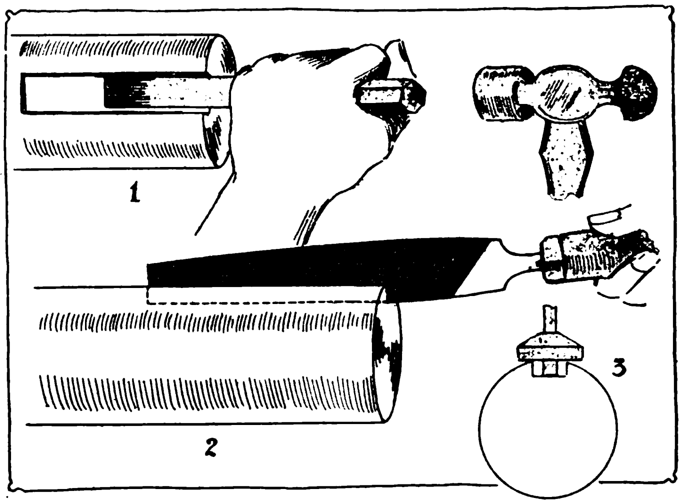


Fig. 5—(1) Method of cutting keyway. (2) Filing it smooth. (3) Measuring depth of keyway

Try driving your car with the spark advanced as far as possible, at all times, without the motor knocking.

There are many other things that might cause your motor to overheat, however; carbonized cylinders, poor water circulation, incorrect timing of motor, dragging brakes or possibly excessive friction. Just as you state, it is not likely that the trouble is caused by carbon but in looking for the cause it is not wise to neglect this possibility for the reason that motor troubles are often caused by the most unexpected circumstances.

Note whether the water is circulating freely, and if not, try to find where the trouble is, whether it is due to dirt, loose pieces of rubber obstructing the passages or what not.

Remember that with a thermo-syphon system, the water will not circulate at all as soon as the level drops below the discharge header in the top of the radiator. Circulation of water in the thermo-syphon system is dependent on the fact that the column of water, considered as such for simplicity, in the pipes and water jackets, is lighter than the column in the radiator because it is warmer and water expands and grows lighter as it is warmed. Therefore, if the level of water drops below the outlet pipe, circulation must stop. Consequently it would be well to note whether you have not been running with the water below this point. Or it is possible that you have a slow leak and that in the course of an afternoon enough water leaks out to lower the level enough to stop the circulation, as described.

If there is dirt in the radiator flush it out thoroughly and if there is any grease in the water wash it with a hot solution of sodium carbonate in water, one handful of carbonate to a pail of water will be sufficient. See that the rubber hose connections are in good condition.

As a last resort, check up the valve-timing by the marks on the flywheel and if there are no marks you had better write to the maker for information on this point.

You do not say whether your water boils or not although it is generally understood that this occurs whenever it is stated that a motor overheats but from your description it seems possible that, while the motor and especially the radiator becomes very hot to the touch, no boiling and therefore, no actual damage occurs, no loss of power is noted and there is no difference in the action of the motor or the performance of the car. If this is the case, there is nothing to worry about. A gasoline motor is designed to operate with the water very near the boiling point, or in other words at about 180 degrees Fahrenheit and although this temperature seems hot to the touch, it does not harm the motor.

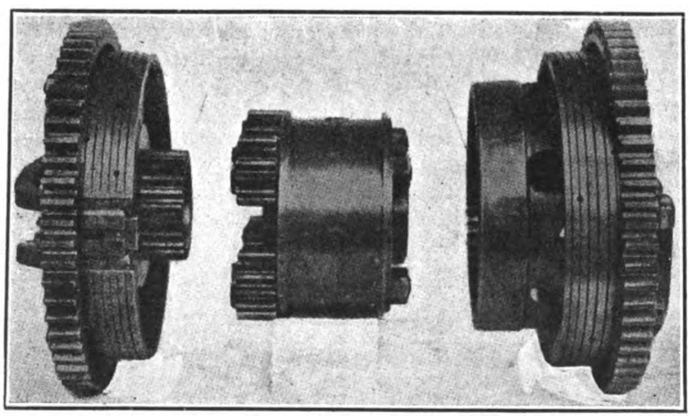
You have given no symptoms of overheating but merely stated that the motor "heats too much" and if the motor does not lose power or knock, there is nothing the matter.

The Engineering Digest

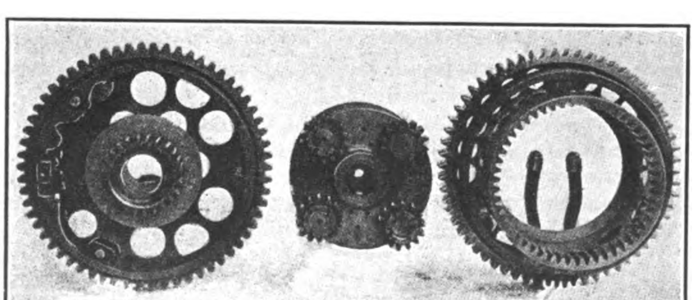
Worm Drive with Planetary Three-Speed Gear Forming a Rear Axle Unit—Tested Several Years

TWO difficulties stand against the adoption of a planetary change-gear for automobiles; first, that the sliding-gear has become almost universally adopted for cars requiring more than two gear-speeds ahead and, secondly, that the arrangement of three or four gear ratios so proportioned that the motor can be utilized fully on all of them is found difficult to make, because the sizes of the planetary gear wheels are somewhat interdependent while the peculiarities in the meshing of an internal gear also limit the choice of dimensions. A third difficulty arises if it is desired to place a planetary gear on the rear axle, as its weight is considerable and forms an unwelcome addition to the unsprung mass of the running-gear of the vehicle. Nevertheless a planetary gear with three forward speeds and reverse has been in operation in several hundreds of cars turned out during the past seven years by Chambers Motors, Ltd., of Belfast, Ireland, and for the past five years it has been located on the rear axle, forming a construction unit with a worm drive and the differential.

With a view to the revision of standard construction data which is now taking place all over in order to exploit all possibilities for building very light cars and cyclecars at a low cost of production, and also with an eye to the simplification, improvement and cheapening of trucks and delivery wagons, the Chambers planetary gear and the substantial details of its construction have become matters of timely interest, rather enhanced by the length of time it has been in practical use, and *Engineering* (London) gives an elaborate description of the latest model, from which the following abbreviated account and illustrations are taken.



Figs. 1 and 2—Two gear-speed members of Chambers gear and differential box with planet pinions



Change Gear Between Vehicle Wheels and Worm

In the general design it is first notable that the change-speed gear comes behind the worm gear in the order of power transmission, so that the speed and driving-pressures of the latter remain unaffected by gear changes. The drive is transmitted from the worm wheel to the drum upon which this wheel is mounted and from this drum through expansion rings to one or the other of the two speed-gear members, one of which comprises the internal-gear ring and the other the central sun gear, and from either of these gears the differential box is driven through the planetary pinions; the wheel shafts finally are driven from the differential box in the usual manner.

Figs. 1 and 2 show the two speed members with their expansion rings and the differential box with the planetary pinions, while the mechanical means employed for assembling these parts within the worm wheel drum and the outer drum, as well as the control parts and the external reverse gear pinions, are distinguishable in the line drawings, Figs. 3 to 7. The grooved pulley-like parts shown in Fig. 1 are actually the outer surfaces of the expansible friction rings, which lie inside the outer drum carrying the worm wheel and are marked *b* in Fig. 5. These friction rings may be expanded either separately or together, this giving the three gear combinations, of which the one caused by clutching both rings is the direct drive. The external teeth on the speed members, which makes them look like large spurwheels, have no share in forward propulsion but come into action for the control of the friction rings and for the operation of the reverse. The drum carrying the worm wheel is for the sake of clearness shown double-cross-hatched in the line drawings. When one speed member is clutched, the other is locked automatically by means of a pivoted catch, referred to later, and on direct drive this special locking mechanism is out of action.

The Gear Ratio

For the first speed, the speed member with the internal gear, and marked *c* in Figs. 3 and 5, is locked, while the friction band of the member with the sun gear, marked *d*, is expanded and driven by the worm gear. For the second speed this is reversed, *d* being locked while *c* is driven.

It is this mutuality in the gear arrangements which is generally resorted to in planetary gears in order to get two different speeds without too many parts and which in turn makes it difficult to get the proportions in the gear ratios what they should be. But with as much effort expended upon planetary gears as has been devoted to sliding-gears this drawback may perhaps be circumvented.

In the present instance the sun wheel has 24 teeth, the internal wheel 52 teeth and each of the planets 14 teeth. These proportions give driving speeds for the vehicle of about 8, 17.5 and 26 miles per hour with the motor running at 1,100 revolutions per minute and the proportions of the worm drive such as they are in the Chambers car. The gear ratios apart from the worm drive may be figured as follows: With the first speed in action, the internal gear is locked, as mentioned, and the sun gear *d* drives the planetary pinions e. One revolution of the internal gear now in the first place produces one revolution of the sun gear by turning the four planetary pinions, as a unit, once around, the sun gear following, and secondly the revolution of the pinions on their own axes causes an additional revolution of the sun wheel determined by the number of teeth, 52 in the internal gear and 24 in the sun wheel, so that the total rotation of the sun wheel becomes 1 plus 52/24 revolutions, making 3.16 revolutions. As one revolution of the internal gear on the first speed is also one revolution of the vehicle wheels, the gear ratio on this speed is thus 3.16. The ratio for the second speed, when it is the sun wheel which drives, becomes by similar reasoning 1 plus 24/52, which is 1.4615. The third speed, being direct, is of course unity, both the internal and the sun gear driving the pinions but in opposite directions, so that they cannot revolve on their axes.

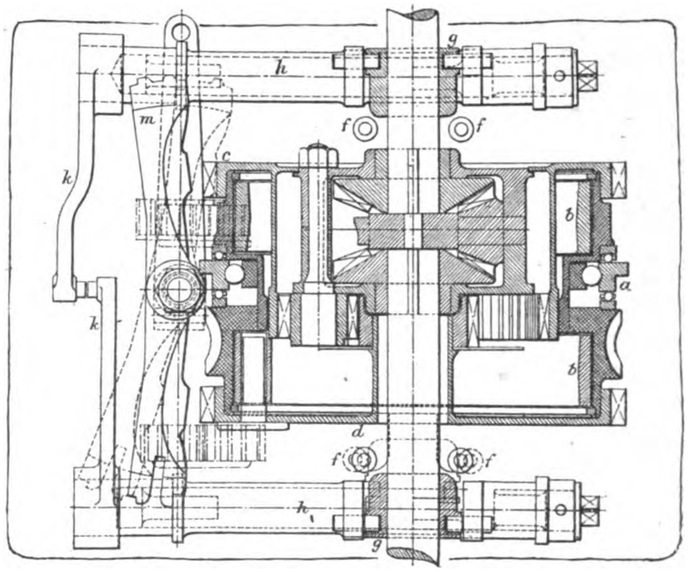


Fig. 5—Horizontal section; locking bar in position for either direct drive or reverse, being out of action

Operation and Control

The operating mechanism is perhaps the most interesting part of the Chambers gear. Each of the expansion rings, Fig. 6, is operated by means of a forked and rotatable clutch lever formed of two similar parts, the ends of which are shaped to carry rollers f and straddle the car axle without touching it. The formation of each part is shown to the right of the friction ring, Fig. 6. The friction rings are expanded when the free ends of the clutch levers are forced apart by a collar which slides on the central wheel shaft, as shown at g in Fig. 5, and the collars—one on each side of the mechanism—are controlled by two hollow rocking-shafts shown at h in Figs. 3 and 5. Each rocking-shaft has two upward-projecting arms which form a fork between the prongs of which the collar rotates, and pins with flat elongated heads are carried by the arms and serve to move the collar along the shaft. Levers shown at k in Figs. 3 and 5 and separately in Fig. 7 are pinned to the hollow shafts and these are connected to the pedals in front of the driver, so that he can move either or both collars. The motion of the rocking-shafts is spring-controlled, the foot pressure forcing them outward against the spring tension. The springs are inside of the hollow shafts, as shown in dotted lines in Fig. 3 and are arranged to be adjusted without dismantling the gear.

The details of the connection between the prongs of the clutch levers and the friction rings are worked out elaborately and are shown in Fig. 8 ou a large scale. The parts marked f are here the ends of the clutch levers. Each of these prongs is formed with a rocking-edge l on its inner face and a feather r on its outer, the feather fitting into a groove in the friction ring. The groove is lined with a hard steel seating. Between the two prongs there is a distance-piece made up of three parts, the inner one of which is wedge-shaped, and this distance-piece forms an adjustment for the friction ring; by slacking the wedge or tightening it the diameter of the ring is altered. The expansion necessary for clutching one of the speed members is obtained, as already explained, by rocking the prongs by means of the collar which forces apart the other ends of the lever arms. By this operation the feathers on the outer sides of the prongs are moved slightly upward and carry the ends of the friction bands with them. The whole arrangement is held together by the flanges on the distance-piece, the pins through the clutch levers and the inward spring of the ring, and the clutch levers are in no

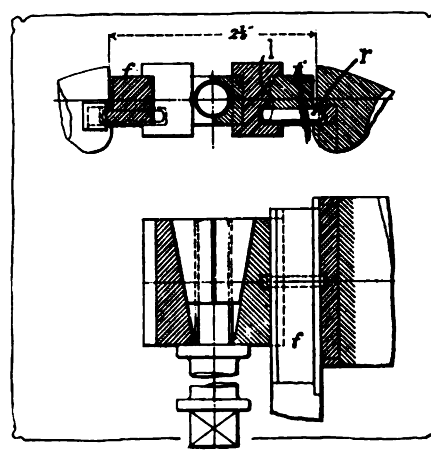
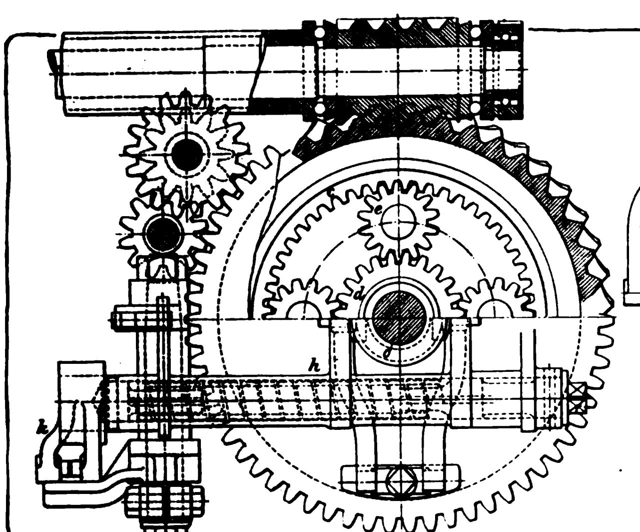


Fig. 8—Detail of clutch operation



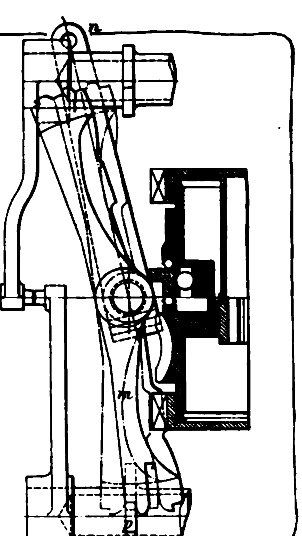


Fig. 3—Left side view, partly in section at middle plane of worm. Fig. 4—Top view of pivoted bar in position for blocking sun wheel and interlocked with clutch control at p

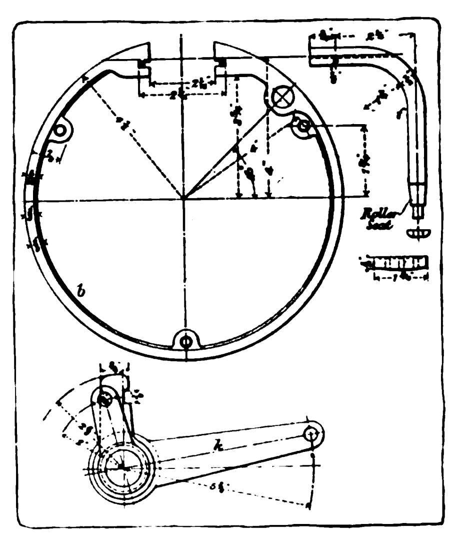


Fig. 6—Expansible clutch ring, with one member of clutch lever. Fig. 7—Bell lever k

other way secured to any part of the whole mechanism.

Locking of the Idle Speed Member

To lock the non-working speed member, while the other drives, the pivoted bar shown at *m* in Figs. 4 and 5 is provided. The range of motion of the bar is indicated in Fig. 4, the opposite motion being equal in extent. It locks by engaging with the outside teeth of the speed member. The bar is moved by lever *n*, Fig. 4, which is connected to the hand gear and it is interlocked with the mechanism for operating the collar *g* by catches on the rocking-shafts *h*, the catches engaging with the stepped ends of the bar, as at *p*.

The Reverse Gear and the Casing

To reverse the direction of the drive, a gear of the sliding type is employed, composed of spurwheels engaging on the outside of the speed members; see Fig. 3. When it is in mesh, the sun wheel drives from the outer worm wheel drum and the internal gear wheel is revolved backwards. The locking bar is out of action. The train of pinions for reverse is proportioned so that the internal gear makes one revolution for every 1.5 reverse turn of the sun wheel.

The whole mechanism is enclosed in an aluminum casing to which are secured the hollow fixed axles inside of which the wheel-driving shafts float, and the radial and thrust ball-bearings for the drive shaft as well as the very large ball-bearing for the worm wheel are mounted directly in this casing. A ridge is formed upon the outer fixed member of this bearing and fits into a corresponding groove in the aluminum while also acting as part of the two ball thrust-bearings taking the end pressure of the worm drive.

Rules for Hotelmen Who Want to Hold Motor Tourist Trade

FRENCHMEN do not like to tour outside of their own country, as a rule, but they admit that the hotels in out-of-the-way places in Switzerland and Holland give more acceptable accommodations than those to be found in some of the French provinces. The *"Club des Cent"* is an exclusive association, recruited from those prominent in art, politics and commerce, which has for one of its purposes to guide French hotelmen to a better understanding of the requirements for securing the best tourist trade. Each member must have driven his own car at least 40,000 kilometers, and all are constituted "overseers of the roads" and report on their condition. At the club there is a book in which the members write their reflections and their desires, and it is now the intention to have some of these remarks printed on cards and sent to hotelmen, to be posted in their private offices, and as folders for general distribution

Among the remarks in the club book bearing on the hotel question the following give an idea of the movement. They are largely in the form of mottos:

To Hotelmen

"Cleanliness, sane nourishment, fresh beds; luxury afterwards."

"Make us pay the price of things; we want you to earn a generous living; but we refuse absolutely to be gouged."

"No special affection for the 'Majestic Palace' or for mahogany barracks: as a rule, the larger the hotel, the more its kitchen flirts with chemistry."

"In a hotel you find often a good landlord, seldom a good manager."

"The club favors especially the good little hotels, the good little inns managed by their owners."

"In a good hotel one is received by the landlord."

"We eat beefsteak, not Louis XV armchairs."

The French Kitchen

"Good French cooking is done with fresh ingredients: fresh greens, fresh eggs, fresh butter, fresh milk."

"Let the salt be served in closed shakers, the pepper likewise; no dry mustard on the edge of the container."

"A good hotel is known by its coffee; no chicory! Coffee is made slowly with boiling water. Any coffee made in advance is poor coffee."

"Sugar bowls with covers; biscuits in closed boxes; cheese under cheesebells. Feed your guests, not the flies."

"The French kitchen ignores the soups bought in bottles or tins at the grocer."

"Down with gelatine! Down with fish glue! Any jelly made with gelatine is a nest for microbes. No chemical extracts! no sauces turned out at food factories! We admit no other kitchen than the kitchen."

"The great kitchen is not always the good kitchen. Down with the schools of cookery invented in countries where they don't know how to eat."

"Buy good wine. Having bought it, learn how to keep it. The hotelman who does not keep a few select bottles in his cellar cupboard is only a hashhouse keeper."

The Personnel

"Get your help in your own country: The Club of the Hundred refuses to stop with hotelmen who employ people with bizarre accents; Swiss in Switzerland, Italians in Italy, French in France."

"You little hotelkeepers, don't degrade your waiters with soiled clothing; any garment is good if it is clean."

"White linen, washed hands and combed women."

"A chauffeur should eat at the same time as his employers; he should be received as well as they are."

Rooms

"Clean, light rooms, large and comfortable bed, plenty of water."

"Buy everything in your own section of the country; Britton crockery and furniture in Brittany, Normandic furniture in Normandy; be at home; save the local color. Down with the products of the international market!"

New System for Swimming Pool at French Club

WHEN the Automobile Club of France built a new swimming pool at the clubhouse it also adopted a new system for keeping it clean and fresh. It is described at length in *Construction Moderne* of March 8 by Mr. Couturaud.

The principle for the installation is to make the same water circulate constantly; from the pool to the filters, the sterilized apparatus operating with ultraviolet rays, the reheater, the circulation pump and back to the pool. The reheater does not receive all the water in circulation but only a fraction adjusted according to the temperature to be obtained. The degree of heating produced by the apparatus remains constant.

The dimensions of the pool are about 25 by 9 meters with a useful depth of 3½ meters. It is built of armored concrete on the level of the street, and the machinery is in the sub-basement.

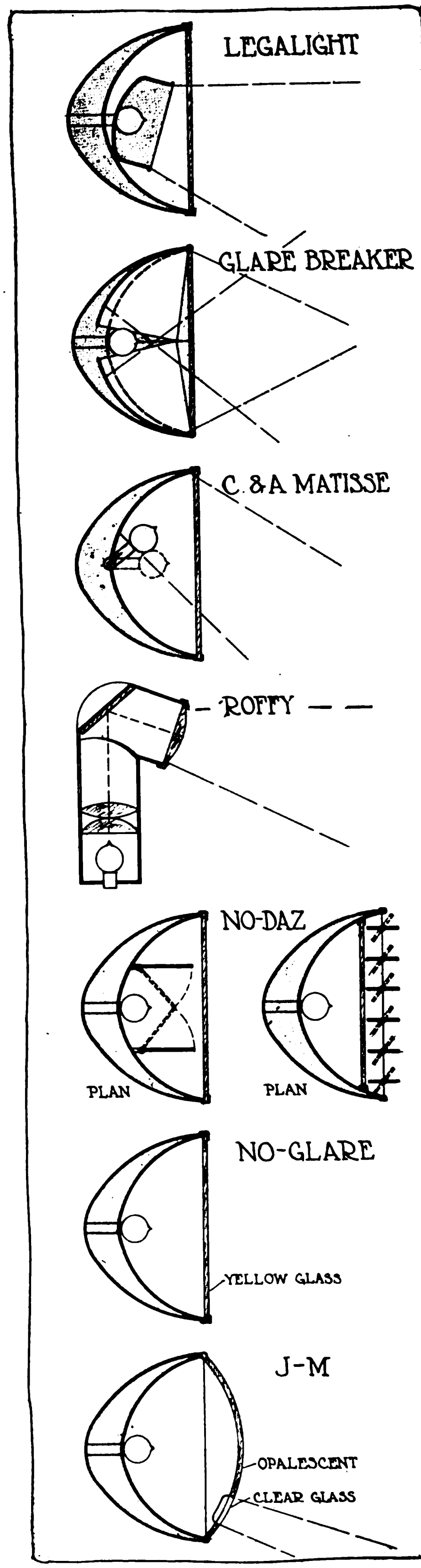
The water can be driven by the pump either into the sewer or to one of two sand filters. These filters are cleaned from time to time by means of a counter-current of clean water which carries away the impurities, the sand being churned up at the same time with rake-like instruments.

The sterilizer, which acts upon the water after it has been filtered, consists of a mercury vapor lamp with quartz bulb around which the water circulates.—From *Génie Civil*, June 20.

Metropolitan S. A. E. Discusses Headlights

NEW YORK CITY, July 3—At a meeting of the metropolitan section of the Society of Automobile Engineers, held at the Automobile Club of America last night, the subject of non-glaring headlights was taken up. All the known manufacturers of devices for eliminating the glare from headlights were invited to demonstrate their devices before the metropolitan engineers and seven responded. These were as follows:

1—Legalight Mfg. Co., New York City.
2—Glare Breaker Co., Pittsfield, Mass.
3—C. and A. Matisse, New York City.
4—Pittsburgh Electric Specialties Co., Pittsburgh, Pa.
5—Ward Leonard Co., Bronxville, N. Y.
6—Corning Glass Works, Corning, N. Y.
7—H. W. Johns-Manville Co., New York City.



Illustrating the seven types of headlight glare-removing devices exhibited to Metropolitan Section of S. A. E. at the Automobile Club of America.

Legalight

The Legalight was described by Joseph Gries. It consists of a small reflector which can be clamped over the bulb by a simple attaching device whenever it is desired to have the lights subdued. The Legalight deflects the rays 15 degrees from the horizontal so that the light falls on the ground in front of the car. At this angle the axes of the light cones are thrown on the road 3.73 feet in front of the car for every foot of height of the lamps. That is, if the lamp is 3 feet above the ground, the center of the stream of light would strike the ground 11.19 feet ahead of the car, illuminating the path ahead. The small reflector is deeply cupped as it was found that if the cup were not deep enough some of the rays would get into the main reflector and would be thrown straight ahead, giving the dazzling effect.

Glare Breaker

The Glare Breaker, as described by J. G. Middleton, of Pittsfield, Mass., is a device which splits the reflector of the lamp exactly across the center. This destroys the parabola and instead of the beams being thrown straight ahead they are deflected downward in front of the car and upward at an angle which is sufficiently acute to remove any danger of the rays striking the eyes of pedestrians or of occupants of oncoming cars. The rays which are thrown from the upper part of the split reflector strike the ground in front of the car and serve to illuminate the road ahead. The device is controlled from the seat of the car and can be operated when another car approaches or whenever it is desired to break the headlight rays by pressing a button which controls a solenoid coil.

C. & A. Matisse

Norman Macbeth, exhibitor of the C. and A. Matisse, in lecturing on the headlight situation, spoke of the cause of glare as being the filling of the retina of the eye with the rays of light. That is, when the retina is filled by a large volume of light, the blinding effect is given. The C. and A. Matisse is a device which can be controlled from the seat and consists simply in a means for removing the lamp bulb from the focal point of the parabola. The bulb socket is pivoted and when it is desired to cut down the direct rays in order to eliminate the glare, the bulb is tilted upward out of focus. This immediately annihilates the effects of the parabolic reflector and the rays are scattered instead of thrown forward in a direct dazzling beam.

Roffy Achromatic

The principles of the Roffy achromatic lamp were explained by J. G. Roffy. The glare-eliminating properties of these lights are due to the inclination of the axis of the light cone so that the uppermost rays are parallel to the ground. According to Mr. Roffy, the best arrangement is to have this ray at a height of 4.5 feet. This would eliminate the possibility of the blinding of either a pedestrian or occupant of another car by the light. The sectional illustration shows the arrangement of the lenses within the lamp, the light being deflected ahead by a diagonal mirror. Immediately above the high-candlepower bulb there is a plano-convex lens that concentrates the light and throws it into the double lens above it. From this lens the light is thrown against the mirror and thence through the projecting lens in front which neutralizes the color distortions produced by the condensing lens. In connection with this lamp there is a series-parallel switch which cuts in half the amperage when thrown into series.

No-Daz

Leonard Kebler, president of the Ward Leonard Company, described two devices that are made under the name of No-Daz. The first of these has a pair of translucent wings fastened inside the reflector. These wings project forward from the reflector in ordinary running, but when it is desired to dim the lights they fold tightly across the face of the reflector, imprisoning the light within. In the second scheme there is an arrangement at the front of the lamp similar to the ordinary shutter on a window. In ordinary running the shutters stand horizontally with the light shining between their faces. As the edges of the shutters are very thin, but little light is absorbed by them. When a button is pressed from the driver's seat the shutters are closed and the glare removed.

No-Glare Glass

The No-Glare glass made by the Corning Glass works was described by Dr. Wm. Churchill. The doctor was the first one to take up the non-blinding headlight from a physiological rather than a mechanical standpoint. He stated that the glare was caused mostly by the presence of rays near the violet end of the spectrum and that the rays at the red end of the spectrum do not materially affect the eye. "The glare is most," he said, "when the intrinsic brilliancy is highest." He then went on

(Continued on page 95)

The AUTOMOBILE

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The French Race

EUROPEAN manufacturers had their first opportunity last Saturday of observing the performance of 274-cubic inch motors in a 467-mile road race, the roads over which the race was run having in some places an average of forty curves to the mile and in other places having other road conditions such as crowned centers that severely tested these new racing creations.

From THE AUTOMOBILE'S cable reports it is apparent that these little speed creations made good, and if 65.5 miles per hour is rather slow compared with Indianapolis records for 500 miles it must be remembered that a tortuous 23-mile road circuit is much different from the brick speedway where racers travel with wide-open throttle most of the time.

That eleven of the thirty-eight starters completed the French contest within the time limit set is proof that the small motor has made good.

THE DOMINANT QUESTION REGARDING SATURDAY'S CONTEST IS, "WHAT GOOD DOES IT DO THE INDUSTRY?"

To those who began nearly a year ago building these special cars to a 274-cubic inch piston displacement and a maximum weight of 2,425 pounds, the race has many lessons. The winning Mercedes has made important discoveries in the matter, so far as the company is concerned. Last year it raced six-cylinder cars and this year it built both four-cylinder and six-cylinder machines to meet the race conditions. For months before the race both models were given strenuous road tests and the four-cylinder emerged a winner. The value of careful testing was shown by the results, this company winning the first three places.

But the race has done more: It has developed the overhead-valve construction as never before. Only one make of car contested that did not have overhead valves and it used sleeve valves. Last year several companies believed they could build T-head or L-head motors with small displacement to give the necessary high crankshaft speeds, but they discovered the error of their ways and this year all adopted some form of the overhead-valve design.

There is not anything new in using the valves in the head. They were more popular in America 8 years ago than today, but the past winter has seen one or two new models of small-displacement motors brought out using this form of valve arrangement, and these are to date giving good results. Saturday's race has given some good examples of how compact valve arrangements can be obtained; of how it is possible without much difficulty to satisfactorily inclose the entire valve mechanism, thereby making lubrication a simple problem and eliminating the noise factor. It is certain that the overhead-valve motor will receive more attention because of this race.

From a motor design viewpoint, Saturday's contest has proven that high crankshaft speeds are largely obtained through very careful balance of motor moving parts and light weight. Pistons turned from the best forging obtainable were cut to a wall thickness of 1/25 inch, and this proved satisfactory; connecting-rods were reduced; crankshafts received more attention than they have ever before received; shafts made from as many as four different parts were used and the performance of some of these has demonstrated that microscopic accuracy in construction has its merits in reduced vibration and naturally greater stability.

The French deserve credit in placing a maximum weight limit on the cars entered. For years we have labored in America with minimum weight limits and several years ago some of our leading low-priced cars were barred from contests because they were too light. Fortunately those days are over and our designers can no longer claim that a car must have weight in order to keep on the roadway. It is not weight that keeps a car on a partially crowned roadway but many engineering factors enter into the work. The careful division of weight over the axles, the suspension, the design of axle parts, the balance of wheels and other rotary parts, the balance of motor, etc., all add their quota in making a car that will hold the roadway at high speeds.

WE MUST KEEP IN STEP WITH PROGRESS, AND THE DAY IS PAST WHEN WEIGHT CAN BE USED AS A RATIONAL ARGUMENT FOR MAKING A MOTOR VEHICLE SAFE ON THE HIGHWAYS.

Gasoline Substitute Manufactured for 2 Cents per Gallon

Tests at Indianapolis Demonstrate That Fuel Made of Moth Balls and Water Has Same Properties as Gasoline

INDIANAPOLIS, IND., July 4—Making gasoline for 2 cents a gallon out of moth balls and water may seem like a dream but that was just what was done at the speedway today. There were some other ingredients, but the white powder, napthalene, out of which moth balls are made, and river water formed the principal part of the mixture which was poured into an old soap kettle out of which came a motor fuel, which, if it was not gasoline, had all the properties of that popular liquid except the smell.

John Andrews says it is gasoline, and he should know because he is the man that invented it.

Synthetic gasoline, that is, gasoline made by combining its elements through laboratory processes is not unknown. It has been accomplished before, but always has cost very much more to produce than if it were distilled from crude petroleum in the usual way. It was the general impression that until the price of gasoline rose a great deal higher than its present figure, no synthetic fuel of this sort would be commercially practicable.

This impression was upset completely in the minds of a dozen engineers when there was unloaded from the tonneau of a touring car, at the speedway, the bottom of a base burner, an old soap kettle, a funnel-shaped hood that fitted over the kettle and some odds and ends of iron piping. The touring car with its load had just arrived from McKeesport, Pa. The whole apparatus possibly could have been purchased from any junk man for the sum of $25, but when it was set up in one of the wooden garages that housed a racing car a month ago the junk heap assumed the form of a very complete still.

The apparatus was in shape for operation in the afternoon, and into the soap kettle was poured about 15 gallons of what the inventor called soup.

This is simply the residue from two or three previous runs in McKeesport, and was used to give quick distillation. It was not gasoline, and could not have had much gasoline in it because it could not be made to burn; nor was there any oil about it. It seemed more like dirty water than anything else. Then 5 gallons of water from the speedway mains was added, followed by about a half cupful of ammonia and a quart of powdered napthalene. The inventor here became quite mysterious and refused to divulge the names of the other constituents. However, he added to the mess in the kettle, about 2 ounces of some clear liquid, then a half cupful of a dark yellow liquid that made a quantity of smoke, and finished by dropping a pinch of some powder into a sort of cross between a whistle and a safety valve on the top of the gooseneck of the still. Then a moderate fire was lit under the kettle and there was nothing to do but await results. How many of the mysterious powders and liquids that went into the kettle were necessary and how many were put in to protect the secret, it is impossible to say.

Process Takes 1 Hour

Twenty minutes after the fire was lit, the still began to give off a great deal of inflammable gas and in just 1 hour a very light colorless liquid began to run out. This was collected in a glass water bottle of 5 gallons capacity. By the end of 2 hours more the water bottle was full. Its contents showed a gravity of 70 degrees Baumé and when poured into a special tank on a National six with a Rayfield carbureter, acted in every way the same as gasoline. It was found possible to increase the proportion of air very considerably.

Today the still was put in operation again. But this time, instead of using the soup, about 20 gallons of water were put in and a larger proportion of the chemicals. The product today had a gravity of 64 degrees Baumé.

A series of exact tests were made on the product by Carl G. F. Fisher and a committee of engineers, including Howard Marmon and Walter Marmon of the Nordyke & Marmon Co., Hanch of the Marmon company, Darwin S. Hatch of *Motor Age*, and others.

A six-cylinder National, weighing 3,800 pounds ran 12.5 miles on the speedway on a measured gallon of the product and showed a flexibility on high gear of between 4 and 55 miles per hour. With gasoline of 64 degrees Baumé gravity it showed 17.5 miles per gallon and a flexibility of between 3 and 61 miles per hour on high gear.

A Marmon then was run 200 miles on the new fuel and the valves showed no appreciable carbonization.

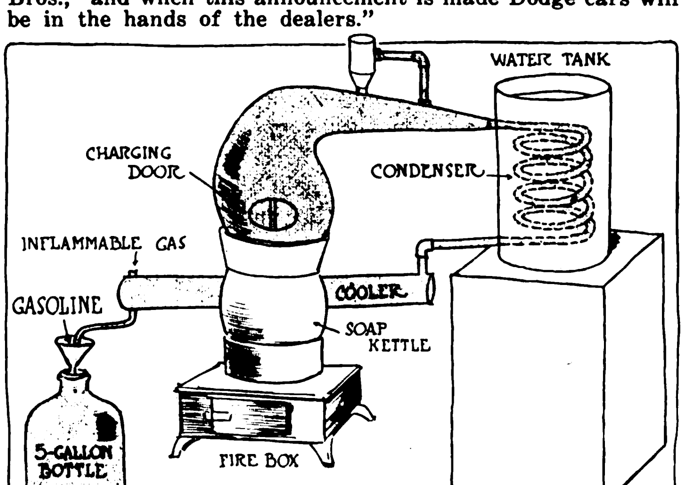
With the availability of this product, seemingly proven, the only doubtful point is the cost of manufacture. According to Andrews, it can be turned out at a cost of 2 cents a gallon. His word has to be taken on this point as he will not divulge the kind or nature of some of the chemicals employed, nor will he permit analysis of the product to be made. The chief ingredients are napthalene and water, neither of which is expensive. Andrews states that all of the materials may be obtained anywhere. As for fuel, the 5 gallons turned out yesterday required three lumps of soft coal, each no larger than a man's head, and four packing boxes split up for wood.

One of the features of the process is the fact that the gravity test of the product can be made whatever desired, simply by altering the proportions of the chemicals. That is, Andrews can obtain at will gasoline of any gravity between 50 and 90 degrees Baumé. At present he cannot hit the desired gravity test by a few degrees on account of the crude apparatus and seemingly haphazard way in which he guesses at the quantity of ingredients.

John Andrews is a Portuguese-American, born on the Maderia Islands, and living in McKeesport, Pa., and owing allegiance to King Manuel. Formerly a sailor and then a worker in the steel mills of Pittsburgh, where he selected the most dangerous work where he could get the highest pay wherewith to carry on his experiments. Recently, he received $350,000 from the United States government for the patent right to a new steel armor plate which he invented and with which the battleship Pennsylvania is being covered.

Dodge Bros. Incorporate for $5,000,000

DETROIT, MICH., July 8—*Special Telegram*—Dodge Bros. have incorporated, capital stock being $5,000,000. John F. Dodge is president and treasurer, Horace E. Dodge vice-president and general manager and Alfred L. McMeans secretary and office manager. The two brothers hold equal amount of stock, giving them full control, while McMeans holds balance. "No announcement about our new car will be made for at least 2 months," said G. C. Hubbs of Dodge Bros., "and when this announcement is made Dodge cars will be in the hands of the dealers."



Apparatus used to manufacture gasoline substitute

N. Y. Workmen's Compensation Law in Effect

Motor Car Manufacturers and Employers in Allied Industries Now Compelled to Indemnify Employees from Results of Accidents—Employer Is Compelled to Insure

NEW YORK CITY, July 1—The Workmen's Compensation Law, which went into effect in New York state today virtually supersedes the old Employer's Liability Law and, to a certain extent, the common law defense as well.

It applies to 47 groups of what are styled "hazardous" employments. These include more than 1,000 occupations. The various groups of so-called hazardous employments include practically all manufactures in the motor car and allied industries. They also include operators of garages and repair-shops, as well as motor car dealers.

The law states specifically that it shall apply to every hazardous employment where the workman is employed "for the pecuniary gain of the employer." This new law differs from the old common law in that it makes an employer responsible for injuries to his workmen whether or not the master is at fault; also, the old common law plea of contributory negligence on the part of a fellow workman is eliminated. In other words, it provides that every workman employed in any one of the so-called hazardous classes who is injured must receive a stated compensation.

EMPLOYEE MUST ACCEPT

The employer is compelled to provide this compensation; the employee cannot refuse to accept it. Agreements between the employer and the employee to waive any such compensation cannot be made, nor can the employer compel the workman to help pay premiums.

At the same time, the law takes away from workmen any and all right to sue under the common law for alleged damages. It also relieves the employer of the responsibility of such suits, but the employer must provide for compensation to his workmen; the law is virtually compulsory in this respect.

The entire burden falls upon the employer, and whereas under the old common law the workman was required to prove negligence on the part of the employer in order to recover for injuries received, the new law assumes—in the absence of substantial evidence to the contrary—that (1) The claim comes within the law; (2) That sufficient notice was given; (3) That the injury was not willfully intended; (4) That the injury did not result solely from intoxication while on duty.

If the employer fails to pay compensation within 10 days subsequent to the time when it is due he is subject to a suit by the state commission, which may declare the entire compensation recoverable in a lump sum with a penalty of 50 per cent. in addition. Such due payments constitute a liquidated claim for damages against the employer or the insurance carrier.

EMPLOYER MAY BE PENALIZED

If any employer fails to comply with the law by adequately providing for compensation to his workmen, the law states that "he shall be liable to a penalty for every day during which such failure continues of $1 for every employee, to be recovered by an action brought by the commission." The commission may, however, at its discretion, remit such penalty provided the employer secures proper compensation.

EMPLOYER COMPELLED TO INSURE

As already has been stated, the law is intended to insure compensation to those workmen whose labors come within the 47 groups that the commission has adjudged to be hazardous. Of these 47 groups there are probably seven that apply directly or indirectly to the motor car industry insofar as the dealer, garagemen and the repair-shop operator are concerned. These seven groups are as follows:

Group 4. The operation, including construction and repair, of machine shops, etc.

Group 16. Manufacture of furniture, upholstery, etc.

Group 21. Iron, steel or metal foundries, rolling mills, manufacture of castings, forgings, heavy engines, locomotives, shafting, wires, tubing, pipes, sheet metal.

Group 23. Manufacture of small castings or forgings, metal wares, instruments, water, gas or electric fixtures; light machines.

Group 24. Manufacture of traction engines, vehicles, automobiles, motor trucks, etc.

Group 25. Manufacture of explosives and dangerous chemicals, gasoline, petroleum, petroleum products.

Group 41. The operation, or otherwise than on tracks, on street highways or elsewhere, of cars, trucks, wagons or other vehicles, and rollers and engines propelled by steam, gas, gasoline, electricity, or mechanical means.

Group 41 covers very broadly the operation of motor cars and commercial vehicles, but in this respect it should be pointed out that the law states specifically that compensation shall be paid only to those who are employed for the pecuniary gain of the employer. This makes it plain that chauffeurs who drive private cars, for instance, do not come within the law inasmuch as they are not employed for the pecuniary gain of their employers.

The operation of repair-shops is quite clearly covered by Group 4 and this group may also be construed to cover the operation of garages.

The employer is compelled to provide compensation for those of his workmen whose occupations come within any of the 47 groups. He is compelled to give evidence that the compensation will be paid by insuring its payment. This may be had in one of four ways:

He may insure with the State Fund which is created under the new law for the purpose; with a mutual insurance company; with one of the many stock companies; or he may carry the insurance himself. It is not likely, however, that many employers will care to insure themselves; only men of unquestioned financial ability will be permitted to do so. Furthermore, "the commission may, in its discretion, require the deposit with the commission of securities of the amount prescribed in Section 13 of the insurance law in an amount to be determined by the commission to secure his liability to pay the compensation provided * * *" This security must remain until the liability for compensation ceases, which may be for 50 years or more.

COST OF METHODS EQUAL

There remain, therefore, but three ways in which the average employer can insure the payment of compensation. Each method has its advantages and its disadvantages. The cost of each method to the employer will be approximately the same. If the employer insures with the state fund, he is automatically relieved of all further liability for compensation. If, on the other hand, he insures with either a mutual company or a stock company, he is not relieved of all liability, for if the "insurance carrier," which means the company with which he insures, should fail, the employer would still be liable for compensation which might go on for an indefinite term of years—50 or more. As a measure of comfort, it may be added that such companies do not often fail. However, this slight hazard exists and it should not be overlooked, for only by insuring in the State Fund can the employer be relieved of all future liability.

If the employer insures with a stock company he will be required to pay a specified semi-annual premium based upon the amount of his payroll. This premium will never vary except as the payroll varies.

The premium which will be required by mutual companies, however, may vary. In other words, there may be assessments in addition to the premium. If, for instance, there should be a terrible catastrophe which would levy so heavily on the resources of the mutual company that an insufficient amount was available for the payment of all compensation, it would then be within the power—it would also be the duty—of the officers of the company to make an assessment upon each of the individual insurers to make up the difference.

STATE FUND HAS TWO ADVANTAGES

The advantages of insuring in the State Fund are claimed to be two in number. These are:

1. The employer who insures in this way extinguishes his liability to pay compensation, and
2. That the expense of managing the fund—not the claims for compensation, however—will be paid by the state for a time. [Two and one-half years.—Ed.]

Those who insure in the stock companies, on the other hand, will be liable for no extra assessments. Those who elect to insure their compensation in a mutual company virtually insure themselves; they become partners in a company which carries the insurance. The advantages of this form of insurance are claimed to be

1. Less expense, in that agents are eliminated;
2. Possibility of dividends in case the premiums should be slightly too high at first due to lack of experience;
3. Ability to insure against employers' liability under the common law and to reject undesirable risks.

In this respect it should be pointed out that whereas both mutual companies and stock companies have the privilege of rejecting undesirable risks in the same way that life insurance companies will refuse to write insurance on the life of a sick man; the State Fund has no such privilege; it must take all those who apply for insurance. It has the privilege of making its rates so high that they are prohibitive, however.

The cost of workmen's compensation insurance by two of these three methods is exactly the same. The rates quoted by the stock companies and those quoted by the mutual companies do not differ. The rates quoted by the State Fund, however, are exactly 8 per cent. less than those of the insurance companies.

In every case the premium rates are based upon the total payroll, the premiums applying to each $100 of wages or salaries. The rates charged by both mutual and stock companies for electric motor car dealers, either with or without garage, is 97 cents per $100 of payroll per year. For dealers in gasoline cars, either with or without a garage, the rate is $1.36. The rates charged by the State Fund on the same risks are 89 cents and $1.25, respectively.

These rates apply on the entire payroll, including such executive officers whose duties may expose them to the operative hazard of the business. The salaries of these officers is only included up to $1,500 a year, however.

The premium charged by the stock and mutual companies on machine shops which have a foundry is $2.07 per $100 of payroll per year. Where there is no foundry the premium is $1.36. The State Fund rates are $1.90 and $1.25, respectively.

The premium for a chauffeur driving a car for the pecuniary gain of his employer under the stock and mutual rates is $2.43 per $100 of payroll per year. The State Fund is 8 per cent. less. In neither case, however, can the total premium be less than $15 a year.

In connection with these rates, it should be remembered that under certain conditions reductions of as much as 40 per cent. may be made. Working together, the stock and mutual companies and the State Fund have created an inspection bureau. It will be one of the duties of this bureau to inspect the premises and to order reductions in rates in accordance with the condition of the premises. In other words, a machine-shop, for instance, which is in poor condition and where open gears, unprotected belting, unprotected stairways, etc., are rule rather than the exception, will pay the maximum rate; but where an earnest effort has been made to reduce the hazard under which the workmen operate, reduction in rates will be made accordingly.

What does the employee get under any of these forms of insurance? For the first two weeks subsequent to his injury he gets nothing, but the employer is required to furnish medical or surgical treatment for the first 60 days. During this period of the workman's disability the law states that the employer must furnish "such medical, surgical or other attendance or treatment, nurse and hospital service, medicine, crutches and apparatus as may be required or may be requested by the employee during 60 days after the injury."

The compensation due the workman is based upon his average weekly wage. This is obtained by multiplying his daily wage by 300 and dividing the product by 52. For total permanent disability, the workman will receive 66 2/3 per cent. of his average weekly wage during the continuance of his disability.

Suppose, for instance, the case of a man 21 years old, earning $22.50 a week. If he is permanently totally disabled he will receive $15 a week as long as he lives; there is no limit to the amount of payment. If he lives 40 years, he receives $31,200; if he lives 50 years, he receives $39,000.

For total temporary disability, this same workman will receive $15 a week during the continuance of his disability until he has received a total of $3,500; for partial temporary disability he will receive $15 a week for varying lengths of time, depending upon the extent of his injury, the schedule being as follows:

Loss of	Weeks	Payment
Thumb	60	$900
First finger	46	690
Second finger	30	450
Third finger	25	375
Fourth finger	15	225
Great toe	38	570
Any other toe	16	240

(Note.—The minimum limit of weekly compensation is $5. In other words, if the workman is receiving but $5 a week the compensation will amount to his regular wage; the maximum limit of weekly compensation is $15 a week.)

Loss of	Weeks	Total Payment
Hand	244	$3,660
Arm	312	4,680
Foot	205	2,075
Leg	288	4,320
Eye	128	1,920

(Note.—The minimum weekly compensation is $5 and the maximum in this case is $20 per week.)

In all other cases the rate of compensation will be 66 2/3 per cent. of the average weekly loss of wages payable during the continuance. In such cases there is no limit to the amount which may be paid.

Driggs-Seabury Gets U. S. Truck Order

NEW YORK CITY, July 6.—The Driggs-Seabury Ordnance Corp., Sharon, Pa., maker of the Vulcan truck, has entered into contract with the U. S. Government to supply 2 and 3-ton trucks during the fiscal year, starting July 1. The estimated number of trucks to be required is between 100 and 120.

3,732,585 Sq. Ft. in Ford Plant After Expansion of 10 Years

In Decade Buildings Now Under Way Will Occupy 85 Acres and House 40,000 Workers

DETROIT, MICH., July 6—Within the next 5 years the Ford Motor Company's plant at Highland Park, Detroit, is to be gradually enlarged so that in 1919 it will have a total floor space of 3,732,585 square feet or cover a piece of ground of 85 acres. At present the plant occupies 45 acres, has room to employ 20,000 men but when the buildings that have been planned are completed the Ford organization will be able to give employment to 40,000 men.

Two buildings 900 feet long, 60 feet wide and 6 stories high costing about $500,000 each were started last year and are now almost completed. Five buildings entirely similar to these, are to be erected within the next 5 years. Like the two nearly finished they will be of concrete with steel columns and rafters supporting the upper floors. There will be a craneway between each building, into which the trains of the Terminal railway will be run. Each of the 6 craneways will be 40 feet wide.

On the lower floors of the buildings, cars and material will be stored, while on the upper floors parts will be made. All these structures will have glass fronts from the third to the sixth floor.

A new power plant is being erected and it will be, according to the Ford company, one of the largest in the world and will have the largest gasoline engine (of 30,000 horsepower) thus far constructed in the world. The power plant will be 240 feet long, 150 feet wide and 85 feet high, and will cost about $1,500,000. When the plant and the other buildings have been completed it will represent an outlay of about $5,000,000.

Brown-Lipe-Chapin Get New Differential

NEW YORK CITY, July 6—The Brown-Lipe-Chapin Co., Syracuse, N. Y., has entered into an agreement with the M. & S. Gear Co., Kansas City, Mo., whereby the Syracuse company secure American manufacturing rights to the M. & S. spiral gear differential. It is the company's intention to manufacture the device in quantities for motor car and axle makers.

The device was invented by William Muehl who constitutes the M. in the M. & S. company. The S. is L. H. Scurlock. The differential differs from the ordinary type in that power is transmitted from the master gear to the axle shaft through spiral gears. Spiral gears are anchored in a housing which is attached to the master gear. The axes of the spiral gears constitute arcs of the circumference of rotation of the housing and they engage a corresponding gear on the shaft.

The advantage claimed for this construction is that tractor effort is equalized. The car wheel which has the greater traction received the greater power through the differential. In case one wheel is in sand or mud and does not pull and the other wheel is on solid ground this wheel will receive sufficient power to pull the car. Dangers of skidding on slippery pavements are said to be reduced by this type of construction.

Metropolitan S. A. E. Discusses Headlights

(*Continued from page 91*)

to quote Dr. Steinmetz, saying that the light that entered the eye was transformed into heat and absorbed by the body. When the glare is marked this heat is sufficient to cause inflammation. The No-Glare glass is designed to cut out the blue, violet and ultra-violet rays and in this way to eliminate the harmful glare.

The J-M frosted glass lens secures its non-blinding qualities, according to Otto Luyties, by the use of a concave, frosted glass lens at the bottom of which there is a slot of white glass which permits the rays to be thrown on the road in front of the car. These rays illuminate the road far enough ahead to answer the requirements of ordinary driving and the non-glaring qualities of the frosted glass remove the objections in city work.

The discussion which followed was opened by A. L. McMurtry, consulting engineer, of South Beach, Conn. He pointed out the requirements of the non-glaring headlight and stated that there seemed to be several methods of approaching the problem. This discussion was a round-table affair and very largely concentrated itself on how glare could be accurately defined and its causes. J. G. Middleton, maker of the Glare Breaker, stated that he believed that the definition of glare would have to be left to the county constable and that he would be the one who decided whether or not the headlight was glaring. For this reason Mr. Middleton stated that it was his belief that the subject should be treated in a direct, practical manner, rather than in a theoretical way. Leonard Kebler stated that it was his belief that the headlights should be deflected toward the ground instead of straight ahead.

150,000 More Cars in 1914 Than 1913

Registrations of 1,203,770 Cars in 33 States for 6 Months Proves Times Are Sound

ALBANY, N. Y., July 3—"Despite the widespread talk of hard times and business depression which has characterized the last six months," says Mitchell May, Secretary of State, "the motor car industry does not appear to have been but slightly affected, if a comparison of the registration statistics reported by the thirty-three states below listed is made.

"According to the most accurate figures obtained by direct communication with the licensing authorities in these commonwealths, during the first half of the present year the number of automobiles registered increased from 1,065,000, recorded for the entire period of 1913, to 1,203,770, the total reported from January to June 25th, of the present year, a gain of nearly 150,000 cars; motorists paying $8,386,108.69 in license fees since the first of the year.

"A substantial increase is noted in twenty-six states, New York still leading far in advance with Illinois retaining second place, while California, owing to her new law requiring re-registration of all cars, jumps from seventh to third place. Ohio drops back into fourth, followed by Pennsylvania, where the figures reach nearly the hundred thousand mark."

State	1914 Jan. to June 25	1913 Jan. to Dec.	1911 Jan. to Dec.
New York	147,186	132,579	81,655
Illinois	110,000	95,592	42,000
*California	104,830	60,000	14,566
Ohio	102,280	86,153	45,150
Pennsylvania	92,098	79,846	43,074
Iowa	87,897	77,269	29,323
Michigan	63,970	54,566	27,664
Massachusetts	63,511	57,197	36,975
Minnesota	58,800	45,054	19,000
Indiana	55,500	61,177	12,000
New Jersey	49,390	49,588	48,266
Wisconsin	45,661	34,647	7,241
Missouri	45,099	39,541	18,225
Connecticut	24,582	20,136	13,500
Washington	19,200	21,000	8,000
Georgia	18,000	12,919	5.700
South Dakota	16.500	14,700	3,250
North Dakota	14,900	12,504	7,185
Maryland	13,568	12,567	7,097
North Carolina	1,600	7,710	1,452
Virginia	11,452	9,023	3,909
†New Hampshire	8,466	7,254	4,489
Nebraska	7,770	34,943	7,766
Vermont	6,602	5,913	3,298
‡West Virginia	6,150	5.007	2,041
Alabama	6,000	5,314	..
Kentucky	5,857	7,551	2,680
Rhode Island	5,151	10,000	5,863
Arkansas	4,555	5,100	1,500
Delaware	2,561	2,145	1.228
New Mexico	2,425	1,972	..
Utah	1,292	3,400	442
Florida	917	3,270	1,333
	1,203,770	1,065,000	505,872

*Re-registration January, 1914. †January to June 1.
‡July, 1913, to June 25, 1914.

Market Reports for the Week

MARKET reports for this week remained generally steady. With the exception of tin and Bessemer and open-hearth steels, prices remained at last week's prices. There were a few small changes, but of no consequence. On Thursday, both Bessemer and open-hearth steels dropped $.50 per ton. Tin rose $.87 per 100 pounds with a reaction at the end of the week, followed by a $.25 reduction in price. There were freer offerings of nearby positions in this city at concessions and there was a small demand from the consumers. A reaction in copper was followed by slightly higher prices. Lead was dull but steady.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¼	.05¼	.05¼	.05¼	.05¼	.05¼	....
Beams & Channels, 100 lbs.	1.26	1.26	1.26	1.26	1.26	1.26	....
Bessemer Steel, ton	18.50	19.00	19.00	....	19.00	19.00	—.50
Copper, Elec., lb.	.13½	.13½	.13½	.13⅘	.13¾	.13 7/10	+.00⅕
Copper, Lake, lb.	.13⅝	.13⅝	.13⅝	.13¾	.13⅞	.13⅞	+.00¼
Cottonseed Oil, bbl.	7.22	7.20	7.20	7.26	7.26	7.24	+.02
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	....
Gasoline, Auto, bbl.	.14	.11	.14	.14	.14	.14	....
Lard Oil, prime	.93	.93	.93	.93	.93	.93	....
Lead, 100 lbs.	3.90	3.90	3.90	3.90	3.90	3.90	....
Linseed Oil	.54	.54	.54	.54	.54	.54	....
Open-Hearth Steel, ton	19.50	19.00	19.00	19.00	19.00	19.00	—.50
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	....
Petroleum, bbl., Pa., crude	1.75	1.75	1.75	1.75	1.75	1.75	... ...
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	....
Rubber, Fine Up-River, Para	.69	.69	.69	.69	.69	.69	....
Silk, raw, Ital	..	5.00	..	..	5.00	5.10	+.10
Silk, raw, Japan	..	4.35	..	..	4.33	4.25	—.10
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	....
Tin, 100 lb.	31.13	31.00	31.00	31.70	32.25	32.00	+.87
Tire Scrap	.04¼	.04¼	.04¼	.04¼	.04¼	.04¼	....

$1,000,000 Indestructible Tire Co. Chartered

WILMINGTON, DEL., July 6—The Indestructible Tire Co. of the United States has been incorporated under the laws of Delaware, with a capital of $1,000,000, to purchase, lease, own, hold and deal in and with tires made from rubber, metal, cloth or other fabrics, for all kinds of vehicles. The incorporators are John McLarin, F. B. Knowleton and S. V. Dowling, all of New York City.

CLEVELAND, O., July 8—The Garford Co., Elyria, has passed the quarterly dividend of 1¾ per cent. on the preferred stock. There is outstanding $500,000 of the issue. The brokers are attempting to arrange a plan whereby an exchange of Garford preferred for Willys-Overland Co. stock can be made.

Stewart-Warner Earns $400,000 on Common Stock

NEW YORK CITY, July 7—The earnings of the Stewart-Warner Speedometer Co. in the quarter ended June 30 last were more than $400,000 on the common stock and for the 6 months period ended on the same date total earnings applicable to dividends were around $600,000. This showing is equivalent to the full year's 7 per cent. dividend on the preferred and 6 per cent. for 6 months on the common.

DETROIT, MICH., June 7—A dividend of 5 per cent. was ordered paid by Referee in Bankruptcy, L. F. Joslyn yesterday to 753 creditors of the R. C. H. corp., including the agents who had made deposits.

New Stock Sold by Miller Rubber Co.

AKRON, O., July 4—The Miller Rubber Co. has succeeded in reducing and rearranging its current debt by retiring of its old preferred stock and reissuing therefor new first preferred shares to the amount of $500,000.

A Cleveland banking house, Borton & Borton, has purchased $400,000 of the stock, which is being offered to the public at 98 plus accrued dividends. $1,000,000 in common stock is outstanding out of a total authorized $1,500,000.

The net earnings for the last fiscal year were five times the preferred dividend requirements on the new issue. The company's sales have increased from $289,840 in 1910 to $1,658,618 in the 11 months ended with May, 1914.

Gasoline Prices Down Throughout Country

NEW YORK CITY, July 6.—Price cutting on gasoline has not only hit this section of the country, but also out West. In Portland, Ore., the automobilists are generally taking advantage of a little gasoline war that has sprung up in that city. The big companies are now selling wholesale at 15½ cents in 50-gallon lots. To big commercial houses who use gasoline in large quantities this price is reduced another half cent, while to garage men and retail sellers of gasoline who use still larger quantities the price is reduced still another half cent.

In Hartford, Conn., all the garages have dropped to 15 cents a gallon in an effort to break up the cut-rate element. Practically every dealer asserts that because of the cut rates of the independent concerns business has fallen away. With the drop by the dealers to 15 cents they assert that business is returning. It is asserted that the price will drop still lower during the next two or three weeks.

The State Corporation Commission in Oklahoma has issued orders fixing the prices on gasoline throughout the State. The retail price is not to exceed 15 cents a gallon except in towns where delivery has to be made from other towns by wagons. The wholesale price is fixed at 12 cents and 13 cents a gallon, the variation being due to the difference in freight rates. In cities and towns close to stations and centers of distribution, the retail price is not to be over 14 cents. The order takes effect at once.

Peerless Conserves Resources for New Plans

CLEVELAND, O., July 6.—The Peerless Motor Car Co. has deferred the payment on the 7 per cent. cumulative preferred stock, because the directors have decided to conserve the resources in view of the fact that the company will soon put a popular-priced car on the market in connection with its present higher-priced line of automobiles.

Walpole Receivers Report a Profit

BOSTON, MASS., July 6—The receivers of the Walpole Tire & Rubber Co., have filed their second report, showing a net profit of $83,801.03 for the 5 months ending May 31. The total earnings amounted to $112,359.64 on sales aggregating $708,486.90.

The receivers report total assets of $406,442.94 for the Walpole Rubber Co., Ltd., of Granby, Que., and assets of $342,074.69 for the Walpole Shoe Supply Co. The latter has a surplus of $34,688.44, and the former a surplus of $27,323.05.

Fire Destroys One of Havers Factories

DETROIT, MICH., July 8—*Special Telegram*—The main plant of the Havers Motor Car Co. at Port Huron, Mich., was destroyed by fire last night. Several finished cars, chassis, bodies and parts were consumed, the damage being estimated at $60,000. The origin of the fire is unknown as yet but thought to have been in the assembly room.

June Sales of Packard Trucks, $825,394

DETROIT, MICH., July 2—The Packard Motor Car Co. states that the sales of Packard trucks to users during the month of June totaled $825,394. This is exclusive of bodies. Not only is this total remarkable in the face of prevalent business conditions but it culminates 4 months of record breaking truck sales.

In March the Packard company sold more than $750,000 worth of trucks. In April the business total was 60 per cent. greater than in April, 1913, while the May total was also 60 per cent. greater than in the corresponding month last year.

The June sales exceed those of June, 1913, by $256,994, an increase of nearly 50 per cent.

The largest individual order received during June was one for twelve Packard 3-ton trucks from the Marshall Field Company, Chicago.

Automobile Securities Quotations

NEW YORK CITY, July 8—Continued inactivity marked the automobile and allied securities during the past week. Most of the stocks made a slightly better showing than a week ago today, there being many slight gains noticeable. The number of stocks showing losses is less this week and a slightly optimistic tone is to be noticed throughout. Brokers state that they expect more pronounced gains the coming week.

The only losses of any consequence during the past week were one of five points by Studebaker preferred, 1½ points by Texas Co., 1 by Vacuum Oil and also by New Departure common and preferred. Willys-Overland continues very strong in both common and preferred showing a gain of 7 points on the common and 2 on the preferred. The full quotations for the week follow:

	Wednesday		Thursday		Friday		Monday		Tuesday		Week's	1913	
Security	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Change	Bid	Asked
Ajax-Grieb Rubber Co. com	220	..	220	..	220	..	220	..	220	..	..	155	165
Ajax-Grieb Rubber Co. pfd	98	104	98	104	98	104	98	..	98	..	..	94	99
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	..	97	100
Case T. M. Co., J. I	80¼	86	80¼	86	82	86	81	86	81	86	+ ¼	..	..
Chalmers Motor Co. com	98	103	98	103	98	103	101	104	101	104	+3	135	..
Chalmers Motor Co. pfd	95	98	95	98	95	98	94	97	94	97	+1	98	102
Electric Storage Battery Co	50½	51½	51	52	51	52	51	52	51	52	..	..	..
Firestone Tire & Rubber Co. com	299	304	299	304	299	304	300	305	300	305	+1	270	280
Firestone Tire & Rubber Co. pfd	108½	110	108½	110	108½	110	108½	110	108½	110	..	104	106
Gartord Co. pfd	75	85	75	85	75	85	75	85	75	85	..	85	95
General Motors Co. com	90	90½	89⅝	90½	92	93½	92¼	93	92¼	93	—1¼	26	30
General Motors Co. pfd	92	93	92	93	92½	94	92	93	92	93	..	72	75
B. F. Goodrich Co. com	23¼	24	23⅛	24	23⅛	24	25	25¾	25	25¾	+2	27	28
B. F. Goodrich Co. pfd	87½	88	87½	88	87½	88	88	89	88	89	— ¼	91	93
Goodyear Tire & Rubber Co. com	166	172	166	172	166	172	166	170	166	170	..	325	335
Goodyear Tire & Rubber Co. pfd	96	98	96	98	96	98	96	97½	96	97½	—2	97	98½
Gray & Davis Co. pfd	98	102	98	102	98	102	98	102	98	102	..	..	..
International Motor Co. com	..	3	..	3	..	3	..	3	..	3	..	3	5
International Motor Co. pfd	3	9	3	9	3	9	3	9	3	9	..	18	25
Kelly-Springfield Tire Co. com	56	58	55	58	56½	57	56	58	56	59	+1	..	..
Kelly-Springfield Tire Co. 1st pfd	75	80	70	80	70	80	76	80	70	80	..	..	..
Kelly-Springfield Tire Co. 2d pfd	98	100	90	100	90	100	94	100	90	100	..	..	..
Lozier Motor Co. com	..	20	..	20	..	20	..	20	..	20	..	15	20
Lozier Motor Co. pfd	..	41	..	41	..	41	..	41	..	41	..	..	90
Maxwell Motor Co. com	14	14½	14	14½	14½	14⅞	14½	14⅞	14½	14¾	— ¼	3	3½
Maxwell Motor Co. 1st pfd	40½	40⅞	40½	41	42½	42¾	42	43	43½	44	+1½	24	27
Maxwell Motor Co. 2d pfd	16½	18	16½	18	17¾	18½	17¾	18¼	17¼	18	+ ¾	7	8½
Miller Rubber Co	138	140	138	140	138	140	138	140	138	140	..	133	137
New Departure Mfg. Co. com	126	128	126	128	126	128	125	127	125	127	—1	..	..
New Departure Mfg. Co. pfd	106	..	106	..	106	..	105	108	105	108	—1	..	..
Packard Motor Co. com	93	..	93	..	93	..	103	112	103	112	+10	..	..
Packard Motor Co. pfd	97	100	97	100	97	100	97	100	97	100	..	..	..
Peerless Motor Co. com	10	17	10	17	10	17	10	17	10	17	..	45	50
Peerless Motor Co. pfd	..	50	..	50	..	50	..	50	..	50	..	..	96
Pope Mfg. Co. com	..	1	..	1	..	1	..	1	..	2	..	5	10
Pope Mfg. Co. pfd	..	3	..	3	..	3	..	4	..	4	..	..	35
Portage Rubber Co. com	..	30	..	30	..	30	..	30	..	30	..	30	40
Portage Rubber Co. pfd	..	90	..	90	..	90	..	90	..	90	..	96	99
*Reo Motor Truck Co	11	11½	11	11½	..	11½	11¾	12¼	11¾	12¼	+ ¾	10½	11½
*Reo Motor Car Co	17¾	18¼	17¾	18¼	17¾	18¼	18	18½	18	18½	+ ¼	19	20½
Rubber Goods Mfg. Co. pfd	100	110	100	110	100	110	..	..	..	..	..	..	..
Russell Motor Co. com	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	47½	48½	47½	48½	47½	48½	51¼	52	51¼	52	+3¾	..	..
Stewart Warner Speedometer Corp. pfd	97½	99	97½	99	97½	99	99	101	99	101	+1½	..	..
Studebaker Co. com	28½	30	29	29¾	29¼	29¾	29½	30½	29½	30½	+ ¾	22	25
Studebaker Co. pfd	80	86	80	84½	81	85	80	85	80	85	—5	84	86
Swinehart Tire & Rubber Co	85	86	85	86	85	86	85	87	85	87	..	85	88
Texas Company	141½	143⅛	142¼	143	143¼	143½	142	143	142	143	—1½	..	..
U. S. Rubber Co. com	58½	59	59	59½	59¼	59⅝	59½	60	59½	60	+2¼	60½	61
U. S. Rubber Co. 1st pfd	102	103	102⅜	103	102⅞	104	102½	103½	102½	103½	+1	103	104
Vacuum Oil Co	220	223	218	223	218	221	218	221	219	222	—1	..	..
White Co. pfd	107	110	107	110	07	110	107	110	107	110	..	102	104
Willys-Overland Co. com	86½	87½	88	89	88	90	89	90	89	90	+7	56	60
Willys-Overland Co. pfd	93	95	93	95½	94½	95	94	96	95	95½	+2	85	93

*The par value of these stocks is $10; all others $100.

Austin Sues Cadillac Co. on Two-Speed Axle Patent

Damages and Restraining Order Asked—Defense Is That Superior Prior Patent Was Purchased —Austin and Cadillac Axles Differ

GRAND RAPIDS, MICH., July 7—The two-speed rear axle used and exploited by the Cadillac Motor Car Co., Detroit, Mich., is alleged to be an infringement in an action filed in the United States District Court here by W. S. Austin, head of the Austin Automobile Company, Grand Rapids.

Austin, suing on patent No. 1,091,618 issued to him on March 31, 1914, asks for an injunction against the Cadillac company and damages for the use of the axle in 15,000 cars.

In defense the Cadillac company explains that Austin endeavored to interest it in his axle in the Spring of 1913 but rejected the invention because it believed the clutch on the rear axle and clutch on the drive shaft was an unsatisfactory arrangement.

A device incorporating one clutch, located on the drive shaft, patented in 1902 by Willis G. Caffrey, was preferred, explains the Cadillac Co., and this patent was purchased.

In a statement Austin says:

"Cadillac became interested in my two-speed axle when it was exhibited at the Chicago automobile show in February, 1913. The company wired me to send them an axle by express and wrote requesting complete drawings showing different constructions that would be suitable for the Cadillac car. I sent them an axle and drawings, and from my correspondence and interviews with them felt assured they intended to adopt my axle and pay a suitable royalty for the use of it.

"As my patent claims were still pending, I could not give them definite reply to their request for full information as to the claims that would be allowed. They finally dropped their correspondence with me and put out a two-speed axle under their own name."

"Our patent attorneys," said Henry M. Leland, of the Cadillac company, "inform us that we do not infringe the Austin patents in any respect. We considered the two-speed axle proposition five years ago and from then until the time we adopted it we experimented with various designs."

Court Advises Separate Sale for Pope Plants

HARTFORD, CONN., July 8—Judge William L. Bennett, of the Superior Court, to-day dismissed the petition of the Boston creditors of the Pope Mfg. Co., which was to the effect that the entire assets of the Pope Co. be sold at auction in Massachusetts by the receiver, Col. Geo. Pope.

Judge Bennet was led in this action of dismissal by the belief that if the bicycle plant at Westfield, Mass., and the automobile plant in this city should be sold separately, and that it will be for the benefit of the preferred stock holders. The creditors will undoubtedly be paid in full and if a good sale is made there may be something for the stockholders. This belief is based on the fact that the Westfield, Mass., plant where bicycles are manufactured has always been a highly satisfactory and successful plant, whereas the automobile plant at Hartford has not been profitable.

Judge Bennett believes that the offer of $1,800,000 made by a Boston syndicate for the entire assets is like sacrificing the property, and it was to avoid this that he dismissed the petition and has advised Receiver Col. Geo. Pope to get an order to sell the property separately. The memorandum from Judge Bennett says:

It appears from the evidence that the property of the defendant corporation in Connecticut consists of a large manufactory and plant for the making, selling and repairing of automobiles and motor trucks, and that the corporation has in the state of Massachusetts a manufactory and plant for the construction, selling and repairing of bicycles and motorcycles.

The business carried on in the establishment in Massachusetts is entirely separate and distinct from that carried on in the Connecticut factories. The Massachusetts business has prospered and has been and is exceedingly profitable. The Connecticut business, on the contrary, has failed to earn profits. Both of these concerns have been carried on in the name of the Pope company.

Since the two establishments of the defendant are in fact separate establishments, each engaged in carrying on its own business, the goodwill alone being the connection between them, if this was all the petitioners had to offer as a reason for a sale at auction of both establishments together as a whole, I should not consider such sale advisable. Each manufacturing plant is of great value, and while customers might be found desirous of purchasing a bicycle business, and others willing to bid for the automobile plant, it would seem more difficult to find one purchaser for both, and the result might easily be that one or the other might be sold for less than its real value.

The petitioners, however, say they have obtained a purchaser who will bid at the auction sale, if such sale is ordered, $1,800,000 for the whole property and assets; that he will bid no greater sum than this, and that he will bid for the whole of the property or for none.

No Other Bidder?

Inasmuch as no one has suggested to the court that any one else has any intention of bidding at the sale, and as it is extremely improbable that any such person will appear, this is in effect a proposition to the two courts having the property and assets of the Pope Manufacturing company in control, to permit a sale for $1,800,000 and this court must endeavor to ascertain whether the sum offered is a fair and adequate price.

The evidence shows that the Massachusetts plant is worth, and ought to bring, $1,250,000, and having heard the evidence I am of the opinion that the Connecticut property is worth and may fairly be expected to sell for more than $550,000. If this petition should be granted it would seem that the Connecticut property would be sacrificed in order to obtain the Massachusetts property.

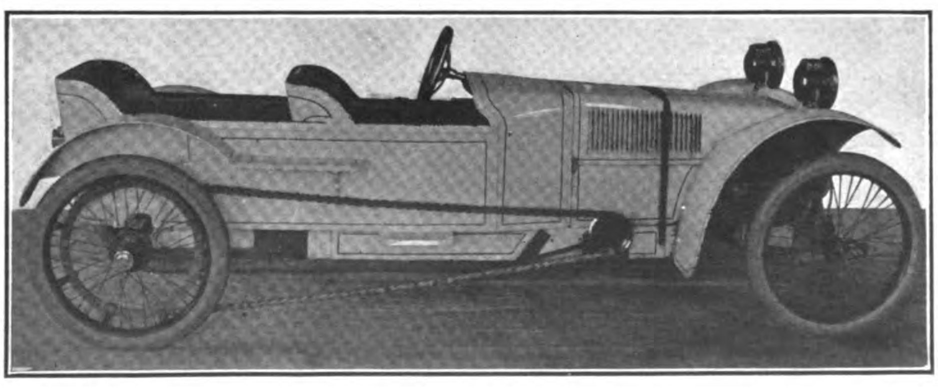
The receiver is of the opinion that however that property is sold, the creditors may reasonably expect to be paid in full, and there is a chance, if the properties are sold separately, to obtain something for the preferred stockholders. This is my own opinion.

The receiver is, however, advised to make application to the court, or if the court is not in session, to a judge of the superior court sitting in chambers, for an order for the sale of the property and assets of the defendant corporation.

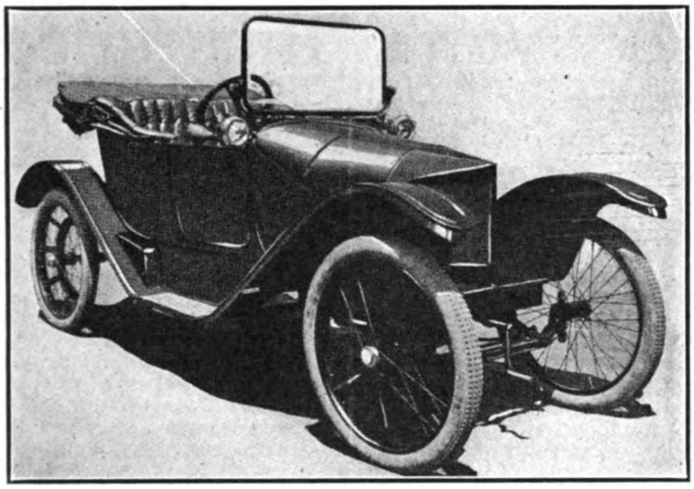
Perry Chain Co., Infringing, Must Quit

CINCINNATI, O., July 6—The Perry Chain Co., Lansing, Mich., which began manufacturing tire chains in 1909 and which since that date has been prosecuted in the courts by the Weed Chain Tire Grip Co., was ordered to cease operations last week by the United States Circuit Court of Appeals in Cincinnati. This court sustained the decision of the United States District Court for the Eastern District of Michigan, which held the Parsons patent No. 723,299 infringed in an action which was terminated last Fall.

The Perry company originally provided its cross chains with tension springs for the professed purpose of causing the grip to fit snugly and not creep. In 1911 this type of chain was substantially abandoned and was followed by the "Weeder." In 1912 the "Weeder" grip was enjoined, whereupon the Perry company began to market the Peerless and Emergency grips, both of the "anchored" type. The Perry company contended that the Parsons device was anticipated by the armor plate guard used on the old style rubber tires of the Thomson traction engine about 1870. This defense was not accepted by the court, which held that Parsons was originally the inventor of the anti-skid chain.



Burrows two-cylinder tandem cyclecar which lists at $375



Koppin light car with V-radiator and streamline body

Following the decision of the lower court a special master rendered an accounting and awarded the Weed company $17,-498.50 damages. A motion for confirmation of the master's report was made and later withdrawn in the appellate court but will be made again.

The Weed company also recently secured a preliminary injunction against the Woolston Mfg. Co., Trenton, N. J., which has been making tire chains and parts.

Koppin Light Car To Sell at $385

DETROIT, MICH., July 5.—The Koppin light car has made its appearance in Detroit. It is built by the Koppin Motor Company, Fenton, Mich., of which H. S. Koppin, one of the best known real estate men in Michigan, is the president. The Koppin company occupies the plant of the old Fenton Cyclecar Company, which has been reorganized after the death of several of its stockholders.

For the present there will be only one model Koppin chassis with one standard body. The motor is an air-cooled, two-cylinder De Luxe of the V type, 3½ inches bore and 3⅝ inches stroke, developing about 13 horsepower. Transmission is of the friction type mounted on large ball bearings.

The standard equipment of the Koppin, which sells at $385, consists of top, side curtains, special design windshield, electric side and tail lights with 6 amp. 60 hr. 21 plate storage battery controlled by dash switch, horn, repair kit, pump and tools.

The offices of the Koppin company are presently at 305 Breitmeyer building, Detroit.

Longuemare To Push Imported Carburetors

NEW YORK CITY, July 8—Following the litigation between the Stromberg Motor Devices Co. and the Longuemare Carburetor Co. in the United States District Court in New York City, the Longuemare company is preparing to push the importation and sale of its foreign made carbureters. A preliminary injunction was issued by Judge Hand, but it affects only the making of carbureters in America. The Longuemare company is permitted to import and sell under a $10,000 bond which it will file before July 22. "The Longuemare Carburetor Co.," states Ludwig Arnson, one of the proprietors, "is convinced it does not infringe the Richard and Ahara patents and, believing that this will ultimately be demonstrated, is preparing to push the imported Longuemares."

Freight Must Be Paid for Blocking, Decides Commission

Interstate Board Disallows Dunnage in Protest of National Automobile Chamber Against S. W. Railroads

NEW YORK, July 5—The dunnage allowances which have been conceded by practically all of the railroads in the United States have been disapproved by the Interstate Commerce Commission and after July 15 all blocking for motor cars shipped in freight cars will have to be paid for at the same rate as is charged for the shipment of the cars which are blocked.

The decision affirms a ruling of the Southwest Tariff Committee which represents practically all of the railroads in the Southwest. The roads originally allowed 500 pounds of blocking to be carried free of freight charges, provided the weight of the carload was above the minimum. This dunnage allowance was made on the theory that it induced shippers to use care in blocking up their cars and. therefore, was of benefit to both the railroad and the manufacturer.

The Southwestern roads cancelled their dunnage allowance several months ago and the National Automobile Chamber of Commerce protested to the Interstate Commerce Commission against the cancellation. The commission denies the chambers petition on the ground that dunnage is in the same class as crating or boxes in which other wares are shipped and that regardless of the ultimate benefit it should be excepted. Pending the decision the cancellation had been suspended.

A Truck Convention in October

NEW YORK, July 2.—Plans are being perfected by the National Automobile Chamber of Commerce for a convention of commercial vehicle interests to be held some time in October to further advance the excellent work that has been done during the past two years.

Burrows Cyclecar Lists at $375

NEW YORK CITY, July 6—With its long, narrow hood, high cowl and tandem seating, the $375-Burrows cyclecar has a very speedy appearance. It is equipped with a 13-horsepower, two-cylinder, air-cooled motor which has its cylinders set at an angle of 45 degrees. The crankshaft is carried on imported annular ball bearings. Ignition is supplied by an Atwater Kent Unisparker and carburetion is furnished by a Schebler, automatic type.

Speed changes are provided by a friction transmission located forward of the driver and it gives four speeds forward and reverse. The jackshaft is a special, flexible design mounted on annular ball bearings. Final drive is by double V-belts to large pulleys on the rear wheels. An adjustment for the stretching of the belts is provided.

Selected ash, having a cross-section 1 by 5 inches, is the material from which the frame is made, it being reinforced by steel flitch plates and cross members. The car is suspended upon quarter-elliptic vanadium springs, front and rear.

Twenty-eight by 3-inch Goodyear non-skid tires, mounted on wire wheels, are employed. The steering wheel is 14 inches in diameter and the gear is provided with an adjustment.

The equipment includes J.-M. Mobilite electric headlights, tail light, horn, and full tool equipment. Its weight is 700 pounds.

This cyclecar is manufactured by the Burrows Cyclecar Co., Ripley, N. Y.

Garagemen and Dealers Win Separator Fight

NEW YORK CITY, July 8—The garagemen and dealers of New York City have won their fight against the gasoline separator ordinance. The board of aldermen at its last meeting of the summer held yesterday, July 7, acceded to the request of four garagemen and dealers' associations in Greater New York and passed Alderman Squire's ordinance, which repeals the statute placed upon the books 4 years ago requiring the installation of separators in garages. The final vote stood 57 for Alderman Squire's ordinance and 1 against it. This ends 4 years of prosecution by the city and insistence by the municipal authorities that garages install, at high expense, a device which when working at its best would not prevent gasoline and oil getting into the sewers, and in a majority of instances would not operate at all.

At a hearing before the welfare committee, prior to the hearing of the board of aldermen, Attorney Charles Thaddeus Terry, for the garagemen, had classed the prosecution by the city as tyranny and the welfare committee was won over to the side of the automobile men, laboring in behalf of the repeal of the old ordinance.

Underwriters Not To Write Insurance

Business Is To Be Centralized—Data on Both Chauffeurs and Owners To Be Compiled—Plan To Recover Stolen Cars

NEW YORK CITY, July 1—The motor car insurance business of the United States is to be centralized and systematized insofar as the adjustment of losses is concerned; data as to every chauffeur and as to car owners applying for insurance is to be compiled and classified; recovery of stolen cars is to be made the work of a nation-wide bureau. These are the objects of the Manufacturers and Dealers Motor Underwriters, Inc., in a proposed plan which has been adopted, following alterations in its policy as announced in THE AUTOMOBILE for June 18, page 1286.

It was originally proposed that the company represent two of the large insurance companies and make motor car dealers its agents, permitting the dealer to sell insurance and providing that repairs covered by insurance be made by the dealer in the car damaged, regardless of what city the dealer be located in.

Under the new plan the company will write no insurance at all, will appoint no agents but transforms itself into a service bureau. A rule will forbid anyone connected with the company from assisting in the securing or placing of any insurance and it will act impartially toward all companies.

The Automobile Service and Inspection Bureau has been formed theoretically as a department of the business but in reality all the company's business will be transacted by this bureau. In fact, the company name may later be relegated to the background and the name of the bureau brought forward as the name of the business.

It has been proposed that this service or bureau be supported, by the various companies making use of it, through a subscription based on a percentage of their premium income in motor car insurance. The service rendered to a company with $1,000,000 premium income would be twice as great and twice as expensive as the service rendered a company with but $500,000 premium income.

In brief, it is the purpose of the bureau to reduce the loss ratio of the insurance companies to a minimum, and it is believed that, with the co-operation of the insurance companies and the motor car dealers and manufacturers, much can be accomplished in this direction.

Correspondents in Every City

The bureau will have correspondents in every city of any size in the United States. In the majority of instances this correspondent will be the paid secretary of the local motor car dealers' association, or of the local automobile club. Through a connection with the motor car trade which has already been established, the bureau will be in touch with every dealer in the United States. This connection, together with the local correspondents, forms the basis of the field organization. The bureau will, of course, have branch offices in the larger cities, such as Boston, Philadelphia, Chicago, Detroit, San Francisco, and other important centers.

The companies subscribing to the bureau will have the privilege of submitting to it, each day, a list of applications for insurance received by them on second-hand, old, and mortgaged cars whenever there is any question concerning the underwriting value of the car. In submitting this data to the bureau it will only be necesary for the insurance company to give the name of the assured, his address, the name of the car, and the model.

The bureau will immediately communicate with its local correspondent and obtain a report on the assured as to all matters affecting the moral hazard of the risk. This report will be forwarded to the company, together with an estimate of the insurable value of the car involved. Estimates of the insurable value of cars will be made by skilled and experienced men who can quickly tell what the probable value of the car is from its description.

As the bureau will have no knowledge of the amount of insurance applied for, a fair and unprejudiced report can be made on any particular risk either as to the moral hazard involved or the value of the car. Such a report on risks of this kind will enable the insurance company to decide whether or not they should write the risk for the amount applied for.

By moral hazard is meant the risk attaching to the owner or the chauffeur; that is, whether they are reliable men, whether the business of the owner makes the risk greater or whether information secured about either owner or driver causes apprehension on the part of the insurance company. All these will be passed upon by the bureau.

It is the purpose of the bureau to establish a card index or registration of chauffeurs throughout the United States setting forth the record of each individual chauffeur. This, at first glance, may seem like a tremendous task, but, through the connection already established with the trade and various motor car clubs, is believed that it will be simply a matter of clerical work to obtain the names of all the better class of chauffeurs in the United States, and this index or registration can very rapidly be built up to a high state of efficiency.

The companies may submit to the bureau a list of risks with the names of the chauffeurs used, and the bureau will immediately report to the company on all those chauffeurs of whom it has record. If there be in the list the name of any chauffeur not upon the bureau's records, the local correspondent will be immediately communicated with and this record obtained.

Stolen Cars To Be Traced

An important feature of the work will be the tracing and recovery of stolen cars. Having, as it will, a correspondent in every city, and being in close touch, either directly or through these local correspondents, with all dealers and garages, the bureau can spread a net-work over the entire United States which will make it extremely difficult for the motor car thief to get very far.

It is proposed that whenever a car is stolen the insurance company or its agent immediately notify the bureau through its nearest correspondent. It will be the duty of that correspondent immediately to notify every dealer, garage, and police department, within a sufficient radius to locate the car quickly. With a system of this kind it would be impossible for the car thief to enter any city or any garage or local dealer's place of business. He would be picked up within a few hours after the bureau or its local correspondent has received notification of the theft.

In the recovery of a stolen car the company would necessarily pay all expenses incurred in securing its return after it has been located by the bureau.

As soon as the car is located, the company will be notified and may itself take such action as may be necessary to obtain the car; or its return will be undertaken by the bureau at the company's request.

Insurance companies, as a rule, have objected to being bound by an agreement to return a damaged car to the manufacturer or dealer, and have insisted that it is their right to get a number of bids on any repair job and to give it to the lowest bidder. This has often resulted in dissatisfaction on the part of the assured, even though the repairman be extremely efficient.

In this connection the bureau can render a great service. It can make it possible for all the subscribing insurance companies to make adjustment in the event of partial loss in any place in the United States, by having the car repaired by the nearest dealer in that make of car if he is equipped to handle the repairs and, at the same time, be assured that the repair bill will be absolutely legitimate.

The bureau will have intimate connection with the entire motor car trade and through this connection will be able to control all adjustments made in this way. If, for example, a car is damaged in a city like Syracuse the bureau will be in a position to recommend to the insurance company the best place to have the car repaired. In most instances, this will be the dealer who sold the car.

By having a connection with the manufacturer of that car, the bureau will be able to assure the insurance company that it will receive fair treatment from the dealer in that particular town. If it does not, the bureau will take the matter up with the manufacturer. Wherever any dealer persists in making excessive or unreasonable charges the bureau will refuse to recommend that dealer for repair work and his manufacturer will be notified immediately.

Furthermore, the bureau will have in its employ a number of experienced motor car men who will be able to judge any item of time or repair parts. It will be extremely difficult for an unscrupulous dealer to overcharge or conspire with his customer to do work on the car not made necessary by the accident.

The service, of course, does not contemplate supplanting the adjusters of the insurance companies. The object is to provide a service which will assist in adjustments and make it possible for the insurance companies to have their repair work done by the manufacturer or dealer at a less expense and in a better manner than elsewhere.

There are a number of additional features, valuable to underwriters, contemplated as part of the bureau which will be established as rapidly as possible. A careful record of all losses will be kept where there is any question concerning the claim. This will enable the bureau to furnish the insurance companies with data of value concerning various classes of risks.

A careful study will be made of traffic conditions throughout the United States and of all circumstances surrounding every possible kind of motor car hazard, all of which will be useful in insurance work. The bureau will co-operate with local authorites throughout the United States in an effort to eliminate from the public highway, as far as possible, the reckless driver. In all cases of reckless driving coming to its attention, the bureau will insist that the highway commissioner of the state involved revoke the driver's license.

Transcontinental Tour Is Abandoned

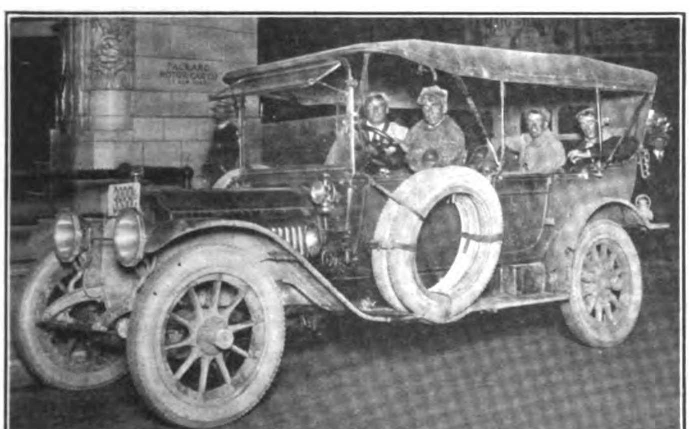
MAPLEWOOD, N. H., July 7—At the midsummer meeting of the American Automobile Assn. now in session it has been decided to abandon the transcontinental tour which was to have terminated within the fair grounds of the Panama-Pacific exposition to be opened in San Francisco in January. In place of the tour the energies of the association will be devoted to routing the principal national highways and to the establishment of a rendezvous for members in San Francisco, Los Angeles and Seattle and to aid in every way possible members who are making the long trip across the continent.

Resolutions were also adopted in favor of a universal wheel tax, against unjust discrimination against automobilists and in favor of the regulation of individuals in their use of the highways. Governor Welker, of New Hampshire, who welcomed the members of the association, said that three trunk lines have now been constructed from the northern end of New Hampshire to the state line of Massachusetts on a state air basis. Commenting on federal aid ex-Congressman S. L. Powers stated that the national government would probably require the states to raise an amount at least equivalent to that appropriated by the nation.

General Motors Business Shows Increase

NEW YORK CITY, July 8—A statement just issued by the General Motors Truck Co. shows a substantial growth in the company's business for the first 6 months of this year. June business exceeded that of June, 1913, by 17 per cent., while the increase for May was 36 per cent. and for April, 20 per cent.

The sales last month exceeded those of May, 1914, by 9 per cent., and May sales were 17 per cent. ahead of those for April of this year.



1913 Packard 48 driven by E. C. Patterson from Chicago to New York in 41 hours 37 minutes

Lincoln Highway Saxon Completes 3,389-Mile Run

Made Transcontinental Trip on Schedule—Averages 30 Miles Per Gallon of Fuel

DETROIT, MICH., July 7—*Special Telegram*—Arrival in San Francisco ended the 3,389-mile trip of the Lincoln Highway Saxon across the continent from New York. According to a dispatch the car reached destination July 4 on schedule, arriving in excellent mechanical condition and averaging 30 miles per gallon of gasoline and 150 miles per quart of oil on its long journey. This Saxon is the first automobile to traverse the Lincoln way on a continuous run, and the first car of its size and price ever to cross continent.

True Far-West hospitality marked the reception given car and drivers, M. A. Croker and Fred Wilkins, at the completion of the run. An escort party went 25 miles out of San Francisco and piloted the coast-to-coast Saxon into the city. Enthusiasm among the crowds that awaited the arrival of the car was at high pitch and many cheers went up when, ocean-to-ocean traveler paraded streets of city.

Upon reaching San Francisco Pilot Croker drove the front wheels of the car into the Pacific ocean so as to make trip literally ocean-to-ocean run. He also emptied water carried from the Atlantic into the Pacific ocean.

The finish of the journey proved spectacular, the Saxon showing a remarkable burst of speed in covering the last 290 miles from Reno to San Francisco in 2 days. For part of the way, the road leads down hill across California, but the route in the Lake Tahoe district provides one of the severest tests in the way of mountain climbing on the whole Lincoln Highway.

The run of 186 miles in 1 day between Kimball, Neb., and Denver, Col., was the record mileage made by the coast-to-coast car. Runs of 170 miles and more were frequent west of the Mississippi, despite the fact that for the most part the road is almost a uphill climb.

Over all kinds of roads and hills and through all kinds of weather, this car maintained the schedule mapped out at the start of the run. It crossed long grades of the Alleghanies between New York and Canton, O., without requiring addition of water to radiator supply.

Before undertaking this trip, the same car made a run of 135 miles a day for 30 consecutive days in Detroit. The 4,050 miles covered on that occasion, coupled with distance of 3,389 miles across the Lincoln Highway, brought total for 60 days of travel up to 7,439 miles, or equivalent of 2 years' service in the hands of the average owner.

Chicago To New York in 41 Hours

NEW YORK CITY, July 8—E. C. Patterson, the Chicago motor sportsman, reached this city last night in his non-motor-stop run from Chicago, covering the distance in 41 hours and 37 minutes. With a party of three in a 1913 Packard 48, he left Chicago at 3:58 a. m., Monday, July 6, and reached this city at 10:25 last night. Mr. Patterson with an assistant drove the car in 4-hour relays.

This trip was the outcome of the failure of the Chicago Automobile Club to stage its non-motor-stop night and day run from Chicago to Boston. Mr. Patterson was one of the prime movers in the projected contest, and when it fell by the wayside he decided to drive his own car under these conditions from Chicago to New York. He succeeded in all except that the motor stopped momentarily at Bryan, O., when filling with gasoline. Patterson had installed a small tank on the dash to supply the carbureter while the pressure was off the main gasoline tank for filling, and at Bryan the auxiliary tank on the dash was turned off a second too soon. With this exception the motor was kept running from start to finish.

The speedometer showed 1,025 miles covered, the route being by way of So. Bend, Toledo, Cleveland, Buffalo, Syracus, Albany, Poughkeepsie, and New York. Good weather was encountered all the way with the exception of rain from Syracuse to New York. Mr. Patterson carried two official observers appointed by the Chicago Automobile Club.

New Management for Pullman Company

YORK, PA., July 6—H. W. Hayden, of Detroit, who was recently elected president of the Pullman Motor Car Co. of this city, is in entire control of the activities of the company. The other officers of the organization retain their interests in the business but leave the active management to Mr. Hayden.

An Oldfield-Burman Match at Milwaukee Next Saturday

A Purse of $10,000 and Championship Title Said To Be at Stake—Big Program for State Fair

MILWAUKEE, WIS., July 3—Bob Burman, speed king, and Barney Oldfield, former wearer of the crown, will meet in a match race at State Fair park, Milwaukee, for a purse of $10,000 and the title on Saturday afternoon, July 11. The state board of agriculture, after much deliberation, granted the use of the one-mile dirt circle for the first of the Burman-Oldfield series. It was necesary for the board to seek an opinion from the attorney-general of Wisconsin as to whether or not the July 11 race would prejudice a contract made by the board with Ernie Moross for a hippodrome exhibition on September 14, the first day of the annual state fair. The state's attorney opined that there would be no violation of the agreement, and the race was declared "on". The state board will cut in on the gate receipts in a sum sufficient to cover any damage that may be done to the track.

George W. Browne, a Milwaukee dealer, is handling arrangements for the match race. He is well known in the racing game, having taken a leading part in the management of the Vanderbilt and Grand Prix at Milwaukee in October, 1912. While the program has not been definitely settled, it is known that both Burman and Oldfield will put on several exhibitions before the main event, which will probably be at 50 miles, and give Milwaukee and visiting enthusiasts a run for their money. In the championship event Burman will use the Peugeot which Goux drove in the last Memorial day 500-mile, while Oldfield will drive the Blitzen Benz II.

At the agricultural board meeting, it was decided to make September 14, the first day of the state fair, "automobile day". Ernie Moross' troupe of barnstormers will put on a half dozen events and there will be no harness racing on that day. On September 18, the closing day of the fair, Oldfield will put on a race against Lincoln Beachey in an aeroplane. At the 1912 fair Beachey raced Oldfield in a Knox and managed to come out ahead. The board has arranged for the most extensive outdoor display of motor vehicles ever held in the middle west as part of the general state fair exhibits.

Studebaker Averages 15.15 Miles a Gallon

BUFFALO, N. Y., July 5—The Studebaker six today finished its series of five 200-mile trips.

The fifth and final 200-mile run was run under most unfavorable conditions. Roads were wet and detours many. It averaged 15.2 gallons per mile and used 2 quarts of oil and 2 quarts of water. It used 13 1-4 gallons of gasoline for the trip.

The actual cost of operating the car, carrying six passengers, is $.0103 a mile. This figure is given on the basis of 1,000 miles of actual road travel, the total gasoline, oil and water cost for the 1,000 miles being added and divided into the total distance traveled.

The following tabulation gives the complete data on the five runs:

	Distance	Gasoline, gallons	Oil, quarts	Water, quarts
First day	204	14½	2	1
Second day	206.7	13½	2	3
Third day	189	12¼	1½	*1
Fourth day	200.6	12½	2	1
Fifth day	200.6	13¼	2	2

*Pint.

Average mileage per gallon of gasoline, 15.15 miles.
Average mileage per gallon of oil, 421 miles.
Average mileage per gallon of water, 470 miles.

A. A. A. Contest Rules for 1914 Promulgated

NEW YORK CITY, July 6—Several changes in the A. A. A. contest rules for 1914 have been made. Richard Kennerdell, chairman of the contest board of the A. A. A., has made a brief summary as follows:

Stock Car Rules

The rules governing speed competition of stock cars and stock chassis have been eliminated and a more simple method of registration of stock models for touring events has been provided. A less technical description of stock models must be filed with the contest board prior to any events in which the stock model is entered, and such certificate is turned over to the technical committee to check up the cars entered for competition in stock car touring events.

Classification

The Class "B" classification for stock chassis has been eliminated and a new subdivision has been made in the Class A Price Classification. Whereas formerly division 1A was for cars under $800, there are now two divisions, 1A for $450 and under 2A for $451 to $800.

In the same way three new classifications have been added to the Class C Piston Displacement Classification. Whereas formerly the smallest division was for cars under 161 cubic inches, the new classifications are:

Cyclecar	Division 1C	under 71 cubic inches
Light car	Division 2C	71 to 100 cubic inches
Small car	Division 3C	101 to 125 cubic inches
	Division 4C	126 to 160 cubic inches

The other divisions under Classes A and C remain the same.

Sanction Fees

Sanction fees remain the same with the exception that where heretofore events 100 miles or over on specially constructed speedways have carried a fee of $1,000 the following modifications have been made:

Road Races, Speedway Races, Beach Races, Track Races and Hill Climbs

No material changes have been made in these rules.

126. DIRECTION—Road races may be run in either direction over the course, provided, however, the pits must be located on the right side of the course in the direction in which the cars are traveling.

For Specially Constructed Speedways

Brick, concrete, wood, etc.	
100 miles and under, per day	$250
101 miles and over	1000
Dirt and other materials.	
100 miles and under, per day	250
101 miles and over	750
Dirt only.	
100 miles and under, per day	250
101 miles and over	500

Where programs are composed entirely of events for cars under 125 cubic inches piston displacement or $450 in price, the sanction fees are 50 per cent. of those regularly prescribed. Where such events constitute only a portion of the day's program, the full fees will prevail.

CREW—In all speed events 100 miles or over the crew of a car must consist of driver and mechanician, and all mechanicians must be registered in the same way as drivers have been required to register since 1910. Attractive gold pins bearing the registry number are provided for registered drivers and mechanicians.

NO INTOXICANTS PERMITTED—A new rule has been incorporated strictly prohibiting the use of intoxicants in contests, under penalty of disqualification.

Touring Rules

The distinction heretofore existing between contests of 6 days and under and contests over 6 days in duration has been eliminated, and new grades for Interclub contests and Economy contests incorporated.

GRADE I covers technical contests embracing preliminary and final examinations, tests of motor, clutch, gearset and brakes, with penalties for damaged or inoperative parts, lateness at control and repairs and replacements.

GRADE II imposes penalties only for lateness and work done.

GRADE III imposes penalties for lateness in arrival at controls only.

GRADES I and II may be conducted for stock or non-stock cars, but Grade III is open only to non-stock cars.

Sanction fees for Grade II contests have been reduced to $30 and for Grade III contests to $10.

Stock car touring events may be conducted under price classification or piston displacement classification.

Touring cars and runabouts may compete together for the same price without reference to passenger carrying capacity.

TIRE REPAIRS—No penalty for tire repairs and replacements, and the time consumed is added to the daily running time. Extra casings and tubes may be removed from competing cars in controls for repairs. Motors may be stopped during tire repairs without penalty.

Demountable rims or wheels may be used in stock car events only where cars are regularly equipped.

The time lost on account of traffic delays occasioned by railroad crossings, congestion in city streets, open bridges, obstructed roadways, etc., will not be added to the daily running schedule, but such lost time must be made up by contesting cars.

DAILY RUNNING SCHEDULE—An average speed of 14 miles per hour has been set for cars priced at $450 and under, the former schedules of 16, 18 and 20 miles per hour remaining applicable to cars of $451 to $800, $801 to $1600 and over $1600.

PASSENGER LOAD—All cars are required to carry at least one passenger other than the driver without regard to body equipment or carrying capacity.

Batteries

Dry cells for ignition or lighting may be replaced without penalty, the work to be done on the car's running time.

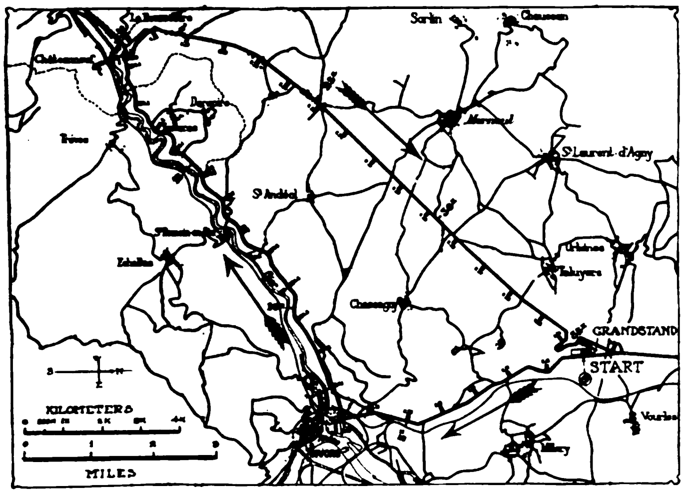
Replacing or recharging of storage batteries where charging generator is regular equipment will be penalized.

Replacing or recharging storage batteries where no charging means are furnished will be allowed without penalty.

Fixed Penalty Schedule

The fixed penalty schedule has been amplified to provide penalties for damaged or inoperative equipment such as self-starters, automatic gearshifts, two speed rear axles, lighting, shock absorbers, speedometers, horns, windshields, tops and similar accessories.

The rules have been simplified and rearranged, in so far as possible, so as to afford a more ready reference.



Map of the Grand Prix race course at Lyons, France, showing the difficult hairpin turns

All Cars Are of Special Design

(*Continued from page 65*)

The amount of speed that the new Fiats are capable of, considering that their weight is under the limit of 2,425 pounds, is proof that this company has worked hard to solve the light motor car, using cylinders 3.9 x 5.6 bore and stroke. The valve mechanism has been described. Lubrication is under pressure to the three plain bearings and to the other parts of the motor but no oil is carried in the base chamber. Two pumps, one driven off the magneto shaft and the other from the camshaft, respectively draw the oil from the base chamber to the tank and deliver it from this tank to the bearings. In this way all the oil supply is carried on the dash where it is isolated from the heat of the motor.

Front wheel brakes are used, which are slightly smaller in diameter than those on the rear wheels. They are expanding types but not encased. The motor and gearbox form a unit construction with a multiple-disk clutch entirely inclosed. Torque and radius rods are not used as the drive is taken through the rear springs which are mounted under the axle and directly under the frame members.

Fiat has a narrow dummy front radiator forming a guard against flying stones and with the radiator proper a few inches back of it. A pure streamline form is maintained with the gasoline tank entirely hidden.

Alda Has Cantilever Springs

The Alda normally carries the radiator on the dash, but has moved it to the front in its present racing machines and leaves an opening in the pointed bonnet so as to get cooling effect while conserving the general lines of its stock car. It uses a motor with 3.7 x 6.3 inch bore and stroke with sixteen overhead valves. The hollow crankshaft is carried on five plain bearings; and the connecting rods are tubular ones made out of B. N. D. steel. Pistons are machined out of solid forgings. The makers declare the motor develops 128 horsepower at 2,800 revolutions per minute. Variable splash lubrication is employed with a large reserve oil tank located across the frame members amidship.

Cantilever springs are set directly under the frame members and are a feature of the car, the only other car in the race to use this type of spring being the Aquila-Italiana. Alda has carried out the streamline body effect by using a pointed tail which forms a locker within which two spare wheels are carried in a horizontal position. The upper part of the tail is hinged. The gasoline is carried in the dashboard tank.

The Opel car with cylinders 3.7 x 6.3 and using sixteen overhead valves, carries the crankshaft on five plain bearings and like all of the cars with the exception of Delage uses a four-speed gearset. Direct is on fourth. At the rear of the motor is a cross shaft which drives the water pump on one end and the magneto at the other.

Piccard-Pictet Almost Stock

The nearest approach to a stock car in the thirty-eight entered is the Piccard-Pictet sleeve-valve motor, built under Argyll license. The stock construction has been changed in that timing and compression are special and the reciprocating parts have been lightened. The cylinders are 3.8 x 5.9. The chassis is shorter than stock and carries front wheel brakes. In other respects stock design is adhered to.

Schneider Has Renault Hood

The Schneider uses a very compact block casting and has its eight overhead valves operated positively without springs. The cylinders 3.7 x 6.29 are mounted on crankcase secured direct to the frame members. The hollow crankshaft of B. N. D. steel is carried on R. B. F. roller bearings, this being the only example of roller bearings for crankshafts in any car.

The radiator design is distinctive in that the radiator is carried at the front of the motor, but the bonnet is a Renault type, extending ahead of the radiator and having a big wire gauze covering set in the front. By this design the car looks like the stock Schneiders which have their radiators back of the motor, Renault fashion. With this new design the radiator is in a position to get the full air blast and yet is protected from flying stones. The streamline effect is carried throughout the rear.

Lyons' Grand Prix Course Is Ideal

The course is of a spectacular nature. It is roughly triangular, 23.3 miles, and has to be covered twenty times, giving a total distance of 46.75 miles. The grandstands are on No. 1 leg 100 or 150 yards from the turn. The situation is ideal. Opposite, and just below the level of the road, is the line of tire and gasoline pits. Half a mile across country is a hill the winding road of which forms a part of the third leg of the course.

No. 1 leg of the course is comparatively easy. No. 2 has eighty turns in 8 miles. It is the portion of the course on which brakes have to give the best of service. Four or five of the turns look and are really dangerous. The others are treacherous. They look innocent, but a fraction of a second's inattention would be sufficient to bring the car in contact with the wall of rock on the right-hand side, or hurl it down the embankment into the vineyards on the left.

120 Miles an Hour on Straightaway

At the end of the second leg there is a hairpin turn followed immediately by a winding climb a mile and a half long. It is followed by a perfect straightaway 7 miles long, of a switchback nature, on which speeds of 120 miles an hour should be attained. It is here that the value of a geared-up indirect drive will be appreciated. The straightaway finished, the drivers obtain a bird's-eye view of the grandstands in the valley below and commence their winding descent. At each of the hairpin turns the approaching leg is left open, so that a driver who has miscalculated his speed can run ahead for 200 or 300 yards. Stout wood barricades are put round the course at all points where spectators are likely to gather. Barricades are also put up in front of every house, even if it is an isolated one on a deserted open road. As a protection to drivers sand and cinders are banked around the outside of every turn to a height of 3 feet. A total of 150 tons of wood, having a length of 35,000 yards, is used to form barricades to keep spectators off the course.

Specifications and Equipment of Cars Participating in the 300-Mile Sioux City Race

Car	Driver	No. Cyl.	Bore and Stroke	Disp.	Mag.	No. Dist.	Plugs	No.	Carb.	Size	Wheel-base	Gear Ratio	TIRES Make	TIRES Front	TIRES Rear	Wheels	Oil
Marmon...	Patschke..	4	5.5x7	445.0	Bosch	2	Bosch	8	Schebler	2	120	2.6 to 1	Palmer	34x4½	34x4½	Houk	Monogram
White.....	Shrunk....	6	4.16x5.75	474.5	Bosch	1	Bosch	6	White	2¾	112	2¾ to 1	Braender	35x5	35x5	Wood	Polarine
Chalmers..	Wetmore..	6	4x5.5	414.7	Bosch	2	Bosch	12	Rayfield	2¼	104	2¼ to 1	Michelin	32x4½	32x4½	Houk	Monogram
Peugeot...	Burman...	4	3.937x7.125	341.7	Bosch	1	Bosch	8	Master	2	....	3 to 1	Nassau	34x4½	35x5	R.W.	Castor
Peugeot...	Stringer...	4	4 25x7.875	446.8	Bosch	1	Bosch	4	Rayfield	2½	108	2 to 1	Batavia	35x5	35x5	R.W.	Castor
Peugeot...	Mulford...	4	3.9x7.08	341.7	Bosch	..	Bosch	8	Zenith	...	....	3 to 1	Firestone Braender Palmer	....	...	R.W.	Castor
Duesen-berg	Ricken-bacher	4	4.40x6.00	360.5	Bosch	1	K.L.G.	..	Schebler	...	106	2.6 to 1	Riverside	33x4½	35x5	R.W.	Oilzum
Mason....	Mason.....	4	4.40x6.00	360.5	Bosch	1	Champion	..	Schebler	...	106	2.3 to 1	Riverside	33x4½	35x5	R.W.	Oilzum
Duesen-berg	Alley.....	4	4.40x6.00	360.5	Bosch	1	K.L.G.	..	Schebler	...	106	2½ to 1	Riverside	33x4½	35x5	R.W.	Oilzum
Sunbeam..	Babcock...	6	3.1x6.0	270.0	Bosch	2	K.L.G.	12	Schebler	1¾	116	3 to 1	Palmer	34.6x4.7	...	Wood & Sankey	Castor
Sunbeam...	Grant.....	6	3.14x5.9	275.0	Bosch	2	K.L.G.	12	Claudel	...	83	3 to 1	Palmer	34x4½	...	Wood & Sankey	Castor
Stutz.....	Anderson..	4	4.8x5.75	416.2	Bosch	2	Bosch	8	Schebler	...	....	....	Silvertown	33x4½	33x4½	Houk	Monogram
Stutz.....	Oldfield...	4	4.8x6.0	434.3	Bosch	2	Bosch	8	Schebler	...	....	....	Firestone	34x4½	35x5	Wood	Monogram.
Mercer....,	Wishart...	4	4.8x6.2	445.0	Bosch	2	Bosch	8	Rayfield	...	112	2.5 to 1	Palmer	35x5	35x5	R.W.	Castor
Braender..	Chandler..	4	4.3x6.0	350.0	Bosch	2	Bosch	8	Rayfield	...	105	2.38 to 1	Braender	33x4½	35x5	Dunlop	Oilzum
Gray Fox..	Wilcox....	4	5x5.5	431.9	Bosch	2	Bosch	8	Rayfield	2½	96	2.3 to 1	Silvertown	34x4½	34x4½	R.W.	Castor
Delage....	Knipper...	4	4.1x7.08	380.2	Bosch	2	Bosch	8	Claudel	2¾	104	3 to 1	Firestone	34x4	35x4½	R.W.	Castor

Note.—All cars in the race were shaft driven

Tire Troubles at Sioux City

(*Continued from page 71*)

looked over and the break sealed. At all of these stops fuel and oil were supplied, much of the latter being necessary because of the leakage. The last stop at 170 miles was for 55 seconds to change a right rear tire. He was called off at 252 miles.

The second Stutz entry, driven by Barney Oldfield, made three stops before it went out of the race with a cracked cylinder. Barney's first stop at 144 miles was for oil, water and fuel. At his next at 146 miles he came to the pits to clean the radiator, which was not cooling properly, and he also removed No. 4 ignition wire, thereby cutting out that cylinder which contained the crack. He attempted to continue on three cylinders, but withdrew the next lap.

The two Sunbeams, driven by Grant and Babcock, did creditable work up to the time of their retirement. Grant made two stops for right rear tires and at 262 miles he broke a universal on the back stretch and was out. His teammate, Babcock, made four stops.

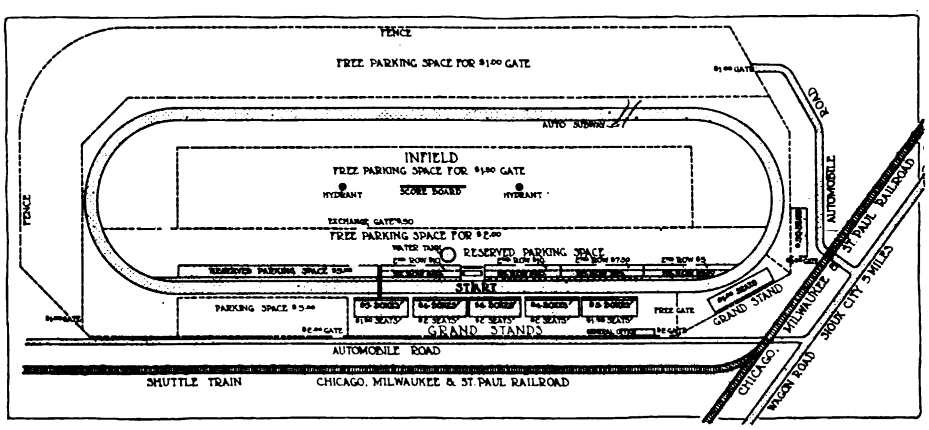
The second car to retire from the race was a Peugeot driven by Stringer. It broke a connecting-rod near the finish line at 86 miles. Previous to this a stop was made at 50 miles for a right rear tire, and considerable trouble was found in starting.

The first car to leave the course was the Mason, with Mason driving. At 4 miles he came in claiming no gasoline was flowing to the carbureter. He remained at the pits 30 seconds, and after leaving went one lap and again came to the pits with a spark plug in No. 1 cylinder blown out. This was replaced and Mason only drove 50 feet when he broke the driveshaft.

One of the local entries, the White six, driven by Shrunk, remained at the pits for more than 2 hours, repairing and replacing two bearings. The center main bearing broke and one rod bearing seized.

Another local car which ran in hard luck was Wetmore's Chalmers six, which made thirteen stops, most of which were for what was supposed to be carbureter trouble. The first stop was at 10 miles to change a right front tire, and the second at 34 miles for a right rear. The carbureter trouble began at 46 miles and it appeared that the fuel was full of water and dirt. The air line to the tank was giving trouble also. After making adjustments the car continued, but the motor still misfired badly. Two more tire changes were necessary at 64 miles, both rear tires being taken off. He was flagged off at 176 miles.

Burman was out at 160 miles with a broken crankcase, connecting-rod and piston. The bearing no doubt was not fed any oil, it seized, then bent the steel connecting-rod which left the crankshaft and punched through the crankcase. Burman made three stops before retiring, the first at 32 miles, when a left rear tire was punctured. His next was at 114 miles for a new right rear tire.



Map of the Sioux City Speedway, over which the 300-mile race was run

J. S. Bretz celebrated the 4th of July in Europe because

F & S

BALL BEARINGS

Finished 1-2-3

in the 1914 Grand Prix de France!

Time	Time	Time
1—Mercedes 7.08.18	2—Mercedes 7.09.54	3—Mercedes 7.13.15
Lautenschlager (65.55 m. p. h. for 467.5 miles.)	Wagner	Salzer

All three mounted exclusively on F & S Ball Bearings, defeating in this, the world's classic road race, the best racing creations of France, England, Italy and Switzerland, over a decidedly winding country circuit of 23.3 miles of 20 laps.

Thus does—History repeat itself again,
In this German Mercedes win;
For a stern chase is a long chase,
When F & S Bearings make the pace.

Factory Miscellany

COUNCIL Bluffs May Have Plant—That it would be practicable to manufacture automobiles in Council Bluffs, Ia., has been proven within the last few weeks at the Keys Bros.' Carriage factory at Twenty-eighth street and First avenue. Two sample cars were completed a few days ago and a thorough test has shown them to be equal to any make of the same size. The "Keys Car" is a five-passenger, 40-horsepower machine with a 112-inch wheelbase and a modern streamline body. The motor is from the Buda factory, four cylinders 4⅛ by 5¼. The body of the machine is from the Michigan Body works.

Excelsior Tool Co. Adds—The Excelsior Tool & Machine Co., East St. Louis, Ill., has begun the construction work on its recently announced addition and will soon seek the necessary equipment.

R-C-H Plant Bought—The power plant and some other buildings, all told a ground 200 by 400 feet, being part of the general plant of the bankrupt R-C-H Corp., Detroit, Mich., have been purchased by the General Ice Delivery Co., Detroit.

Carter Carburetor's New Building—The Carter Carburetor Co., St. Louis, Mo., of which C. O. Baxter is president, has bought a new factory building and will install equipment for the manufacture of carbureters, and also erect and equip a brass foundry on adjoining vacant land.

Another Ford Plant—The growth of the Ford Motor Co. of Canada, Ltd., is illustrated by the number of new branches being established. It is erecting a large plant on Christie street, Toronto, a site for a plant is being excavated at Montreal, and now comes the announcement that property has been purchased at London, Ont., for a new assembling plant.

Will Make New Spring—P. Walter Fay, of the Warren Garage Co., Worcester, Mass., has formed a company to start the manufacture of the new spring for motor vehicles for which he received a patent a short time ago. Daniel T. Higgins and John J. Barry have joined the company, and the springs will be turned out in a shop on Vine street for the present.

Reo's Three New Buildings—The Reo Motor Car Co., Lansing, Mich., has three new buildings under construction which will greatly increase the capacity of its plant. The additions will consist of a forge shop and power house, 96 by 225 feet; a machine shop, 95 by 560 feet, both one story, and a three-story erecting and painting shop, 144 by 256 feet. Machinery of the latest type will be installed.

Visiting Cambridge Plants—Many civic and other bodies are taking advantage of the opportunity to visit the big plants of the Gray & Davis Co. and the Ford Motor Car Co., located near each other on the boulevard in Cambridge, Mass. One of the recent gatherings at both places was that of Mayor Good, members of the board of aldermen and city council and the board of trade of Cambridge, who spent several hours going through both places.

$395 Car in Lansing—Lansing, Mich., is to have another automobile manufacturing concern, which will build a car to sell at $395. Those interested are Messrs. Thomas and Walls, who are busy just now with the incorporation formalities, the capital stock of the concern to be $250,000. The Chamber of Commerce, which had appointed a special committee to hear the promoters, heard a report from its members, which, after a thorough investigation, decided to provide the funds for the construction of a model car which is expected to be ready within 30 days.

Monorail in Buick Plant—A three-story fireproof building is being erected by the Buick Motor Co., Flint, Mich., for its enamel plant. In addition to the standard equipment of the modern enameling plant in the Buick building will be installed the monorail system for moving the raw material and the finished product to the various parts of the factory. There will be fifteen ovens and two high speed electric elevators of 4,000 pounds capacity each. There will be washed air ventilation, dustless floors, ice cooled drinking fountains of running water, well lighted and sanitary lunch and locker rooms and shower baths for the employees.

New Auto Tractor Plant—The Auto Tractor Co.'s new plant in Niles, Mich., is nearing completion. It is a one-story structure, 100 by 115 feet, with a monitor in the center having a clear span of 33 feet. The roof is supported by a traveling crane to serve the center bay of the building. The factory is located on the South Bend division of the M. C. R. R. Machinery will be installed within the next 10 days. The officers of the company are W. H. Zimmerman, president; F. J. Plyn, vice-president, and F. S. Hadfield, secretary-treasurer. The company makes a specialty of manufacturing farm tractors for attaching to all standard makes and sizes of automobiles.

Will Manufacture Tire Holders—The Rimolox Tire Carrier Co., Evansville, Ind., has been incorporated with $20,000 capital stock to manufacture tire holders or supports. The directors are M. A. Strouse, A. Harnishfeger and W. N. Erskine.

Electric Welding Co. Adds—The Electric Welding & Products Co., 2206 Clarkwood avenue, Cleveland, O., manufacturer of automobile supplies and screws, will build a one-story, 45 by 123 foot brick addition to its plant.

The Automobile Calendar

July 13-14	Seattle, Wash., Track Races, Seattle Speedway Assn.
July 25-26	Belgium Grand Prix Road Races.
July-August	French Army Truck Subsidy Trials.
Aug. 1-3	Galveston, Tex., Beach Races.
Aug. 2-9	Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16	Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17	Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupé de l'Auto Race.
Aug. 27	Brooklands Track, England: Annual Automobile Race.
Aug.	Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug.	Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7	Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15	Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2	S. A. E. European Trip.
Oct. 16-26	Paris, France, Automobile Salon.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
November	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14	London, England; Olympia Show.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
November 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
November 15	Paris, France, Kerosene Motor Competition.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

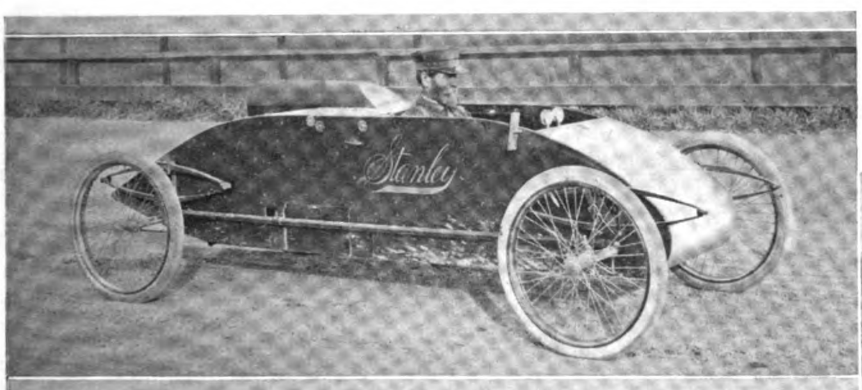
VOL. XXXI NEW YORK—THURSDAY, JULY 16, 1914—CHICAGO No. 3

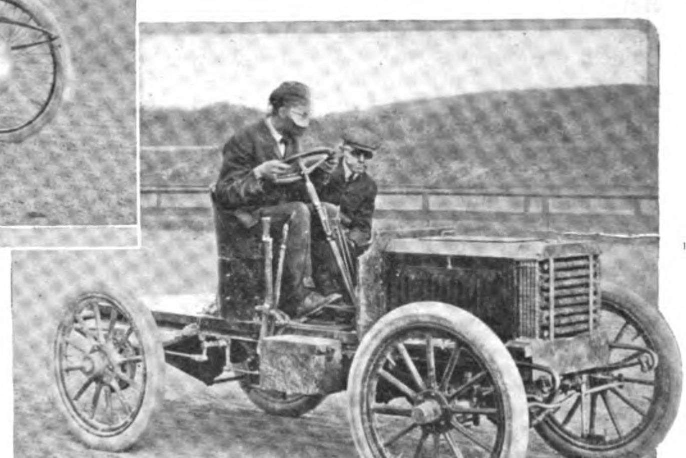
The AUTOMOBILE

New England a Factor In the History of Racing

Mishaps Brought Experience and Progress in Design and Construction—Forerunners of Modern Streamline Racers

By
James T. Sullivan



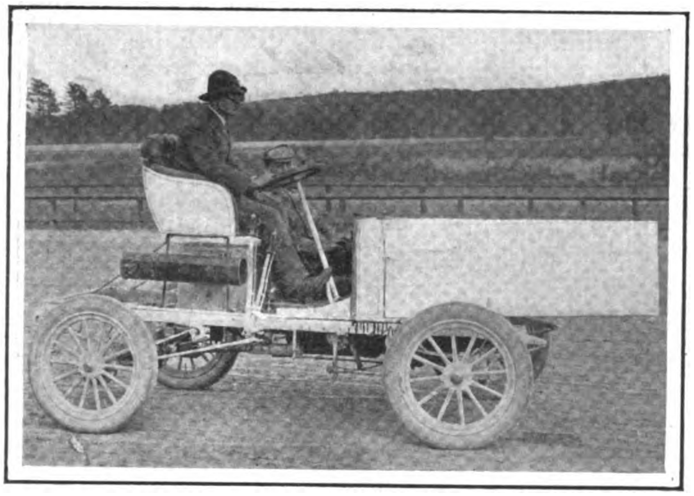


Above—F. E. Stanley in the Stanley steamer racing car in which he broke records at the meet at Readville, Mass., May 30, 1903. This was the first car of the kind ever built, the forerunner of those that swept Ormond Beach later. Right—J. L. Snow on his Peerless racer which made fast time in early Massachusetts races

BOSTON, July 11—When it was announced that the qualifying time for one round of the Indianapolis speedway was to be 1.42, and later when the cars tore around the track at an 80-mile-an-hour average or better, some of the men who participated in the first race meets in Massachusetts smiled at the thought of the difference between past and present. For New England, by the way, was in the van when it came to real racing and it furnished men and machines that made racing history in those days.

40 M.P.H. High Average for a Race!

Some of these men are still in Boston. From time to time they get together at outings and talk about the old days. At that time 1.42 was a pretty good average for a mile, not to mention that the Indianapolis distance is 2.5 miles. And 40 miles an hour for a race was splendid, only no one ever considered going that distance. Five miles was about the limit. At that time—we are going back now to 1902 and 1903—there was much eagerness and anxiety displayed in getting cars ready, but it was not the professional feeling that one finds now when a force of mechanics do a lot of the work. It was "do it yourself" the best way you could. And the finish of a race brought a lot of cheers mingled with laughter in which the losers joined as heartily as the winners. Also the private owners of the cars represented got excited and shouted for their favorite wilder than the fans at a ball game.



Webb Jay mounted on one of the early steam cars which made an excellent showing in the early days of racing

To go back to these first races the one that inoculated Bay Staters with the fever took place at the exclusive Country Club grounds in Brookline in 1902 on a half-mile track. To get into the club one must spurt blue blood when a vein is punctured, and so for some of the participants it was great sport to rub elbows with the élite. Larz Anderson, until recently Minister to Japan, and before that Minister to other countries, whose millions are many, and who by the way is one of the most democratic fellows one ever met, had become interested in racing about that time. He owned a number of machines, some of which he has yet, and so a race meet appealed to him. Of course star drivers were wanted. About that time Kenneth A. Skinner, a pioneer dealer and first president of the Boston Automobile Dealers' Assn., had won fame by making a round trip to New York with Albert Champion in 32 hours 22 minutes. His time for one way was 19 hours 15 minutes. It was marvelous. That was the time that the A. C. A. tour came to Boston in a couple of days. Harry Fosdick then jumped into the newspaper headlines by clipping 8 hours off Skinner's record, and he was the Barney Oldfield of the hour.

Half-Mile Race Was Too Long

Therefore the star attraction of the Country Club race meet was to be Fosdick, and a driver named Griffen, specially imported to drive the great Locomobile racer of those days. The race was booked to be a thriller as they both had steamers and all sorts of hair-raising things were expected. Anyway, the great moment arrived. When the flag dropped Fosdick was yelling "Wait a minute! wait a minute!" It seems his steam pressure was getting up beyond the danger point and he was trying to get his machine under control like a horse prancing about unmindful of a jockey's efforts to head the right way. Griffen shot off all right but, alas, Fosdick was left at the post. Meanwhile the spectators were watching the lone racer speeding around the half-mile track. He made the first corner all right, then the straightaway, but after that he began to slow up and finally he stopped. A half mile was too long even for him. So the great race blew up, to the merriment of everyone.

Big Two-Cylinder Motors Favorites

There was another big event carded, the special match between one of Alexander Winton's creations and a Pope Robinson. It was in this event that Larz Anderson was most interested, for he was the owner of the Winton. Two-cylinder motors with big cylinders were expected to do wonders, but even that race proved a bit tame after the start, for the drivers had to bother with their cars all the way and speed was out of the question.

There had been some races at Providence that year, too, and so the year following the Massachusetts A. C., a newly formed organization, decided to hold some races at the famous Readville track. This is a 1-mile circuit, and when in good shape it is fast for a dirt track. The club officials selected May 30 for the date, and so these events in 1903 really mark the first successful race meet in the Bay State. Looking back now over the old rules it seems strange to see the classification according to weight and with or without tonneaus. A stripped chassis, as it is known now, was not in evidence.

A New Radiator Every Day

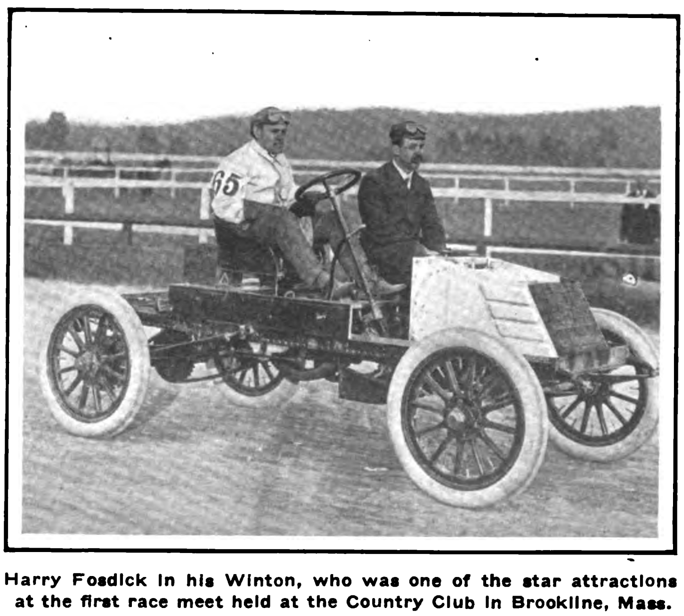
In that series of races there was a lot of fun getting ready for it, and participating in it. Jack Snow, now manager of the New England branch of the Peerless, had his troubles. It was late each day when he got a chance to go out to the track, some 20 miles from Boston. In fact, it was considered some feat in those days to make a non-stop run out or back. Jack was having trouble with the cooling system, and his radiator would shake so that it would spring aleak. He used a new one about every day. Finally he got a new radiator from the factory the morning of the race and he quickly put it on. But on the way out the motor would heat, and everywhere along the way where he could get water, he stopped and filled it up. Still it was no use. Finally the race took place and for 5 miles he drove around with a motor that got pretty hot. It was the same story in other events. He even borrowed a pump from another car and put it on, thinking that was the cause.

Excelsior in the Radiator

That night when he went over the machine he found that the radiator had come packed in excelsior, and a lot of it had got into the tubes so that they were choked. Of course such a thing could not happen nowadays.

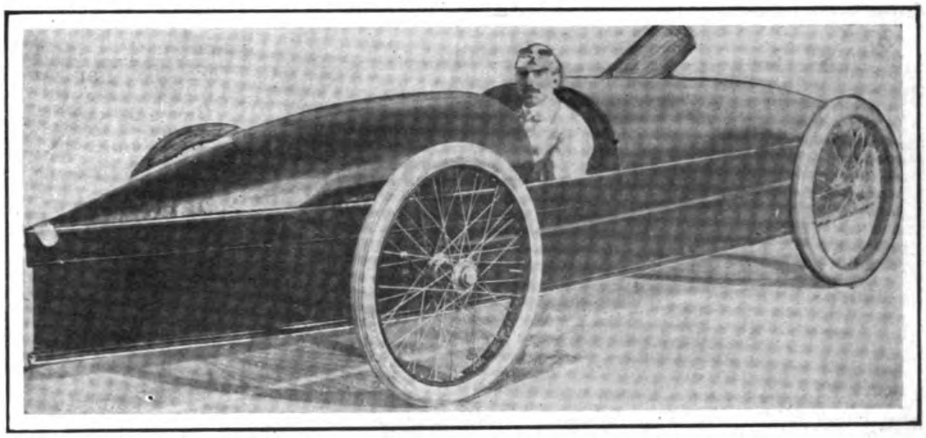
In those days when weight was the qualification tonneaus were taken off and put on with much speed. But that did not always do the trick. So the cars toted along several bars of pig iron or bags of sand to load into the machines to make them eligible for a heavier weight class. It used to be amusing to watch the weighing in and the dumping on or off some of the bars of pig iron or bags of sand, with the contestants watching to see that there was no jockeying with the weights.

In that first race meet there were some notable contestants. J. H. MacAlman, now president of the Boston Automobile



Harry Fosdick in his Winton, who was one of the star attractions at the first race meet held at the Country Club in Brookline, Mass.

Dealers' Assn., was a winner. L. R. Speare, ex-president of the A. A. A., figured in it. So did Frederic Tudor, one of the shining lights of clubdom in Boston, and the man who registered the first motor car under the Massachusetts laws, and who still carries every year the enviable 1 as his number plate. Then there was F. A. Hinchcliffe, now manager of the New England branch of the Winton, and A. R. Bangs, who sold the Franklin in those days. Louis S. Ross, the first man to win the Dewar trophy at Ormond, as well as a number of other prizes, was a participant.


Fred Marriott in the type of Stanley steamer which Louis Ross used in breaking records at Ormond Beach in the early days of automobile racing

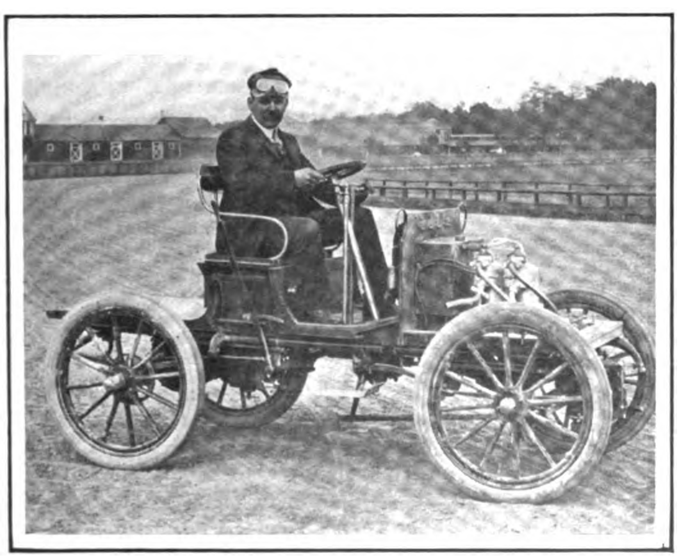
Steamers Beat Racers' Time

Webb Jay came on to show what his machine could do. He did not have the famous "Whistling Billy" then, but used another White steamer that was said to be fast. Then there was F. E. Stanley, the Newton maker, who electrified the crowd with his steamer when he made the then marvelous time of 1:02 3-5. Also George Cannon, a Harvard man, who was a pioneer racer with steamers, and whose home-made car held the record until Stanley took it away from him in this meet. George Reed, now the agent for the Vulcan in Boston, but handling the Stearns then, also raced and so did Fred Durbin, the man who by retiring when he got married, gave Fred Marriott the chance to drive Stanley machines and win honors at Ormond.

Cannon continued to cut a wide swath for a couple of years with his steamer, then he had a Grout steamer built and later ordered Louis S. Ross to construct one for him. This last machine was guaranteed to do a mile in 25 seconds, and it had two boilers and a double motor. But Cannon never called for it. He dropped out of sight and has not been heard of in racing since. Ross got tired of racing after some of the cleaning up Ormond and he has quit racing, too. He is now in the railroad fuse business in Newton. Skinner is renting cars in Boston.

The First Pursuit Race

It was an interesting collection of cars, too. There was the Stanley close to the ground; the Cannon machine with its smokestack, and the drivers in front; the others with long and short hoods. Most of the events were limited to 5 miles, but there was one event that exceeded the limit. It was a pursuit race, and the two stars, Skinner and Fosdick, fought it out. The idea was borrowed from Australia, it seems. Skinner had a De Dion and he started from the wire while Fosdick was over on the other side at the half-mile mark. When the flag dropped it was Fosdick's job to catch Skinner or Skinner's job to overtake Fosdick. There was much excitement, as each driver had a lot of friends, and when passing the wire they were cheered and urged to speed up. Fosdick had more power, however, and mile after mile brought him nearer to the foreign car until finally he caught up with Skinner after going 9.5 miles. It was hailed as a great American victory. The time was 12:56 4-5.


Kenneth A. Skinner in the imported De Dion racer which he drove in the first pursuit race, which was practically the only event exceeding 5 miles in distance in the early New England race meets

Introduction of Odd Racers

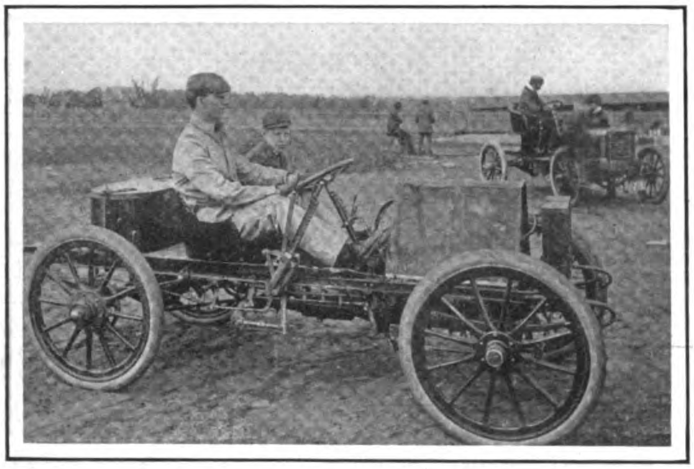
However, the star event of the day was the record-breaking achievement of F. E. Stanley, and the introduction to racing of the small cars that got all sorts of names from "woggle-bugs" to "torpedoes" from the racing scribes. It is interesting to look back now and quote from the papers of that date extracts about the race. Cannon had made 1:05 1-4 at Providence for a mile, and he and Stanley were invited to try to break that mark. So it was a special match. Here is what the Boston Globe said about it the next day:

"Terrific Speed of Racing Marvels

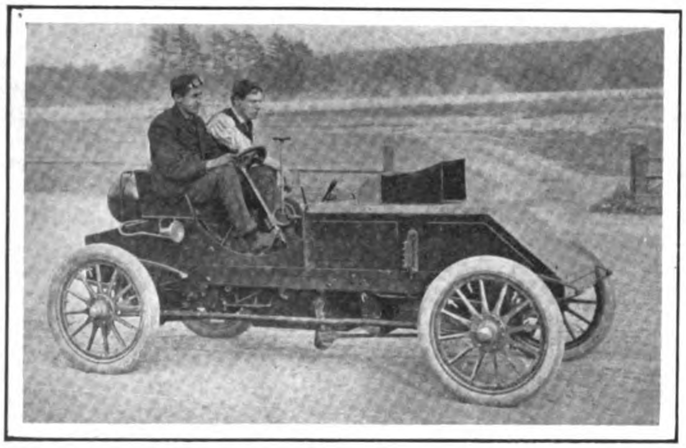
"Owing to the terrific speed at which these racing marvels travel it was deemed unsafe to start them together and the officials decided to run them against time. Roars of applause and the tinkling of automobile bells greeted the veteran Mr. Stanley as he prepared for his trial. His racer, setting close to the ground and shaped like an inverted torpedo, presented an odd appearance as it slowly moved up the track. Mr. Stanley, sitting in the middle, with just his head showing above the graceful curves of the bow and stern, resembled a gunner on a duck-shooting expedition more than anything else.

The Record Still Unbroken

"Without any apparent motion on the part of the operator the thing in red shot forward, emitting clouds of steam. Thrice did he circle the track and then the masked head nodded to Lon Peck, the starter, for the word. A pistol report rang out and the race against time was on. So terrific was the pace that few realized that the inanimate object was tearing around the track at such speed until car and man entered the home stretch, when the thousands broke forth in applause. The time was announced as 1:06, and the crowd relapsed, a trifle disappointed, but still hopeful of seeing the record broken.



Another view of John L. Snow mounted on one of his Peerless racers which upheld the prestige of the gasoline car in the early days of racing in New England



Charles Grout in a Grout steamer which made fast time in the early days of racing when rivalry between gasoline and steam driven cars was at its height

"Another low, rakish craft appeared on the scene. Every superfluous ounce of weight had been removed by Mr. Cannon for his trial, and his pet was in perfect trim for this great event. With the designer was F. L. Marselis, Jr., who added ballast as well as other assistance. The Cannon machine seen above the heads of the throng lined along the home stretch looked like the back of a dug-out, its smoke funnel projecting the least bit backward. The occupants sat in front of the boiler and were partly shielded from the wind by the long, low projecting bow. After a few times around the word was given and away sped the Cannon ball. Up to the first turn with a rush everything looked hopeful for a new record, but a wider detour on the turn lost some time, and when it reached the stretch it was going like a phantom. But 1:06 was the time announced and so far the race was a dead heat.

"Another race of a different class was decided while the boilers and tanks were filled and again Stanley came forth. This time, with the grace of a serpent, the racing contrivance glided down the stretch and flew around the turn. Into the back stretch darted the steamer, and down past the half mile post it shot with the velocity and certainty of an arrow. Intense silence reigned, as with unabated speed the torpedo went into the last turn. Not an inch did the machine swerve, Mr. Stanley holding it as close to the pole as he could with safety.

A New Record Made by Stanley

"With a whirr and a slew the low-clinging object appeared in the home stretch leaving a trail of steam and dust. Low murmurings grew in volume until they reached a great shout and the bells, gongs and horns took up the din as man and car neared the goal. Like a flash it was all over and then a hush fell over everything as the crowd waited for the official time. When the announcer shouted the time 1:02 4-5 there was a mighty cheer and the throng waited until the record-breaker sped around the track again. Mr. Stanley modestly acknowledged the great reception as he waited for Mr. Cannon to make his second try. Although the latter worked his steam car for every ounce, the best he could do was 1:04 2-5, breaking his own record, but 1 3-5 seconds slower than Mr. Stanley. So a new king was crowned."

Interest Centered in Getting the Pole

In a special match between Webb Jay and Frank Durbin, the former's car was put out of commission due to the gasoline catching fire, and so Durbin modestly refused to accept the win without competition. The races were pretty well contested, and there were not many runaways. The driver who got the pole had an advantage, for he could hug it and not cover so much ground as the fellows on the outside, and so the interest was centered in stealing the pole from each other. Then there would be a shout.

In those days the steamer and the gas car were very much in evidence and there was great rivalry. They had outclassed the electrics which, by the way, won the first race meet ever held, that at Providence some years previously. Following the 1903 events at Readville, which were a big success financially for there was an attendance of some 10,000 people, a big throng for those days, motor races became a yearly feature by the Massachusetts A. C. and later by the dealers themselves, and then the Bay State A. A. Sometimes there were two meets a year. But of late years they have been abandoned for lack of interest.

English Engineers To Discuss Self-Starter

LONDON, ENGLAND, June 29—At the last council meeting of the Institution of Automobile Engineers, held at the headquarters at 13 Queen Anne's Gate, the program for the November session of the institution was finally decided. The meeting will open with the presidential address by Col. H. C. Holden. One of the papers to be read will be on the "Position of the Self-Starter in America," by one of the members of the Society of Automobile Engineers of America, who will be in England in November.

Other subjects to be dealt with will be "Lubrication of Motor Cars," "Some Experiments on Benzole," two papers on "Aspects of Commercial Vehicles, Gears and Gear Cutting," "Worm-Drive and Power Expended in Flight." A number of the members of the I. A. E. are contemplating a visit to Belgium this summer. More than thirty have already signified their intention of taking part in the trip.

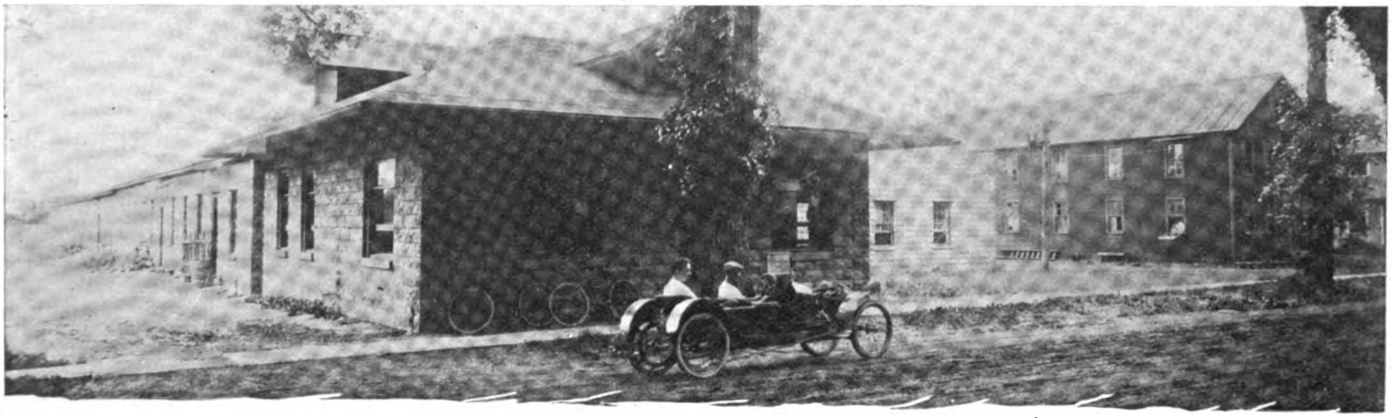
Safety Society to Test Rear-End Signals

NEW YORK CITY, July 15—Rear end signalling devices for automobiles wil be given a public test in the near future by the Safety First Society. There are many devices of this kind, several of which are ingenious, indicating not only the intention of the driver to slow down or stop his car, but also which way he intends to turn, whether to the right or left. These devices are said to be in general use abroad.

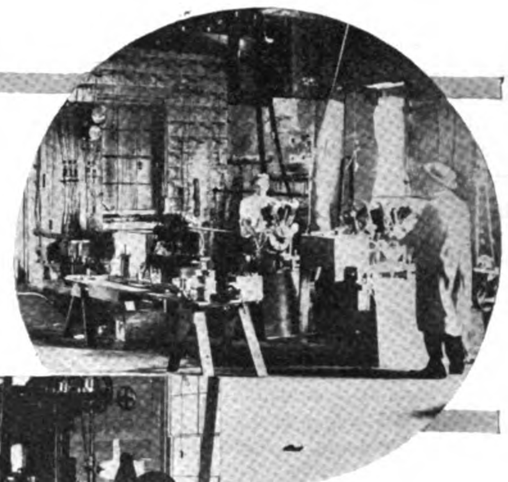
Workmen Call Off Westinghouse Strike

EAST PITTSBURGH, PA., June 14—The Westinghouse strike at East Pittsburgh has been called off by the workmen, the day set for returning to work having been set for Monday, July 13, a large number of men, however, reported on the Friday and the Saturday preceding. The works are now running full time.

One of the New Cyclecar Plants

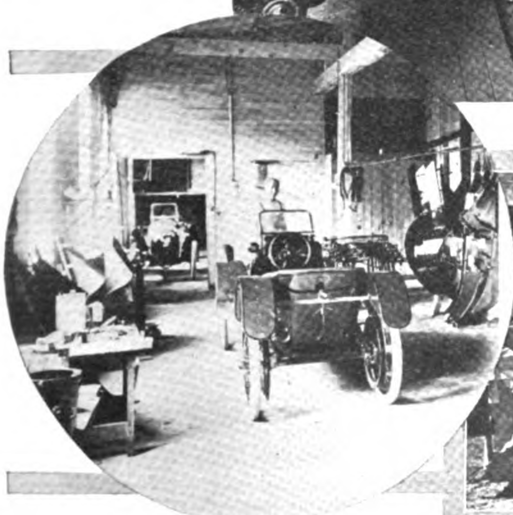


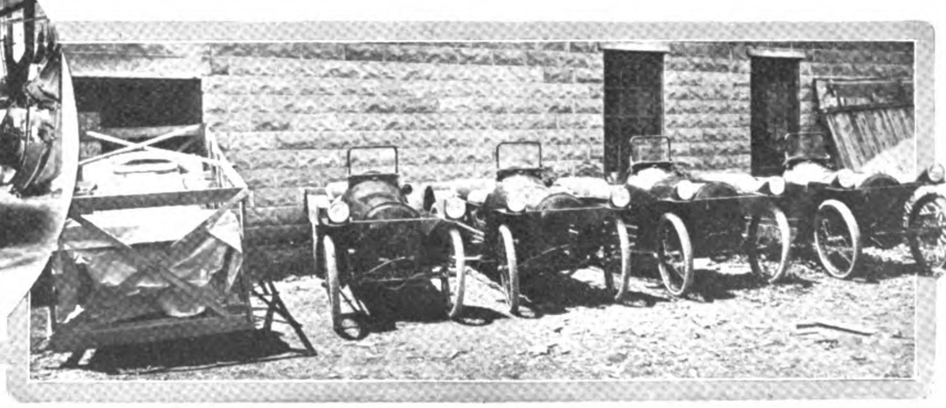
Main office and factory buildings of the O-WE-GO Car Co., Owego, N. Y., with an O-WE-GO car in the foreground



Above — View in the general assembly room, with bodies lined up in the preparatory stages of the assembly of O-W E-G O cyclecars

Above — Engine testing department. Note electrical test apparatus. Motors must develop 10 horsepower before acceptance by assembly department. Left—Machine shop in assembly department.





Left—Paint shop. Bodies are enameled and baked in ovens. Three coats of color and varnish are used. Right—One day's output

Bosch Now Produces Rushmore Systems

Fig. 1—New Bosch starting motor

Rushmore Generators and Starting Motors Added to Bosch Line—Complete Systems Now Available for Every Requirement

THE absorption of the Rushmore interests by the Bosch company places the latter in a position to supply complete electrical equipments for any car on the maiket. Previous to the combination the Bosch company had been at work on generator and starter designs of all types. The introduction of the Rushmore sliding-pinion flywheel starter into the Bosch line makes it possible to meet all requirements.

At present there are eleven designs of Bosch generators and three Bosch starting motors. The Rushmore designs, which will henceforward be known as the Bosch-Rushmore models, comprise three generators and four sizes of starting motor. The Bosch models are designed for operation on 12-volt circuits while the Rushmore machines are adapted for 6-volt installations.

So far, the only car to be completely equipped with lighting, starting and ignition as standard by the Bosch company is the Marmon. Figs. 2 and 3 show respectively the application of the generator on the pump shaft and the starting motor on the crankcase at the side of the flywheel in this particular installation. The simplicity of the Rushmore method is noticeable in Fig. 3, the motor being supported on an arm projecting from the crankcase. The pinion on the end of the armature shaft, overhanging the teeth on the flywheel is also clearly shown. When not actually turning the flywheel the starting motor is completely isolated, suffering no wear and causing no friction.

Generators of All Types

The several designs of generator are necesary to meet the different requirements both of speed and possible fitting positions on various types of engines. Three of the Bosch generators are shown in Fig. 4. That at the left is intended for drive by chain through a pinion at one end of the armature shaft. It will be noted that the shaft at the other end does not project through the casing. In this respect this design differs from the center illustration. Here the shaft passes right through the casing and so enables it to carry the drive to the magneto as in the Marmon installation, Fig. 2. Where the crankcase has not been specially designed to take such a generator in this position between the pump and magneto, the generator at the right, Fig. 4, is suitable, being provided with a base which is identical with the standard magneto and with the shaft center at the same height above the base. To meet the exceptionally low armature position it was necessary to use a two-pole field magnet having the

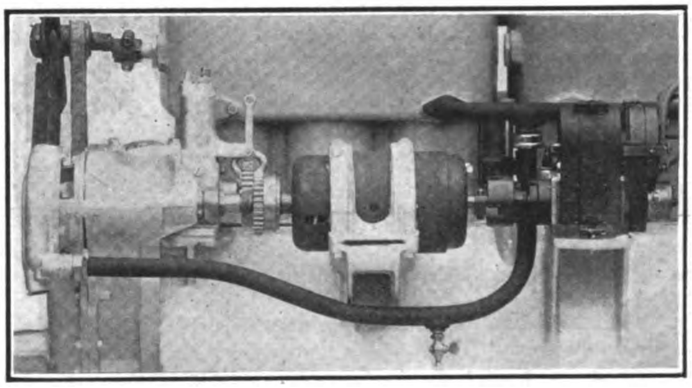


Fig. 2—Installation of Bosch lighting generator between the pump and magneto at the side of the Marmon engine

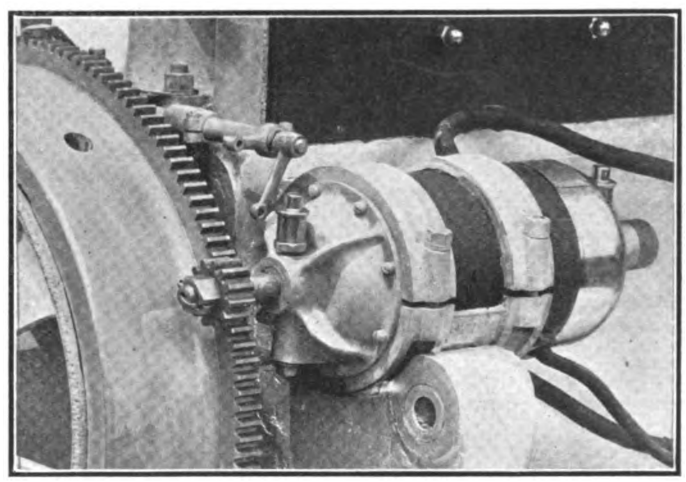


Fig. 3—Application of the Bosch-Rushmore starting motor, which operates directly on the flywheel, to the Marmon engine. Note the starting pinion, which is attached positively to the sliding armature shaft

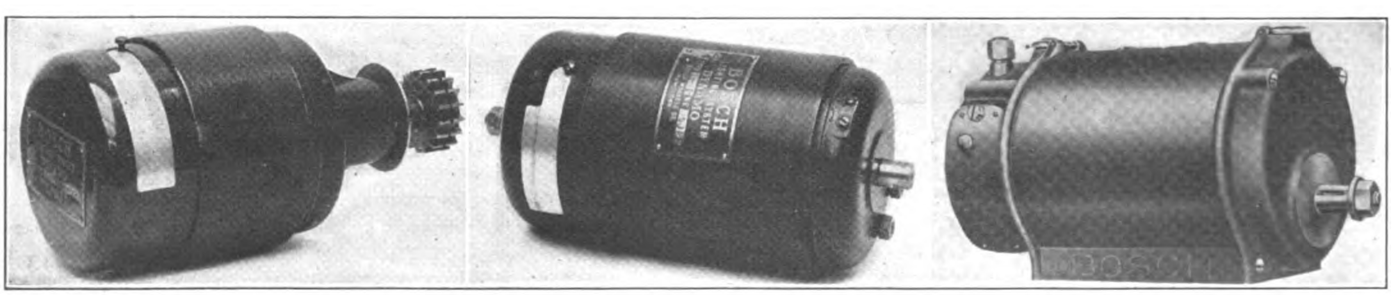


Fig. 4—Three types of Bosch lighting generators. At the left, for driving by chain. In the center, for insertion in a shaft line, for which purpose the armature shaft is carried through the casing at both ends. At the right, a special model with standard magneto base and low position of armature

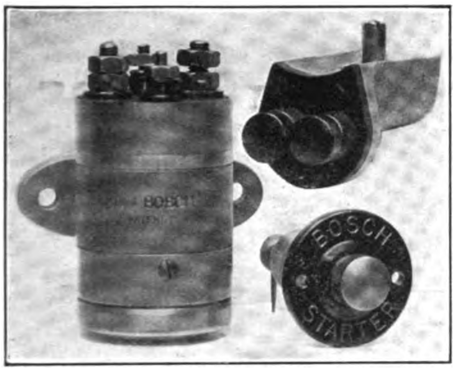


Fig. 5—Bosch electrically operated starting switch, which connects the starting motor to the battery by pressure on the small starting button at the right.

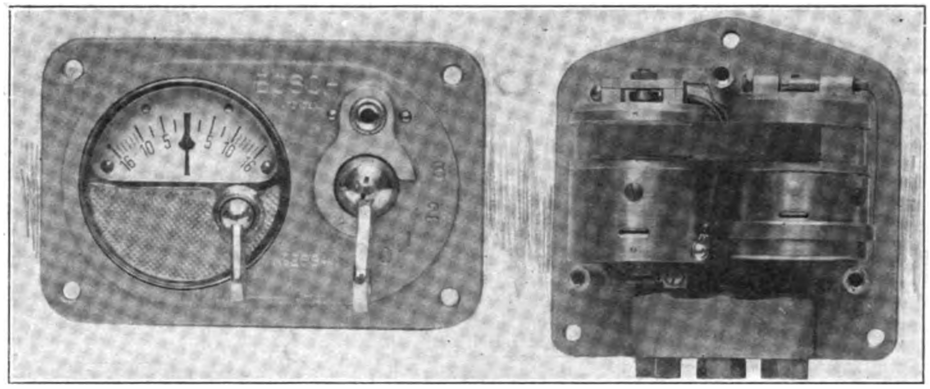


Fig. 6—At the left, instrument board for the Bosch system. The dial registers either amperes or volts. The switch arm is provided with a lock. At the right, the carbon-particle regulating device for the generator circuit, with the cover removed

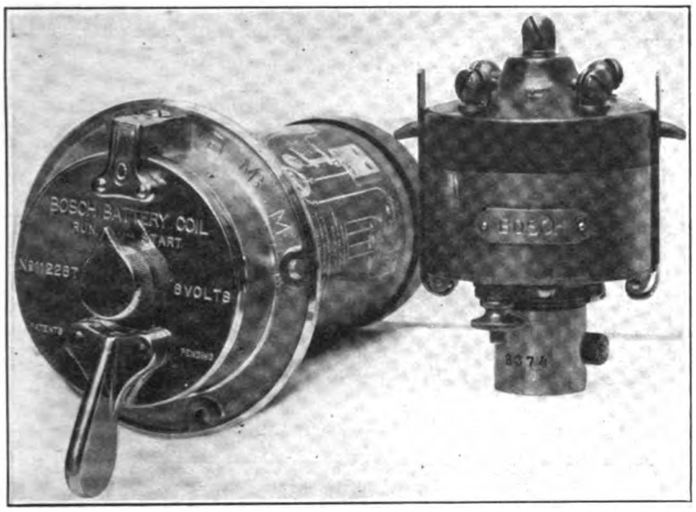


Fig. 7—Bosch battery-magneto switch and coil for dash mounting

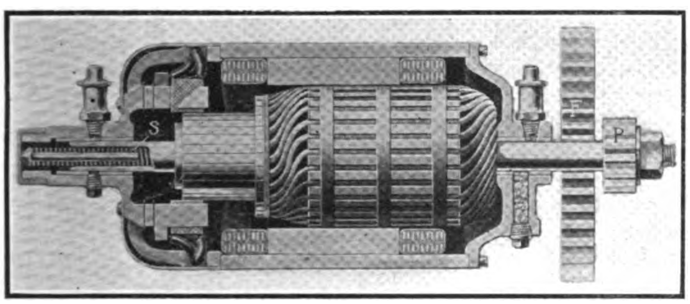


Fig. 8—Section through Bosch-Rushmore starting motor, showing displaced armature, which automatically draws the starting pinion into mesh on applying the current

field coils all located above the armature. In some of the types a gear is contained in the end cover.

Generator Control

Control of the current in the generator circuit in the Bosch installation is effected by the use of a solenoid regulator in the field circuit and a carbon-particle resistance, Fig. 6. The latter is contained in a compact case which can be conveniently located behind the dash. It is provided with a dust-proof cover. By tightening or loosening the nuts which regulate the pressure of the carbon particles any resistance can be obtained to suit individual running and lighting conditions. The battery used is known as the Bosch-Elba and is an Elba battery adapted to the requirements of the Bosch company.

Besides the carbon regulating device which can be located anywhere, there is a combined instrument and lock switch, Fig. 6, at the left for placing on the dash. The small lever below the dial is moved to one side or the other to read amperes or volts, while by locking the handle of the other switch it is impossible to operate anything electrical on the car.

Overrunning Clutch Used

The Bosch starting motors are of the overrunning clutch type and in order to insure correct switching in of the motor in the circuit the starting switch is not operated directly but through the agency of a small pilot switch. In Fig. 5 the cylindrical casing contains the electrically operated starting switch. Pressure on the small starting button at the right causes the contacts in the main switch to close, thereby connecting the motor directly with the battery circuit. The Bosch starting motor, Fig. 1, weighs 35 pounds and is 10.25 inches long by 5.85 inches diameter.

The small switch at the upper right, Fig. 5, is fitted on cars where it is desired to retain the starting crank. When cranking up, this switch automatically cuts out the magneto and connects the battery side of the ignition system. Immediately the engine fires the battery current is replaced by the magneto, also automatically. The dash coil and battery-magneto switch, which is another unit in the complete Bosch equipment is shown in Fig. 7.

Regulation of the Bosch-Rushmore generator is by means of an iron wire resistance or ballast coil placed across a series bucking winding on the field poles. A peculiarity of iron wire in an electrical circuit is that of suddenly increasing its electrical resistance when heated to a certain critical point. By so proportioning it that the heating is accomplished by the current itself the iron wire coil is made to act as a sort of electrical brake on itself, weakening the main fields and so cutting down the output of the dynamo.

Rushmore Principle Retained

No radical alteration has been made in the principle of operation of the Rushmore starter. In this method of starting the engine the motor is applied to the flywheel through a single pinion in mesh with teeth on the periphery of the flywheel. The means of bring the motor pinion into position for starting is unique among electric motors for this purpose. In applying the current the armature, which is held out of its working position by means of a spring at the end of the shaft is pulled up into the fields, carrying with it the pinion on the end of the armature shaft which then meshes with the flywheel and starts the engine. A section, Fig. 8, of the Bosch-Rushmore starter shows the Spring S at one end of the armature shaft and the pinion P at the other.

The Bosch-Rushmore starting and lighting system will be used on probably 80 per cent. of the installations. This in conjunction with the Bosch magneto and ignition systems constitutes a complete electrical equipment.

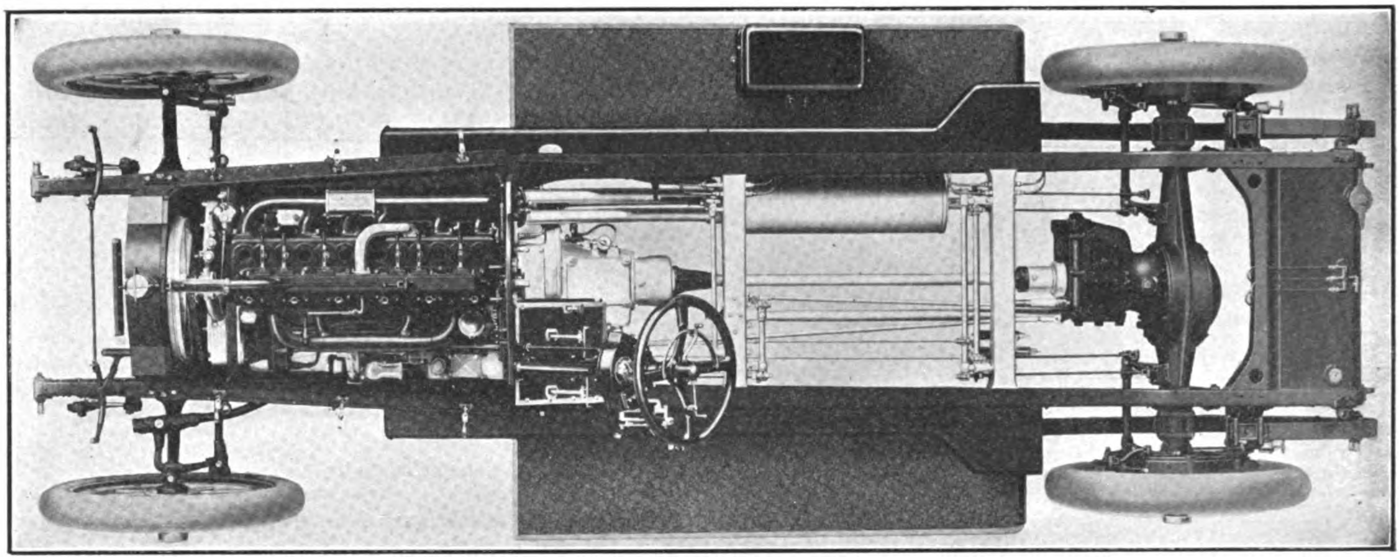


Fig. 1—Plan view of the chassis of the Packard 3-38 6 cylinder car for the 1915 season

Packard Continues Two Sixes

Changed Lamps and Carbureters —Separate Ignition and Double Exhaust Systems Continued

FOR this season Packard will continue its two sixes with but minor refinements. They will be known as the 3-38 and the 5-48 and, as the names suggest, will be practically continuations of the 2-38 and 4-48 of last season.

In general appearance they are practically the same as heretofore, having the same lines, and features such as the Packard form of radiator and sloping hood, the special type of bodies built in the Packard shops and so on.

Mechanically, too, there is little difference. General construction which has always been associated with the Packard chassis is still adhered to throughout. There are two main units, viz., the motor unit, comprising the power plant and clutch, and the rear axle unit, which consists of the final drive, gearset and differential gears.

Motors are practically identical with those used in the previous cars. They are both of the L-head type with cylinders cast in threes. The 3-38 has a bore of 4 inches and a stroke of 5½ inches, giving it an S.A.E. rating of 38 horsepower, while the 5-58 with its dimensions of 4½ by 5½ inches is rated by this method at 48. The company uses these ratings in designating the cars, but their maximum power outputs are 65 and 80 horsepower, respectively.

Headlamps Are Changed

There is one change in the outward appearance of the cars which is distinctive. This is the head lamp design. Each of the headlights has an auxiliary headlight with a separate reflector below the main lamp. The smaller lamp is an integral part of the other. These auxiliary headlights are designed for city driving or for meeting cars on the road but it is pointed out have the added advantage of being supported near the ground so as to throw light on the road ahead. With the addition of auxiliary headlights, the side lamps are reduced in size and are now designed to be used only when the car is standing at the curb or for driving in cities where headlights of any kind are prohibited The tail light and license tag illuminator have been replaced by a combination tail light and license light on the left rear fender.

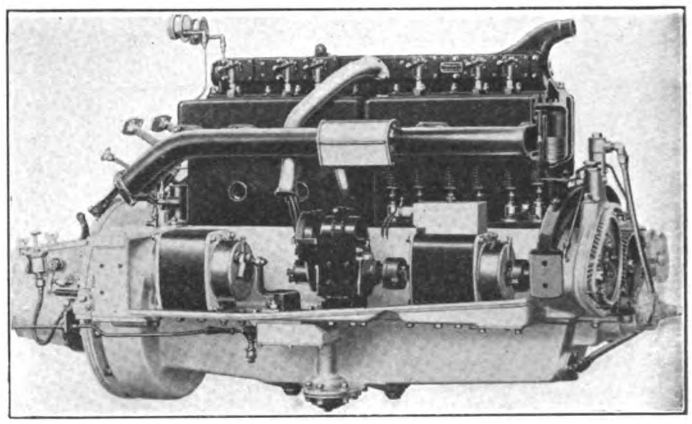


Fig. 2—Right side of the 3-38 motor with cut-away view in front

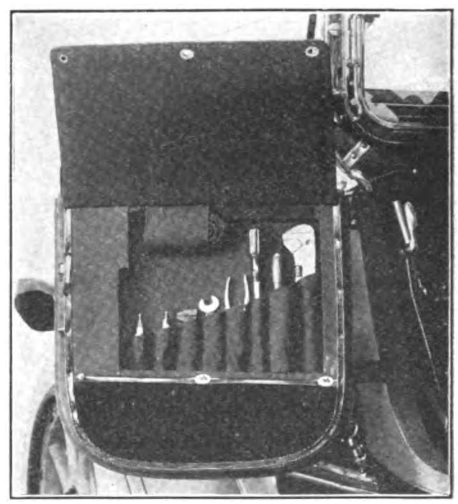


Fig. 3—Tool compartment in left front door

Though of the same operative design, the carbureter body has been changed in design so as to afford a housing for the auxiliary air valve. The opening in the housing is turned to the rear of the motor, thus reducing to a minimum the chances of getting dirt in the carbureter. Other minor changes are the increasing of the size of the radiator on the 3-38, the making larger of the gearset on this same model and the increasing of its motor's valves to 2⅛ inches.

Taking up the constructional details of the 3-38, the wheelbase is continued at 140 inches, which gives ample length for any desired type of body. Tread is standard at 56 inches, while the overall length of the seven-passenger car is 187.5 inches.

The engine has its valves all on the right side and completely enclosed. These are of nickel steel, mechanically operated from the camshaft and interchangeable. The inclosing covers are of aluminum and oil tight. Pistons fitted with three rings each are conventionally linked to the crankshaft by drop forged I-beam connecting-rods. The crankshaft, carried on seven large size main bearings attached to the upper half of the crankcase, is so mounted and its proportions such that no vibration is possible, making for quietness and smoothness of running.

Crankcase Split Horizontally

The crankcase which is conventionally split into two horizontal sections, has cast webs integral with the upper section on either side. These webs extend to the side members of the frame, and act as mud aprons, preventing any mud or water from splashing up onto the motor parts.

The hot water jacketed inlet manifold on the left side of the engine is continued. This has four openings into the cylinders, two for each block of three. These passages must go across to the valve side, and in running through the water jackets, assist further in fuel vaporization. The specially constructed double exhaust manifold is also continued. This has a separate passage for the burnt gases from each block of three cylinders so that there is no overlapping of the exhausts. There are consequently two pipes connecting from the rear of the header and running down to the muffler.

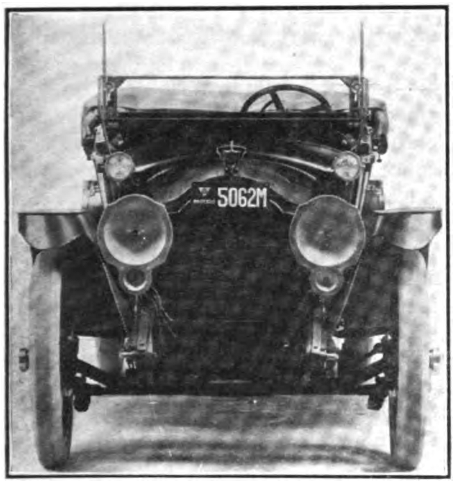


Fig. 4—Front view of Packard 3-38 touring car, showing new headlights

As on the previous car, the ignition system is entirely independent of the lighting and cranking system. A Bosch duplex magneto is located on the right side of the engine.

The oiling system is unchanged. Lubrication is by force feed from a gear driven pump, located in the crankcase. This pump is driven by worm gear on the camshaft.

Packard-Bijur System Continued

The Packard-Bijur cranking and lighting system is retained with slight refinements. The cranking motor and the generator are separate units. They are both located on the right side and are readily accessible. The generator is driven by a shaft from the front gears and operates at 1½ times crankshaft speed, generating at speeds from 10 miles an hour and giving its maximum voltage at 15 miles an hour.

The cranking motor which has capacity to turn the engine at 100 revolutions a minute when the latter is warm is geared at about 19½ to 1 to the flywheel, and a pedal under the driver's heel operates the shifting mechanism and sends the current to the instrument for starting purposes.

Back of the engine is the dry plate clutch which is housed in unit with the power plant, its case bolting to the crankcase. The casing plates are faced with a special friction material while the shaft plates are of metal with ground faces. The driveshaft, which is uninclosed, is fitted with universal joints and drives from the clutch directly back to the gearset in unit with the rear axle.

Three forward speeds are afforded, while the rear axle itself has a pressed steel housing, and contains worm-bevel gears which were brought out first by the Packard company. These are a combination of the bevel type and the worm, the gear faces being curved so that they engage with a rolling action, giving contact throughout the engagement and making them noiseless.

The springs are of the usual form—half elliptic in front and three-quarter in the rear. They are underslung from the axles, giving a somewhat lower hanging of the frame. The spring sizes are 2¼ by 40 in front and 2½ by 53 in the rear.

The regular line of Packard bodies is still featured. There are all types of inclosed cars, as well as distinctive phaetons, and touring cars of the open type. Equipment is complete and prices remain unchanged.

Tires are 26 by 4½ inches in front and 37 by 5 in the rear.

The 5-48 has a wheelbase of 144 inches, and incorporates all the features of the 3-38 with the added advantage of more surplus power. The specifications of the 3-38 cover the 5-48 with the exceptions that all tires are 37 by 5, cooling water capacity is slightly greater, and front springs are ½ inch longer.

The appearance of the 5-48 is almost identical with the 3-38, bodies being interchangeable.

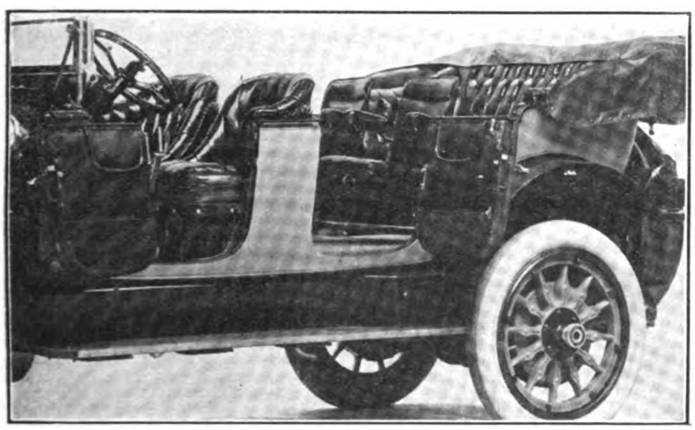


Fig. 5—Seating arrangement adopted in the Packard 3-38

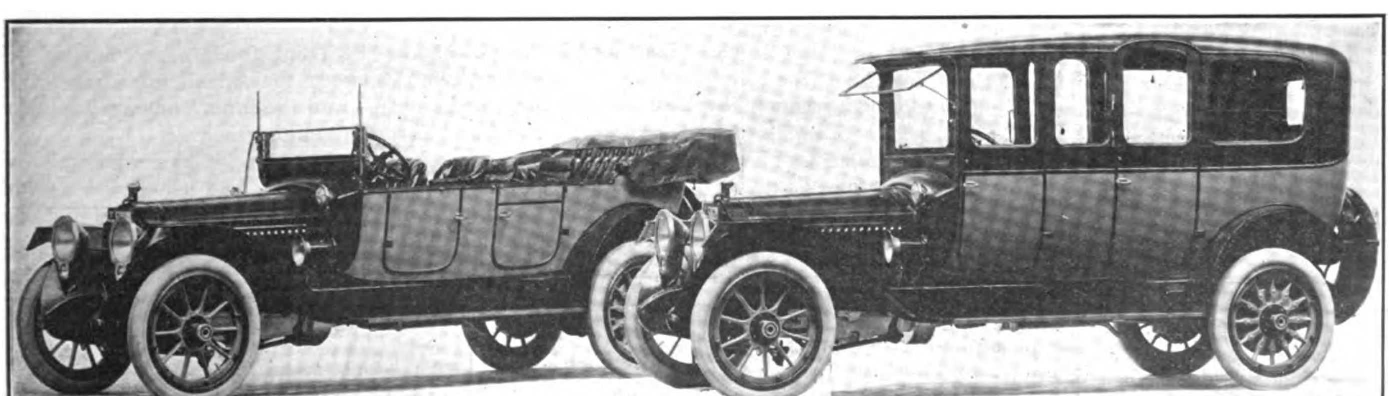
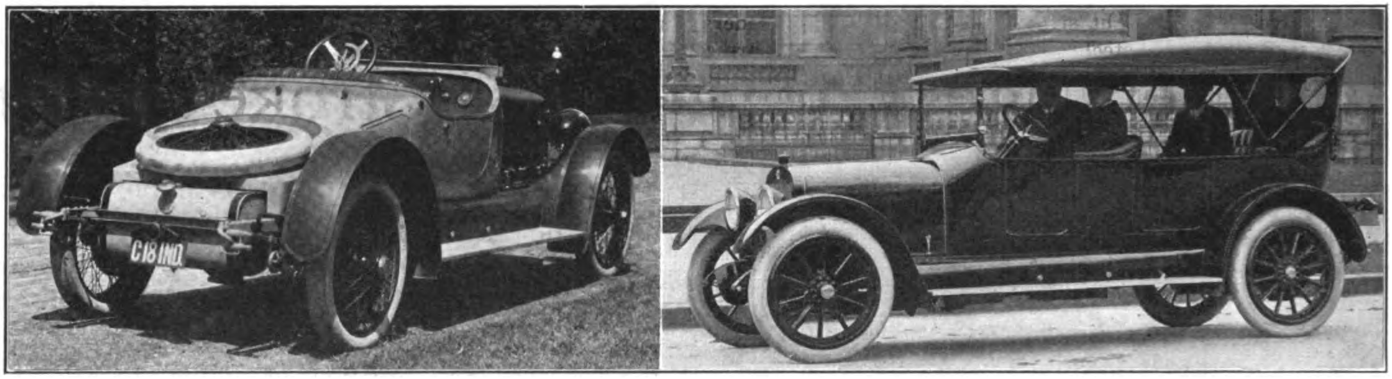


Fig. 6—Left—Packard 3-38 touring chassis with six passenger saloon touring body. Right—Touring chassis with limousine body



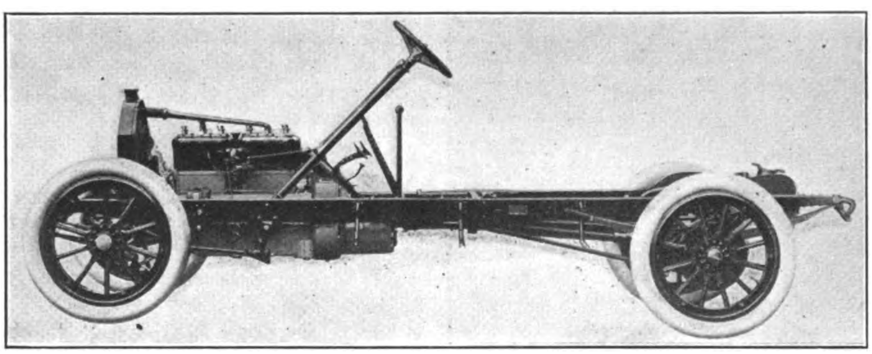
Left—Rear view of new Premier roadster. Right—The new touring car

Premier Continues T-Head Motor

PREMIER will continue the T-head model for 1915. Under the name of 6-49 this chassis will be a continuation of the 6-48 of the previous season but will be featured by a new roadster of racy lines with provision for carrying on the rear deck an extra wire wheel or two spare tires in an inset circular space into which they fit. The only mechanical change of importance in the chassis is the use of long semi-elliptic springs at the rear in place of the three-quarter elliptic. This has necessitated a few frame changes in order to meet the requirements of suspension.

Rather unusual factory equipment are the shock absorbers and recoil straps which are fitted. These, together with the rubber bumpers and the 60-inch semi-elliptic rear springs are designed to give maximum easy riding. The equipment also includes the Golde one-man-top, single piece ventilating windshield, Warner speedometer, and so on. Wire wheels are offered for the touring cars at $80 per set of five, but on the roadster either wire or wood wheels will be specified.

Starting and lighting is by the Remy system while an Eisemann magneto is used for ignition. The two- and five-passenger bodies will sell for $2,385 and the seven-passenger for $2,435 with full equipment.



Side view of chassis comprising 1915 Premier line

Cylinder dimensions of 4 by 5½ inches give the engine an S.A.E. rating of 38.4 horsepower, which is rather lower than the actual power delivered by the engine, the manufacturer stating that it delivers from 48 to 70 horsepower. Triplet casting of the cylinders permits placing the three cylinders close together, making a minimum distance between main bearings and center bearings. Lubrication of the motor is a circulating system with a constant level splash maintained by a gear driven pump. There is a sight feed glass on the dash. In the lower half of the crankcase are moulded transverse troughs. These have partitions between them so that the dippers on the ends of the connecting rods dip into the oil on any grade below 27 per cent. The oil which overflows from the troughs drains into the reservoir in the rear, and again is forced back into them. Pockets in the bearing journals catch the oil and feed it direct to the bearings through the oil holes.

Valves are completely inclosed and the push rods have 1-inch rollers which are ground inside and outside. The flywheel is completely inclosed and the whole T power plant is suspended at three points. The three-speed gearset is in an oil-tight housing and the gears are cut from nickel-steel forgings, the shafts running upon annular ball bearings. The ends of the transmission shaft are provided with stuffing boxes which prevent leakage of oil. The rear axles are made under the Premier patent and are generally termed a three-quarter floating type, inasmuch as this carries none of the load, but the shaft cannot be pulled out of the housing without disconnecting from the differential pinions. The Premier people call it "90 per cent. floating axle." It has an internally ribbed center housing so that truss rods are dispensed with. Handholes in the rear of the housing permit the gear to be adjusted to take up wear. The brake drums are an integral part of this clutch and hub arrangement. The internal brakes are operated by a pedal, and are steel shoes. The emergency brakes are external and are steel bands covered with Raybestos. The brakes altogether provide 526 square inches of braking surface. Tires are 36 by 4½ inches in size, although 34 or 36-inch wheels are offered on the touring car as an option.

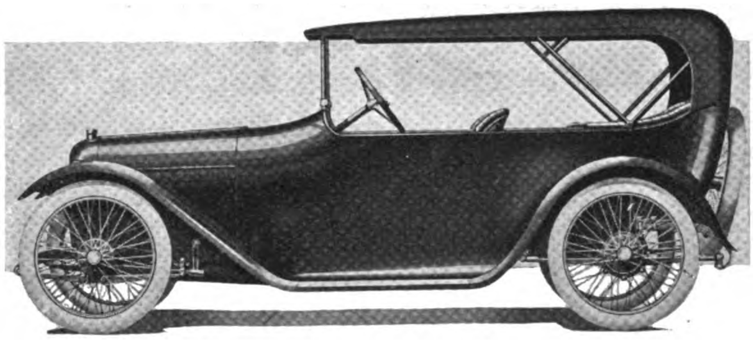
The framework is of oak braced with steel over sheet metal panels. Special protection is provided against rattling of the hood, and the front fenders are flanged to make a rigid connection between the splash guard and the car. All fenders are crowned and the inner ends are brought down several inches below the running boards.

In the touring car spare tires are carried in a cradle at the rear, which provides for two extras. The headlights are of the two-bulb type, providing brilliant lights for country driving and less intense ones for the city, this doing away with any side lamps. There is a combination tail and license lamp, an instrument lamp, and inspection lamp, all being independently operated. A motor driven tire pump is provided which is gear driven from the engine. The steering column which is on the left side is provided with a carbureter air adjustment.

Fischer Light Car Has Long Stroke Motor

Three Body Styles Supplied in Streamline Design—Deliveries To Be Made August 20

FISCHER is the name of a small car built by the C. J. Fischer Co., Detroit, Mich. At one time C. J. Fischer was connected with the Lavigne Co., and was interested in the production of the small car by that concern last winter. Mr. Fischer is now head of the C. J. Fischer Co., and the new Fischer car is made in several body styles ranging from $595 to $845.



Side view of Fischer touring model with one-man top

The company expects to produce from 5,000 to 10,000 cars the first year. It is now negotiating for plants and expects to make deliveries by August 20.

The Fischer is a small car with a block motor 2 3-4 by 4. A three-speed selective gearbox is a unit with the motor. Shaft drive construction with a semi-floating rear axle are used. The wheelbase is 104 inches and the tread is the standard 56 inches.

The body styles are: Model A speedster $595, tires 30 by 3; Model B Two-passenger car $595, tires 30 by 3; Model C cabriolet two-passengers, $645, tires 30 by 3; Model D, four-passenger touring, $645, tires 31 by 3.5; and Model E four-passenger sedan, $845, tires 31 by 3.5.

The designs of all the body styles are conventional streamline effects. The speedster is really a racing design with large hood in the cowl and very low seat, the effect being accentuated by semi-elliptic springs mounted below the axles. It does not carry fenders.

The two-passenger roadster is also a low-hung type but uses three-quarter elliptic springs and has a high-sided body with all equipments.

Wire Wheels Standard on Speedster

The standard equipment on all models is artillery wood wheels with the single exception of the speedster, but a set of five Houk wire wheels can be secured for $30 extra. The speedster carries these as regular equipment. Where wood wheels are used demountable rims are fitted.

All models use a V-shaped radiator designed to be proportionate to the chassis size, and rounding the radiator at the top takes away the abrupt line at the front. Crowned fenders are used.

The equipment of all models includes an electric cranking and generator system, speedometer, windshield, top, etc.

The motor used is a standard Perkins type made by the Massnick-Phipps Co., Detroit. It has a bore of 2 3-4 inches and a stroke of 4 inches, giving a rating of 12.10. The motor readily turns up 15 horsepower. The power plant is three point.

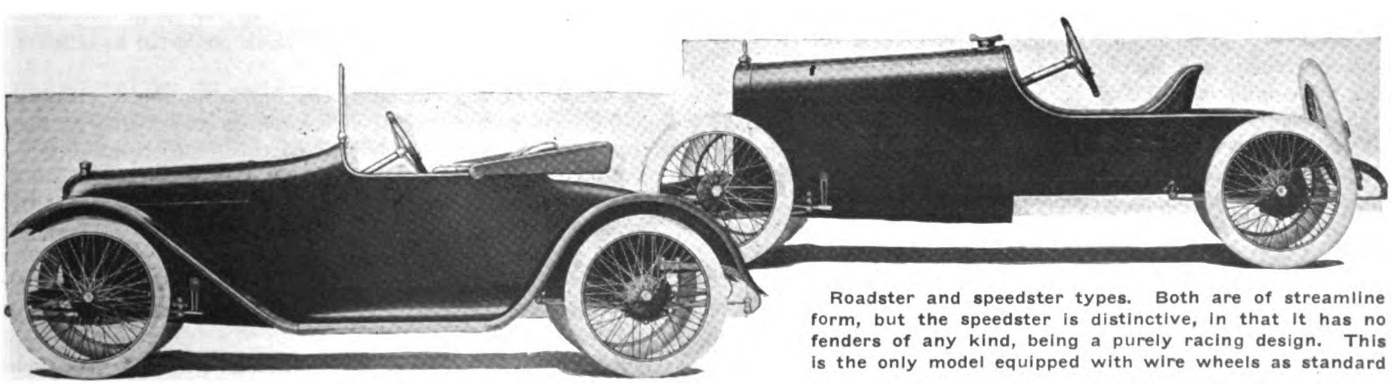
The cylinders are block cast and are L-head with the valves on the left and inclosed. The crankcase is of the barrel type, which construction is much used on small motors due to the greater rigidity which it gives to the crankshaft bearings and to the better machining. Inspection of the bearings is made possible through the plate at the bottom which also forms the reservoir for the oil.

An unusual feature is the manifolding on the left side. The intake and exhaust are really cast in one piece, the passages to the various openings and to carbureter and exhaust pipe being cored within the casting. The exhaust passes above the intake and there is an opening to each cylinder. Below this there are the two passages to the intake ports, a short pipe from the carbureter connecting to this casting at the center. The exhaust pipe joins the combination manifold at the rear. This construction has the advantage of assisting gas vaporization and should make for a better atomized mixture.

The oiling is done by a plunger pump and splash from the ends of the connecting rods dipping into the individual oil troughs.

Cooling is by thermo-syphon and ignition by the Atwater-Kent distributer system.

The motor gives its power to the rear through either a cone or multiple disk clutch and thence to a three speed selective sliding gearset. Thence it is passed on by a 3 1-2 per cent. nickel steel drive shaft which is equipped with a Spicer universal joint. The rear axle is semi-floating of the bevel gear type and its axle shafts are carried on Hyatt bearings, while the pinion shaft is mounted on double-row ball bearings.



Roadster and speedster types. Both are of streamline form, but the speedster is distinctive, in that it has no fenders of any kind, being a purely racing design. This is the only model equipped with wire wheels as standard

Prophesies Internal-Combustion Motored Car Simpler than Electric

The Automobile Engineers' Forum

Thinks 40 Miles an Hour on City Streets Set Aside for Rapid Traffic Is Mild Expectation for Future—Automobile No Longer a Fashionable Fad But a Necessity

COLUMBUS, O.—Editor THE AUTOMOBILE—There are a number of points in the recent address of Dr. C. P. Steinmetz on electric vehicles, reported in your issue for June 11, which would be interesting subjects for further discussion in your columns.

That the automobile is to a large extent following the history of the bicycle is a statement which few will deny, but it may indeed be doubted whether the decadence of the fashionable amusement of motoring will relegate the gasoline vehicle to the very limited field of usefulness prescribed by the noted electrician.

As to big, unwieldy engines, their day is even now almost over—their doom was sealed at Indianapolis when a car of only 183 cubic inches displacement made its wonderful showing.

The future competitor of the low-priced electric will be a gasoline vehicle with no excess power or weight, and with parts selected with a view to maximum simplicity and reliability. Thus developed, its advantage over a vehicle depending on any present form of storage battery will be considerable.

40 m.p.h. on Special Streets

It must first be understood that there is nothing fixed or final about present limits of speed in ordinary driving. The average speed of human transportation has been an ever-increasing variable ever since power was first harnessed. Present speed limits for safe driving are governed by mechanical reliability, road conditions, and (principally) by psychological state of both motorists and pedestrians. All of these factors will show great improvement in the future, and in a few years it may be possible to drive through a city at 40 m.p.h., perhaps on streets set apart for rapid travel, with safety fully as great as at 15 m.p.h. under present conditions. The business man, or workingman, may then have a cozy country home 10 miles from his work, and reach it in no more time than the city man now spends turning corners and dodging pedestrians in the city.

Certainly the congestion of city residence must be relieved in the future in some such manner as this; and the storage-battery vehicle will not do it. Central-station battery charging with daily delivery of car will be prohibited by distance and high labor cost; private rectifier plants involve cost, attention, and usually poor care of batteries. As to weather reliability, the internal-combustion vehicle is steadily gaining on the storage-battery type, and may soon greatly exceed it. And for every-day transportation speed will be as essential to the future vehicle as it is to the present railway train.

Control Can Be Made Simple

As to control, it can be made simple if desired. Manual spark control is no longer necessary for satisfactory operation and economy; gear-changing can be done mechanically or electrically if desired, and need hardly be more difficult than using the controller of the electric.

The bicycle is limited in its sphere of usefulness by its low speed and carrying capacity, and by the disinclination of man for work. But the light internal-combustion vehicle has possibilities of time-saving and cheap convenience which cannot be impaired by the passing of a fashionable sport.—H. K. RANDALL, M. E. in E. E.

Thinks Present Agitation Against Headlight Glare is Overdone

BOSTON, MASS.—Editor THE AUTOMOBILE—One of our engineers, who is now in England, has kept in close touch with the various tests of devices and lamps constructed with a view toward eliminating the glare of headlights, but according to reports which we receive from this gentleman, nothing has yet been evolved to satisfactorily reduce the glare without impairing volume of illumination.

We have experimented with so-called non-blinding glass; we have tried a partial eclipse with celluloid, glass, etc., in order to bring the ray below the eye level, but while we have been successful in eliminating undue brilliancy, we have at the same time been obliged to minimize the power of the lamps.

To be quite frank, we believe that this present agitation is being overdone, and that the effect of approaching headlights at night is not so serious as some people seem to believe. As a matter of fact, the drivers of approaching cars are but momentarily within the glare of the beam and immediately pass therefrom.

No Way to Solve the Problem

So far as we can determine, there is no way in which this problem can be solved. As soon as the dazzling effect is minimized the illumination is reduced in proportion, and we believe that the brightly lighted highway is of vastly more importance to the automobile driver than the occasional meeting with a car equipped with powerful headlights, coming in the opposite direction.

We are selling a great many headlights equipped with our dimming attachment. This is in reality two bulbs of different candlepower within one of our standard headlights.

In the center is the regulation bulb, and when the lighting switch is turned all on or head and rear on this bulb is illuminated and the small 4-candlepower bulb at top of reflector remains unlighted.

When the operator desires to dim headlights the switch is turned side and rear on. This lights the small bulb and the large bulb becomes inactive.

We have had submitted to us various attachments, such as swivel shields of blue glass, patches to be placed immediately in front of the steering column; and now we hear of a pair of goggles recently invented by a motorist in Massachusetts whereby the approaching glare is entirely eliminated. However, none of these accessories seem to be practicable. It is quite possible that there is a genius somewhere who will some day evolve a non-blinding headlight which will possess all the qualities of the regulation headlight, but the perfection of such a device is evidently in the distant future.

A discussion along these lines should result in an interchange of ideas and opinions which may bear fruit in the way of a glareless headlight. We shall watch future pages of THE AUTOMOBILE with a great deal of interest, and we sincerely hope that you may be able in this way to solve the problem.—GRAY & DAVIS, INC.

Supply Dimmer Switch for Headlights Under Protest

BRIDGEPORT, CONN.—Editor THE AUTOMOBILE—We have tested every known method of cutting down the glare of electric headlights for automobiles, cyclecars and motorcycles. We are supplying the electric lighting equipment for a large number of manufacturers of cyclecars and small automobiles.

We do not advocate the use of the dimmer switch but we are forced to supply this because our trade demands this type of device.

In the first place, when the searchlight is provided with two electric bulbs, it provides an insurance to the auto driver and guarantees to him having at least two bulbs in good condition at all times. Two headlights each equipped with two bulbs provide four bulbs and leave a sufficient margin of safety.

Dual Bulb System Best

The small pilot light can be a 1, 2, 4 or 6 candlepower bulb to provide the necessary and essential amount of illumination for driving in any part of the country. If the automobile owner does 95 per cent. of his driving in a well-lit city, a 1 candlepower pilot light is of sufficient brilliancy. If the owner resides in the suburbs, a 2 or 4 candlepower is sufficient. If he lives in the country, the 6 candlepower will supply all the light required for driving a short distance until he can again use the searchlights. The writer has tested this dual bulb system so thoroughly that he is convinced that he is wasting his time to consider any other system because the results are sure, satisfactory, comply with the law and provide a sufficient supply of light for driving at the same time cutting down the dazzling glare that is so annoying to other drivers and to horsemen.—E. A. HAWTHORNE, President Hawthorne Mfg. Co., Inc.

Thinks Practical Ideal Car Possible by Correct Design

WATERLOO, IA.—Editor THE AUTOMOBILE—If you were in the manufacturing business sitting in judgment of the ideal car designed by your engineer you would know something of the vagaries and the chimera of the man of theory.

It is only by long experience and putting to practical use theories, that facts are established and frequently theories are demolished.

It is related that Prof. Agassiz, a great naturalist, on his way into the Maine woods to study fish was being regaled with fish stories by his guide who told him that speckled trout were frequently found where they were going, that weighed 7 or 8 pounds. The great naturalist told the ignorant guide that this was impossible, that speckled trout couldn't grow to that size. The naturalist in telling the story, said that he on the next day caught a speckled trout that weighed over 9 pounds. Thus was a lifetime of theory exploded by a single fact.

The theoretical ideal car costs a little more to build and turns out to be no better than the actual one.

Did you know that the great inventions and discoveries of the age are largely made by tenderfeet in the profession to which they belong, that is to say, men who are uneducated in the business and have no more sense than to depart from the theory and try out by experiment and thus learn.

Duesenberg Is an Example

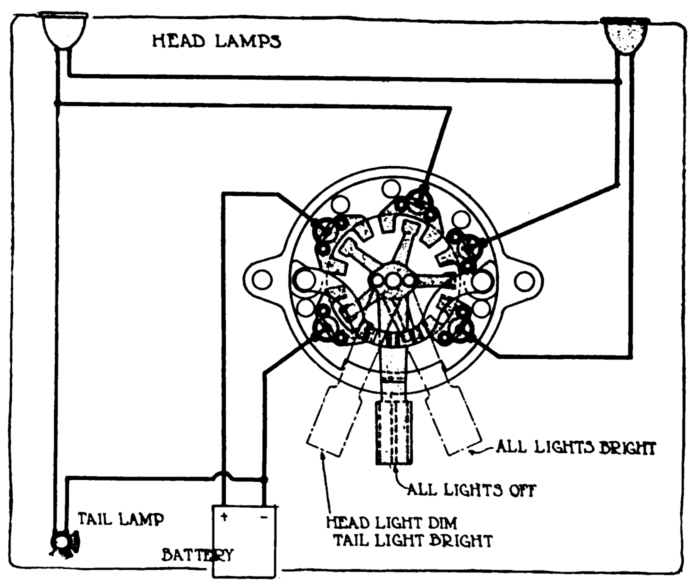
To illustrate the point I am trying to make on a theoretical ideal car, in 1905 Fred Duesenberg, educated in the common schools of Iowa without so-called technical education, obtained in schools and colleges, built his first two-cylinder motor for an automobile, following out a design he had used in producing a motorcycle. By common consent that motor proved to be the greatest two-cylinder motor ever put into an automobile.

Mr. Duesenberg built a single-cylinder motor so arranged that he could produce any degree on his camshaft by threading his shift and by an ingenious device could raise or lower the cylinder and thus increase or decrease the compression and could also set the cylinder off center on one side, then by careful experiment under a brake test he determined the proper degree to set his cams, the proper compression and the proper offset.

The Real Ideal Car

The information he gained there, he applied to the two-cylinder motor and has also applied it to the motor that we are now building into cars and the cars with this motor in them are meeting with the most enthusiastic reception by the public.

At the same time our agents, some who have been with us for the last 4 years and furnished us money to run on, still have their ideal car. Their ideal car doesn't consist of machinery parts, but simply of the painting, upholstering, body lines, top, etc. They say that it seems at times as though you could sell anything in a chassis that had a body and finish that appealed to the customer, and at the same time we are continuing to build an automobile to run and sell and stay sold.—E. R. MASON.



Wiring diagram showing the method of control used for dimming headlights by the Hawthorne Mfg. Co.

Gearset of Geometrical Design Is Best

Makes Gearshifting Easier Than the Arithmetical Design with Less Danger of Clashing—More Power on Third Speed of Four-Speed Type

By W. C. MARSHALL

Part I

A CHANGE speed gearbox employing a geometric ratio between first, second, third and fourth speeds, is a better type of gearset for an automobile than an arithmetical design in which an arithmetical ratio is maintained between the different successive gear ratios.

The geometrical type of gearset is better because with it gearshifting is easier, and there is less danger of clashing. Further, the geometrical design of gearbox gives more power on third speed in a gearbox with four speeds forward.

A geometrical gearset, say with four forward speeds, is one in which the increase in ratio is in the form of a geometrical progression, as, 1, 2, 4, 8. To explain: Your gear ratio is 8 to 1 on low, is 4 to 1 on second speed, is 2 to 1 on third, and is 1 to 1 on fourth or direct. In a geometrical progression, the ratios are multiples of 1 or 2 or 3 of the preceding number, thus in the example, 2 is double of 1, and 4 is double of 2, and 8 is double of 4. Another geometrical ratio might be 1, 3, 6, and 12. Still another 1, 3, 9, and 27.

The Arithmetical Gear Ratios

On the other hand, an arithmetical progression is one in which the increase in ratio is accomplished by even steps. Thus, in your four-speed gearset, the four gear ratios may be: 1, 5, 9 and 13, that is, 13 to 1 on low, 9 to 1 on second, 5 to 1 on third, and 1 to 1 on direct. You will note that 4 has been added in the arithmetical ratio. We could have another arithmetical ratio in which 3 might be added, and it would be 1, 4, 7 and 10.

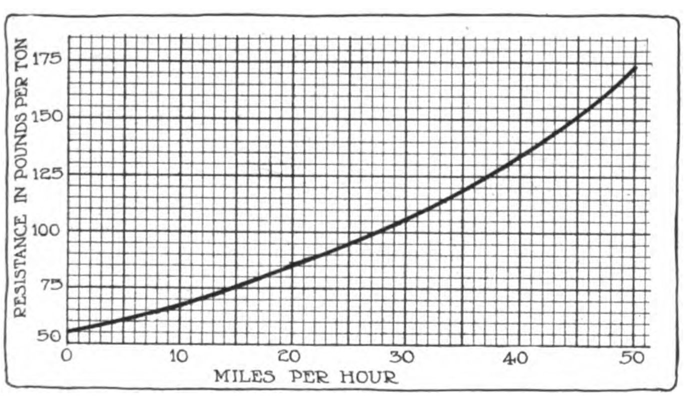


Fig. 2—This diagram is intended to show that the car resistance in pounds per ton of car weight is greater at high speeds in miles per hour than at low speeds. For example: At 25 miles per hour the car resistance is 95 pounds per ton weight of car, whereas when the car is traveling 50 miles per hour the car resistance has risen to 170 pounds per ton of car weight. Now, Fig. 1 shows a power curve which falls as the speed of the motor is increased in r.p.m., whereas Fig. 2 shows a curve of car resistance which rises as the speed of the car in miles per hour rises. Consequently, the gearbox is the necessary go-between to bridge the gap between the diverging conditions in Figs. 1 and 2; in a word, the gearbox is the means whereby we furnish the power to overcome the higher resistance of the car from the motor at low speeds

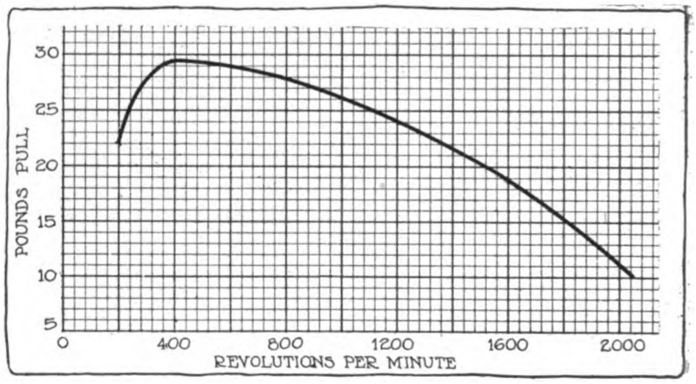


Fig. 1—This diagram shows why a gearset is necessary in a car. The curve shows that the power from the motor is greater at 400 r.p.m. than at 1,800 r.p.m. so far as actual pull is concerned, and this is because the pressure in the cylinder is greater, which is the case because a greater charge of gas enters the cylinder at 400 r.p.m. than at 1,800 r.p.m.

Here then we have what is meant by a gearset employing geometric ratios for the different forward speed changes, and also what is meant by a gearset employing arithmetical ratios for its different formed speeds. The question to be proven in this article is that the set with a geometrical ratio is preferable for different reasons than the gearset with arithmetical ratios. The following paragraphs tell first why it is easier to shift gears using a geometric type of gearset, and also why there are more equal changes in motor speed with the geometric type than with the arithmetical.

In any gearset the desired object to be attained is that there is the same change in motor speed between first and second as when shifting between second and third or shifting from third into fourth. In the geometric gearset these steps are uniform, whereas in the arithmetical gearset they are not, and to this are ascribed the reasons for greater difficulty in gear-shifting with the arithmetical gearset.

Why Use a Gearset?

First we must ask ourselves why we need a gearset. Here is the answer: The modern automobile, which has an internal combustion engine for driving power, is, to a large extent, dependent on the range of power compassed by its motor. This is largely governed by the size of the motor. The motor develops its power not at a given number of crankshaft revolutions per minute, as a steam engine, but at varying revolutions.

If it could develop as much horsepower at few revolutions per minute as is possible at many revolutions per minute there would be less call for large motors and fewer speed changes in the gearbox.

The ordinary motor develops its maximum pressure on the piston (about 95 pounds per square inch) when the engine speed is about 800 revolutions per minute. If the speed increases the gaseous mixture has not sufficient time to enter and fill the cylinder, therefore the pressure becomes less and the turning power per revolution decreases.

One Reason for Gearset

The curve of average pressure in the cylinder has a form in general like that in Fig. 1. It is evident that a load cannot be carried by the engine at a low speed, therefore if an engine were directly coupled to the driving wheels of a motor car it would be impossible to start the car without outside assistance.

The average pressure on the piston multiplied by the radius of the crank equals the torque of the motor. If the torque is multiplied by the revolutions per minute and the length of the circle through which it moves, the product equals the foot-pounds of work performed by the motor in a minute. The horsepower exerted can be found by dividing these foot-pounds by the foot-pounds per horsepower, namely 33,000.

Horsepower can obviously be increased by increasing the revolutions per minute. As more horsepower is needed to start a motor car than to keep it in motion, except for high speeds, some means must be employed to enable the motor to run at high speed at a time when the car is running at slow speed. The curve of resistance of a car (on a level road) can be represented graphically as in Fig. 2.

Where the Gearbox Comes

As the torque curve is shown by Fig. 1 to be of little value before the engine reaches 400 revolutions per minute we must introduce some mechanism between the motor and the driving wheels which shall allow the engine to run at a high number of revolutions per minute while the road wheels are rotating slowly. The most common mechanism to-day is the gearbox in combination with the clutch.

Deciding on Gear Ratios

Let us consider the problems which determine the design of the gearbox. The motor design and brake test give an idea of the power available under the bonnet while the resistance of the car is the factor which determines what work must be done by the motor.

How shall we determine the intermediate gear ratios to enable the motor to properly overcome the variable resistance and yet not exceed its economical or workable speeds?

The ideal curve of tractive effort would appear substantially as shown in Fig. 3. The low-speed reduction in the

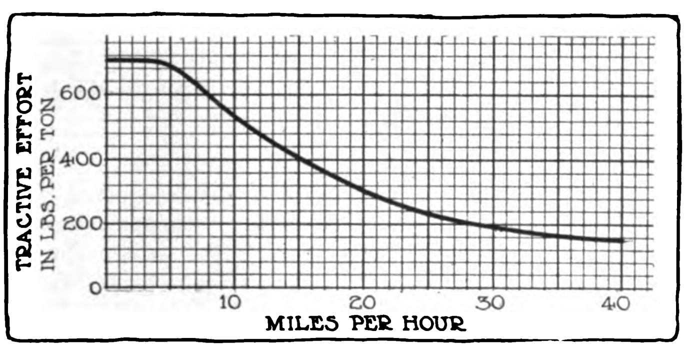


Fig. 3—This curve shows the power that can be exerted by the motor in propelling the car. For example: Fig. 1 shows the power the motor can give, and Fig. 3 shows the proportion of this power that can be applied to moving a car, the remainder of the power being lost in friction. Thus at 10 miles per hour the power exerted by the motor would be 500 pounds a ton in propelling the car, and at 30 miles per hour the power in propelling the car would be 200 pounds per ton, and at 40 miles per hour the power needed for propelling the car would be 150 pounds per ton of car weight. This is because the motor is working faster and its torque, or power curve, falls off

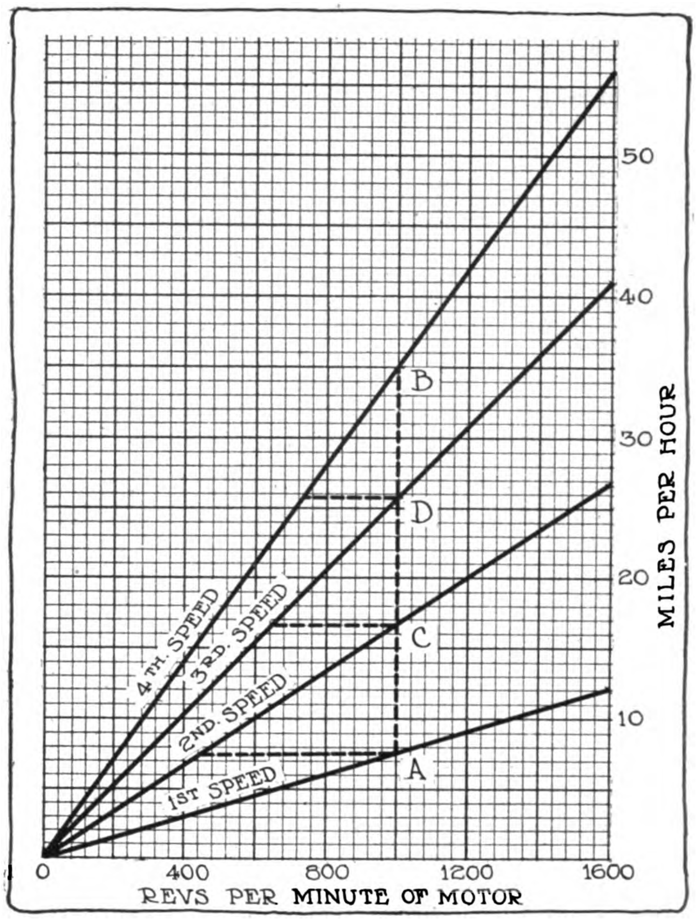


Fig. 4—This curve illustrates graphically how motor speeds must change when shifted. It is a diagram of an arithmetical gearset and shows by the three horizontal dotted lines the changes in speed when going from low to intermediate, from intermediate to third, and from third to fourth. These three dotted horizontal lines are not all of the same length; the bottom one, representing the change in speed of motor when going from low to intermediate, is much longer than the other two. This means, in other words, that there is much greater change in the motor speed when shifting from low to intermediate than from intermediate to third or third to fourth. This difference is not desirable, and the ideal gearset would have the same amount of change in motor speed between low and intermediate as between the other speeds

gearbox should be such as to overcome all the difficulties encountered en route, as well as to reserve enough motor power to accelerate the vehicle at starting. Air resistance can be neglected in first speed calculations because it is so small at moderate speeds.

Let W = weight of loaded vehicle,
t = coefficient of traction,
c = % grade of steepest hills one meets,
R = radius of driving wheels
and T_m = equal turning effort or torque of motor.

Then the resisting force of the vehicle will be

$$F_r = RW(t + c) \qquad (1)$$

If E = the efficiency at the rim of the power transmission mechanism and r the ratio of R.P.M. of the motor and wheels, the available power at the rim will be

$$F_d = rE\,T_m \qquad (2)$$

The force which can produce acceleration will be

$$f = \frac{F_d - F_r}{R} \qquad (3)$$

and the acceleration will be

$$j = \frac{fg}{W} \qquad (4)$$

Substituting in (3) the values of F_r, F_d and f obtained from equations (1), (2) and (4) we have

$$j = g\left(\frac{E\,T_m}{WR}\,r - (t + c)\right) \text{ and } r = \frac{WR}{E\,T_m}\left(\frac{j}{g} + (t + c)\right)$$

If we took $T_m = 184.4$ ft. lbs., $W = 3600$ lbs., $R = 1.46'$, $r = 18$ $(t + c) = 0.2$, $E = .65$

$$\text{then } j = 32.2\left(\frac{.65 \times 184.4 \times 18}{3600 \times 1.46} - 0.2\right) = 6.76 \text{ ft. per sec.}$$

The highest gear ought to permit the vehicle to advance on a moderate road on a level or perhaps up a gentle slope without forcing the driver to change his transmission gearing from high to a lower ratio because of the least difficulty. The highest speed then ought to be serviceable in the great majority of cases that occur. It is necessary, as experience shows, to avoid an exaggerated gear ratio which requires the hand constantly on the change speed lever and which, moreover, is rather a cause of retarding the mean speed than of accelerating it.

In the establishment of the highest speed gearing there is no need of considering the acceleration, but it is necessary to take account of the air resistance which is at its maximum.

Let t' = coefficient of traction,
c' = % of slope.
r_h = the gear ratio,
S = surface of vehicle presented to wind ahead.
V = speed hoped for.
C'_r = the resistant couple.
C_a = the available couple.

We have then

$$C'_r = W\,R\,(t' + c') + 0.0056\ RSV^2$$

and $C'_a = r_h\ E\ T'_m$.

Equating these two expressions, since the acceleration is neglected.

$$r_h = \frac{RW\,(t' + c') + .0056\ SV^2}{E\ T'_m}$$

The graphical illustration of the variation of speed changes can be shown by Fig. 4.

Adopt for the first speed ratio of gearing the ratio 14 as r.p.m. of motor to wheels. For 1000 r.p.m. this gives 7.4 miles per hour as the speed of the vehicle.

Erecting an ordinate at 1000 r.p.m. to meet the horizontal line of 7.4 miles speed gives us a point on the first speed line which can be drawn through the origin and this point.

The same calculation with a gear ratio of 3 gives a speed of 35 miles per hour.

(To Be Continued)

Recent Court Decisions—Defeats Trolley Co

By George F. Kaiser

NEW YORK Court holds in a recent case that, when a person comes out of his house to help his visitors into their automobile and, while standing between the car, which is pulled up close to the curb, and the trolley tracks, is injured by a trolley rapidly approaching, he may collect from the trolley company.

In this case a man was helping a woman into the front seat of an automobile and was standing between the trolley track and the machine, in a space about 3 foot wide. Before he came out into the street he had looked to see if any cars were approaching. He saw none, however, and heard no signal and was unaware of the fact that a trolley was coming until it struck him. The Court said that, the fact that he was standing there from one-half minute to a minute while opening the door of the automobile, did not necessarily mean that he was negligent but that was a question for the jury.—*Breese vs. Nassau Electric R. C.*, 147 *N. Y. Sup.* (*New York*) 416.

Dealer Liable While Demonstrating

Oregon case decided against dealer who was demonstrating a car and teaching a person, who had made a contract to buy, how to run the car.

A person while walking on the street was run down and injured by an automobile which was driven by a salesman employed by a dealer. The car at the time the accident occurred was being driven by a man who had contracted to buy it. The salesman had just given him a demonstration and at that time was acting as his instructor, showing him how to operate the car. The injured person brought suit for $40,866, and sued both the dealer and the buyer. The jury first returned a verdict of $2,750 against the buyer and $5,250 against the dealer. The court refused to accept this verdict, however, telling them that it could not split up the damages that way, holding one party for one-third of the damages and the other for two-thirds. The jury thereupon retired again and on returning gave a verdict against the dealer for the entire amount. The dealer appealed, but the Court held that as it was understood that the buyer was to be taught to run the car by the dealer, and the person in charge of the car, though not actually operating it at the time of the accident, was one of the dealer's salesmen, the verdict of the jury should not be disturbed and held that the judgment for $8,000 against the dealer was right and proper. —*Holmboe v. Morgan, et al.*, 138 *Pac.* (*Oregon*) 1084.

Collects from Bus Driver

A radiator of an automobile which has been injured in a collision may be brought into Court and introduced as evidence, providing it is shown that it is in the same condition when brought into Court as it was immediately after the accident.

In a recent Iowa case, suit was started for damages on the claim that a bus driver had negligently run the tongue of the bus through the radiator of an automobile and bent the lamps, lamp brackets, fenders, hood and the fan of the car; $117.95 damages were asked. The jury gave the automobile owner judgment for $75 when the radiator which had been damaged was brought into Court and introduced as evidence. The owner of the bus objected to the radiator being brought in, but the Court held that it was properly admitted.—*Neel v. Smith*, 147 *N. W.* (*Iowa*) 183.

Motorist Fails of Recovery

Washington Court says that when an automobile approaches a street car crossing its driver must make a reasonable use of his senses for his own safety and he is negligent if he is not on the lookout for cars at a point where he can determine if he can get across safely and if an automobilist approaching a crossing takes his last look for cars when 150 feet away, the Court further declared, he is guilty of contributory negligence.

In this case a motorist sued for personal injuries caused in a collision with a street car at a crossing. The automobile was found to have approached the street car at a speed of 20 miles per hour, with its side curtains up and the Court held accordingly that the motorist was guilty of contributory negligence and dismissed his case against the railroad.—*Bowden vs. Walla Walla Valley R. R. Co.* 140 *Pacific* (*Washington*) 549.

Plug Location Has Little Effect

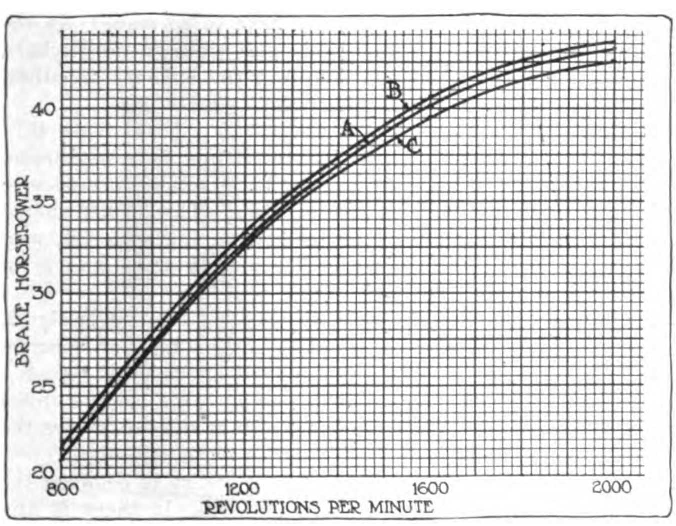
Difference Between Power Curves Produced with One and Two-Point Ignition Also Slight According to Latest Experiment

THERE have been endless experiments to determine the difference made in the power produced by a motor with one or two sparks or with the plug located in different parts of the cylinder. These experiments are always of interest because they vitally effect the user of the car by determining for him whether or not it is possible to secure a greater amount of power out of the same size motor. The latest experiment in this line shows a very little difference between the power produced when the plugs are located over the intake or exhaust valves and also but slight change when a two point instead of a single point ignition system is used. The experiments have been performed by C. F. Dendy Marshall and are reported in *The Autocar*. The report follows:

"It is, I think, a foregone conclusion that, given a good spark, neither duplicating it nor changing its position, can give more than quite a small increase of power. I recently suggested, and took part in, a trial which throws some light on both these points. A six-cylinder engine was put through three sets of brake tests under precisely the same conditions —(A) with single sparking plugs over the inlet valves, (B) with double plugs in series, one over each valve, and (C) with single plugs over the exhaust valves. As the engine was a new one, and had not been brought up to its full power, it would not be fair to mention the name and dimensions, but, of course, the comparative value of the tests remains.

Compression Space Kept Constant

"There were two plugs in each cylinder all through, in order that the compression space should not be varied, one set being disconnected during the first and third series of tests. The extra plugs were of the double pole variety. This is necessary, because the ordinary plug discharges to the cylinder, so in order to obtain two sparks the current must enter and leave by the first plug without being "grounded," passing on to the next one. This in effect forms the old gap system, which was thought a good deal of ten or twelve years ago, only in this case the gap is inside the cylinder instead of outside.



Three curves of brake horsepower under different spark plug conditions: A, with single plug over the intake; B, with double plugs in series, one over each valve; C, with single plugs over the exhaust valves

"The following are the figures obtained, each one being the average of four observations taken during the course of a minute. No significance need be attached to the fact of the first one in Test 3 being just above the corresponding figure of Test 1, as the difference is so small, and was probably either due to errors of observation, or to a slight irregularity in the running of the engine.

Revs. per minute	800	1,200	1,600	2,000
B.H.P. Test A	20.9	32.8	40.2	43.5
B.H.P. Test B	21.4	33.3	40.5	43.7
B.H.P. Test C	21	32.6	39.4	42.6
Approximate percentage of difference of power.				
Test B over A	2½	1½	¾	½
Test A over C		⅓	2	2¼

Two Plugs Are Unnecessary

"The results of the three sets of tests are plotted in the accompanying curves. On the whole, the conclusion seems to be that two plugs are hardly worth having. In the engine under test the advantage of double ignition is more marked at slow speeds, being quite negligible when the engine is running hard. On the other hand, the position of a single plug becomes of greater importance as the speed increases.

"The engine I experimented with was of the fashionable type, with all the valves on one side. In "The Gas, Petrol, and Oil Engine," by D. K. Clerk and G. A. Burls (vol. ii.), a similar test with a T-headed engine is mentioned on page 337, which was carried out by Professor Watson, the results being:

R.P.M. of engine	1,100	1,600
H.P. single ignition	18.4	26
H.P. double ignition	20.8	29.2
Difference	2.4 (12%)	3.2 (10%)

"In this case the advantage is increased with the speed, though not the percentage of improvement. It seems that the double plug arrangement has much more effect when the valves are on opposite sides than when they are on the same, owing probably to the two points of ignition being farther apart, and perhaps partly to the fact that the charge is symmetrically fired."

Los Angeles Has Kelly-Springfield Buses

The bus lines which are to be operated by the Pacific Motor Coach Co., Los Angeles, Cal. between Los Angeles and various nearby cities will use, 3.5-ton trucks, made by the Kelly-Springfield Motor Truck Co., Springfield, O., and fitted with bodies built by the St. Louis Car Co., St. Louis, Mo.

The maximum speed will be between 18 and 20 miles per hour, and the buses have a seating capacity of 54 passengers, sixteen being housed in the closed compartment of the lower deck, eight in the open compartment, and thirty on the upper deck.

Chassis Is Stock 3.5 Ton

The chassis used is a stock 3.5-ton design fitted with 6-inch dual rear tires and specially heavy axles. The motor is a four-cylinder water-cooled type, suspended on three points. The cylinders are T-head, cast in pairs and the bore and stroke is 4.5 by 6.5 inches. Speed changes are effected through a three-speed sliding gearset.

It is also expected that the Pacific Coach Co. will have the concession for motor transportation within the ground of the Panama-Pacific Exposition.

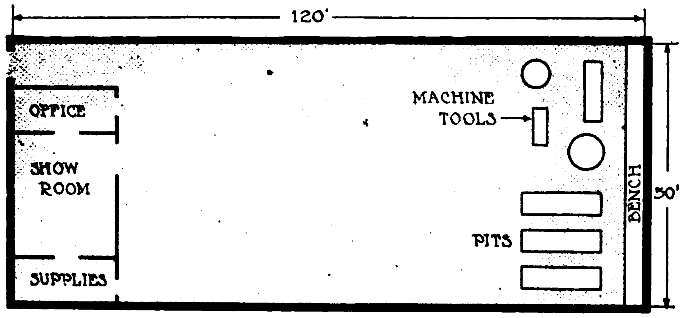


Fig. 1—Plan for one-story garage with salesroom

The Rostrum

Two-Cycle More Flexible When Skilfully Adjusted

EDITOR THE AUTOMOBILE:—Seeing by the recent letters in THE AUTOMOBILE that many of the readers are friendly to the two-stroke cycle motor, I have had revived in me my old-time two-cycle enthusiasm which I had when I used to sell Elmore valveless cars. Let it be said, in all truth, that while many cars cost more and looked better, I have yet to see the first four-cycle car excel in performance or in fuel economy.

The last 50 horsepower car turned out by the factory is running in Tampa today and is giving its owner 13 miles to the gallon of gasoline after having it fitted with special equipment. This car is a 1912 model.

To the man who has had a wide range of experience in the several types of automobile motors, the assertion often made by well-meaning four-cycle advocates, that the four-cycle is more flexible than the two-cycle, is really amusing, but is true enough in the hands of a four-cycle driver.

It has been my experience that the average good four-cycle driver is apt to make a poor two-cycle driver—it is a good deal like learning the two-step before the waltz.

To get flexibility out of a two-cycle one has to be a good carbureter adjuster, changing the mixture as the load and speed varies. The use of a well-trained ear helps wonderfully; I think the skillful operation required is the biggest factor that has worked to keep the two-cycle in the background as far as automobile service is concerned.

In France the two-cycle is making progress. Especially is this true of the four-cylinder Koechlin, which has a bore and stroke of 3.3 by 5.9 inches, producing a piston speed of 3000 feet per minute and developing 110 horsepower. This motor has no crank-case compression; in fact, I do not know of any of the best motors that do have it. With Europe developing the two-cycle it looks as though it may yet come to the front.

Tampa, Fla. L. C. HANNA.

Planning One-Story Garage

Editor THE AUTOMOBILE:—We are planning to build a one-story garage of brick, 50 by 150 feet, and we would like to receive suggestions from you as to the general layout and inside finishing for the stock room, show room and office.

Grafton, W. Va. B. M.

—In laying out the garage you should put the show room and offices at the front and the benches and machine tools across the back of the structure. The rest of the space should be devoted to storage. A plan is shown in Fig. 1.

How much space should be given to the show room and the supply store depends entirely on how many models you plan to carry and how great a stock of accessories you intend to display.

In general a 20-foot strip across the front of the building, with a space at one side for the entrance of cars to the garage, should be large enough. The offices should be placed next to the entrance, and at the other side of the structure put the supply store, with the space in between for the display of cars.

The office should be placed next to the entrance so that the same clerk can check the cars as they go in and out that attends to the office.

In the large central space the cars can be displayed to best advantage. The space devoted to accessories should be separated from the show room by a railing, and the office should be similarly partitioned off.

The finish can be almost anything desired. For instance, you might use a good hardwood floor, such as maple, oak or parquet. The trim may be any of the woods used in house construction, such as oak, chestnut, cypress, and the walls can be papered, painted or paneled, according to your taste and the amount of money you have at your disposal.

The repair of cars should be done at the rear of the building, as the best light will be here, and also this arrangement allows an unbroken space in between for car storage. Place the machine tools at one side, back of the benches, and on the other side arrange two or three pits. The roof should have plenty of skylights, and the walls of the garage should be strong enough to allow the addition of a second story at some later date.

Wants Quieter Valve Action

Editor THE AUTOMOBILE:—1—I would like to put a quieter valve action into my 1911 car. It has the square head or mushroom type of valve now. Could the roller tappet type of the Packard 18 be applied? If so, could I use the regular Packard cams or would a new set have to be made? In the Cadillac the valves are all on same side, while in the Packard the inlet valves are on one side and the exhaust on other. Would this make any extra difficulty?

Plattsburg, N. Y. S. D. B.

—1—We would not advise you to change from mushroom to roller followers, as there is very little actual difference in the noise produced by these two designs. The former should be quiet enough to satisfy the most exacting motorist, providing the valve mechanism is not unduly worn and is in proper adjustment.

The side thrust of the cam on the follower face, Fig. 2, as the valve mechanism is lifted, produces unequal wear on the valve guide. In time this wear is sufficient to cause a noticeable amount of noise, due to the push rod being slapped up against one side of the guide every time the cam moves the mechanism. The remedy is to put in new valve guides.

Another place that noise frequently occurs is between the end of the valve stem and the push rod. If there is any great amount of space between these two members a clicking noise will be produced. This can be largely eliminated by adjusting the nuts on the top of the push rod. A piece of carbon on the valve seat will also cause a valve to be noisy.

Another cause of noisy valves, that has been suggested, is produced by the sticking of the valves.

However, if you decide to attempt to make the change to roller cam followers you will not be able to adapt Packard cams but will have to make a special design. It is doubtful also whether even then will it be possible to use rollers because of lack of room.

Wants Hunting Body with Bed

Editor THE AUTOMOBILE:—Is there a car body made for hunting? One so arranged that the back of front seat may be turned back against the rear seat of the car, forming a bed?

Bakersfield, Cal. THOMAS SCOTT.

Such a body can probably be obtained from the Spaulding Mfg. Co., Grinnel, Ia., maker of the Spaulding car. This concern fits the body illustrated in Fig. 3. The back of the front seat folds down and exactly fills the space between the front and rear seats. The back is held in position by two knurled head bolts. This equipment may be supplemented by a reading lamp and an air mattress, which is inflated by the power tire pump.

Another design is that shown in Fig. 4. This bed is made of heavy canvas, with a hem at each end, through which stretcher bars run. To the ends of these bars are fastened the front and rear supports, which are secured to their respective springs by means of ropes. When not in use the bed is rolled around the stretcher bars and made into a handy package.

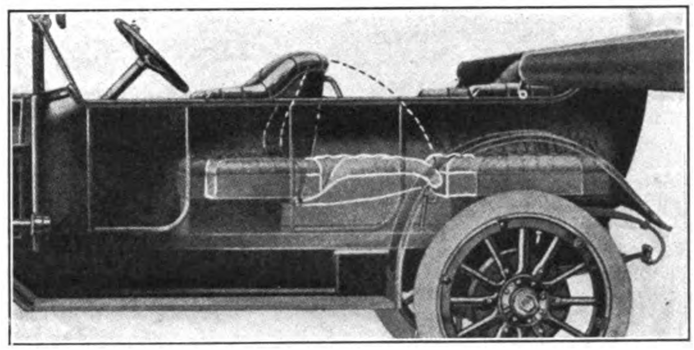


Fig. 3—Spaulding car that can be used for a bed

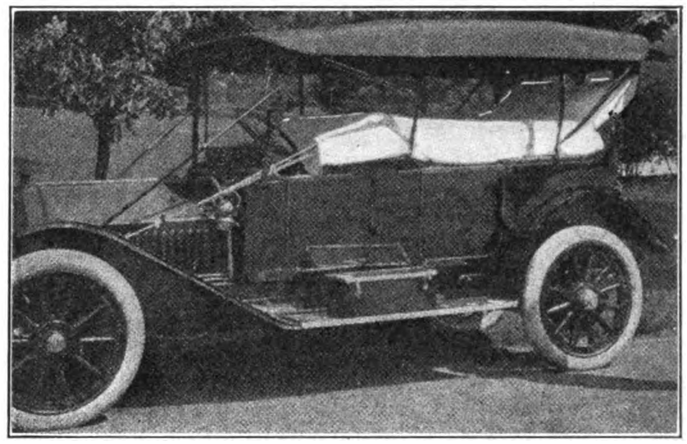


Fig. 4—Bed that is suspended over seats

Two, Four and Six-Cycle Motors

Editor THE AUTOMOBILE:—1—Please explain in next issue of THE AUTOMOBILE the proper way and easiest way to time a two-cycle, a four-cycle and a six-cycle motor.

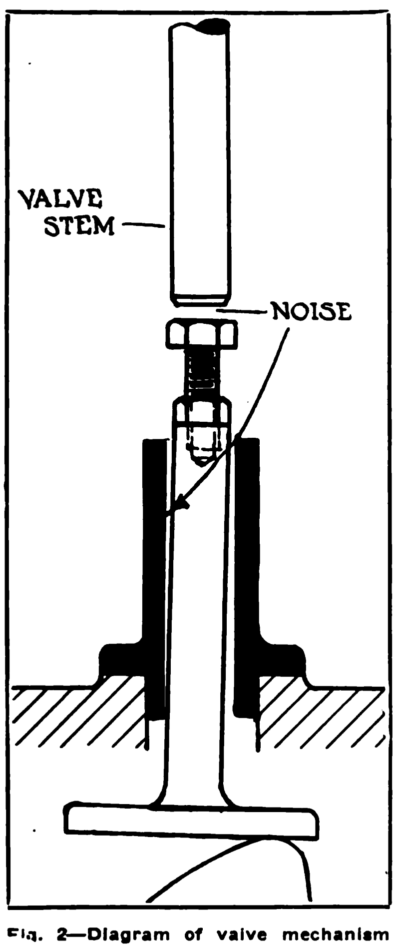


Fig. 2—Diagram of valve mechanism showing where noise occurs

2—Explain the different ways they fire and the difference it makes in timing the valves.

3—Give sketch and explain how to adjust a carbureter, especially the Schebler and Rayfield and a few more of the standards.

H. A.

Anniston, Ala.

—1—From the way you have asked these questions it is evident that you have not a correct understanding of the word "cycle" and that you have confused it with the number of cylinders a motor has. A cycle is the occurrence of a series of events at regular intervals. You might consider that the seasons, Spring, Summer, Fall and Winter form a yearly cycle.

In the same way gasoline motors are described as two-stroke cycle, four-stroke cycle or six-stroke cycle, depending on whether it takes two, four or six strokes of the piston to perform the complete set of functions necessary to produce an explosion. Thus in a two-stroke cycle, or a two-cycle motor, as it is more commonly known, the gas is forced into the cylinder when the piston is at the bottom of the stroke, is compressed as the piston moves upward and is ignited when the piston reaches the top of the stroke. Then on the downstroke the explosion occurs. When the piston reaches the lower end of the stroke the exhaust port is uncovered and the burnt gases escape.

In the four-cycle motor, on the first stroke the piston moves out and sucks in a charge of mixture, then on the second stroke the piston moves back again and compresses this charge. At the end of this stroke ignition occurs, and then as the piston moves out on its third stroke the gases expand. On the fourth the piston moves in again and forces the burnt gases out into the exhaust pipe.

Six-cycle motors are rare and have never been brought beyond the experimental stage. One that was suggested a few years ago had the following cycle, beginning with the explosion stroke: With the piston at upper dead center, at the end of the compression stroke, a small pump injected the correct quantity of fuel, and combustion took place. Following this there was a long expansion stroke, and then the exhaust stroke occurred. On the third stroke a charge of cold, clean air was sucked into the cylinder and was exhausted on the fourth stroke. More cold air was drawn in on the fifth stroke, while on the sixth compression of this air occurred. It will be noted that during three of the strokes, or one-half of the time, the cylinder was filled with cool air, and it was planned to use this means to cool the motor, no exterior ribs or any other influence being employed.

2—The ordinary two-cycle motor does not need to be timed, as the ports are automatically uncovered by the piston.

The operation of the two-cycle motor will be made clear by referring to Fig. 5. The gas is first drawn into the crankcase and then it is transferred under a pressure of 2 or 3 pounds to the combustion chamber. The left illustra-

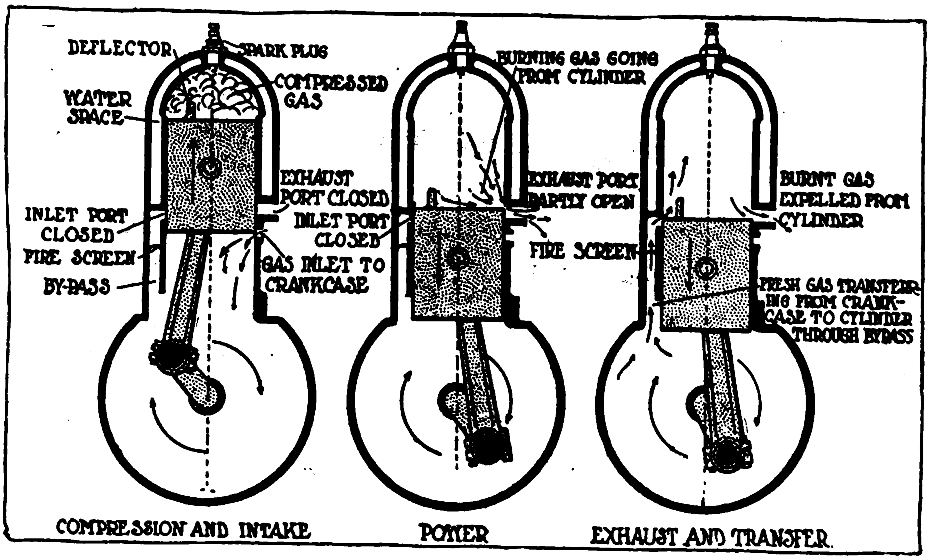


Fig. 5—Diagram showing operation of two-cycle motor

tion shows the piston nearing top dead center. The gas in the combustion chamber is being compressed and the upward movement of the piston has just uncovered the gas inlet port to the crankcase. At the moment that this port is opened the pressure in the crankcase is slightly lower than atmosphere, because the piston has moved upwards and thus increased the volume of the crankcase chamber, the increase of volume being accompanied with a reduction in pressure, since the quantity of the gas in the chamber remains constant while this is occurring.

The slightly lower pressure in the crankcase when the port is opened causes an inrush of gas from the carbureter.

When the piston reaches top dead center the spark ignites the gas and the piston is driven out on its expansion stroke. As it nears the lower end of its travel, as shown by the center diagram, the exhaust port is uncovered and the burned gases flow out. This downward movement of the piston also compresses the gas in the crankcase, so that when the inlet port into the cylinder is uncovered, shortly after the exhaust port, a fresh charge of gas is transferred to the combustion chamber. This is illustrated at the right.

It will be noted that there is a baffle plate on the top of the piston, which deflects the gas upward to the top of the cylinder so that the entering gas flows up one side of the cylinder and down the other. This action helps force any exhaust gas, that remains, out. A fine wire screen is placed in the by-pass to prevent a back fire from exploding the gas in the crankcase.

Timing of Four-Cycle Varies

2—Since there are no valves in the ordinary two-cycle motor, there is no timing to be done when the motor is put together, it merely being necessary to attach the pistons, connecting-rods and to put on the cylinders. The times of port openings and the length of opening can be varied to a certain extent by varying the width of the ports. For instance, referring to Fig. 5, it will be readily seen that if the exhaust port is made .75 inch wide the port will be opened sooner by the downward movement of the piston than if the port width is .5 inch.

The method used in timing a four-cycle motor all depends on conditions, although the object in any case is to so set the camshaft, which is positively driven from the crankshaft, that the valves will be opened and closed at the proper moments with reference to the positions of the pistons, and the only time you should have to do this is after taking the motor apart.

As a rule there is a mark on one of the teeth of the camshaft gear and another on the crankshaft driving gear, and if these two gears are set so that the two marks come together the motor will be correctly timed, providing the gears are properly attached to their respective shafts.

If there are no such marks, or if their correctness is to be tested, then the camshafts should be set so that the valves will open to correspond with the marks on the flywheel. Suppose, for example, that the motor is a T-head design with camshafts on opposite sides, one for the inlet and the other for the exhaust valves. Then there will be marks on the flywheel for the opening of the intake valves and others for the opening of the exhaust valves.

It is only necessary, however, to time one cylinder. If the intake and exhaust valves for cylinder No. 1 are correctly set, the timing of the other cylinders will be correct, because the camshaft moves as a unit.

Therefore, turn the motor over until the mark for the opening of the intake valve on this cylinder, Fig. 6, is at the top and then mesh the camshaft with the crankshaft gear in such a way that the intake cam will be holding the push rod tight against the end of the valve stem. Do likewise for the exhaust valve.

If there are no markings on the flywheel, and it is necessary to time the valves, place one of the cylinders on dead center and determine where these markings should be. To do this it will be necessary to know when the valves should open and close, and this may be found from the instruction book. It may be expressed in degrees, inches of piston movement or in inches measured on the flywheel.

With No. 1 piston on upper dead center, measure off from the top of the rim the number of degrees or inches on the flywheel rim to the mark that indicates the opening of the intake valve of this cylinder. With this mark established, turn the motor until this mark is on top, and then proceed as when this has already been determined by the maker.

If the timing is expressed in inches of piston travel, then the intake valve of cylinder No. 1, for example, should open

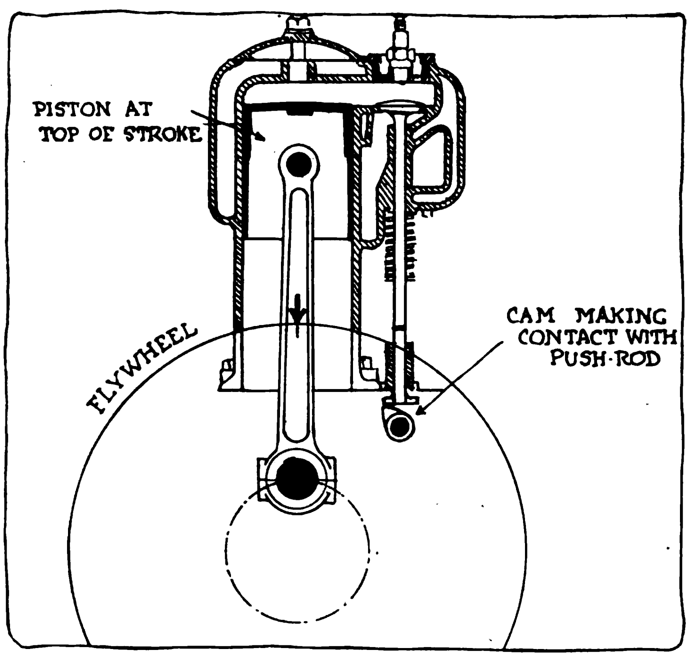


Fig. 6—Diagram showing how valves are timed

when the piston has moved out on its stroke .25 inch. Turn the crankshaft until the piston is this distance below top dead center and then put the camshaft in position.

3—Carbureters are so different in their methods of adjustment that it is impossible to describe the adjustment of more than one model of each of the makes that you mention.

How To Adjust Rayfield

When adjusting a Rayfield carbureter, Fig. 7, bear in mind that all adjustments are turned to the right for a richer mixture; the automatic air valve requires a very light spring tension. Before adjusting the carbureter be sure there are no obstructions in the gasoline line; that manifold connections are absolutely tight and free from air leaks; that valves and ignition are properly timed, and there is a hot spark and good compression in all cylinders.

Set the automatic air valve so it seats lightly but firmly. With throttle closed and dash control down, close the nozzle needle by turning the low-speed adjustment to the left until block Y slightly leaves contact with the cam M. Then turn to the right about one and one-half turns. Open the throttle not more than one-quarter. Prime the carbureter by pulling steadily for a few seconds on the priming lever G. Start the motor and allow it to run until warmed up. With retarded spark, close the throttle until the motor runs slowly without stopping. Turn the low-speed adjustment to the left one notch at a time until the motor idles smoothly. If the motor does not throttle low enough, turn the stop arm screw A, to the left until it runs at the lowest number of revolutions desired.

Then advance the spark about one-quarter and open the throttle rather quickly. Should the motor back-fire it indicates a lean mixture. Correct this by turning the high-speed adjusting screw to the right about one-quarter turn at a time until the throttle can be opened quickly without back-firing. Should the motor not back-fire, turn the high-speed adjusting screw to the left until it does. Then turn to the right until the motor runs smoothly and powerfully.

Adjustments made for high speed will in no way affect the low speed. Should the motor back-fire or the mixture be lean at intermediate speeds, after high and low-speed adjustments have been made, turn the air valve adjustment P to the right, a notch at a time, thereby decreasing the air supply and enriching the mixture. Use all the air possible, for economy.

The low-speed adjustment must not be used to get a correct mixture at intermediate or high speeds. The automatic air valve should always be seated when the motor is throttled down to its lowest speed.

Before starting the motor when cold observe the following instructions: Open the throttle not more than one-quarter (if opened more starting will be difficult); enrich the mixture by pulling up the dash control; prime the carbureter well by pulling on priming lever G for a few seconds. When stopping the motor pull up the dash control. Open the throttle about one-quarter and switch off the ignition. This leaves a rich mixture in the motor, which insures easy starting.

How Schebler Model R Is Adjusted

The model R Schebler, Fig. 8, is a single jet raised-needle type of carbureter, automatic in action. The air valve controls the lift of the needle and automatically proportions the amount of gasoline and air at all speeds.

It is designed with an adjustment for low speed. As the speed of the motor increases, the air valve opens, raising the gasoline needle, thus automatically increasing the amount of fuel. It has but two adjustments—the low-speed needle adjustment, which is made by turning the air-valve cap, and an adjustment on the air-valve spring for changing its tension.

Easy starting is secured by an eccentric which acts on the needle valve. It is intended to be operated either from the steering column or from the dash. It raises the needle from the seat and an extremely rich mixture is furnished for starting and for heating up the motor in cold weather. A choker in the air bend is also provided.

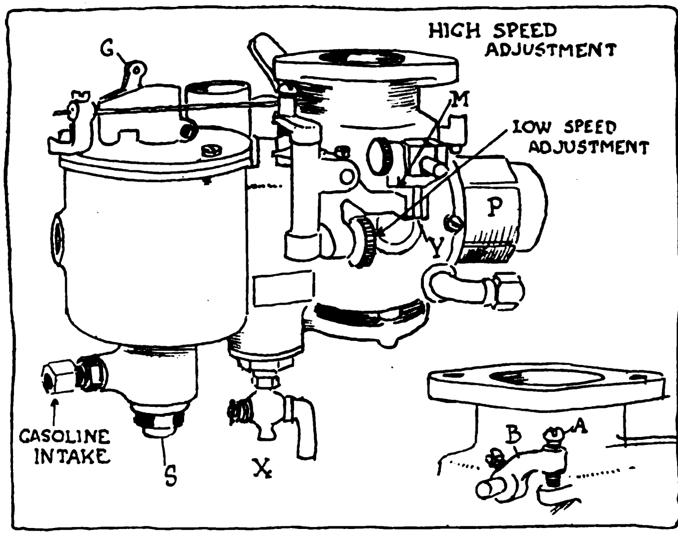


Fig. 7—Rayfield carbureter showing adjustments

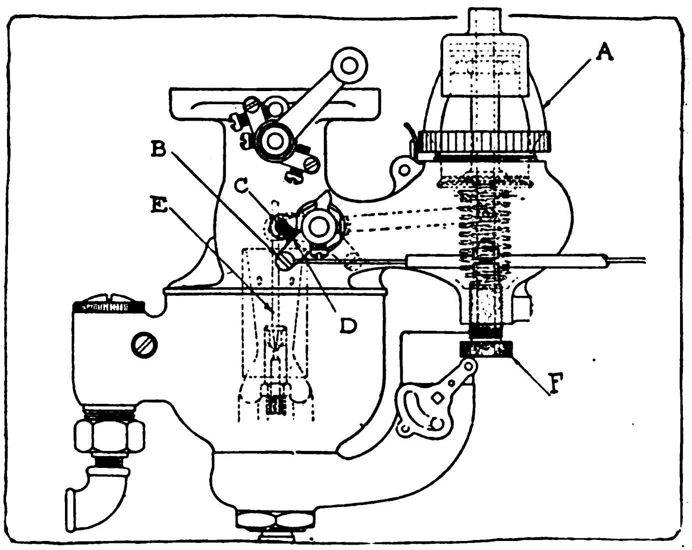


Fig. 8—Schebler carbureter showing points of adjustment

When the carbureter is installed see that lever B is attached to steering column control or dash control, so that when boss D of lever B is against stop C the lever on steering column control or dash control will register lean or air. This is the proper running position for lever B.

To adjust the carbureter turn air valve cap A clockwise or to the right until it stops, then turn it to the left or anti-clockwise one complete turn.

To start the engine open the throttle about one-eighth or one-quarter way. When the motor is started let it run till the engine is warmed, then turn the air-valve cap A to left or anti-clockwise until the engine hits perfectly. Advance the spark three-quarters the way on quadrant; if the engine back-fires on quick acceleration turn the adjusting screw F up (which increases the tension on the air-valve spring) until acceleration is satisfactory.

Turning the air-valve cap A to the right or clockwise lifts the needle E out of the nozzle and enriches the mixture; turning to the left does the reverse.

When the motor is cold or the car has been standing move steering column or dash control lever towards Gas or Rich, which lifts the needle E out of gasoline nozzle and makes a rich mixture for starting. As the motor warms up move the control lever back gradually towards Air or Lean to obtain the best running conditions, until the motor has reached the normal temperature. Then place the lever at Air or Lean.

Why the Industry Flocks Westward

An Analysis by Noted Engineer of the Reasons Which Compel Ambitious Builders of Automobiles, and in Lesser Degree the Makers of Parts and Accessories, to Seek Locations Where Their Efforts Are Upheld and Strengthened by a Multitude of Favorable Industrial and Financial Currents

An Appended Opinion on the Light Cars of the Future

From an Interview with Hiram Percy Maxim by M. C. K.

NOWHERE have more attempts been made at starting automobile manufacture than in New England, and nowhere have the results been less in proportion to the expectations. The accompanying map shows a dot for every factory that has been abandoned. Each of them testifies that the desire to make automobiles has been entertained by individuals. The scale on which New England is engaged in other industries and enterprises bespeaks a disposition which in automobile manufacture should have led to production counting up in numbers as high as anywhere else in the country if the conditions had been favorable. New England always had plenty of capital, hosts of capable machinists and other mechanics, all the financial grit needed for tackling new problems and all the persistence required for solving them.

Why, then, does not New England today produce more than 1 per cent. of the automobiles made in the United States? And why does any proposition to locate a new factory in New England, or to revive an old one, meet with a chilly reception among the financiers of that section? Why, on the other hand, does the manufacture of automobile accessories and of special machinery with which to make automobiles on the Western scale prosper much better in New England than the manufacture of the automobiles themselves?

These questions which have a bearing not only on the past but also on the future, whenever the matter of locating a manufacturing plant is involved, seem sufficiently interesting to justify an attempt to get them answered as authoritatively as possible, so much more as the answer might throw light on similar questions in other sections of the country. The cyclecar movement, among other radical factors in the present situation, might, for example, easily call for the establishment of new factories, and New England, New York State or Pennsylvania might seem to afford excellent opportunities for opening up new manufacturing business, as the chances for a thriving local trade, to help the beginning, apparently would be brighter there than in the Middle Western territory where factories abound. Also, the fact that export trade on Europe, South America and Asia looks promising, and would be a welcome filler to even up the fluctuations in the home demand, beckons the new concern to an eastern location.

A man who seemed particularly well qualified to shed light on any questions asked in this connection was found in the person of Hiram Percy Maxim, whose work as designer and builder of automobiles dates back to the very beginnings of the industry and who has been located in the midst of all the New England industrial currents and cross-currents almost without interruption ever since, while still maintaining close touch with friends, associates and subordinates who drifted West and followed the rising tide of automobile manufacture in Cleveland, Detroit and other bustling centers for the new activity.

A visit at the Maxim Silencer works at Hartford did not fail to elicit the expected ideas, clear and definite, on the subject.

Prosperity the Main Obstacle

"New England is too prosperous in other lines. If New England were finding it harder and harder every year to make money, the situation might be different. But this is not the case, not yet. For every plan to make a big success of automobile manufacture, the New England business man counters with a plan for making a bigger success in finance or insurance or in some of the old established industries, on a much smaller investment and on lines with which he is familiar. New England is making more money on these lines than ever before."

"Still the many who have started must have had an idea of continuing," it was suggested.

"But when it came to the point, in each case, of doing what should be done, to improve, to enlarge to meet competition, the helping hand which is extended so freely in the West was not found; it was engaged in other directions."

"You don't think that the mechanics of this section are too capable along fixed lines, too conservative and averse to new modes of working? Or that there is a scarcity of hands to tend automatic machine tools."

"The mechanics are all right. The trouble is with the investors.

"The mechanics as a rule are full-skilled and full-paid, to be sure, and there has not in this line of work been much employment for the class of factory hands whose only skill consists in tending special machinery, but this is because the manufacture of automobiles here in most instances has not advanced to the point of organization at which highly specialized machines could be bought.

Successes No Longer to Be Duplicated

"New England makes special automobile machinery but it is sold elsewhere. The orders come from other parts of the country. And things have changed. A concern like that of Pratt & Whitney, which I started, could not be started now, successfully. Billings and Spencer have doubled their business three times over, since automobiles began to be made, but no other similar concern could do the same now from a New England location."

Different Situation of Partsmakers

"To what do you ascribe the fact that New England continues to succeed in making automobile parts on a large scale?"

"A concern starting in to make a certain part selects one which it can make with the equipment it has. There is no new investment. The concern is bigger than the new business it undertakes from the beginning. Later, if the partsmaking end of it grows to be the main thing, enlargements and improvements can be made out of the profits, and they know then what they are doing. New England business men are not slow; not so slow that they won't buy new machinery if they can see the need of it plainly and no better use for their money, but they are certainly loath to throw old machinery on the scrapheap. The partsmakers usually can find a place for the old machines which have served them in the past, even if they have to install new machines as well."

The Force of Example

"Is there going to be any change in this whole condition?"

"How can there be?" it came quickly from Mr. Maxim, "it is logical. It is easier to go West and find suitable conditions. People follow the lines of smallest resistance. Nobody can afford to spend more than half of his energy in overcoming the drag. The force of example is against you instead of for you; and it is powerful. Let me mention an instance. In 1902, when air-hardened tool steel was still a relatively new thing, I was out at the Pennsylvania Railway shops at Altoona where they had just installed a high-speed lathe. It cut big clean red-hot shavings, bigger than any of the workmen had seen before and faster, much faster, the cutting edge of the tool red-hot too, and the men gathered around the machine to watch it, whenever they could. Its new efficiency impressed them deeply, and they went back to their benches or their machines and worked with much greater energy than before. They simply could not work at the old slow gait with that lathe setting another example before them every day. There was a clear gain of 100 per cent. in the speed of all the workers in that shop, and they tell me that this advancement was maintained ever afterwards. So much for one single example, and an inanimate one at that."

The Money Not All

"Could a Western man or set of men with liberal ideas and sufficient capital come here and organize automobile manufacture on a large scale, starting with small and cheap cyclecars, for example, and developing a simplified type of automobile in which New England might come to excel?"

"Perhaps, but I don't think they could. At least they could do better by placing their plant in the midst of helpful surroundings, with the rest of their community, as well as neighboring communities, interested in the success of automobile manufacture and anxious to help pushing. The ambitions of New England, on the other hand, run in the directions where the biggest money is made now by New Englanders. Changes in this come hard."

"To show the difference in the spirits of things," Mr. Maxim continued, "I will mention another example. The agent for a spotwelder recently came to a St. Louis concern where a great deal of riveting was being done on stoves and convinced them that they could save $25 per day and get the work done better with a spotwelding machine. With riveting, you know, there is a lot of waste work in indexing the holes. 'Will I have it sent by express?' the agent asked. By express! a machine weighing 700 or 800 pounds. The charges would be $100, how ridiculous! 'Why not?' responded the agent, 'you save 10 days in time over fast freight. At $25 per day that is a loss of $250. Deduct $100 for express charges and you are still $150 ahead.' In five minutes the St. Louis concern had placed the order, to be shipped by express. The same agent shortly afterwards made a thorough demonstration with a similar concern in ———, here in New England. The order was placed, but when it came to the question of shipment, though the conditions were parallel, the New England firm rebelled vigorously. To pay $100 to an express company for a bit of transportation which could be done for one tenth of that sum was against all sense and precedent, whether it looked like a saving or not. It could not be done. And it was not done. This difference between the West and New England crops out at every turn. It seems to be in the blood here; yet, when a New Englander goes West he gets into the new spirit in a week."

Other examples were mentioned, so actual that they cannot be detailed, but tending to show how very loath the prosperous New England concern is to scrap any part of the machinery which is still in working order and with which he is able to make profits so long as no modernized competition has gained headway. Government contracts and much other profitable work still find their way to New England firms which have the prestige of an industrial position of long standing but whose equipment is antiquated.

"It seems that the New England industries need Taylorizing," suggested the interviewer, "if they shall keep permanently ahead, in other lines than automobile manufacture."

"There is an entering wedge in the Taylor system and the manner it is being advanced," Mr. Maxim thought, "which seems rather congenial to the New England spirit. It is taken up in several places here. Still, that is a long road."

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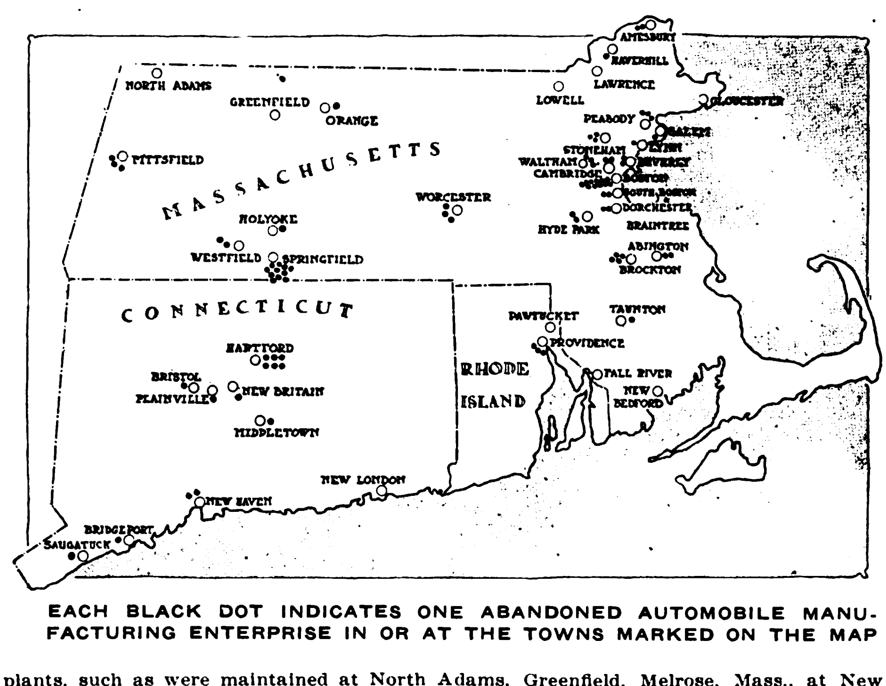
During this discourse, all the while he was gaining a



EACH BLACK DOT INDICATES ONE ABANDONED AUTOMOBILE MANUFACTURING ENTERPRISE IN OR AT THE TOWNS MARKED ON THE MAP

Early experimental plants, such as were maintained at North Adams, Greenfield, Melrose, Mass., at New Haven, Danbury, Conn., and at many other places before the year of 1902 are not included in the map. The names identified with the abandoned factories recall many a worthy industrial struggle, as follows: In **MASSACHUSETTS:** **Boston**—American Automobile and Power, Lyman & Burnham, Radford, Richmobile, Sturdevant-Mill, Razoux, Napier, Ariel, Essex, Bay State, Holmes. **Springfield**—Warwick, Knox, Automotor, Springfield Automobile, Morse, Rogers, Knox Truck, Atlas, Bailey, Med-Bow, Sultan. **Abington**—Lamson, Buffum. **Brockton**—Motor Cycle, American Motor, Cameron, Roader. **Waltham**—Waltham, Metz, Metz Company. **Cambridge**—Crest, Berkshire Motors. **Westfield**—Loomis, Westfield Motor Truck. **Hyde Park**—Robinson, Pope-Robinson. **Orange**—Grout. **Worcester**—Morgan, Morgan Company, Morgan Motor Truck. **Pittsfield**—Berkshire, Alden Sampson, Stilson. **Amesbury**—Boston and Amesbury, Crown. **Stoneham**—Phelps, Gray & Couch, Shawmut. **Beverly**—Upton, Cameron. **Dorchester**—Clark, Crest. **Salem**—Locke Regulator. **Holyoke**—Matheson. **Taunton**—Taunton Motor Carriage. **South Boston**—Gilmore Electric. **Lynn**—General Electric (automobile department). **Peabody**—Vaughn, Corwin, American Coulthard. **Haverhill**—Hill. In **CONNECTICUT:** **Hartford**—American Cycle, Electric Vehicle, Law, Maxim & Goodridge, Columbia, Kelsey. **New Britain**—Corbin (automobile department). **Middletown**—Eisenhuth. **Plainville**—Bristol. **Saugatuck**—Toquet. **Bridgeport**—Ariel. **Bristol**—Bristol Engineering Company. In **RHODE ISLAND:** **Pawtucket**—United Motor Corporation, Brown Machine. **Providence**—Builders' Iron Foundry, "Alco," Page. At **Rumford,** Maine—Bonton.

new and clear view to explain why the automobile industry has flocked, and continues to flock to the West, the interviewer could not help being impressed with the sturdy ability which must have been displayed in the automobile manufacturing concerns in New England—with which the States of New York and Pennsylvania perhaps should be included—that after all have managed to fight winning industrial battles without falling in with the helpful tide of the westward current, compelling respect and patronage on the strength of individuality of design and construction.

Another matter suggested itself. The occasion for getting the opinions on the future from one whose judgment has been matured under these severe conditions could not be neglected. In consequence, Mr. Maxim was plied with more questions relating mostly to those things which are radical and prospective in automobile design. The answers, bound to be rendered in a limited space, had to be given word for word, so as to convey nothing more and nothing less than that for which Mr. Maxim would assume the responsibility. And for this reason they were given in the form of a letter—which makes it plain, too, what questions were asked—as follows:

The Coming of the $250 Light Car, Fully Equipped, a Certainty in the Light of Previous Development of Automobile Engineering

My Dear Mr. K.:

The following is what I have to say regarding the questions you asked me here in Hartford:

I think we are decidedly in a position to be able to revise our automobile engineering knowledge so as to produce a commercially successful **light motor car.** In looking forward from a standpoint of established fact to what seems to be a logical possibility, we must take past history as our chief guide. Let us briefly analyze automobile engineering history as it relates to this particular question:

We began by concerning ourselves exclusively with what was necessary in order to "keep the machine going," regardless of any other consideration. Breakdown, was the great nightmare before us. Cost to manufacture and market were subordinate questions.

Then came the middle period, when the most skillful of us saw clearly beyond dispute that we had the knowledge of how to produce a machine which would "keep going indefinitely." This conviction developed a new school of automobile engineering. It was evident that with this knowledge of how to produce a motor vehicle which could be absolutely depended upon inspired certain of us to see how **cheaply** we could produce this reliable motor car. The low price astonishingly successful vehicle appeared forthwith. This is where we stand today.

Now, there are certain of us who realize **two big facts** —that we have the knowledge necessary to build a thoroughly reliable machine, and that we also have the knowledge necessary to build this machine and sell it for $500. This has inspired certain of us to take the third step: To alter our original engineering practice enough to accommodate the new manufacturing possibilities, **and to produce a motor vehicle for $250.** There are a lot of us who are convinced that this can be done, just as there were some of us in 1903 who were convinced that a successful car could be made and sold for $500.

This idea is fixed in men's minds, and we know that once an idea is positively fixed there will be a man come along who will carry out the idea successfully. The light cheap car will come, and nothing can hold it back, in my judgment.

As regards **starters, gear shifters and transmissions,** I believe these will undergo astonishing simplification **after** the light car has come into its own. It is just as logical to believe that a cheap and thoroughly good starter will be produced when the demand for it has been established, as it is to believe that a cheap and thoroughly good motor car will be produced. Tremendous possibilities exist when the demand is big enough. I expect the starter will be operated by gas, as this is both light and cheap, and I expect the lighting will be electrical with something very cheap in the way of a primary battery for carrying the load when the engine is not running. But, this is only my own personal analysis, and really should not be given, since we are engaged in this discussion in considering broad questions only.

In the case of gear shifters and transmission devices, I fully believe that we have every right to assume that we shall duplicate in the cheap light car every improvement developed for the high priced car. If semi-automatic gear shifting becomes general, a way will be found to semi-automatically shift the gears on a light car by an extremely cheap-to-build and light-weight device.

Just so with transmissions. If an hydraulic or an electric transmission comes on large cars, a duplicate will be found for the light cheap car. The law applies on accessories in exactly the same manner that it applies to the complete motor vehicle.

In the matter of Dr. Steinmetz's expressed belief that the electric motor car will be the car of the future, I am unable to believe that Dr. Steinmetz intended this to apply immediately, or within the next ten years. We all expect that eventually we will find a way to develop power from some previously prepared and intensely concentrated fuel, and that this fuel will be applied electrically. But, we do not consider we have the right to expect this until several new **discoveries** have been made, and not merely new inventions. We are as far as we can go electrically, in motor vehicle matters, until some new discovery is made, in my judgment.

As for your question regarding whether the average citizen [motorist] will ever catch up to the technical understanding of the internal combustion motor, and its accessory apparatus, I do not believe it is necessary. He will never catch up to any specialty, whether it concerns an internal combustion engine or a surgical operation. The average citizen is a composite of many composites, and all he asks is that you give him something which will **get him there and back** with the expenditure of ordinary average intelligence. If you don't someone else will, and he knows it, and he will buy from the other fellow.

Very truly,

June 27, 1914. *Hiram Percy Maxim.*

The question of location is one so momentous to every new concern and to every firm contemplating a change that no one man's opinion on the subject can be considered as exhausting its interest. The fact that Chicago, for example, has never become a large center for automobile manufacture may not be fully explained by the superabundance of other financial interests in that city and its vicinity; yet they may have influenced the results. Everywhere the personal elements and those depending upon the currents of information and assistance, financial, mechanical and industrial, in which a manufacturing concern finds itself placed, are so intricately mingled that final conclusions are difficult to reach except in the case of strongly marked movements involving large districts. That bonuses and municipal concessions may play an important part in influencing a decision on location is usually conceded, but in the history of the industry these considerations have rarely proved themselves decisive for full-grown success in the long run.

Broad and reasoned viewpoints on the whole matter, illuminated by examples, could not fail, if they were forthcoming, to help in bringing clearness in a matter which is often decided somewhat at random, on purely personal or local grounds, and in many other cases is allowed to drift along for years unsatisfactorily. The views of Mr. Maxim seem very helpful to start thought along definite lines, while those relating to design and cost no doubt will rouse contradiction.

The Engineering Digest

Concurrent Control of Fuel and Air in Bréguet's Carbureter

LATELY a large number of Gnôme and Rhone motors in French aeroplanes have been fitted with Ramondou carbureters, which are a recent invention by Bréguet, the well-known aeroplane designer and builder. Practical tests had shown that they were more economical with fuel—in the case of motors with revolving cylinders—than the best carbureters before used and also that they produced a higher maximum power—both items of the greatest importance for aviators.

The characteristic of the Ramondou carbureter is that the gasoline and the air supply are regulated simultaneously to produce the same proportions in the gas mixture at all motor speeds.

The carbureter body A has at the narrowest place of the suction channel a lateral cylindrical appendage in which two concentric and hollow pistons I and J can be moved to regulate the cross-sectional area of the suction channel from zero to maximum, as in other cases done by the throttle. Piston I projects at one end, where it is provided with an eye for attachment to a control rod, from the cylindrical body and contains in its bore the valve needle B which at its opposite end projects into the jet and fuel feed tube F. Spring K establishes an elastic connection between pistons I and J. In the position shown in Fig. 1, in which both pistons completely close the suction channel, the needle B also shuts off the fuel by pressing the conical portion Z against the mouth of tube F.

The regulation of the two pistons in the opposite direction is limited in two ways. The piston I can be pulled into the cylinder until the flange S abuts against the end of the adjustable threaded sleeve T, while piston J can follow this movement only till it is stopped by the ends of screws M which sit in the ring D, provided with the lever H, and themselves can be adjusted. The manner of adjusting the threaded sleeve T by means of the screwhead E and the locknut V is plain from the drawing. The ring D is moved slightly up or down, when lever H, to which the air-control rod is attached, is turned, as the screws M follow oblique slots in the cylinder wall. The spring K comes into action when piston J is stopped by screws M while piston I and needle B are pulled farther out. Spring L serves only the purpose of steadying the needle valve.

Rapidly Regulated

The regulating of the carbureter is done as follows: After the motor has been started, the suction channel is first throttled to a small opening—2 to 3 millimeters—and then the fuel feed for still-running is adjusted once for all time by screwing the jet tube F in or out, after loosening the locknut U, so as to regulate the interval between the mouth of the tube and the needle at the conical portion Z. This adjustment once found and the locknut re-secured, the regulation for full power is made. To this end the piston I and the needle are pulled out till the maximum power is obtained, locknut V is loosened and sleeve T is screwed into abutment with flange S. The proper amount and velocity of air at this adjustment is obtained by means of lever H which, as mentioned, limits the opening of piston J.

After these permanent adjustments the carbureter will thus produce the correct fuel proportions as well at still-running and very slow speed as at the highest velocities, and it is the designer's theory, which has been found supported by the practical tests, that the proportions must also be right at all intermediate speeds by reason of the simultaneous opening or closing of the jet and the suction channel by which the throttling operation for any desired power effect is made.

Furthermore, the lever H, though normally left untouched, may be separately operated if a change in atmospheric conditions—altitude, humidity—should make this desirable.

Security against carbureter fire is to some extent obtained through the fact that the fuel is shut off when the suction channel is closed, and any striking out of a flame is prevented by the double metal-gauze screens O in the air-intake drum and the S-shaped course a flame must follow to reach them, causing it to spend what force it may have against the slightly springy aluminum bell G.

In applying this carbureter to an aviation motor with revolving cylinders, it is connected by a right-and-left thread union nut directly with the end of the hollow crankshaft, as is the general practice for Gnôme motors. It can also be applied with an intermediate elbow, so as to bring the plane of the air-intake parallel to the direction of movement. The principle of this carbureter should be applicable to automobiles.—From *Der Motorwagen*, June 10.

Saving a Little Weight and Wear in Sliding-Gears; Vibration Too

IN all gear boxes the wheels, when in mesh, are directly opposite each other, as in the left portion of Fig. 2, and the chamfered portions of the teeth, while necessary for easy shifting of the gears and to avoid burring them, represent a certain waste in the useful width of the metal, as they constitute narrow zones on both sides of the wheels, and these zones are out of engagement and yet so close to being engaged as to give rise to noise and vibration. It is now proposed

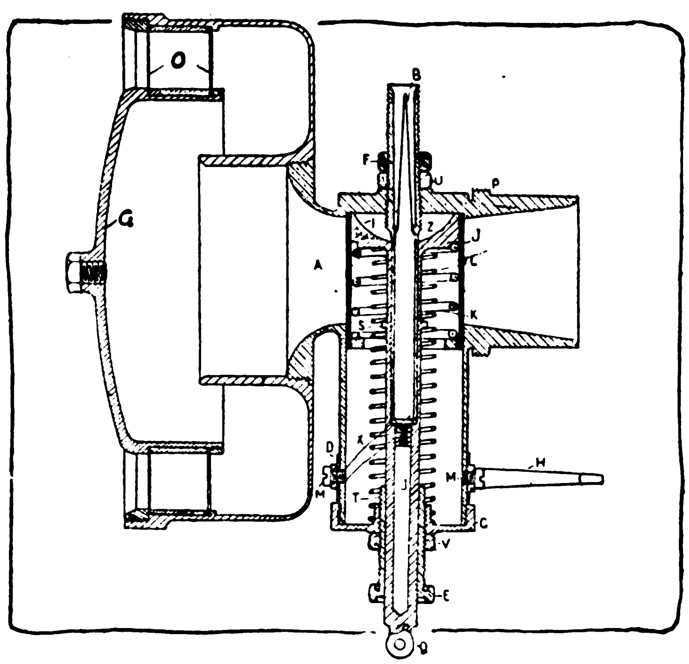


Fig. 1—Ramondou carbureter, aeroplane style

to remedy this and gaining the width of one of the zones for the metal in engagement by arranging to push the slidable gear so far through that the chamfered zones of both gear wheels are released, as shown to the right in Fig. 2, while the entire width of the straight portions is engaged.

In practice the tapered portions of the teeth correspond to a width of about 3 millimeters in the ordinary four-speed gearbox with three sliding members. In this case, if the improvement is applied to the three reduced gears, the application to the third speed does not lengthen the gearbox at all, while the application to the second speed lengthens the box by 3 millimeters; and, further, if the wheels for the second and third speeds on the intermediate shaft are in one piece, the slidable wheel enters the space left for the disengagement of the sliding-fork.—From *La Technique Automobile*, June 15.

Sightly Device for Securing Nuts and Bolts—Tests Favorable

SPRING washers and split pins are the most favored means for securing the nuts on the ends of bolts in automobile construction in cases where they afford sufficient security, while locknuts of the depth required for real efficiency are deprecated for looking clumsy and adding to the necessary length of the bolts. New devices intended to supply the long-felt want of a thoroughly acceptable contrivance are therefore constantly forthcoming, while automobile and accessory designers, on the other hand, strive to reduce the number of bolts used in a construction to a minimum, even resorting to riveting in many instances, on the plan that the riveted end of a bolt can be chiseled off, in case of necessity for taking the construction part, and the bolt replaced. Retaining-flanges and autogenous welding are also employed more and more where formerly bolts and nuts abounded.

The latest locking device, heralded from France, is shown in Fig. 3 and has been tested at the laboratory of the Conservatory of Arts and Trades. It was here shown that a locknut turned on with a pressure of 5 kilograms at the end of a wrench .40 meter long came completely loose after 80 shocks, while the *autobloc*, as the new device is called, though secured by hand only, remained in its place after 103,000 blows. It was also found that the work required for turning an *autobloc* nut without its locking piece amounted to 3.2 gram-meters, while with this piece in place the work required rose to 2,720 gram-meters. Prolonged use of the device on the locomotives of the Metropolitan in Paris has confirmed these results.

A peculiarly shaped slot in the nut and the locking-pin constitute the whole provision, the bolt remaining whole and no longer than needed for taking the nut. The slot has a rocking-edge on its outer side and a curve on its inner side. The pin has rectangular faces and is thinner at one end than at the other; the face turned toward the bolt is grooved lengthwise to correspond with the thread of the bolt. It seems that the grooves are straight. When the pin is driven into its place, it is squeezed between the sharp ridge on the outer wall of the slot in the nut and the much larger contact surface with the threads of the bolt. When a tendency to loosening of the nut manifests itself, the pin therefore turns with the bolt and is wedged the harder in the slot the stronger the tendency to loosening becomes.—From *Omnia*, June 27.

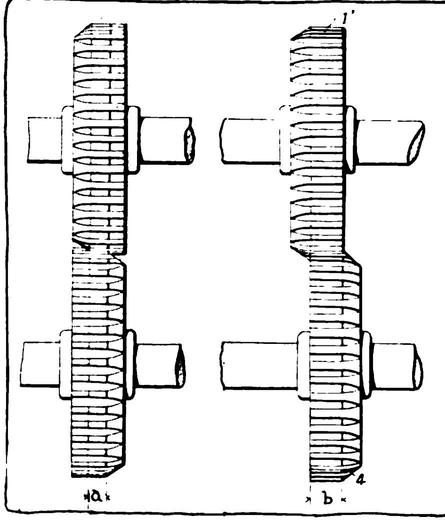


Fig. 2—Improved gear mesh.

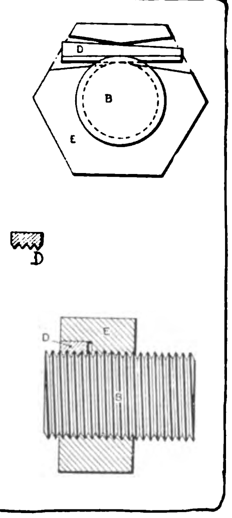


Fig. 3—Nut lock

Double Eccentric Worm Adjustment —An Important Improvement

IT is known that the correct mounting of a worm drive is so complicated and difficult that this feature more than any other has retarded the adoption of this driving system, says Mr. Decoux and quotes in confirmation of this assertion Mr. Perrot, chief engineer of the Argyll works where a good thousand of worm-drive vehicles have been turned out. Mr. Perrot's remark is: "The worm must be mounted absolutely in the middle plane of the worm wheel; the smallest deviation causes considerable friction, and the drive heats up." The simplest method for overcoming all difficulties involved in this peculiarity consists in employing a double eccentric adjustment on the principle indicated in Fig. 4, according to Mr. Decoux. It is patented, he says.

The worm shaft A is mounted with its bearings in two eccentric sleeves B and C. One of them can be the torque tube and the other can be operated from the rear. By turning one of the eccentrics the worm shaft is displaced to the right or left, to center it in relation to the wormwheel. If it is desired to adjust the shaft vertically, it is sufficient to turn both eccentrics an equal amount in opposite directions. The regulation is thus obtained without need of adjusting the wormwheel, so that its alignment with the other organs of the construction, such as the gearbox, is conserved.

By this method the axis of the worm shaft can be taken to any position within a circle which has for its radius the sum of the two eccentricities. The plan facilitates machining and mounting and readily admits of changes in the transmission-ratio. It can also be applied to the steering gear and for the centering of brake shoes. In the case of the worm drive, a system for locking the adjustments has also been devised.—From *La Technique Automobile*, June 15.

The Oiling of High-Speed Motors

AT the recent Tourist Trophy run on the Isle of Man the majority of the involuntary stops were caused by deficient cylinder oiling, doubtless due to exaggerated linear piston speeds, according to a French observer's report. Fractures of mechanical components were practically unknown and the tires gave little trouble. With regard to the oiling it is noted, however, that all the motors used in the race, excepting that in the Straker Squire car, were specially designed creations, this including the Knight motors in Minerva cars, which were provided with an auxiliary exhaust.

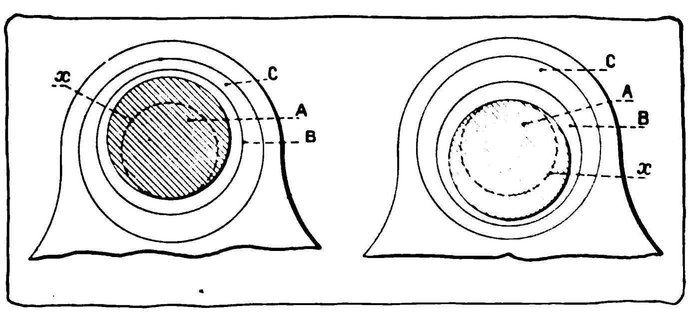
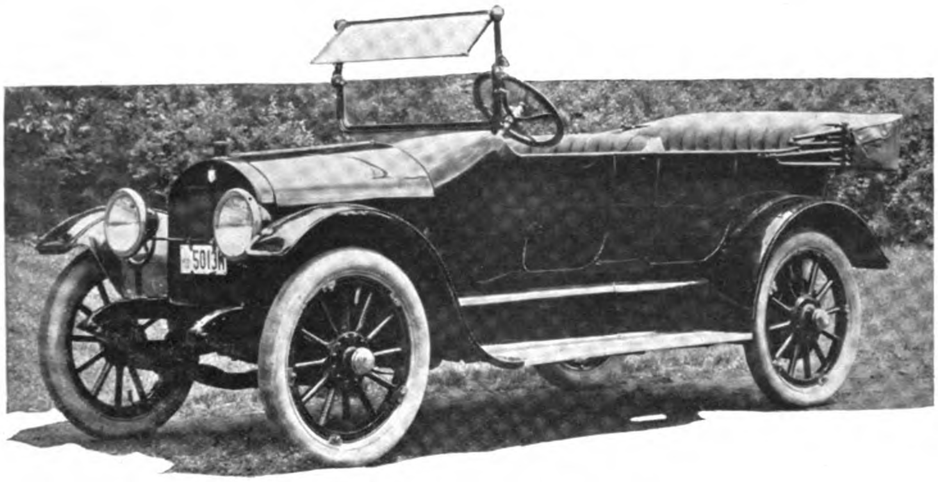


Fig. 4—Adjustment for worm drive shaft

Stream Lines Distinguish 1915 King



King for 1915 with larger motor, streamline body and crowned fenders for $1,165

Plan view of 1915 King showing seating arrangement

Bore of Cylinders Increased 1-16 Inch —Wheel-Base Lengthened One Inch— Brakes Improved — Inside Upholstery

RADICAL changes mark the introduction of the King car for 1915. A larger motor, streamline body, crowned fenders and a reduced price are the three most prominent innovations. With the new body and the many refinements the new King bears but little resemblance to its namesake of a year ago.

1/16 Inch Added to Bore

The most important change mechanically is the addition of 1-16 inch to the bore of the cylinders, making them 3 15-16, the stroke remaining at 5 inches. This adds materially to the power output, although the manufacturer's rating has been left at from 30 to 35 horsepower. The S. A. E. rating is 24.8 horsepower.

The latest idea from Europe is that the upholstery is placed entirely inside the body, none protruding over the edges. This is a harmonious touch which is distinctive.

Cantilever Spring Mounting New

Although retaining the cantilever rear springs which have always been a characteristic feature, a modification has been made in the manner of attaching their rear ends to the axle housing. The former plate-and-sleeve construction on the axle housing has given way to a hinge form of attachment. An eye bolt through the lower leaf of the spring secures the latter to a sleeve around the housing.

In connection with this spring mounting change, the forward end of the torque tube is attached to the lower side of the gear box by a slip joint which allows free end play to the torque tube while preventing injury to the end thrust bearing in the universal joint due to side thrusts occasioned by changes of positions of the outer ends of the rear axle in conforming to the irregularities of the road.

New Axle Housing 50 Pounds Lighter

The wheelbase has been lengthened 1 inch to 113 inches. A pressed steel axle housing now is provided to replace the east type formerly employed. This new housing is 50 pounds lighter. The axle itself is of new form in that a floating construction supersedes a three-quarter floating one. Option of either a 3.7 to 1 or a 4 to 1 ratio is given. The latter for hilly country.

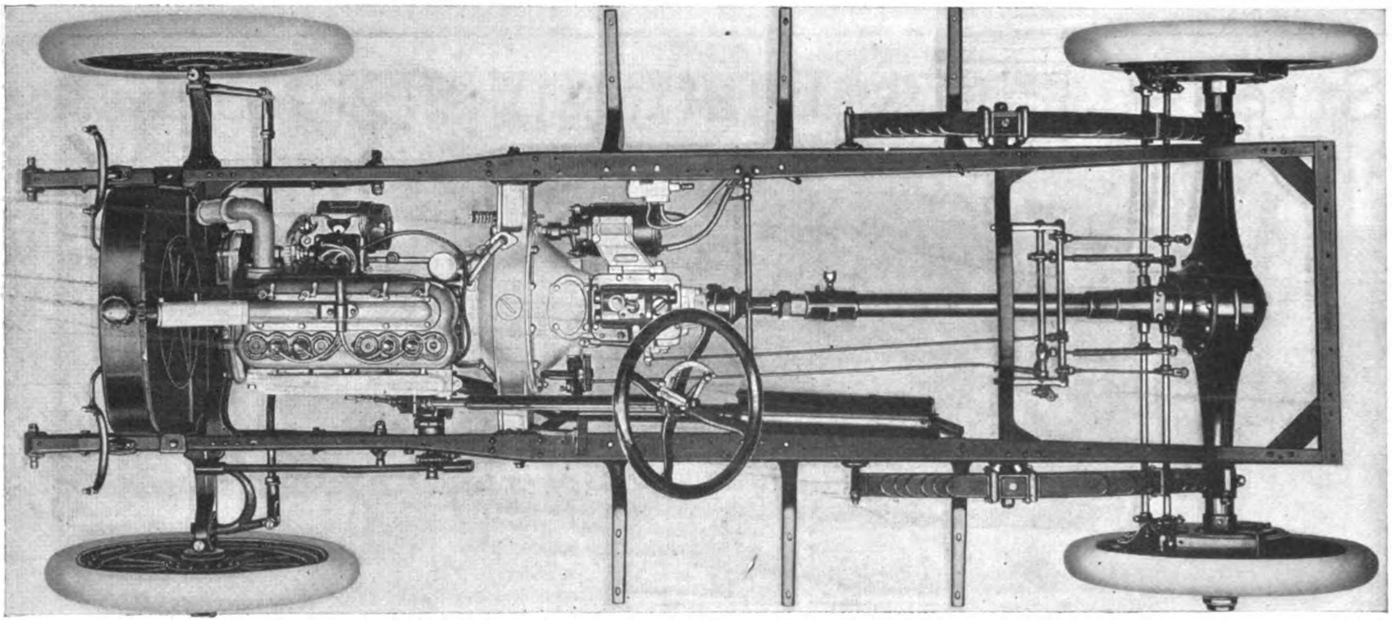
The brakes, too, have come in for some change to make them simpler and more efficient. The internal bands are of the full wrapping type for operating practically the entire circumference of the drum, as compared with the semi-wrapping or crescent-shaped band used in the preceding model. Operation of these internal bands is now by an S cam instead of by toggle joints.

The general construction of the engine has not been changed because of the bore increase. It is an L-head type with both manifolds on the left and is three-point suspended from the main frame, the clutch and gearset being in unit with the crankcase. The aluminum crankcase is horizontally split into halves.

Both intake and exhaust manifolds are separate from the cylinder block, and bolt to it. There is an individual opening into the exhaust header from each exhaust port, while in the case of the intake one opening into the block takes care of the distribution internally to two intake ports. One manifolding change is the shortening of the intake and causing the carbureter to be mounted higher. This is made possible by the location of the fuel tank in the cowl and makes the Stromberg carbureter more accessible, besides tending to greater mixing efficiency since there is less pipe length for condensation.

Spiral timing gears are used. There is only one exposed shaft, that being on the right and driving through belt connection the fan, the ignition distributer and the generator, when the latter is supplied.

A honeycomb radiator replaces the formerly used vertical tube pipe. It is more efficient and its appearance attractive, the front edges being coped after present-day fashions. The system is thermo-syphon. The inlet connection to the block is at the front right side, the distribution to the jackets being an integral part of the casting.



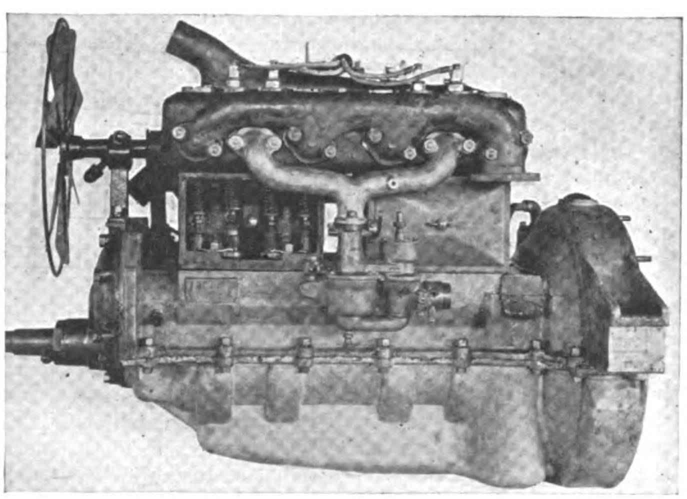
Plan view of King chassis, showing new slip joint attachment at forward end of driveshaft housing

The lubrication system is a combination of force feed and splash, the flywheel acting as a pump and delivering the oil to the crankshaft bearings and the timing gears. Rotating in the oil, it throws oil into a scoop or trough by centrifugal force. Thence it goes to the bearings. The cylinder walls and pistons receive the splash from the connecting-rod ends dipping into the splash troughs, there being individual troughs.

Flywheel Acts as an Oil Pump

The ignition has been entirely changed, the magneto being replaced by the Atwater-Kent system. The distributer is mounted where the magneto was formerly placed, being driven off the end of the fan and generator shaft. The chief advantage claimed for this change is that there is a gain in flexibility at low speeds due to the fact that the current supplied by the battery is constant regardless of the speed of the motor.

The Ward-Leonard cranking motor and generator are separate units, with the generator mounted below the ignition unit on the right of the engine, and driven by silent chain from the shaft. This chain is not enclosed and allows the ready removal of the generator. Generation of current reaches its maximum at from 10 to 15 miles an hour car speed, the generator being driven at twice engine speed. A special controller keeps the Willard 80-ampere-hour battery charged fully and prevents too rapid charging, at the same time allowing full rate at the car speed mentioned.



Left side of King motor showing a high mounting of carbureter

The cranking motor unit is located at the right side of the gearbox, to which it is bracketed and is a more powerful one than its predecessor, being capable of turning the engine at from 135 to 140 r.p.m., as compared with 90 r.p.m. The reduction gearing between it and the flywheel has also been simplified, one of the intermediate gears having been eliminated.

Starter Control Has Been Improved

The starter control has been improved and in place of the old pull-up handle there is now a lever between the front seats at the driver's right which is operated by pushing forward. The starting system is a two-wire type of 6 volts. There are large and small bulbs in the head lamp for city and country driving.

There are nine bronze disks and an equal number of saw steel disks used in the clutch whereas in the preceding model all disks were of steel. The disks are provided with cork inserts instead of being faced with an anti-friction material, as heretofore. The new clutch is very easy in action. The three-speed gear set uses chrome nickel gears, as compared with the combination of carbon and nickel in the older models. Ball bearings have given way to Hyatt throughout the gearset. A ball-and-socket lever controls the shifting instead of the cross type used before.

In line with the other body trimness, the fenders are crowned and conform closely to the contour of the wheels. The instrument board containing gasoline gauge, electric light switches, ignition switch, speedometer and speedometer light is another new feature which brings the new King up to 1915.

Gasoline Tank in the Cowl

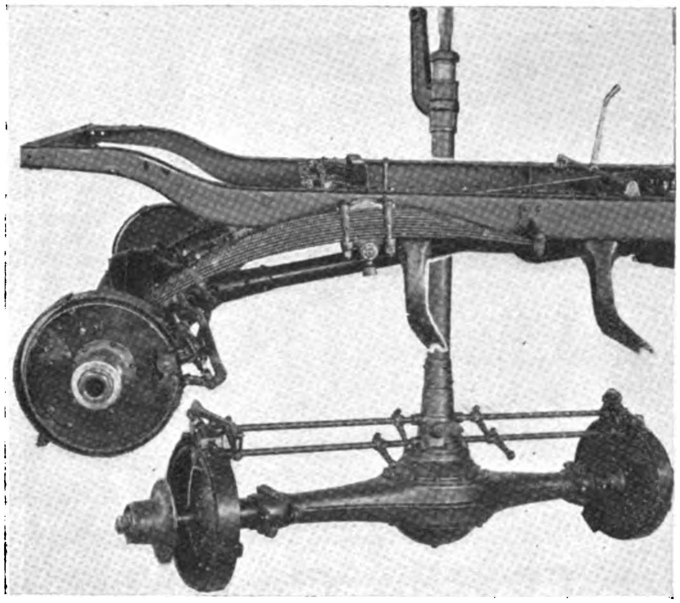
The gasoline tank is located in the cowl and contains 12 gallons, the filler being at the right side so as not to interfere with either occupant of the front seat. A gasoline gauge is also provided. The previous model had the gasoline tank under the front seat.

A notable manner of clearing the running boards of any obstructions is found in this new model. The storage battery is placed under the front seat at the driver's right, the tool box being located under the drive seat. These are therefore both very accessible, while the space under the rear seat is left for luggage. The extra demountable rim and tire are carried at the rear. Tires are 33 by 4 front and rear.

Steering is on the left, the gear being of Gemmer make and operating through an 18-inch wheel. Cast aluminum spark and throttle levers on the wheel are a new thing in motor car construction, they being usually made of steel and nickeled. These aluminum controls naturally cannot tarnish and are amply strong. The horn button is conveniently located in the center of the steering column above the wheel.

The equipment takes in everything now demanded by the driver. There is a rain division windshield, silk mohair one-man top, quick detachable side curtains, Stewart speedometer, electric horn, demountable rims with one extra and a complete outfit of tire tools, machine tools and jack.

The 1915 series, known as model C, comes in roadster and touring car, and the application of the Ward-Leonard cranking and lighting system is optional as it was last year. With this equipment the new price with either body is $1,165 as compared with $1,195 last year when similarly equipped. The price without these electric features is now $1,075, or $20 less than previously.



Upper—King rear construction, showing cantilever spring. Lower—Plan view of rear axle and driveshaft, showing new mounting of springs at rear

Metz for 1915 Has New Fore-door Body

IN producing its 1915 model, the Metz Co., Waltham, Mass., has paid a great deal of attention to the details of body design, with a view to perfecting the car's appearance but no mechanical changes have been made, as none were found necessary. The price remains at $495.

The new car is characterized by a streamline body, with tapering hood, sloping cowl, high doors, and a slanting rear deck. The new windshield is a two-piece, design that is fully adjustable. Another departure is the removal of the lamps from the fenders they now being attached at either side of the hood. They are reinforced by a connecting bar. A Prest-O-Lite tank has been substituted for an acetylene generator. The body changes have necessitated increasing the wheelbase from 90 to 96 inches and this also improves the looks of the machine. The gasoline tank, holding 10 gallons of fuel, is concealed in the cowl and feeds by gravity.

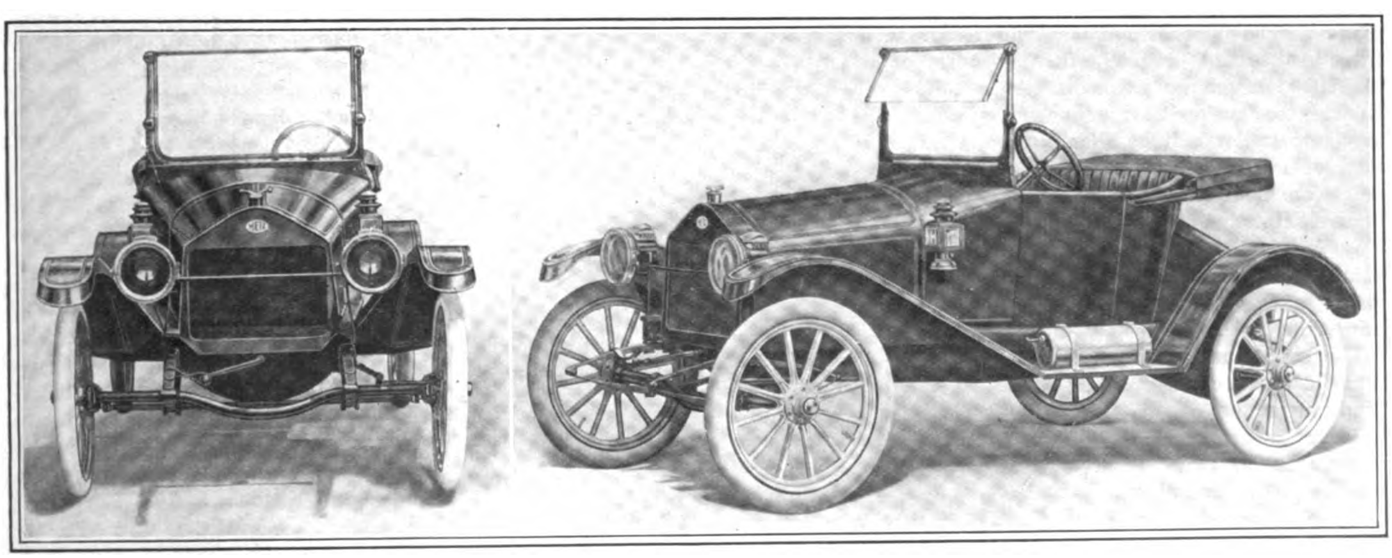
Mechanically the 1915 Metz, is exactly the same as the 1914 model, the leading characteristic of which is the friction speed changing mechanism from which drive is taken through a jackshaft and side chains to the rear wheels.

The four-cylinder motor has block-cast, L-head cylinders 3.75 by 4 inches, the S. A. E. rating being 22.5 horsepower. The valve stems and springs are inclosed and both crankshaft and camshaft, which are steel forgings, are finished by grinding and run in white metal bearings. Lubrication is by a constant level splash system with pump circulation of the oil; and cooling is by thermo-syphon, the capacity of the system being 3.5 gallons. The carbureter, which is made by the Metz company provides the proper mixture at all speeds and ignition is effected by a Bosch high-tension magneto.

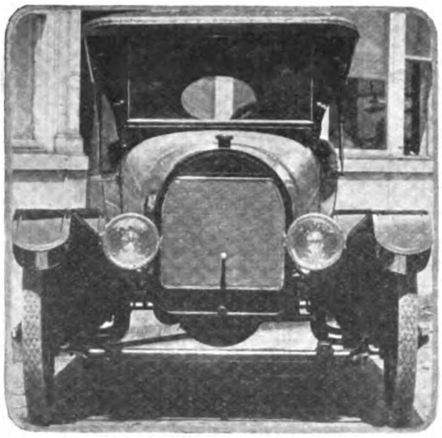
Friction Drive Employed

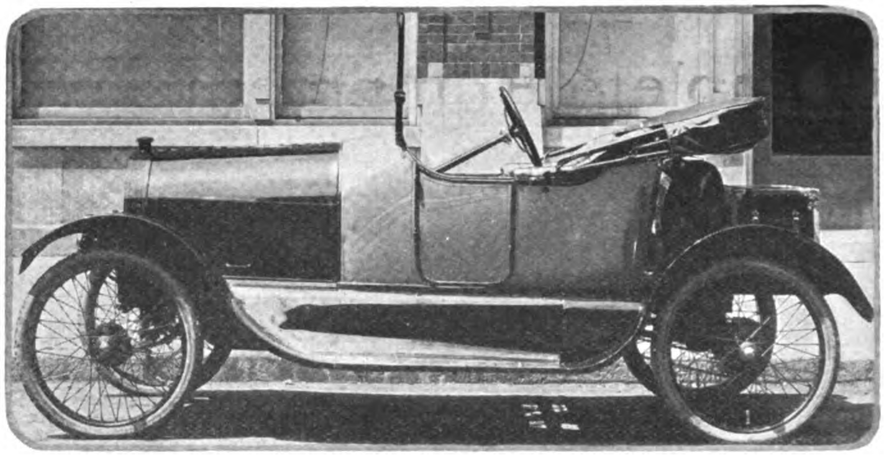
The friction drive is effected through a disk and wheel, the wheel being shifted along the face of the disk to gain the different speeds. From the wheel the power is transmitted to the drive shaft by a single silent chain; and from the jackshaft which carries an inclosed differential, the drive is transmitted to the rear wheels by side chains which are inclosed in tight cases and operate in oil. The gear ratio is 3 to 1 on high.

The frame is of pressed steel and is supported by full elliptic springs all around. The wheels are wood, 30 inches in diameter and are shod with 3-inch tires. The braking equipment of the machine is unusually complete there being a set of internal expanding brakes on the rear wheels, an external contracting brake on the jackshaft, and besides, the friction disks may be used for braking purposes. All wheels run on ball bearings and the tread is 56 inches.



Left—Front view of 1915 Metz, showing streamline hood. Right—Side view of Metz showing new body lines





Dodge light car from the front—Side view of the little Dodge runabout body with streamline effect

Dodge Car Newest in Light Field

Dodge Motor Car Co. Offers Electric Starting on $595 Car Weighing 1,400 Pounds

THE Dodge light car has just been brought out by the Dodge Motor Car Co. of Detroit, which must be distinguished from Dodge Bros. of the same city. The Dodge car which is referred to here is made by the company which has been named after its president, Alvan M. Dodge who was formerly associated with the Wahl Motor Car Co.

The new car is a two-passenger type of standard tread having a sloping hood and rounded top, giving a more or less foreign appearance. The complete weight of the car with tanks filled is 1,400 pounds.

In offering this new light car, the Dodge company makes two optional prices. When equipped with top, windshield, two gas headlights, oil tail lamp, gas generator, 30 by 3 tires and bulb horn, the car may be had for $495. But with electric cranking, top, windshield, two double-bulb electric headlights, electric tail lamp and horn, electric generator and storage battery, 30 by 3 1-2 inch tires, the price is $100 more.

The car has a four-cylinder, water-cooled, valve-in-the-head engine with a bore of 3 11-16 inches and a stroke of 4 inches. This is said to develop 25 horsepower, which is ample to pull the light chassis through any kind of road. Speeds from 3 to 45 or 50 miles an hour are attainable, while it is further stated that economy of fuel is another notable feature, 30 miles to the gallon of gasoline being the rule.

The engine uses rocker arms to operate the overhead valves.

The cylinder head itself is detachable, making it possible to remove pistons and connecting-rods through the top. The spark plugs are set into the head casting at an accessible angle, while the exhaust manifold is integral with this head, the outlet being through a single opening, thus eliminating back pressure.

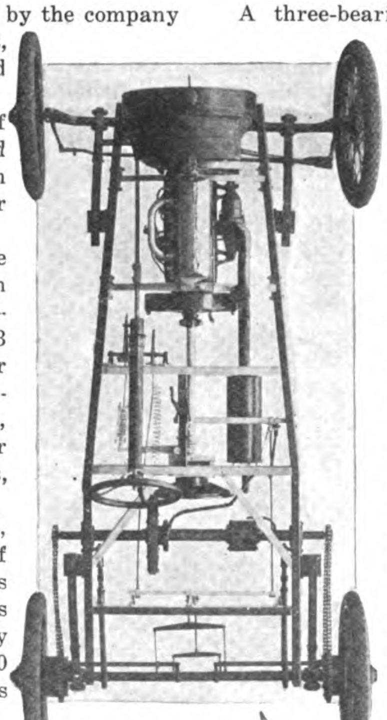
A three-bearing crankshaft, a camshaft with an equal number of supports and large valves made possible by the head construction indicate that the motor is substantially and properly designed. The valves have a clear opening of 1 1-2 inch. The principal bearings are brass backed.

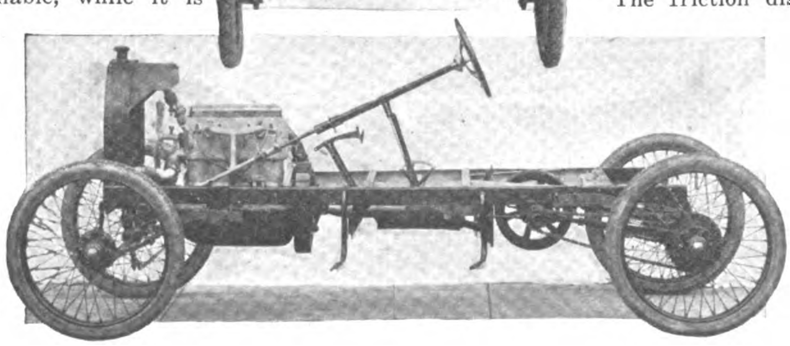
The oiling is by splash with positive pump feed, a sight feed being mounted on the dash; ignition by a high-tension system; cooling by thermo-syphon with a belt-driven fan; and a Zephyr 1-inch carbureter is used.

The motor is carried on two bowed cross pieces, front and rear, and its flywheel is not inclosed. The driving shaft runs directly from it back half way of the chassis to the friction disk transmission mechanism mounted on a frame cross member. This friction drive is of the standard type, the disk being mounted to slide on the end of the shaft so as to be brought against and released from the friction wheel which revolves at right angles to the disk. This wheel is carried on a jackshaft, from the outer ends of which chains run back to the rear axle.

The friction disk control lever is at the right of the driver, the steering wheel being on the left side. The side drive chains, running in oil, are inclosed and the rear axle to which they connect is a 2-inch tubular type. There are two sets of internal expanding brakes on rear axle drums.

Cantilever springs are used front and rear. Wire wheels are standard.

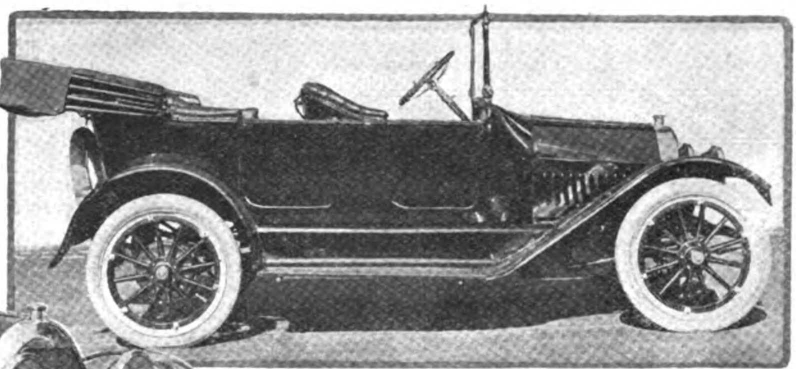


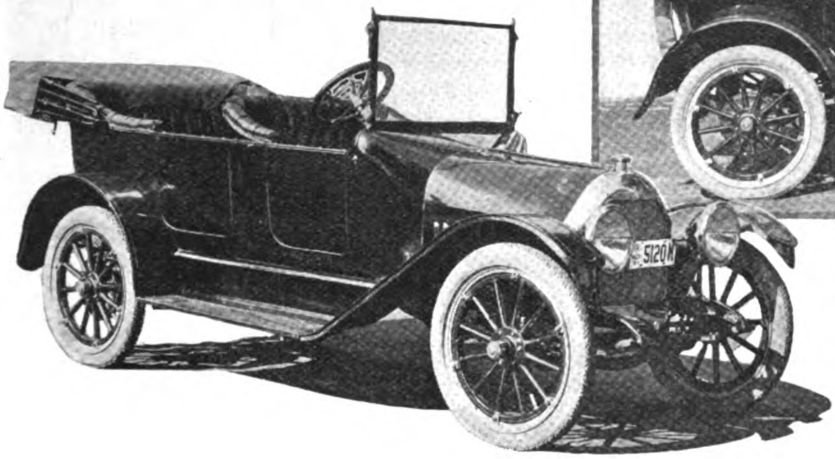


Plan and side views of the chassis which has been constructed for lightness and strength—Note friction drive

Complete Equipment Features 1915 Wahl

Streamline Body with Greater Seating Capacity — Concealed Hinges — Electric Equipment to Order





Two views of the new Wahl touring car, which has been refined for the 1915 season. Note molding of hood into body

FEATURED by more complete equipment, the new Wahl car, the product of the Wahl Motor Co. of Detroit, is now ready for delivery. The new features of the car are chiefly minor refinements and include a more up-to-date top, full streamline body with flush doors, concealed side door hinges, wider seats, deeper upholstery, roomier tonneau, double-bulb headlights, electric horn and, to order, an electric starter.

On the 112-inch wheelbase chassis there are two bodies fitted as standard, a roadster and touring car. Both sell at the same price, $890, with equipment, excluding starter and lighting system which is $125 extra. The car weighs 2,250 lbs. and is featured by a unit power plant, disk clutch, three-speed gearset with right drive and center control.

The horsepower rating of the Hazard motor is 28.5, according to the maker, and with a 3.75 by 4.5 cylinder this motor should readily turn up that amount although the S.A.E. rating is but 22.5. The construction is of unit type, the gearbox bolting through a flange to the rear of the flywheel housing, and the three-point suspension principle being carried out by having the two rear supports integral with the flywheel housing and the front support in the center. The cylinders are cast in pairs.

Valves on the Left

Being an L-head the valves are all on one side—the left. These are completely inclosed by two cover plates removable through thumb nuts. The exhaust header runs above the intake connections, and there is an individual exhaust opening from each cylinder, allowing free escape of the burned gases, while there is a common opening from each two cylinders to the intake manifold.

Crankshaft and camshaft are each carried on three bearings. The timing gears are spirally cut and of proper pitch to eliminate any noise when running at speed. One cover plate at the front when removed exposes the entire gear train for inspection or adjustment. The crankcase is of the barrel type. That is, instead of having two horizontally split halves, it is all in one piece. There is an opening at the bottom, which gives access to all bearings, however.

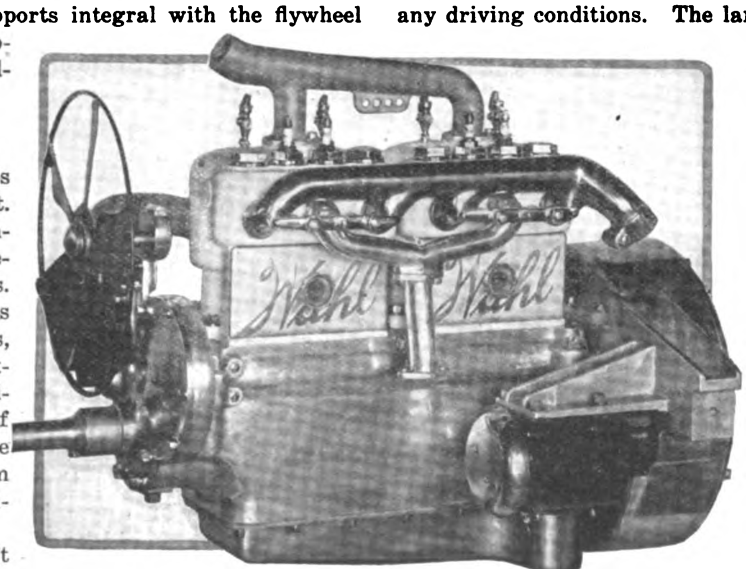
The oil pan which is bolted to the under side of the crankcase contains a series of four troughs which are used in connection with the splash system of lubrication. A scoop on the lower end of each connecting-rod dips into the corresponding trough on each down stroke, splashing the lubricant up into the cylinders and lubricating the walls and piston surfaces. The timing gear drive is oiled from an oil pocket of a depth sufficient to insure a sufficient quantity of oil at all times.

The carbureter is a Stromberg, while ignition is provided for by an Atwater-Kent distributer system, the unit being placed on the right side and driven by a shaft in connection with the timing gears.

Thermo-Syphon Cooling

A very efficient method of cooling by thermo-syphon is employed, which is said to be proof against over heating under any driving conditions. The large V-radiator is of Mercedes type. The fan is belt-driven.

The two-unit electrical system is a Deaco, motor and generator being separate and mounted on opposite sides of the power plant. The generator, on the right, is driven from the exposed shaft at crankshaft speed, while the starting motor is placed at the opposite rear side and connects to the teeth in the flywheel rim through an overrunning clutch. The Michigan battery used with these instruments is of 90 ampere-hours capacity and 6 volts. The system is two-wire and there are two sets of bulbs in the headlights, the smaller being for city work.



Side view of the Hazard motor used in the Wahl car

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The Monocar

NOW that the postal department is extending the length of rural delivery routes from 24 to 50 miles and increasing the appropriation from $1200 to $1800 in order to permit of the use of a motor vehicle, there should be good opportunity for a small vehicle specially designed for this use. Such a vehicle could be a monocar, seating but one, and should be designed to meet all weathers.

The monocar has attracted attention abroad but has never been considered seriously in this country, in spite of the fact that some large industrial houses that provide their sales solicitors with motor vehicles are in favor of a one-seated machine as compared with a two-seated one. There are many city salesmen, in different lines, that have not any more use for a two-seated vehicle than they have for a limousine. The single-seated car is particularly suited for the work, and for city salesmen it can be made of narrower tread, which will assist in getting through traffic faster than the standard-tread machine.

The monocar for the rural free delivery man should have a narrow streamline body, so that resistance can be cut to a minimum, and weight can be held at the low-water mark. A compartment for the mail can be arranged in rear of the seat and a light, but adequate, top fitted from this compartment to the low windshield.

Getting Together

INDICATIONS point to a motor truck convention during the coming fall, in which motor truck makers and dealers will be brought together to discuss the problems that enter into the manufacture and merchandising of trucks. For the last 18 months this industry has been without any get-together conferences, and in not a few places it has suffered because of this.

Getting together, if for no other reason than becoming better acquainted with one another, is in itself sufficient reason why the makers and dealers should meet in annual conference. When a maker is left to himself for several months or perhaps a year or so, it is almost certain he will develop some action or mode of merchandising that is not in harmony with the best interests of the industry. Participation in open discussion prevents this.

There are, however, hosts of subjects that truck makers can discuss to their advantage. Some makers are opposed to conventions, because they think that nobody can tell them anything of value and that the entire convention will resolve itself into a question of a few giving away their manufacturing and merchandising secrets to the weaker ones.

Fortunately, there are few in this class. The rank and file acknowledge that there is much to be gained from a convention, and that while there may not be any revolutionizing factors unearthed, yet meeting and discussing questions in common will wipe away many of the cobwebs that have hung so long in the musty places that the owners have begun to look upon them as real enduring factors.

Merchandising problems in the truck industry will stand discussion. Not that several of the leaders in the industry are not using the most approved methods but that some of the weaker ones are not merchandising to their own advantage or to the good advertisement of the industry.

Others have been working on the installment payment policy along impossible lines.

With others the "knocking" evil has been carried so far as to react on themselves as well as injure the industry.

Others are a little dubious on the future of the industry and a true analysis of the possibilities of motor trucks would stand them in good stead.

There are those who want to know what service from the manufacture to the dealer means, and others who want to know what service from the dealer to the owner should comprise.

The possibilities of using kerosene in motor trucks and the feasibility of kerosene carbureters are today mooted questions whose clear discussion must benefit the industry.

With some the question of final drive is uppermost—whether it is to be enclosed chains, double-reduction bevels, single-reduction bevels or the worm mounted either above or below the axle.

It is not expected that a convention would give the last word on any of these subjects, but a thorough analysis would be of material interest to many in the industry.

1 Car to Every 35 Inhabitants in Bay State

Registrations of 64,717 Cars in 6 Months Exceed by More Than 2,000 the Total Licensing of 1913

BOSTON, July 11—An argument against pessimism in the motor industry is shown by the fact that in 6 months of 1914 more than 2,000 motor cars have been registered in Massachusetts, more than during the entire 12 months of 1913, and the latter was a very good year, too.

In the 6 months the Bay State has collected $16,201.18 more from automobile owners than it has in the entire 12 months of the preceding year. If the rate of increase keeps up more than 75,000 motor cars and trucks will be listed this year. And the revenue will total more than $1,000,000.

At the present rate approximately 100,000 will be operators of machines, or one in every 35 inhabitants.

Comparisons between the first 6 months of 1913 and a similar period of 1914, and also between the entire 1913 period and the first 6 months of 1914 show some interesting figures. There is not an increase in the operators and chauffeurs because each gets a license that runs for 12 months, renewable at any time. But there is an increase for the first 6 months this year over the first 6 last year in all departments except chauffeurs, the decrease there denoting that more people are driving their own cars. The figures are given in the accompanying table.

Delaware Adds 164 More Cars for June

DOVER, DEL., July 13—One hundred and sixty-four new registrations were added to the list of owners of automobiles in Delaware during June. Of this number there are fifty-eight Fords, eleven Maxwells, fifteen Overlands, seven Buicks, nine Studebakers and eight Metz cars. The rest comprise a few foreign cars and a few high-priced cars.

Colorado Exceeds 1913 by 2,000 Cars

DENVER, COLO., July 9—The total registration of motor cars thus far for 1914 is 15,340. This is a gain of more than 2,000 above the total registration for 1913, which Secretary of State Pearce estimated at 13,000.

The city and county of Denver has a registration of 6,844 for 1914 and the outside counties 8,496, as against 4,793 for Denver last year and approximately 8,000 for the outside counties. 1913 was the first year of state licensing of motor vehicles in Colorado.

The 1914 registration is divided as follows:

Total number of gasoline passenger cars	14,267
Total number of electric vehicles	708
Total number of gasoline motor trucks	272
Total number of electric motor trucks	27
Total number of steam cars	66
Total number of all classes	15,340
Number of gasoline passenger cars up to 25 horsepower	8,695
Number of gasoline passenger cars above 25 horsepower	5,572

90-Day Warranty Pasted to Car

NEW YORK CITY, July 7—The plan of pasting a copy of the N. A. C. C. standard warranty on the board which holds one of the front seat cushions, so that the warranty becomes a part of the car, has been adopted by one of the members of the National Automobile Chamber of Commerce to insure that the purchaser will receive a copy of the warranty and have plenty of opportunity to become familiar with its terms.

It has been the experience of the company that dealers do not always notify the factory of the name and addresses of new owners, so that sometimes it is impossible to place a copy of the guarantee in their hands.

Triplicate copies of the warranty are issued for each car, each bearing the serial number of the warranty and number of the car and lettered respectively A, B and C. One copy is pasted in the car, one goes to the dealer and one is retained by the manufacturer. All bear the printed facsimile signatures of the president and the secretary-treasurer of the company.

This method keeps the owner advised of his right to demand the replacement of defective parts, etc.

Jeffery Co. Fixes 23 Sales Districts

KENOSHA, WIS., July 13—A new plan of organization was announced by Sales Manager E. S. Jordan at a conference of Jeffery salesmen held at Kenosha last week.

The country has been divided into twenty-three districts, each in charge of a district representative working under the general direction of the factory sales department.

It will be the duty of the Jeffery district representative to appoint dealers, determine the extent of territories and exercise general supervision over the business of the Jeffery Co. in the districts assigned.

The appointments made with the territories designated and the headquarters of the various men are as follows:

Agent	Territory	Headquarters
C. G. Anderson	Northern Illinois	Peoria, Ill.
G. N. Bliss	Kansas and Nebraska	Kansas City, Mo.
John Carlberg	Oklahoma and Arkansas	Oklahoma City, Okla.
J. E. Corby	Indiana	Indianapolis, Ind.
A. E. Creeger	Western Ohio	Tiffin, Ohio.
C. S. Culp	New York	Rochester, N. Y.
W. H. Dailey	Southern Illinois	Kenosha, Wis.
L. H. Glenn	Western Iowa	Omaha, Neb.
H. C. Hart	Eastern Iowa	Des Moines, Iowa.
T. W. Johnston	North and South Carolina	Columbia, S. C.
E. W. Milburn	California and Nevada	San Francisco, Cal.
R. R. Minton	Colorado, Utah and Wyoming	Denver, Colo.
G. B. Muma	Montana and Canada	Winnipeg, Man., Can.
R. L. Newton	Va., E. West Va., D. C.	Richmond, Va.
L. E. Rood	Wisconsin	Kenosha, Wis.
John A. Rose	Florida and Georgia	Jacksonville, Fla.
H. D. Snyder	Michigan	Grand Rapids, Mich.
B. F. Spencer	E. Ohio, W. West Va., W. N. Y.	Warren, Ohio.
C. R. Spencer	Alabama, Mississippi and Tennessee.	Memphis, Tenn.
H. A. White	Texas and Louisiana	New Orleans, La.
W. Ross Eaton	Arizona and New Mexico	Phoenix, Ariz.
H. A. Burgess	Idaho, Washington and Oregon	Portland, Ore.

Bingham Co. To Make $800 Trucks

CLEVELAND, O., July 11—The Bingham Mfg. Co. has taken over the plant and adjoining property of the Electric Locomotive & Engineering Co., at Lorain avenue and Lake Shore Railroad, and will go into automobile manufacturing. Plans now outlined call for the manufacture of a light delivery truck to sell at about $800. Officials claim it will be the cheapest truck for its capacity made in the country. The car will have a 25-horsepower motor, 114-inch wheelbase, and its bed will be 42 by 78 by 52½ inches. It is expected to turn out about thirty cars a month at first and to increase to 100 cars a month later. The capacity is estimated at 500 cars a month.

Tabulation Showing Registrations of Automobiles, Trucks and Drivers in Massachusetts in 1914 to July

	First 6 Months of 1913 and 1914.			Total for Entire 12 Mo. of 1913, within Increase and Decrease for First 6 Mo. of 1914.	
	1913	1914	Increase	12 Mo. 1913	Inc. or Dec.
Automobiles	53,628	64,717	11,089	62,660	2,057
Motor cycles	5,555	6,359	804	7,127	*768
Manufacturers and dealers	1,266	1,443	217	1,330	*113
Operators	9,679	11,525	1,846	17,009	*5,474
Chauffeurs	3,028	2,795	*233	5,233	*2,428
Operator renewals	26,429	32,238	5,809	40,858	*8,620
Chauffeur renewals	9,183	11,140	1,957	17,934	*5,794
Receipts	$646,323.09	$780,363.69	$134,040.60	$764,153.51	$16,210.18

*Decrease.

Interchangeable Wire Wheel, Packard Patent, for Kardo?

Letters of a Broad Basic Character Date Back to Early Application in 1901

WASHINGTON, D. C., July 14—What might prove to be an important addition to the group of Kardo patents was issued today. The patent covers demountable wire wheels which may be used interchangeably on the front and rear axle. It was issued to the Packard Motor Car Co. on an old application of Edward P. Cowles who was at one time employed by the Packard company in Warren, O.

This patent shows on its face that it was filed in 1912, but as it is an offshoot of an earlier application filed in 1901, its date is carried back 13 years to the early days of the automobile industry.

As may be expected from its early date, the claims are broad, covering the use of removable wheels which may be interchangeably used on the front and rear hubs, claim 7 for instance, reading as follows:

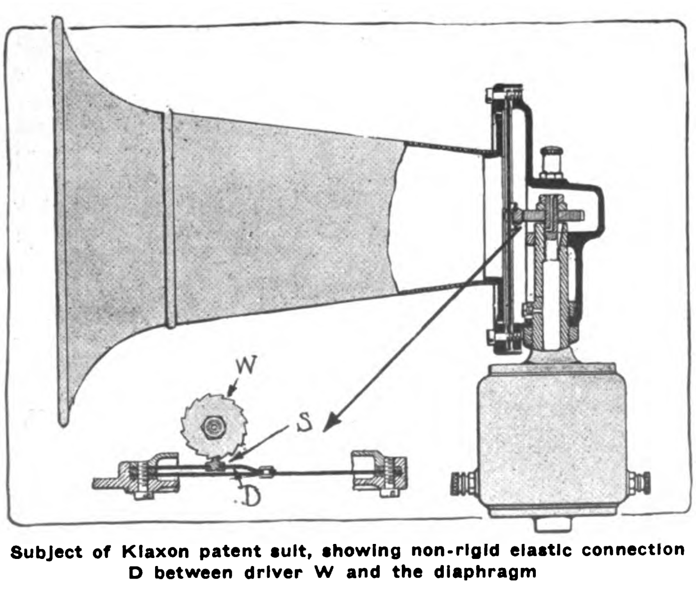
"In a motor vehicle, the combination with a front and rear stationary axle of a steering spindle pivoted at the end of the front axle, a hub-receiving member surrounding and freely rotatable upon said spindle, a driven hub-receiving member at the end of said rear axle, and wheels having hubs adapted to be removably secured, interchangeably, to said hub-receiving members."

Mr. Cowles' general idea is well expressed in his specification, where he says, "By simply removing the nuts the wheels can be interchanged, or in case of extended journeys an extra wheel carried on the carriage can be quickly and conveniently put on to replace a disabled one, without disturbing the ball or roller bearings in any way."

It is not known at the present time just what use the Packard company will make of this patent but it is reported on authority that the Kardo Co. will take it over to use in connection with the axle patents which it acquired recently from the Packard, the Peerless, and the American Ball Bearing companies.

Protest Against Truck Demonstration Tax

NEW YORK CITY, July 11—A protest against the demonstration tax now imposed upon motor truck dealers in this city has been lodged by the various dealers in this city with the Merchants' Assn. Manufacturers of and dealers in automobiles are required by the Callan automobile law to take out a general license which covers all of their vehicles prior to sale, such vehicles being identified by a single license number. But these vehicles are not allowed to be used for hire for private use. It is, however, necessary, particularly in the case of motor trucks, to demonstrate the capacity of the truck before a sale can be made. These demonstrations often show the truck in operation under the same conditions as it would be used by the owner.



Subject of Klaxon patent suit, showing non-rigid elastic connection D between driver W and the diaphragm

The Automobile Bureau of the Secretary of State's office holds that demonstrations with loads is a violation of the requirements of the law and demands that the manufacturers in such cases take out owners' licenses for these demonstrating trucks. This would compel the payment by the manufacturers in some cases of several thousand dollars annually for license fees.

The failure to comply with this law, that is, the taking out of both an owner's license and also a general license required of the manufacturers, makes the driver liable to arrest and fine.

Simms Spark Plug Patent Valid

DETROIT, MICH., July 11—In the case of the Frontier Specialty Co. against the Heinze Electric Co. for infringement of Simms Patent 642,167 covering a priming spark plug construction, final decree has been entered in favor of the complainant. The Court held that the patent is good and valid as is the title of the complainant and that the defendant infringed claims 1 to 6 inclusive and the defendant has been enjoined from further infringement of the patent. All question of damages, etc., has been settled.

Cadillac 2-Speed Axles Not Enjoined

DETROIT, MICH., July 10—Judge Sessions of the United States court, in Grand Rapids, Mich., refused to grant an injunction against the Cadillac Motor Car Co., Detroit, from continuing to make any more two-speed axles, as had been applied for by W. S. Austin, the Grand Rapids automobile manufacturer. The case will come up for final hearing August 11.

Weed Company Gets Default Order

NEW YORK CITY, July 13—In the case of the Parsons Non-Skid Co. and the Weed Chain Tire Grip Co. against the Leather Tire Goods Co., Inc., no answer was filed by the defendant in 20 days after the serving of the notice. Judge Hand has signed an order taking the bill of complaint pro confesso. The motion was made by Frederick S. Duncan, attorney for the complainants. The court ordered that the bill be taken pro confesso, "and that after the expiration of 30 days after the entry of this order a final decree may be entered herein."

A preliminary injunction on default was issued by Judge Mayer in favor of the Parsons Non-Skid Co. and the Weed Chain Tire Grip Co. in May in the U. S. District Court for the Southern District of New York.

The plaintiffs charge infringements on the Parsons patent No. 723,999, covering the well known Weed chain tire grip construction.

Klaxon Sues Newtone Dealer

NEW YORK CITY, July 13—The Lovell-McConnell Mfg. Co., Newark, N. J., has brought suit against Julius Bindrim, a Brooklyn dealer in automobile supplies selling Newtone and Newtone Superior horns. The plaintiffs allege infringement of patent No. 1,094,403, granted April 21, 1914, and covering a non-rigid elastic connection or coupling between the driver and diaphragm of an automobile horn, as shown at D in the illustration. The driving wheel is shown at W and the stirrup at S. These improvements are intended to render the sound less harsh and at the same time to reduce the wear and tear on the diaphragm. The Newtone and Newtone Superior horns referred to are models put upon the market since the beginning of the suit of the Lovell-McConnell company against the Automobile Supply Mfg. Co.

The Automobile Supply Mfg. Co. is defending the suit against Bindrim in the same manner in which it has defended all suits brought against its dealers.

Fined for Speeding—Appeals—Wins

NEW YORK CITY, July 14—The first speeding case to be tried in this city by a jury has resulted in a victory for an automobile owner and it only took the jury five minutes to acquit him after the magistrate had fined him $50.

Silas Axtell, an attorney, was the defendant. It seems that the whole case revolved around the question, whether going 18 miles an hour at 10 o'clock at night when the street was empty of any traffic was really breaking the law. The officer claimed he was going 26 miles an hour. Mr. Axtell proved he was going 18 miles an hour. The magistrate then fined him $50 for exceeding a speed law of 15 miles an hour in the crowded section of the city, with the permission of an appeal. Mr. Axtell's evidence that the street was practically empty of any traffic, was ruled out.

The appeal came yesterday before Judge Crain in General Sessions and the owner was acquitted. The judge stated that a speed of 15 to 20 miles an hour is safe when the streets are not crowded and when the driving is not reckless. The same testimony heard by the magistrate went before the jury. The ordinance involved:

1. Rates of Speed—No person shall operate, drive or propel, and no owner thereof riding thereon or therein shall cause or permit to be operated, driven or propelled, on any public highway in the city of New York, any motor vehicle recklessly or negligently, or at a speed or in a manner so as to endanger, or to be likely to endanger, the life or limb or property of any person, provided, that a rate of speed exceeding 15 miles an hour shall constitute prima facie evidence of a rate of speed and manner of driving prohibited as aforesaid and of a violation of the provisions of this section; provided further, that a rate of speed exceeding 20 miles per hour shall constitute a rate of speed and manner of driving prohibited as aforesaid and in violation of the provisions of this section; provided further, however, that a rate of speed exceeding 25 miles per hour on public highways where the same pass through country or outlying sections which are substantially undeveloped and sparsely settled, shall constitute a rate of speed and manner of driving prohibited as aforesaid and in violation of the provisions of this section.

This ordinance which became effective June 1, 1913, gives persons driving automobiles the privilege to travel the streets of New York at the rate of 20 miles per hour, but, in the unusual language of the ordinance, if the speed exceeds 15 miles it will constitute prima facie evidence of recklessness or negligence.

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WASHINGTON, D. C., July 9—A drawback allowance was today granted by the treasury department on the exportation of automobile windshields manufactured by the Diamond Mfg. Co., Detroit, Mich., with the use of imported glass.

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Stewart-Warner Charges Patent Infringement

CHICAGO, ILL., July 13—Suit has been brought in the United States District Court by the Stewart-Warner Speedometer Corp., Chicago, against the National Carbon Co., Cleveland, for alleged infringement of a Stewart magnetic-type speedometer. This is an amendment to the original bill filed a few months ago against the American Eveready Co., New York with offices in this city. The American Eveready Co. and the National Carbon Co. have consolidated and the Chicago branch, now called the American Eveready Works of the National Carbon Co., was the original defendant. The American Eveready Co. states that it will fight the case.

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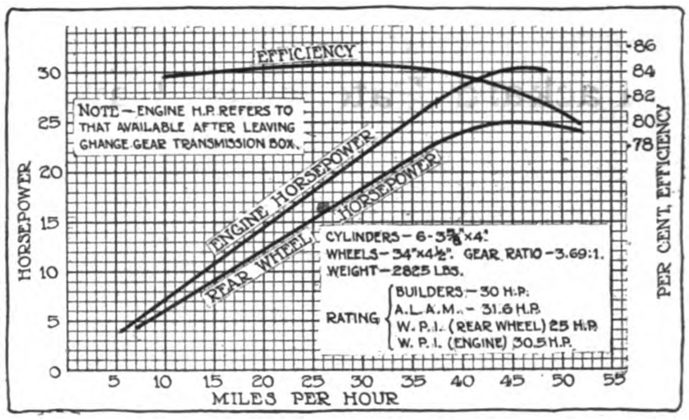
Ball Bearings in Customs Auction

CLEVELAND, O., July 9—Eleven cases of ball bearings will be sold at public auction on August 11, 1914, at the Custom House, this city, at 10:30 A. M. The cartons containing the balls are printed, "Best Quality Diamond Cast Steel Balls," manufactured by the Auto Machinery Co., Ltd., Coventry,



Curves showing the results of a test on the efficiency of the Franklin 6-30

England. The dutiable value is $4,070. The duty at 35 per cent. is $1,424.50 and the home value is $5,494.50. A detailed description of this merchandise can be obtained at Room 214, Federal Building, Cleveland. Samples will be forwarded to the collector of customs in the cities of those interested.

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Detroit Section of E. V. A. A. Organized

DETROIT, MICH., July 9—For the purpose of further promoting the popularity of electric vehicles, both for pleasure and for commercial usage, a Detroit section of the Electric Vehicle Association of America has been formed, of which J. W. Brennan, purchasing agent of the Edison Illuminating Company, Detroit, is temporary chairman.

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Franklin Shows 84.4 Per Cent. Efficiency

WORCESTER, MASS., July 8—Final reports of a test on the Franklin 6-30 chassis held in the automobile testing plant of the Worcester Polytechnic Institute of this city show an average efficiency of 84.4 per cent. in the power transmission of the car at ordinary driving speeds.

In making the test the car was run on direct gear. The rear wheels rested on steel drums which were connected to water brakes which absorbed and measured the power. In this way a reading was secured on the power that would be available for driving the car along the road at any given speed. Readings were taken at car speeds of from 5 to 50 miles an hour and the results plotted in the curve shown herewith.

The efficiency given is the ratio of the power delivered at the wheels to that delivered by the engine. Thus at 35 miles an hour if the motor is delivering 25.5 horsepower and the wheels are delivering 21.5 the car is 84.4 per cent. efficient and 15.6 per cent. is being lost in tire friction, slippage and internal losses such as bearing friction, etc. The results of the test are certified by the Institute.

Bosch Buys Rushmore Interests

NEW YORK CITY, July 8—The Bosch Magneto Company has bought the plants and the entire business of the Rushmore Dynamo Works, of Plainfield, N. J. The completion of this deal, which has been pending for some months, now gives the Bosch company two factories in which to carry out the combined business of the merger.

All the contracts and service obligations of the former Rushmore company will be carried on, and it is the present intention to carry on the Rushmore line as it was before the combination took place, with such refinements and additions as time may suggest. The Plainfield plant has a floor space of 100,000 square feet and at the present time employs a force of about 700 men. This, added to the Springfield plant of the Bosch company, practically doubles the facilities for manufacturing and now puts the Bosch company in a position to accept orders for any quantity of the full line of electric lighting and starting systems which will be manufactured.

The line of starting and lighting products which was formerly known as the Rushmore will now bear the name of Bosch-Rushmore, while the other Bosch products will still carry the name Bosch as heretofore. The government work in searchlights, etc., will also be continued.

While the manufacturing end of the Rushmore line will continue much as it was under the direction of Bosch officers, the sales and service work will be handled through the Bosch organization. The 239 service stations that have been built up by the Bosch company will now take care of the service work for the entire business. Victor Kliesrath, as chief engineer, and C. M. Wills, as factory superintendent, will supervise the work under their jurisdiction in both plants of the company.

The Rushmore company has been established for over 20 years, having specialized during that time in the production of dynamos for train lighting and arc lights. They became interested in the automobile lighting problem at an early date and then finally in the production of an electric starter. This full line, which was described in THE AUTOMOBILE for November 6, 1913, and augmented by another light starting motor, as described in the issue of May 14, will be continued. In addition, the Bosch company is manufacturing a starting and lighting system of their own. Both the Bosch and Bosch-Rushmore systems operate at 12 volts. The Bosch starting motor uses an over-running clutch and the Bosch-Rushmore a flywheel installation.

Detroit Dealers Move 12,500 Cars in 1914

No Indication of Depression in Contiguous Region—Business Generally Better

DETROIT, MICH., July 14—Detroit automobile dealers have sold during the first 6 months of this year approximately 12,436 automobiles. Eighteen of the local dealers, by their own figures, have sold 10,236 machines, and adding to this the estimate of 1200 machines sold by dealers who have not given their definite figures gives the total of 12,436.

It does not mean that this number of automobiles have been sold in Detroit and vicinity, as some of the dealers have practically all of the State of Michigan. Others have but a few counties.

In general, business this year has been much better with Detroit dealers than a year ago, in spite of the depression due to general financial conditions and that brought about by the Mexican war. Ninety-five per cent. of the Detroit dealers state they have had a better year during the first 6 months of this season than during the corresponding 6 months of 1913. The remaining 5 per cent. are not optimistic.

Practically all of the dealers are looking forward to good business for 1915, some of them having already booked large orders. Nearly half of the dealers this year experienced a shortage of cars at one time or another, and with some of them the shortage during the months of May and June was an important factor.

The following extracts from individual reports of the different companies show the general tendency of business during the first six months of the year:

Buick—Business for the first 3 months of this year was 100 per cent. better than for the 6 months a year ago. We were sold out by March 16. Since then we have turned down 316 orders. We have already booked orders for 136 1915 cars.—C. C. Starkweather, Branch Manager.

Car-Nation and Keeton—We started delivering the little Car-Nation light cars only the latter part of April and have sold several hundred, while the sales of the high-priced Keeton have been most satisfactory. The general outlook is very good—Lininger-McHugh Co.

Cartercar—Our records show 25 per cent. increase over corresponding period a year ago. Have hardly been able to get cars during last 3 months.—L. Williams.

Chalmers, Pierce-Arrow, R. & L.—Business increase 25 per cent. over a year ago. Demand for cars very strong during last month. —Neumann, Lane Co.

Chevrolet—Have done 50 per cent. better business than a year ago.—Chevrolet Motor Co.

Detroiter—Business is good, but there has been general unrest so that a high mark in sales has not been reached. Conditions are beginning to look better.

Ford Business Gains 60 Per Cent.

Ford—Business 60 per cent. better than 1913. June has been our best month, and is 100 per cent. above last year. Have sold 5,200 cars, or 2,200 more than same period last year. Our territory is entire state of Michigan, less five counties around Grand Rapids and the upper peninsula.—Ford Motor Co. Detroit Branch.

Grant—From March to July 1 have sold 165 cars. Conditions are improving and 1915 will be a big year.—Geo. C. Waite.

Hudson—Business 100 per cent. better than in 1913. Have 1915 models on hand and getting splendid business.—E. Bemb, Bemb-Robinson Co.

Hupmobile—Business 40 to 45 per cent. better than last year. Have not felt so-called business depression.—Grasser Motor Car Co.

Krit—During first 6 months of this year have sold only five less cars than during the preceding 14 months. We handle Detroit and Wayne County only. Business 50 per cent. better than last year.—H. L. Davies.

Lozier and Paige—From May 1 to July 1 have sold 100 more cars than a year ago during same period. On one model we are twenty-five cars behind deliveries now.—Wetmore-Quinn Co.

Maxwell 100 Per Cent. Ahead of 1913

Maxwell—Have sold close to 700 cars during first half of 1914, which represents an increase of 100 per cent. over last year, and could have increased our business 150 per cent. if we could have obtained cars. For last three months have been shy 100 cars per month in deliveries.—Cunningham Auto Co.

Oakland—Business 20 per cent. better than first 6 months of last year. Could have sold 40 or 50 more cars up to July 1 if we could have had them. Our territory, Wayne County only.—Detroit Oakland Branch.

Oldsmobile—Have disposed of 25 per cent. more cars than last year. Outlook for 1915 good.—Detroit Oldsmobile Branch.

Overland—Have sold a few less than 600 cars, and of these 60 per cent. right in Detroit. Business 100 per cent. better than a year ago. Our territory only five counties in state. During last 2 months we did $200,000 worth of business.—Overland Motor Car Co.

Packard—Business satisfactory as it has always been.—Standard Auto Co.

Couldn't Get Enough Cars

Reo and Mitchell—Have never had a better year than 1914 so far, having sold 600 cars in the Reo territory of nine and one-half counties, and the Mitchell in one-half the state. Three-quarters of our sales were made in Detroit and Wayne County. This business would have been 50 per cent. bigger if we had had the cars to sell. Our records show that in June we could have sold 200 more cars. Business 65 per cent. ahead of last year.—M. A. Young.

Saxon—In 4 months have sold 400 cars. Could have sold 200 more if we could have gotten them.—T. J. Doyle.

Business Never So Good—Studebaker

Studebaker—During the 8 years I have been in the automobile business, business has never been as good as this year. We have done close to 30 per cent. better during the first half of 1914 than during the corresponding 6 months of 1913. During the last 3 or 4 weeks we could not get another four and thus lost about 120 to 125 sales in less than one month. The business in sixes has been nothing short of surprising. I think the outlook for the future business has never been better and estimate that

Market Reports for the Week

MARKET prices in general remained constant this week. A weaker tone in a few of the metal products developed. Both electrolytic and Lake copper dropped in prices, due to a small demand. Tin had a fluctuating week of it. Rising to $32.60 on Friday, it suddenly broke, closing on Tuesday at $31.50 per 100 pounds. This reduction in price was in sympathy with that in London, which occurred on the same day. There was very little demand from either consumers or speculators. Prices were generally steady in the oils and lubricants market. Cottonseed oil went up $.09 per barrel due to brisk trading conditions. The rubber market in this city was firmer this week, especially for plantation. Fine Up-River Para rose $.01.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	....
Beams & Channels, 100 lbs.	1.26	1.26	1.26	1.26	1.26	1.26	....
Bessemer Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	....
Copper, Elec., lb.	.13 7/10	.13 7/10	.13 3/5	.13⅝	.13⅝	.13 3/5	—.00 1/10
Copper, Lake, lb.	.13⅞	.13 17/20	.13¾	.13¾	.13¾	.13¾	—.00⅛
Cottonseed Oil, bbl.	7.21	7.21	7.23	7.28	7.31	7.30	+.09
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	....
Gasoline, Auto, bbl.	.14	.14	.14	.14	.14	.14	....
Lard Oil, prime	.93	.93	.93	.93	.93	.93	....
Lead, 100 lbs.	3.90	3.90	3.90	3.90	3.90	3.90	....
Linseed Oil	.54	.54	.54	.54	.55	.55	....
Open-Hearth Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	....
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	....
Petroleum, bbl., Pa., crude	1.75	1.75	1.75	1.75	1.75	1.75	....
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	....
Rubber, Fine Up-River, Para	.69	.70	.70	.70	.70	.70	+.01
Silk, raw, Ital.	..	4.95	..	..	4.90	4.95	....
Silk, raw, Japan	..	4.33	..	..	4.35	4.35	+.02
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	....
Tin, 100 lb.	31.95	31.55	32.60	32.50	32.25	31.50	—.45
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	....

1915 will be the biggest year we ever had. Conditions are good all over the state, the increasing sales coming from all over and no one particular section of Michigan.—Sales Manager Detroit Studebaker Branch.

Winton—Business 50 per cent. ahead of last year. Were sold out May 18. Business for 1915 is 100 per cent. ahead of the business of a year ago.—Winton Detroit Branch.

New Federal Factories To Cost $500,000

MILWAUKEE, WIS., July 13—Officials of the Federal Rubber Mfg. Co. celebrated the third anniversary of the company's existence on July 1, by giving orders for the erection of new factory buildings to cost over $500,000. Work is already under way on the new structures. When completed the new buildings will mean an increase of 150,000 square feet of floor space, making 450,000 square feet in the entire factory. There are 1,500 employees on the Federal payroll, More men will be employed as soon as the additional factory space is available.

Superintendent Hutchens is already at work on the buildings for 1915. These will consist of a separate building 60 feet by 497 feet with six stories and basement to four of the present buildings—all 50 by 50 feet and five stories in height. Brick and mill construction will be used throughout, this having been found to be the most desirable for purposes of rubber manufacture. Among the buildings on which work has been started is the addition to the power plant. This will contain two new boilers of the latest water tube type, capable of delivering 1,000 horsepower to the dynamos. Overhead coal bunkers will be arranged in such manner as to eliminate the handling of fuel by employees from the time it leaves the freight car until it enters the automatic stokers at the base of the furnace. These coal bunkers will be 700 tons capacity.

In addition to new boilers, a 1,000-kilowatt low pressure, exhaust steam turbine will be installed. This will be directly connected to three wire current direct generator with jet condenser and cooling tower. This will increase the electric power generated formerly by one-third. Enough space will be provided in the new building to take care of one more of the big turbines, which will probably be installed during the coming year.

Superintendent Hutchens estimates that over $1,000,000 has been expended in new machinery and buildings in the past 3 years. Of the 8 acres owned by the Federal company, 6½ acres are covered with buildings, and a big portion of the remainder will be placed under roof by the end of next season.

Overland Plans 75,000 Cars for Next Year

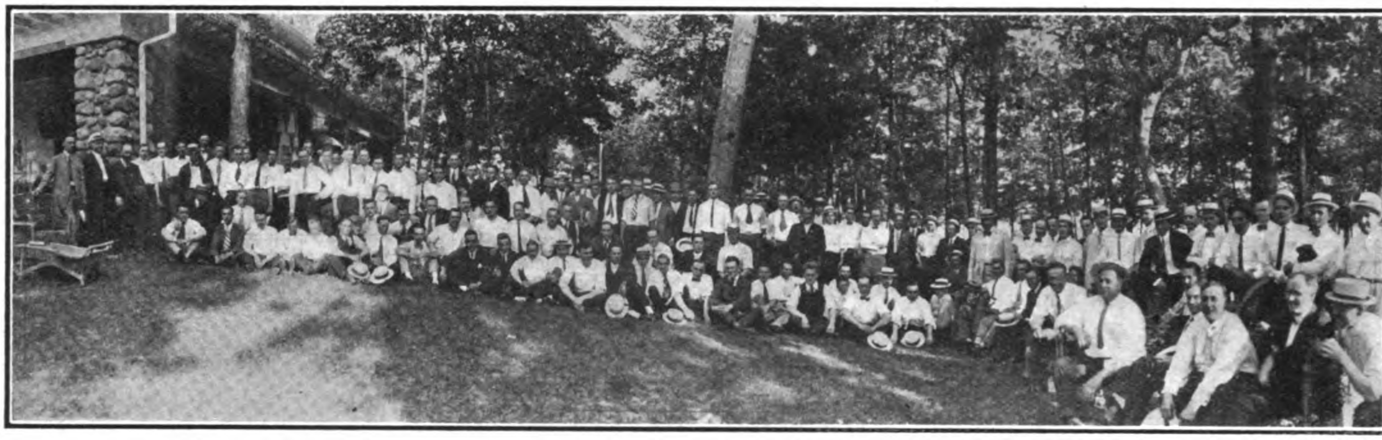
LONDON, ENGLAND, July 10—John R. Willys, president of the Willys-Overland Co., is quoted as saying that he expects to turn out 75,000 automobiles from the factories of his company during the next 12 months. Last year, he said, the company manufactured 45,000 cars. Mr. Willys also stated that the company expects to ship 7,500 automobiles to Europe next year.

Automobile Securities Quotations

NEW YORK CITY, July 15—The continued inactivity which has marked the automobile and allied securities market for several weeks has been apparent throughout the past 7 days. There were very few changes recorded, most of the stocks remaining at the same level as last week. Case gained 2 points. Firestone Tire 5, Goodyear 4 on the common and 1 on the preferred, Maxwell common gained ¼ point, Stewart, Warner common ¾ of a point, Studebaker common 1½ and preferred 2 points. The only other gains recorded were U. S. Rubber first preferred ½ point and Willys-Overland common 1 point. The losses suffered were very slight. The complete quotations for the past week follow:

Security	Wednesday Bid	Wednesday Asked	Thursday Bid	Thursday Asked	Friday Bid	Friday Asked	Saturday Bid	Saturday Asked	Monday Bid	Monday Asked	Tuesday Bid	Tuesday Asked	Week's Change	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co. com	220	..	220	..	220	..	220	..	220	..	220	..	..	145	160
Ajax-Grieb Rubber Co. pfd	98	..	98	..	98	..	98	..	98	..	98	..	..	94	100
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	97	100
Case T. M. Co., J. I	83	92	83	92	83	91	81½	86	83	92	83	92	+2	..	..
Chalmers Motor Co. com	101	104	101	104	101	104	101	104	101	103	101	103	..	110	116
Chalmers Motor Co. pfd	94	97	94	97	94	97	94	97	94	95½	94	95½	..	98	102
Electric Storage Battery Co	51⅞	52	51⅞	52	51½	52	51½	52	50	52	50	52	—1	..	..
Firestone Tire & Rubber Co. com	300	305	300	305	300	305	300	305	305	308	305	308	+5	270	280
Firestone Tire & Rubber Co. pfd	108½	110	108½	110	108½	110	108½	110	108½	110	108½	110	..	103	105
Garford Co. pfd	75	85	75	85	75	85	75	85	75	85	75	85	..	85	95
General Motors Co. com	91½	92	91	93	91½	92½	90	93	91½	92½	91½	92½	— ¼	27⅞	30¼
General Motors Co. pfd	92¼	93	92½	93	92¾	93	92	93	92	93	92	93	..	73¼	77
B. F. Goodrich Co. com	24	24¾	25½	26	26⅝	26⅞	26½	26¼	26	27	26	27	+1	27½	29
B. F. Goodrich Co. pfd	88½	89½	88½	90	88½	89	88½	89	88	89	88	89	..	90¾	92¾
Goodyear Tire & Rubber Co. com	166	170	166	170	166	170	166	170	168	170	170	—174	+4	330	337
Goodyear Tire & Rubber Co. pfd	96	97½	96	97½	96	97½	96	97½	96½	99	97	— 98½	+1	98½	100
Gray & Davis Co. pfd	98	102	98	102	98	102	98	102	98	102½	98	102½	..	..	..
International Motor Co. com	..	3	..	3	..	3	..	3	..	3	..	3	..	3	5
International Motor Co. pfd	3	9	3	9	3	9	3	9	3	9	3	9	..	18	25
Kelly-Springfield Tire Co. com	56	60	56	60	55	60	55	60	56	58	55	60	—1	..	..
Kelly-Springfield Tire Co. 1st pfd	70	80	75	80	75	80	75	80	76	80	70	80	..	..	..
Kelly-Springfield Tire Co. 2d pfd	90	100	93	100	93	100	93	100	94	100	90	100	..	..	..
Lozier Motor Co. com	..	20	..	20	..	20	..	20	..	18	..	18	..	15	20
Lozier Motor Co. pfd	..	41	..	41	..	41	..	41	..	41	..	41	..	..	90
Maxwell Motor Co. com	14¾	15	14¾	15	14¾	15	14¾	15	14	15	14¾	15	— ¼	2¾	3¼
Maxwell Motor Co. 1st pfd	44	44¾	44½	45	44	45¼	43⅝	45	44½	46	43½	45	..	24	26
Maxwell Motor Co. 2d pfd	18	19½	18¼	19¼	17½	19	17½	19	17½	19	17	19	— ¼	6	8
Miller Rubber Co	138	140	138	140	138	140	138	140	138	140	138	140	..	133	137
New Departure Mfg. Co. com	125	127	125	127	125	127	125	127	125	127	125	127	..	..	..
New Departure Mfg. Co. pfd	105	108	105	108	105	108	105	108	105	108	105	108	..	..	..
Packard Motor Co. com	103	112	103	112	103	112	103	112	103	112	103	112	..	..	..
Packard Motor Co. pfd	97	100	97	100	97	100	97	100	97	100	97	100	..	..	..
Peerless Motor Co. com	10	17	10	17	10	17	10	17	10	17	10	17	..	40	50
Peerless Motor Co. pfd	..	50	..	50	..	50	..	50	..	50	..	50	..	..	96
Pope Mfg. Co. com	..	2	..	2	..	2	..	2	..	1	..	1	..	7	10
Pope Mfg. Co. pfd	..	4	..	4	..	4	..	4	..	3	..	3	..	27	33
Portage Rubber Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	..	45
Portage Rubber Co. pfd	..	90	..	90	..	90	..	90	..	90	..	90	..	..	90
*Reo Motor Truck Co	11¾	12¼	11¾	12¼	11¾	12¼	11¾	12¼	11½	12½	11½	12½	— ¼	10	11½
*Reo Motor Car Co	18	18½	18	18½	18	18½	18	18½	18	19	18	19	..	19	21
Rubber Goods Mfg. Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. com	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	51¼	52	51¼	52	51¼	52	51¼	52	52	53	52	53	+ ¾	..	..
Stewart Warner Speedometer Corp. pfd	99	101	99	101	99	101	99	101	99	101	99	101	..	..	..
Studebaker Co. com	31½	32	31¼	32	31⅞	32⅜	31¼	32	31	32	31	32	+1½	22½	24¾
Studebaker Co. pfd	83	86	82	86	83	85	83	86	82	86	82	86	+2	82	87
Swinehart Tire & Rubber Co	85	87	85	87	85	87	85	87	85	87	85	87	..	85	88
Texas Company	143	144	142¼	143	141	143	141	142	141	143	141	143	—1	..	..
U. S. Rubber Co. com	60	60¼	59¾	60¼	59½	60	59½	60	57½	58½	57½	58½	—2	59½	60
U. S. Rubber Co. 1st pfd	103¾	104	103⅞	104	103	103⅞	103	104	103	104	103	104	+ ½	104	105
Vacuum Oil Co	220	223	220	223	220	223	220	223	218	222	218	220	—1	..	..
White Co. pfd	107	110	107	110	107	110	107	110	107	110	107	110	..	102	104
Willys-Overland Co. com	87	89	88½	89	89½	90½	90	91¾	89	91	90	91	+1	57½	62
Willys-Overland Co. pfd	95	96½	95	95½	95	96	95¼	95½	94	96	95	96	..	85	90

*The par value of these stocks is $10; all others $100.



Maxwell Motor Co.'s district salesmen, heads of departments and college boys employed in the factories enjoying an outing at the summer home of Walter E. Flanders, president of the company

Gasoline Prices Are Still Tumbling

Competition and a Reaction in the Crude Oil Market Among Contributing Factors

NEW YORK CITY, July 14—Gasoline prices throughout the country are getting lower. However, every reduction in the price of gasoline is not the result of competition alone. The recent reaction in the crude oil market had a great bearing on the lowering of these prices and not nearly so much price cutting would have been done had this not happened. However, the biggest reductions in prices have come where most competition is offered. The following list gives the prices in different sections of the country:

New York City	$0.23	St. Louis, Mo.	$0.11
Los Angeles, Cal.	.12	Jersey City, N. J.	.09
Detroit, Mich.	.11	Dallas, Tex.	.08

Conditions in this city have kept the prices a little higher than in the surrounding country. Since the beginning of July, New York garage owners have generally reduced the price of gasoline from $.25 to $.22 and $.23 a gallon, and it is likely that further reductions will be made in the near future.

The initial step in reducing prices was taken at a meeting of garage owners, started by the West Side Garage Owners' Assn., last week. Arrangements are now progressing towards the holding of another meeting of the garage men to effect a reorganization in the garage business. Under existing conditions the cost of car storage generally charged by the garage does not cover expenses. In order to make a profit the garage owners kept up the price of gasoline. Until the recent cut in prices was effected, the New York garages were paying $.14 a gallon for their gasoline and retailing it at $.25. To equalize conditions, it is proposed to raise the storage charges and lower the price of gasoline. It is thought that in this way it will be possible to bring the price of gasoline at the garages below $.20 a gallon.

The strongest competition in the East is found in Hudson county, N. J., across the Hudson from New York City, where gasoline can be bought as low as $.09 a gallon. Most of the gasoline in that territory is supplied by the Standard Oil Co. of New Jersey, Gulf Refining Co., and the Texas Co.

In the South gasoline prices are lower than they have been for a long period. In Texas gasoline is being sold to the dealers in some instances as low as $.08 a gallon.

In the middle West gasoline is sold below $.11, more frequently in Missouri.

In California several cuts in gasoline prices have recently been announced by the Standard Oil Co. of California, and these have been followed by the other companies.

3,256 Cars and Trucks Exported in May

WASHINGTON, D. C., July 15—*Special Telegram*—Ninety-nine commercial cars valued at $127,024 and 3,157 passenger cars valued at $2,857,601 were exported in May, as against 141 commercial cars valued at $236,383, and 2,895 passenger cars, valued at $2,918,806, exported in May a year ago. During the 11 months' period ended May the exports were 694 commercial cars, value $1,061,354 and 26,324 passenger cars, value $23,522,081 in 1914, and 878 commercial cars, value $1,569,750 and 22,254 passenger cars, value $22,252,032 in 1913. Our best customer in May was Canada, which imported 764 cars, valued at $941,345. United Kingdom was second with 663 cars, valued at $556,753, and British Oceania, third with 466 cars, valued at $416,259.

Charge Stock Issuance Fraud by U. S. L. Directors

BUFFALO, N. Y., July 14—Judge Hazel in federal district court Monday afternoon named James O. Moore of Buffalo, Guy M. Walker of New York City and A. Henry Ackerman of Brooklyn, N. Y., as receivers for the United States Light & Heating Co., directing them to continue business of the concern. The court fixed a joint bond of $100,000 for the three receivers. Mr. Ackerman is at present manager of the Niagara Falls plant of the company.

Alleging that in the past 5 years directors of the United States Light & Heating Co., a Maine corporation, with a plant here in Buffalo, issued in an illegal manner $9,500,000 worth of stock, several petitioners in United States district court added to their application for the appointment of a receiver charges of fraud and mismanagement. Issuing of stock in five particular cases is claimed by the petitioners and complainants as having been in violation of the law.

The stock issued to William Hawley, a director of New York, said to be worth $100,000, is alleged a fraud, stock reported worth $10,000 awarded to Sanford Adler of New York is cited in bill of complaint as being fraudulent and also the reported issuing of stock said to be worth $100,000 to J. Allen Smith of New York, at the time of the transaction vice-president of the company, and Charles A. Starbuck chairman of the directors. The issuing of stock to Edmond Hooley, inventor, of Niagara Falls, in exchange for patent rights secured by the inventor is illegal according to the complainants because the stock, they maintain, was worthless. The petitioners for appointment of a receiver by the court and complainants in an action to determine whether or not the affairs of the company were mismanaged and the directors guilty of fraud and illegal operations in office are the Picher Lead Company, Joplin, Missouri; the Buffalo Drill Company and Frederick R. Humpage, of 22 Bidwell Parkway, former head here of the E. R. Thomas Motor Car Company, creditors and stockholders and certain associate creditors and stockholders.

The directors of the company, some of whom are liable to face prosecution in the event that the petitioning creditors establish proof in their contentions of fraud and illegal practices, and William Hawley, Walter S. Crandall, Charles A. Starbuck, J. Allen Smith, Theodore P. Shonts and John A. Fleicher.

Since the first of the present year the affairs of the company have been satisfactorily carried on by Frederick R. Humpage of Buffalo and Guy M. Walker and J. A. Fleicher of New York City as a stockholders' committee. The petitioning creditors do not desire that the factories of the United States Light & Heating Company be closed down, and in court yesterday afternoon they offered in eivdence contracts to show that considerable business is offered the plant and that money perhaps sufficient to meet all obligations can be secured within the next several months.

What the petitioners maintain they do want is a thorough review of the operations of every defendant in the actions and an adjustment of the company's affairs. The concern claims assets of $3,000,000 with reported liabilities of $900,000. The plant and main offices of the company are located in Niagara Falls, and during the absence of J. Allen Smith, vice-president and general manager, who now is in Europe, the concern has been managed by Henry Ackerman, Buffalo, who in conjunction with the stockholders' committee has profitably run the business during the past few months.

Through the complaint filed by Frederick Humpage it was shown where various alleged fictitious stockholders' claims had been made by stockholders and large and exorbitant sums had been transferred to their personal use. Another important factor in the case is the fact that through John A. Fleicher, a stockholder in the company, the famous Brady estate of New York, is interested to the extent of several thousands of dollars.

Counsel for the company announced today that it will contest the receivership in the courts. The statement made advances the claim that to bring about the receivership it was necessary that the company receive preliminary notice and that no such notice was given.

Billings & Spencer To Increase Force

HARTFORD, CONN., July 10—Satisfaction is keen in local industrial circles now that the Billings & Spencer Co. has taken over the plant of the Columbia Motor Car Co., which has been closed down for some time past and dismantled of mechanical equipment. The Billings & Spencer Co., one of the soundest of the old line local industries took immediate possession. It is said an increase in the working force will result from the purchase. During the slack period with the former owners work was done in the shop for Billings & Spencer. The company has outgrown its present quarters. The transfer of the business to the new possession will be made gradually. In this way there will be no interruption in the work at the old plant. The Billings & Spencer company's progress has been consistent with the expansion of the automobile industry. With the new purchase there is ample room for expansion as the tract comprises over eight acres and furthermore shipping facilities are infinitely better at the new location as spur tracks from the main line of the New York, New Haven & Hartford road run into the factory yard and buildings. Automobile forgings constitute a big share of the company's product and most of these are shipped to the middle western manufacturers of cars. The company manufactures 23 different kinds of wrenches and in specializing on forged automobile accessories.

Quantity Production Means Cyclecar Success

By Hon. Mitchell May, Secretary of State

AN interesting phenomenon of the last year or so is the development of a motor vehicle intermediate between the motorcycle and the ordinary motor car. The name cyclecar has been invented for this hybrid machine; and it is a name that should stay, since it embodies the two principles upon which the vehicles are made,—viz., that they chiefly resemble motor cars so far as the body is concerned and motorcycles in respect to the chassis. The difference between a motorcycle and a motor car has never been legally defined in this state, but custom regards as motorcycles all motor vehicles having three wheels or less. The four-wheeled cyclecar is always a motor car, whereas the three-wheeled one might or might not be.

Big Makers Would Help

The cyclecar is still in its infancy and it is not without interest to consider at this early stage its probable line of development. There are a number now in use; some with seats arranged in tandem and some abreast and with every form of gearing and transmission. So far, the output has been from the small maker rather than from the large motor car manufacturers. The latter are at present busy with the usual form of motor vehicle, and are little under pecuniary temptation to turn their activities into a new channel. There is no doubt that the large manufacturers would be able, if they took up the cyclecar, not only to improve it greatly, but even to introduce some of its simple features into the smaller motor cars. At present, the motor car is changing very little. The influence of cyclecar design bringing with it fresh ideas, should, therefore, be good. It will inevitably suggest here and there alternative ways of doing things which have too long been stereotyped. Precisely just what effects will be produced in this way, it would be impossible to predict, but a useful stimulus may be looked for.

Hon. Mitchell May, secretary of state of New York

The cyclecar is the direct descendant of the motorcycle and side car, just as the latter sprang from the bicycle. The effort needed for propulsion of the bicycle was too wearing to allow the combination to become popular. With mechanical power this objection vanished. A cyclecar chassis is much more lightly built than motor car chassis; besides, the steering is far more simple. Some designs are on the market for $400 and there is no reason why they should not become cheaper. With proper encouragement, the cyclecar should prove an exceedingly effective way of making motoring still more popular, particularly as a means of vacation touring. At present there are not many cyclecars in use in this state, but when there is introduced a cheap, reliable vehicle costing less than a motor car does now, and capable of carrying two persons and their luggage, the movement may be expected to grow until the production of cyclecars becomes one of the greatest industries in the country. So far, the great motor car manufacturers have stood aloof and it is not to be expected that much will be seen of the cyclecar during the present year. But a great field of possibilities awaits the maker whenever the demand tempts him to take advantage of the possibilities.

Price Is the Main Factor

However, the whole question of cyclecars revolves itself into one of price and, as manufacturers have already shown that cars of moderate power can be marketed at an exceedingly low figure, when turned out in sufficient quantities, the most probable solution of the cyclecar problem seems to be in a similar direction. But the question of relative comfort is sure to be the final criterion by which choice will be made. Great as have been the strides in motorcycle and side car constructions, in the shape of greater trustworthiness and increased comfort for both rider and passenger there is no doubt that many people regard the combination with distrust on account of the apparently exposed position of the rider and the cramped position of the passenger. The degree of comfort obtainable in a cyclecar depends on the amount of attention the makers are willing to bestow upon the springing and as soon as they realize that the buyer of a motor car does not care to be too crowded, a very great improvement will result. With the light weight which is characteristic of the cyclecar the designers should be able to construct good suspensions.

French Army Testing Trucks; 112 Compete for Subsidies

Rigorous Road Trials from July 6 to August 4 Begin and End with Examinations

PARIS, FRANCE, July 9—In this year's French military commercial vehicle trials to determine the type of trucks suitable for government subsidies, there are 112 entries, constituting the biggest number of commercial vehicles ever brought together for a competition in France. The event opened on June 29 with examination and verification of the competing machines. The trucks took the road on July 6 and with the exception of 3 rest days will be kept constantly on the move until the evening of August 4, when the survivors are submitted to a close technical examination. Going back to a previously tried system, the trucks are run over a varied set of roads around Versailles, returning to this town each evening. As Versailles is practically a suburb of Paris, and within a dozen miles of the great majority of the French factories, the choice of this centre is pleasing to manufacturers.

This year's trials differ from those of last year by the admission of tractors in addition to ordinary trucks. The four wheel drive machine is a type now being seriously encouraged by the army and likely to have a considerable application for commercial purposes. All the firms taking part in the trials are French, as required by the rules. The list is as follows, each firm entering from 2 to 8 trucks of different types: Berliet, Renault, Dewald, Clement-Bayard, Delaugere-Clayette, Cottin & Desgouttes, Blum, Rochet-Schneider, Barron & Vialle, Panhard & Levassor, La Buire, Peugeot, Aries, Saurer, Mors, Balachowsky & Caire, Schneider, De Dion Bouton, and Delahaye.

Results Out in French 4-Wheel Drive Tests

PARIS, FRANCE, July 9—After considerable delay, the official results have been published of the military four-wheel drive tractor competition held by the French army last March. This event, the first of its kind, took place across country and over military roads in the east of France, during which the machines were put to a particularly severe test, and was followed by a very close technical examination in the artillery headquarters at Vincennes, near Paris. In the following list merit points have been awarded for regularity of operation, hill climbing ability, economy in fuel and oil, and finally for the state of the mechanism at the end of the tests.

LIGHT TRACTORS

		Points
1	Latil No. 9	810.7
2	Panhard No. 2 (Knight motor)	773.6
3	Panhard No. 1 (Knight motor)	743.6

HEAVY TRACTORS

1	Renault No. 11	949.3
2	Renault No. 12	943.8
3	Latil No. 8	906.6
4	Latil No. 7	851.1
5	Panhard No. 3	832.7
6	Panhard No. 4	789
7	Schneider No. 13	805.7
8	Schneider No. 14	784.7

Sixteen Entries for Elgin Races

CHICAGO, ILL., July 14—One new entry for the Elgin road races of August 21-22 has been filed within the past week—that of Charles Erbstein's second Marmon, which will be driven by Lou Heinemann.

Eight cars are already nominated for both days, making a total of sixteen for the meet. These include E. J. Schroeder's Peugeot, E. V. Rickenbacher's Duesenberg, Oldfield's and Anderson's Stutzes, Grant's and Babcock's Sunbeams, and Patschke's Marmon. The Chicago Automobile Club is counting on six cars from the Moross group, including Tetzlaff, Hughes and Calson in Maxwells, Klein in the King, Brock in the Ray, and d'Alene in a Marmon. Spencer Wishart and Ed Pullen in Mercers are promised, and Finley Porter is rushing work on his new cars in order to start three of them at Elgin.

Bob Burman has promised positively to drive his Peugeot both days, and it is almost certain that Mulford will be here with a third Peugeot. Alex Sloan is figuring on starting two Cases, and Knipper in a National is another probability. De Palma, too, can be counted on as a certain starter, but it is not known which he will drive, a Mercedes or a Vauxhall. Two more Duesenbergs will be nominated, while there are probably a dozen other likely candidates.

An extra $1000 has been added to the prize money, making first each day worth $2000; second $700 and third $300. Harry Vissering, president of the Chicago Automobile Club, already has given $200 for the fastest lap the second day, while the first day is taken care of by Martin Kavanaugh, also a club member, who hangs up $200 for the first day.

Grand Prix Mercedes for Next Vanderbilt Race

NEW YORK CITY, July 11—One of the three Mercedes that took first, second and third place in the Grand Prix of France on July 4 will probably be a contender in the next Vanderbilt Cup race.

Paul Lacroix, the American agent for the Mercedes, has received instructions from E. J. Schroeder, owner of the Mercedes car which won the two last Vanderbilt cup races, to enter into negotiations with the Mercedes factory to obtain for him one of the Grand Prix racers, which Mr. Schroeder intends to compete with in the next Vanderbilt and Grand Prix races in California and the next Indianapolis 500-mile race.

It is probable that Ralph De Palma will drive this car in the three events, but if he is not secured it is most likely that either Lautenschlager, Wagner or Salzer will come over to drive in the races.

It is expected that one of these cars will be here before long. De Palma is now abroad expecting to conclude arrangements with the Mercedes factory to bring one over for the Elgin road race, where it will be entered by E. C. Patterson.

$4,650 in Prizes at Galveston Races

GALVESTON, TEX., July 10—Sixteen events are announced for the next big automobile race meet—the Galveston Beach Carnival, scheduled for July 30-31 and August 1 and 3. Events for all classes of racing cars are on the program and $4,650 in cash prizes is offered, together with numerous valuable trophies. An innovation this year will be a day devoted to amateur races exclusively.

Parade To Dedicate 1915 Motor Exposition

SAN FRANCISCO, CAL., July 7—A line of 25,000 automobiles, the largest number of cars ever brought together at one time in the United States, is expected for the 50-mile parade during the Automobile Day Festival of the Panama-Pacific International Exposition on July 15.

This important event will signalize the dedication of the space to be devoted to automobile exhibits at the exposition. Upon the conclusion of the parade, which will terminate upon the exposition grounds, the area set aside for automobile exhibits will be turned over to the automobile industry by Captain Asher Carter Baker, U. S. N., retired, director of the Division of Exhibits.

Tented Motor Show at Indiana Fair

INDIANAPOLIS, IND., July 13—The fall motor show, to be held at the Indiana State Fair here the week beginning September 7, promises to eclipse any motor show ever given by the Indianapolis Automobile Trade Association, under whose auspices it is to be held. The committee in charge of the show consists of Fred I. Willis, of the Hearsey-Willis Co.; George D. Wildhack, general traveler for the Oakland Motor Car Co., and John Orman, of the Premier Motor Manufacturing Co.

A tent 150 feet wide and 325 feet long is to be used. This will give 20,300 square feet of exhibiting space, exclusive of

Lining up for Montamarathon trophy race at Tacoma, July 4 aisles. It will be located on a prominent part of the fair grounds, near the Coliseum. Until August 22 space will be sold at ten cents a square foot, members of the association to be given the preference. After that date the price will be increased to twenty cents a square foot.

15,000 at Louisville Midsummer Show

LOUISVILLE, KY., July 11—Under the auspices of the Louisville Automobile Club this city's first annual midsummer automobile show was held last Thursday at Fontaine Ferry Park. Twenty exhibitors were represented in the display, which included gasoline pleasure cars, trucks and electrics. Many dealers handling some of the leading makes were unable to enter the exhibition because of their inability to secure models from their factories at this time, it was announced.

Optimism was in evidence everywhere among the dealers, and indications point to a splendid season next year. According to the majority of the dealers, business is much better than it was at this time in 1913, the principal complaint of the agents being that they cannot secure a sufficient number of cars from manufacturers. Local distributors are doing the bulk of their business out in the State, where the farmers and people living in small towns are purchasing cars in greater numbers than ever before. There seems to be the greatest demand for the machine selling in the neighorhobd of $1,000, and the small cars listed under $700 also have made great strides.

The midsummer show was staged in connection with a membership campaign being conducted by the Louisville Automobile Club. Fontaine Ferry, where the exhibition was held, is an amusement park. The event was designated as Automobile Day and about 15,000 people were in attendance.

Cadillac Owner Wins Consistency Trophy

DENVER, COL., July 10—The sweepstakes trophy for the best general average of consistent driving in the first annual All-Colorado Auto Derby, July 3, 4 and 5, was won by Harry W. Swigert, driving a Cadillac. Point cups for the five separate legs of the 280-mile run from Denver to Colorado Springs, Canon City, Pueblo and return were won respectively by Carl Ph. Schwalb in a Cadillac; Swigert, winner of grand prize; A. C. Lee in an Abbott-Detroit, E. H. Bull in a Franklin and Theodore Marx in a Locomobile.

The winning time for the entire course of 280 miles was 14 hours, 6 minutes and 15 seconds, which was within 9 minutes of the time secretly fixed by the timing committee as the most reasonable for covering the official route, namely, 14 hours and 15 minutes.

Tests of New Fuel Continue

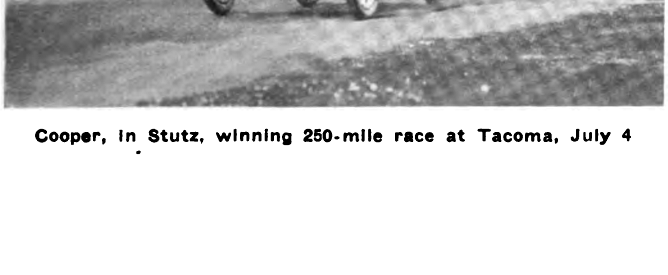
INDIANAPOLIS, IND., July 13—Experiments with the substitute for gasoline invented by John Andrews, of McKeesport, Pa., are still under way at the Indianapolis Motor Speedway and continue to attract wide attention. The experiments are being closely watched by Carl G. Fisher, president of the speedway company, and by chemists from other cities. It is understood steps are to be taken soon to place the substitute on the market.

The new fuel is distilled from water and chemicals. Andrews asserts it can be marketed at 5 or 6 cents a gallon. It can be made of any quality from 60 proof to 100 proof. The process of manufacture is rapid.

Several cars have been used in the experiments. A six-cylinder Cole using the substitute made 13.5 miles to the gallon, the substitute having a specific gravity of 60. Previously the same car made 12.9 miles to the gallon on 64-proof gasoline.

A National six-cylinder car made 16.5 miles to the gallon on 64-proof gasoline and later made 17.75 miles to the gallon on the substitute having a specific gravity of 60. Another National six-cylinder touring car, fully equipped, attained a speed of 56 miles an hour on 64-proof gasoline, then reached a speed of 60 miles an hour on 60-proof substitute.

A Marmon car made a continuous run of 116 miles on 9½ gallons of the substitute, an average of 12.2 miles to the gallon.



Cooper, in Stutz, winning 250-mile race at Tacoma, July 4

Rules Difficulties May Kill Wisconsin Tour

MILWAUKEE, WIS., July 13—There will be no revival of the Wisconsin State Automobile Assn. reliability tour for the Milwaukee Sentinel $1,000 trophy in 1914, and it looks as if the Badger motoring classic is dead for all time. Officers of the association claim that the A. A. A. will not grant a sanction for a grade 1 tour, nor permit the association to take its own steps to provide a stock car classification and registry. Therefore, for the second time, the 1,000-mile run is abandoned and unless the association makes good in 1915, there is scant hope that there will ever be another dealer's touring contest in Wisconsin, at least not under the W. S. A. A.'s auspices.

The tour was instituted in the summer of 1910 and proved a success. The trophy, which cost $1,000, was won by a Buick. In 1911 the Imperial was returned winner. Both tours were under the stringent grade 1 code of the A. A. A. In 1912 the promoter was not able to muster sufficient cars under this set of rules, so grade 3 regulations were invoked and all but three or four out of twenty-two cars came through with perfect scores and the Sentinel cup was not awarded, certificates and medals being distributed. In 1913 the W. S. A. A. ran up against the snag which put several other prospective contests in the United States out of business. The A. A. A. had no stock cars registered as required by grade 1 rules and could not grant the Badger promoters a sanction. The same situation confronts the Badgers this year.

Monihan Resigns from Cole Company

INDIANAPOLIS, IND., July 13—John Guy Monihan has severed his connection with the Cole Motor Car Co., this city, resigning the position of associate director of sales and advertising. Mr. Monihan states he will probably re-enter the automobile business this fall, but meanwhile will make an extensive automobile tour with his family.

Rudge-Whitworth Offers Prizes for Elgin

NEW YORK CITY, July 13—The Rudge-Whitworth Co., Ltd., Coventry, England, manufacturer of the Rudge-Whitworth detachable wire wheels, whose license is held in this country by the Standard Roller Bearing Co., Philadelphia, Pa., will offer the following prizes to the cars coming in first and second in the Elgin Road Race, held by the Chicago Automobile Club this year, August 21, provided the cars are equipped with Rudge-Whitworth detachable wire wheels: First, $200; second, $100.

Will Tour to Yellowstone Trail Meeting

MINNEAPOLIS, MINN., July 11—The automobile tourist caravan for the annual meeting of the Yellowstone Trail Association meeting, August 5 and 6, at Hunter Hot Springs, Mont., will leave Minneapolis July 27. Stops will be as follows: July 27, Montevideo; 28, Aberdeen, S. D.; 29, McIntosh, S. D.; 30, Marmarth, N. D.; 31, Miles City, Mont.; August 1, Billings, Mont.; August 3, Hunter. The association will lay plans at the convention for the government to open Yellowstone Park to motor cars and to extend the trail to Seattle. Government stone crushers from the Panama Canal Zone are expected to be loaned for the trail work.

Cyclecar National Association Elects New Directors

DETROIT, MICH., July 13—Active organization work has been inaugurated by the Cyclecar Manufacturers' National Assn. At a meeting in this city July 5 F. Ed. Spooner was elected secretary, with offices at 903 Free Press Building. Two vacancies in the board of directors were filled by the election of W. I. Twombly, of the Twombly Motor Corp., New York City, and W. Lumb, of the Flagler Cyclecar Co., Cheboygan, Mich. The makers at the meeting decided to encourage the promotion of contests of every character, including track races, hill climbs, etc.

Factory Miscellany

DENBY Truck Opens Factory—The Denby Motor Truck Co. has started business in Detroit with offices at 2036 Dime Bank Building, and a factory at Dubois and Franklin street. The factory has 20,000 square feet of floor space, which is to be doubled later, option having been taken on the additional room. Contracts have been placed for material for 500 trucks for the first year, with an increase to 1,000 trucks as the business develops. Particulars regarding the truck that will be manufactured are withheld at present but it will run from 1,500 pounds to 1-ton in capacity, according to reports. Garvin Denby is president and general manager of the company; J. Walter Drake is vice-president of the new company; Arthur Webster is secretary, and Edwin Denby, treasurer; L. C. Freeman is engineer, while R. P. Spencer is sales manager, with R. F. Moore advertising manager.

Southern Tire Co. Builds—The Southern Tire & Rubber Co., Augusta, Ga., will erect a plant to manufacture tires, etc. It will be 50 by 200 feet, with brick construction, and will cost approximately $9,000.

Will Furnish Atlas Spare Parts—The Auto Parts & Repair Co., Springfield, Mass., has purchased the repair end of the Atlas Motor Car Co. and can furnish all parts for 2-cycle engines at all times.

Simplex Co. Manufacturing Rims—The Simplex Demountable Rim Co., Milwaukee, has been organized to manufacture automobile rims and tire appliances. The capital stock is $150,000 and the promoters are M. Rosenheimer, W. J. Sarres and M. H. Rosenheimer. It has been engaged in manufacturing on a small scale for several months, but intends to lease larger factory quarters at once.

Richard Co. Will Build—The Richard Automobile Mfg. Co., Cleveland, expects shortly to begin the erection of a plant on Finney avenue and the Belt Line Railroad for the manufacture of touring cars. There will be provided 25,000 square feet of floor space. As the parts will be made by other plants, the work in the plant will be confined mostly to assembling, so that little machinery will be required, although a few small machine tools may be purchased.

Lord Baltimore's New Building—The Lord Baltimore Truck Co., Baltimore, Md., will move into its new building on July 20. This plant, situated on Bank and Fifth streets, Highlandtown, Baltimore, is 50 by 140 feet, two stories high with a 6-ton elevator. This building will be devoted to the manufacturing of Lord Baltimore internal gear-driven 1 and 2-ton trucks. In the new quarters there will be a paint shop and the cars will be finished complete by the company. The company has just received an order from the War Department for a 1½-ton truck.

Alter Co. in New Plant—The Alter Motor Car Co., formerly at 1146 Grand River avenue, Chicago, has moved into its new plant in Plymouth, Mich., a two-story plant, 50 by 200 feet. The concern, which is a new one, recently shipped its first ten cars and has several hundred cars booked to be delivered within the next few months. "We will be pretty busy from now on," said H. P. Choate, of the company, "catching up with our back orders. We have been delayed, especially because it took much longer to get the plant fixed up than had been anticipated."

Studebaker Acquires New Building—The Studebaker Corp., Detroit, Mich., has recently acquired the building at Hastings street and the Boulevard, Detroit, which will be used as a service department. This gives the Studebaker over 100,000 square feet of additional floor space, and means the employment of about 100 more men. When the 1,200 feet of new loading docks on Clark and Jefferson avenues, Detroit, will have been erected the Studebaker Corp. will have facilities to handle 800 freight cars per day.

Automobile Plant for Calumet—A letter has been received by Secretary George L. Price, of the Commercial Club of Calumet, Mich., from a new motor car manufacturing company, recently organized, but whose name will not be made public at present, and which desires to locate its plant in the Michigan copper district. The automobile company, in its correspondence, stated that it will have a yearly output of 1,500 cars and give employment to a large number of men.

Will Manufacture Garage Tools—The International Electric Tool Co. has been organized in Milwaukee, Wis., by a number of well known men in the electrical and engineering field to engage in the manufacture of a line of electrical tools for garages, machine shops, foundries, etc. The officers are; President, William R. Sorgel; vice-president and secretary, William H. Gaulke; treasurer, E. K. Rundle. Factory space has been leased and equipment is now being installed.

Simmons Co.'s Three New Buildings—The Simmons Mfg. Co., Kenosha, Wis., a large producer of spring sets for motor car cushions and upholstery, and the largest manufacturer of metal beds and parts in the world, has broken ground for three additions to cost $100,000 and be completed by August 15. The buildings will consist of a machine shop, pattern shop and drafting room, 60 by 260 feet; a gray iron, brass and bronze foundry and blacksmith shop, 60 by 200 feet; and a pattern storage house, 40 by 125.

The Automobile Calendar

July 18-19	Seattle, Wash., Track Meet, Meadows Amusement Co.
July 25-26	Belgium Grand Prix Road Races.
July-August	French Army Truck Subsidy Trials.
Aug. 1-3	Galveston, Tex., Beach Races.
Aug. 2-9	Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16	Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17	Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupé de l'Auto Race.
Aug. 27	Brooklands Track, England; Annual Automobile Race.
Aug.	Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug.	Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7	Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15	Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2	S. A. E. European Trip.
Oct. 16-26	Paris, France, Automobile Salon.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
November	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14	London, England; Olympia Show.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
November 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
November 15	Paris, France, Kerosene Motor Competition.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in  the Industry

Motor Men in New Roles

DODGE BROS. Announce District Agents—Dodge Bros., Detroit, have made the following appointments as district representatives: C. W. Matheson, in New York, with jurisdiction over the eastern half of that state, the northern half of New Jersey, the eastern half of Pennsylvania and the state of Connecticut. Mr. Matheson is well known in the trade, having been the organizer and president of the Matheson Motor Car Co., Wilkes-Barre, Pa., and later of the Matheson Automobile Co., New York. More recently he was first, western manager for the Palmer-Singer Co., and then became their general sales and advertising manager. F. L. Jones, formerly with S. F. Bowser & Co., the tank makers, and with Armour & Co., Chicago, will look after the Dodge Bros. interests in Philadelphia. A. C. Templeton, formerly in charge of the Kisselkar Sales Co. for northern Wisconsin and Michigan and at one time Detroit representative for these cars, and later with the Winton Motor Car Co., will have charge of Minneapolis and the surrounding territory. C. H. Hurst, formerly in Canada and more recently in Chicago with the White, will look after the business in Omaha, Neb., and surrounding territory.

Jones Lippard-Stewart Representative—C. R. Jones has been appointed district representative of the Lippard-Stewart Motor Car Co., Buffalo, N. Y., with headquarters in Dallas, Tex.

Smith Chandler Sales Manager—E. V. and Lionel Armstrong have taken charge of the new home of the Chandler Motor Car Co. in Los Angeles. D. P. Smith has been named sales manager.

Evans Goodyear Service Manager.—D. E. Evans, formerly sales manger of the General Motor Truck Co., St. Louis, Mo., is now service manager of the Goodyear Tire & Rubber Co., Detroit.

Hole Manager—The Wilcox Motor Car Co., St. Louis, Mo., has appointed a new manager for the St. Louis branch. He is Frederick E. Hole and succeeds J. P. Gertsen, who resigned because of ill-health.

Horton with Dodge Bros.—E. J. Horton, recently Eastern sales manager of the Empire Automobile Co., Indianapolis, Ind., and who also was with the R-C-H Corp., is now a member of the staff of Dodge Bros., Detroit.

Jacks Retail Sales Manager—O. A. Jacks has been appointed retail sales manager of the La Crosse Auto Co., 921 Hennepin avenue, Minneapolis, Minn. The company handles the Marathon, Imperial and Herreshoff cars.

Greene Succeeds Weldon—F. A. Greene succeeds Frank Weldon as manager of the Cole Motor Co., Des Moines, Ia. Mr. Weldon continues his connection with the company and probably will accept another agency in the state.

O'Brien Goes to Newark—Manager Sills of the Chevrolet Co., of New England, has transferred F. O'Brien, the head salesman at the Boston branch, to Newark, N. J., where he will be manager of the company's branch there.

Lersch Herreshoff Sales Manager—V. D. Lersch, manager for the Goodyear Rubber Tire Co., Albany, has resigned that position to become sales manager for the Herreshoff Motor Sales Co., the general sales agents for the Herreshoff Light Car Co.

Join Locomobile Branch—J. W. Burke, formerly with the sales staff of the New England Fiat branch, and W. S. Porter, of New York, are two recent additions to the sales department of the Boston branch of the Locomobile Co., the latter being sales manager.

Butler Makes Change—A. I. Butler, formerly manager of the Goodyear Tire & Rubber Co., Brooklyn, N. Y., is associated with The Batavia Rubber Co., New York City, in the capacity of special representative. Mr. Butler will look after northern New York territory.

Marcotte in Detroit—Roy E. Marcotte, for the past two years manager of the advertising department of the Canadian branch of the Studebaker Corp., Detroit, Mich., is now with the Detroit Studebaker and will continue taking care of the Canadian publicity from there.

McKenny Makes Change—N. E. McKenny, formerly with the American Steel & Wire Co., the American Plow Co., Madison, Wis., and the Zender, Paeschke Frey Co., Milwaukee, Wis., is now with the Federal Motor Truck Co., Detroit, being in charge of the promotion department.

Mooney Hupp Sales Manager—F. J. Mooney, advertising expert of the Hupp Motor Car Co., Detroit, Mich., who had temporary charge of the spring selling campaign, has been appointed sales manager of that company, in addition to being in charge of the advertising department.

Voorheis Oakland Sales Manager—C. B. Voorheis, until recently sales manager of the King Plow Company, Peoria, Ill., has been appointed sales manager of the Oakland Motor Car Co., Pontiac, Mich. He will be closely associated with Vice-President and General Sales Manager F. W. Warner.

Williams Heads Haynes Agency—The Haynes Auto Co., Kokomo, Ind., has established an office in this city at Fourth avenue and York street. Dave Williams, formerly connected with the advertising department of the American concern at Indianapolis, is the representative of the factory in charge here.

Joe Dawson Improving—Joe Dawson, who was injured in the 500-mile race at Indianapolis, Ind., May 30, while driving a Marmon car, is much improved. He is still in the hospital and it may be several weeks before he is able to be out. It is announced at the hospital, however, that his complete recovery is assured.

Macey Resigns—R. Ward Macey, Jr., recently severed his connection with the Premier Motor Mfg. Co., Indianapolis, Ind., but retains his interest in the company as a stockholder. Before becoming sales manager of Premier, Mr. Macey was in the sales department of Franklin, and before with Henry Ford.

Spear with Scripps-Booth—R. H. Spear, formerly a specialist in factory organization, management and executive administration and editor of the "Commercial World Encyclopedia of Accounting," has been appointed general manager of the Scripps-Booth Co., Detroit, makers of the Scripps-Booth cyclecars.

Campbell's New Job—C. I. Campbell, secretary of the Boston Automobile Dealers Assn., has been made manager of the Rockingham Fair, which will take place at Salem, N. H., during the first week of September on the big grounds formerly devoted to horse racing, and later where automobile contests were held.

New Resigns—Dr. Norman R. New, sales manager of the Milwaukee branch of the Mitchell Automobile Co., Chicago, resigned July 1 to resume his association with the home office and headquarters in Chicago after a 2-year stay in Milwaukee. H. W. Bonnell, local manager, assumes the position of sales manager in addition to his other duties.

Brandt Joins Hudson Forces—E. H. Brandt has resigned from the Detroit-Cadillac Co., New York City, to become the general eastern representative of the Hudson Motor Car Co., Detroit. He will make his headquarters in New York City and will have charge of the Hudson company's eastern business in the territory including the Eastern States and eastern Canada.

French National Advertising Manager—L. S. French has become advertising manager of the National Motor Vehicle Co., Indianapolis, succeeding P. P. Willis, who resigned to accept a position with the advertising agency of Thomas Carroll Tripp, Cleveland, O. Mr. French until recently was with the Henderson Motor Car Co., and prior to that was with the Cole Motor Car Co.

Sudrow King Sales Manager—F. G. W. Sudrow has been appointed by the King Motor Car Co., Detroit, Mich., as southern district sales manager. Mr. Sudrow was for 8 years secretary and treasurer of the National Battery Co., of Buffalo; for 2 years was connected with the Stoddard-Dayton Motor Car Co., of Dayton, O., and has also been sales manager of the Apple Electric Co. and the Marion Motor Car Co. He has a wide acquaintance of friends throughout the southern section, and will assume his duties July 1.

Smith Heads Regal Agency—R. C. Smith, formerly with the Minnesota Motor Sales Co., and A. P. Heaney, lately with the La Crosse Auto Co., both of Minneapolis, Minn., are now respectively president and general sales manager of the Regal Motor Car Company, of Minneapolis, which has been incorporated with a capital stock of $25,000, and will act as distributors for the Regal cars in Minnesota, North Dakota, the Northern half of South Dakota and Western Wisconsin. The company is located at 1400 Hennepin avenue.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BUFFALO, N. Y.—Hudson-Oliver Motor Co.; capital, $15,000; automobiles. Incorporators: E. G. Oliver, George B. Wesley, Charles W. Pooley.

CHICAGO, ILL.—Halleman Motor Livery Co.; capital, $1,000; construct, maintain, operate and deal in automobiles. Incorporators: G. W. Halleman, F. H. Janowisk, Harry De Coudres, J. Dulsen.

CLEVELAND, O.—Atlas Tire and Rubber Co.; capital, $5,000; to deal in automobiles, tires, etc. Incorporators: J. M. Bernstein, E. E. Gross, N. J. Baker, F. Allen, J. M. Ulmer.

CLEVELAND, O.—Trenton Motor Sales Co.; capital, $5,000; to deal in automobiles. Incorporators: W. K. Stanley, J. R. Jewitt, P. C. Steller, S. Horwitz, I. A. Skinner.

COLUMBUS, O.—Justus & Parker Co.; capital, $15,000; to deal in automobile supplies and accessories. Incorporators: E. E. Parker, C. E. Justus, H. M. Parker, Bernard Smith, J. A. Justus.

COLUMBUS, O.—Tesseyman Auto Co.; capital, $20,000; to deal in automobiles. Incorporators: J. E. Tesseyman, I. A. Tesseyman, F. N. Boyd, J. F. Galloway, M. Heinrich.

DETROIT, MICH.—Steere Engineering Co.; capital, $50,000; to manufacture engines, etc. Incorporators: W. S. Blauvelt, Currier Lang, A. H. Green, F. W. Steere.

DETROIT, MICH.—Simplex Engine Co.; capital, $40,000; to manufacture engines. Incorporators: H. Fraser, W. G. Taylor, F. Smallridge.

DETROIT, MICH.—Princess M. C. Co.; capital, $100,000; automobiles. Incorporators: Ola C., I. N. White, K. F. Klein.

HAMILTON, O.—Miami M. C. Co.; capital, $10,000; to deal in automobiles and supplies.

MINNEAPOLIS, MINN.—Regal Motor Co.; capital, $25,000; to deal in automobiles. Incorporators: R. C. and I. E. Smith, J. Costella.

MOLINE, ILL.—Kellogg Turbine Muffler Co.; capital, $15,000; general manufacturing, including automobile parts and accessories. Incorporators: E. M. Kellogg, E. M. Kellogg, Jr., E. C. Brain.

MONTREAL, CAN.—Stockwell Motors, Ltd.; capital, $100,000; to manufacture automobile trucks. Incorporators: F. B. Stockwell, E. E. Leger, H. E. Walker.

NEW YORK CITY—James C. Stopps; capital, $15,000; automobiles. Incorporators: James C. Stopps, Jos. M. Palmer, Louis C. Goetting.

NEW YORK CITY—Motor Credit Co.; capital, $1,000; to deal in automobiles. Incorporators: Arthur Enock, Adolph Morris, David Grinberg.

OSWEGO, N. Y.—Ontario Motor Car Co.; capital, $5,000; automobiles. Incorporators: Arthur P. Wolever, Frank C. Wolever, Chas. A. Peterson.

OWEGO, N. Y.—B. Z. T. Car Co.; capital, $25,000; to deal in automobiles. Incorporators: F. M. Baker, F. D. Baker, C. K. Bell, all of Owego.

PHILADELPHIA, PA.—Crown Tire & Supply Co.; capital, $100,000; to manufacture, sell and deal in automobiles and accessories. Incorporators: F. W. Thompson, B. S. Edwards, J. M. Frere.

PHILMONT, N. Y.—High Rock Motor Co.; capital, $5,000; to manufacture motors. Incorporators: F. B. Harder, P. M. Harder, L. F. Harder, all of Philmont, N. Y.

PUNXSUTAWNEY, PA.—International Motor Co.; capital, $15,000; to manufacture rotary motors. Incorporators: C. M. Long, Jacob E. Wolf, William Burley, J. P. North, A. B. North, Odessa Whiting, F. J. Smith, I. N. Graffius.

ROCHESTER, N. Y.—Pritchard-Lyon Motors Corp.; capital, $25,000; to manufacture motors. Incorporators: P. H. Pritchard, Aast avenue, Brighton, N. Y.; A. R. Pritchard, C. B. Lyon.

ST. LOUIS, MO.—Champion M. C. Co. of Missouri; capital, $50,000; to deal in automobiles. Incorporators: A. R. Walton, O. A. Peters, E. D. McMahon.

TORONTO, ONT.—Dominion Motor Car Co.; capital, $40,000; automobiles.

WATERLOO, IA.—Waterloo Overland Co.; capital, $10,000; automobiles and accessories. Incorporators: John Hanson, J. H. Hadley.

WATERVILLE, N. Y.—Hale Auto Corporation; capital, $500; automobiles. Incorporators: J. Chas. Hale, Augusta M. Hale, Chas. R. Hale.

GARAGES AND ACCESSORIES

BROOKLYN, N. Y.—Bedford Taxi Cab Co.; capital, $5,000; general taxicab business. Incorporators: Isaac Cohen, 128 Hamboldt street, Brooklyn; Abr. Gurewitz, B. H. Fraum.

BRONX, NEW YORK CITY—Grand Concourse Garage Co.; capital, $5,000. Incorporators: John M. Ireland, Mary A. Ireland, Caroline Haffen.

BRONX, NEW YORK CITY—Puncture Seal Co.; capital, $5,000; to manufacture compounds for mending inner tubes, tire accessories, etc. Incorporators: Henry D. Bahn, Frank S. Murray, Frank Eber.

CHICAGO, ILL.—Davis Automobile Accessories Co.; capital, $25,000; manufacturing automobile accessories. Incorporators: E. M. Oehlert, A. S. Kedzie, Harry Garrett.

CLEVELAND, O.—Atlas Tire and Rubber Co.; capital, $5,000; to deal in automobile tires. Incorporators: J. M. Bernstein and others.

CLEVELAND, O.—Harris-Henderson Tire Co.; capital, $5,000; to deal in tires and accessories. Incorporators: J. A. Harris, F. A. Henderson, J. C. Barkley, R. L. McVean, J. P. Dempsey.

GALION, O.—Galion, Mt. Gilead and Cardington Motor Transit Co.; capital, $20,000; to operate a motor bus line. Incorporators: G. C. Hornatin, F. B. McMillin, C. B. Marsh, D. J. Donavin, C. J. Cugler, E. H. Conaway, M. L. Phillips.

HAMILTON, ONT.—National Rubber Co., Ltd.; to manufacture automobile tires. Incorporators: Geo. Wenig, D. B. Wood, R. W. Long, Chas. L. Boyd, F. E. Walker.

HEMPSTEAD, N. Y.—Comfort Shock Absorber Co.; capital, $500; to manufacture shock absorbers for automobiles. Incorporators: Geo. G. Bouthinon, Ida Bowdren, Geo. P. Bowdren.

INDIANAPOLIS, IND.—Gates Mfg. Co.; capital, $20,000; to manufacture motor car tops and seat covers. Incorporators: F. E. Gates, R. A. Gates, F. O. Lane.

MINNEAPOLIS, MINN.—Lyndals Garage Co.; capital, $25,000; to deal in automobiles. Incorporators: C. E. Bullock, H. M. Lewis, E. O. Miller.

MT. GILEAD, O.—Galion, St. Gilead and Cardington Motor Transit Co.; capital, $20,000; general bus line.

NEW YORK CITY—Hollywood Garage Corporation; capital, $30,000. Incorporators: John J. Pheelan, Gerald A. Grant, Max Frieder.

NEW YORK CITY—Independent Auto Renting & Garage Co.; capital, $500. Incorporators: Thos. Callahan, Chas. M. Siegel, Chas. Pechner.

NEW YORK CITY—New York Steam Auto Tire Works; capital, $10,000. Incorporators: John J. Foley, Minnie Beck, J. A. Callanan.

NEW YORK CITY—Public Service Auto Co.; capital, $1,000. Incorporators: Frank J. Bryant, Henry Wilber, Henry F. Carden.

NEW YORK CITY—Wall Street Taxi Cab Co.; capital, $1,000. Incorporators: Bessie O'Hare, John J. O'Hare, Danl. O'Donnell.

NEW YORK CITY—Western Tire Co. of America; capital, $5,000; general tire business. Incorporators: L. Walter Lisberger, Joel Jacobs, Frank H. Cross.

NEW YORK CITY—Seventh Street Garage; capital, $10,000; garage business. Incorporators: S. Frankfater, J. Klinger.

NEW YORK CITY—Imperial Auto Touring and Taxicab Co.; capital, $1,000; general taxicab business. Incorporators: A. S. Gussow, 621 East 3d street, New York City; A. Miller.

NEW YORK CITY—Progress Auto Renting Co.; capital, $1,000; to rent automobiles. Incorporators: Morris Klein, 101 W. 114th street, N. Y. City; Samuel Klein, A. P. Blum.

PITTSBURGH, PA.—Auto Sprinkler Equipment Co.; capital, $25,000; to manufacture automobile sprinklers. Incorporators: H. A. Logue, H. C. Fry, Jr., J. E. Stone.

QUEENS, N. Y.—Astoria Taxicab Corp.; capital, $3,000; taxicab business. Incorporators: G. L. Doyle, W. F. Wund, A. V. Kenealy.

ROCK ISLAND, ILL.—Sandbo Starter Co.; capital, $10,000; to manufacture and deal in engine starters. Incorporators: H. W. Danimann, A. G. Arp, A. I. Sandbo.

SAN FRANCISCO, CAL.—Swan Carburetor Co.; capital, $200,000; to manufacture carburetors. Incorporators: H. S. Hutchings, E. M. Boynton, B. W. Boynton.

SAVANNAH, GA.—Harris Tire Co.; capital, $40,000; to manufacture automobile tires. Incorporators: S. N. Harris, H. M. Garmany, C. S. Richardson, L. B. Rith, M. B. Brabham, J. E. Mosher, E. De Loach, J. L. Sellers.

TOLEDO, O.—Rupp-Skeldon Motor Co.; capital, $50,000; to manufacture and deal in all kinds of motors. Incorporators: Robert G. Young, James Nye, James Greenwald, Bess Young and B. W. Johnson.

TULSA, OKLA.—Hi-Grade Gasoline Co.; capital, $1,000; to deal in gasoline. Incorporators: B. Revel, D. C. Rose, R. S. Fellows.

WARREN, O.—Auto Test Co.; capital, $20,000; to deal in automobile supplies. Incorporators: F. L. Spellman, H. E. Vaughan, H. G. Paden, F. W. Andrews and C. S. Vaughan.

WHITE PLAINS, N. Y.—Ashley Wire Wheel & Rim Co.; capital, $50,000; manufacture wire wheels and rims for autos. Incorporators: R. W. Ashley, F. W. Kolb and Henry L. Stuart.

WILMINGTON, DEL.—International Motor Wheel Co.; capital, $1,000,000; to manufacture automobile wheels. Incorporators: H. E. Tatter, W. J. Maloney, O. J. Reichard.

CHANGES OF NAME AND CAPITAL

CLEVELAND, O.—Alco Motor Co.; name changed to Main Motor Co.

DETROIT, MICH.—Canfield Garage Co.; capital increased from $5,000 to $12,000.

DETROIT, MICH.—Fischer Closed Body Co.; capital increased from $125,000 to $500,000.

INDIANAPOLIS, IND.—Service Motor Car Co.; change of name to Service Motor Truck Co.

OKLAHOMA CITY, OKLA.—Globe Petroleum Co.; capital increased from $8,000 to $24,000.

PORT WASHINGTON, WIS.—Turner Mfg. Co.; capital increased from $100,000 to $150,000.

Automobile Agencies Recently Established

PASSENGER CARS

Place	Car	Agent
Alva	Okla	Doty & Adams
Ashland, Ky	Detroiter	Wellman M. C. Co.
Ashland, Ky	Ford	Marting's Gar.
Ashland, Ky	Overland	Wellman M. C. Co.
Attica, O	Detroiter	H. Fike
Booher, W. Va.	Detroiter	C. B. Booher
Bowling Green, Ky	Hupmobile	Imperial Auto Co.
Bowling Green, Ky	Studebaker	Imperial Auto Co.
Braddyville, Ia	Maxwell	Wort, Friend & Andrews
Brookfield, Mo	Moon	Barbee Gar.
Bryan, O	Detroiter	C. F. Yunck
Cambridge, O	Detroiter	E. B. Shipley
Campbellsville, Ky	Ford	Buchanan-Lyon Co.
Carrollton, O	Saxon	C. A. Hess
Cavett, O	Detroiter	I. N. Borden
Cedar Rapids, Ia	Moon	Moon Auto Sales Co.
Celina, O	Detroiter	Wagner Motor Sales Co.
Chattanooga, Tenn	Buick	Chattanooga Buick Co.
Chattanooga, Tenn	Chalmers	Chattanooga Motor Car Co.
Chattanooga, Tenn	Hudson	Bill Jones Auto Co.
Chattanooga, Tenn	Overland	Wallace Buggy Co.
Chico, Cal	Maxwell	J. I. Lewis
Cleveland, O	Grant	Crotty Co.
Cleveland, O	Jeffery	J. H. Greenwald
Cleveland, O	Mercer	G. L. Sitgreaves
Colby, Kan	Maxwell	J. T. Fitzgerald
Dana, Ind	Maxwell	Scott & Stanfield
Elkhorn, Neb	Maxwell	H. J. Schneider
Evansville, Ind	Allen	E. H. Rasch & Co.
Fayetteville, O	Detroiter	C. McGuillan
Fredricktown, O	Detroiter	Leedy Farm Suppply Co
Glenmont, O	Detroiter	G. L. Robinson
Goodland, Kan	Maxwell	R. A. Kent
Great Bend, Kan	Maxwell	J. A. Pritchard
Halstead, Kan	Maxwell	R. E. Jones
Hawesville, Ky	Ford	T. D. Hale
Hot Springs, S. D.	Maxwell	W. A. Stanley
Hoxie, Kan	Maxwell	F. A. McIvor
Jamestown, O	Detroiter	W. F. Harper
Knoxville, Tenn	Cadillac	Cadillac Sales Co.
Knoxville, Tenn	Hudson	Rodgers & Co.
Knoxville, Tenn	Hupmobile	Rodgers & Co.
Lancaster, O	Detroiter	C. E. Cline
Lexington, Ky	Briscoe	A. W. T. Davis
Lexington, Ky	Howard	Phoenix M. C. Co.
Lexington, Ky	Reo	Phoenix M. C. Co.
Logan, O	Detroiter	Hocking Valley Auto Co.
Ludington, Mich	Ford	Cartier Auto & Gar. Co.
Ludington, Mich	Hupmobile	Cartier Auto & Gar. Co.
Ludington, Mich	Jackson	Cartier Auto & Gar. Co.
Ludington, Mich	Pullman	Cartier Auto & Gar. Co.
Ludington, Mich	Oldsmobile	D. MacVichie
Lyons, Kan	Maxwell	Lyons Auto Co.
Marietta, O	Detroiter	F. G. Henry
Marietta, O	Chandler	Jacob Spindler
Marion, O	Detroiter	A. D. Hill
Maysville, Ky	Ford	Central Garage Co.
Maysville, Ky	Hupmobile	Kirk Bros.
McCracken, Kan	Maxwell	Hollis Motor Co.
Menominee, Mich	Hudson	Auto Service Co.
Minister, O	Detroiter	J. B. Piening & Son
Minneapolis, Minn	Regal	Regal M. C. Co.
Monessan, Pa	Moon	Monessan Plumbing Co.
Montreal, Que	Moon	Sevigny & Lalonde
Newark, O	Detroiter	J. E. Sigler & C. Norris
Newport, R. I	Ford	D. W. Flint
New Straitsville, O	Detroiter	D. Watkins
Norton, Kan	Maxwell	Garrity & Mansfield
Norwalk, O	Chevrolet	Big Gar.
Omaha, Neb	Overland	J. R. Jamison
Otway, O	Detroiter	J. R. Walsh
Piqua, O	Detroiter	C. R. Alexander
Pomona, Cal	Maxwell	F. A. Moore
Poole, Ky	Maxwell	Poole Motor Sales Co.
Prospect, Ky	Maxwell	G. S. Dick
Providence, R. I	Hudson	R. W. Powers
Redlands, Cal	Maxwell	R. M. Morrow
Redondo Beach, Cal	Maxwell	B. E. Savage
Saginaw, Mich	Overland	Simons Sales Co.
Sentinel Butte, N. D	Maxwell	C. J. Englund
Sherwood, O	Detroiter	Sherwood Gar.
Simpsonville, Ky	Maxwell	L. G. Baskett
Springfield, O	Detroiter	W. E. Neer
Sunbury, O	Detroiter	G. E. Murphy
Tippettville, Ga	Maxwell	A. B. Tippitt Sons Co
Valley City, N. D	Maxwell	F. Flora
Washington, C. H., O	Detroiter	Economy Sales Co.
West Manchester, O	Detroiter	H. A. Gaeting
Wheeling, W. Va	Detroiter	Union Auto Co.
Wilmington, O	Detroiter	E. T. McPherson
Wooster, O	Detroiter	Wooster Gar.
Youngstown, O	Herff-Brooks	Cartercar Sales Co.

COMMERCIAL VEHICLES

Place	Car	Agent
Bowling Green, Ky	Koehler	Imperial Auto Co.
Clinton, N. J	Koehler	Frederick Neuhaus
Galveston, Tex	Koehler	Jno. Christensen & Co.
Meridian, Miss	Koehler	E. S. Curtice
St. Louis, Mo	Commerce	Federal Truck Co.
Sterling, Col	Hercules	Sterling Hdw. & Implement Co.
Summit, N. J	Koehler	E. F. Anderson
Twin Falls, Idaho	Hercules	Diamond Hdw. Co.
Wagner, S. D	Hercules	F. S. Strohbehn
Washington, Pa	Koehler	Standard Auto Co.
Wheeling, W. Va	Hercules	Century Motor Car Co
Wiley, Col	Hercules	J. B. Duffield
Worcester, Mass	Koehler	Whalen Bros.
Youngstown, O	Koehler	Regal Sales Co.

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(107)

Accessories for the Automobilist

DINSHAH Motor Tester—An electrical device showing where the motor is at fault, whether this trouble is electrical or mechanical, has been brought out by the Dinshah Sales Corp., 735 Seventh avenue, New York City. While it is attached to the high-tension circuit it is so delicately attuned that it will show all the ordinary mechanical troubles, such as lack of compression, faulty armature bearings, etc.

The tester, Fig. 1, consists of a set of spark gaps, one for each cylinder, and a set of vacuum tubes that give varying colors, depending on the condition of the electrical circuit and the motor. This outfit is housed in a box provided with a convenient visor that keeps out the light and aids in watching the operation of the instrument.

In a four-cylinder motor, for example, there are heavily insulated wires provided with clip terminals so that they may be quickly attached to the spark plugs or magneto terminals. These wires run to individual terminals in the bottom of the tester box. On one side of these terminals are the spark gaps and on the other side are the vacuum tubes. The return connections are grounded through a single wire that is also provided with a clip terminal so that it can be attached to any convenient metal part.

Note the Sparks

In testing a motor the first thing to do is to determine whether all cylinders are receiving sparks that are both hot and properly timed. This is accomplished by disconnecting the spark plug terminals and attaching the four leads of the motor tester to the magneto terminals. Then the motor is cranked over by hand, and if the sparks occur in the regular order and if the tubes show flames of a uniform color, then the ignition and timing is all right. It must not be overlooked to connect the leads from the tester according to the firing order of the motor. If this is done the sparks will occur in 1-2-3-4 order in the instrument. The spark gaps are set at such a distance that it takes the same voltage for the current to jump the gap as is required when the spark crosses the plug gap under compression. In other words, the resistance offered by the atmospheric air gap is equal to the resistance offered by the smaller gap under full compression pressure.

Where it is inconvenient to crank the motor by hand or by a starter, it may be run on two cylinders while the other two are being tested.

Having determined that the sparks are of good quality and that the firing order is correct, all the high-tension wires are connected up again and the four-tester leads are fastened to the spark plug terminals.

It will be noted that on the inside of the tester cover there is a full set of instructions so that anyone can determine, in an instant, just where the trouble is. These directions are divided into two parts, one set referring to the testing of the electrical generating system, as it is called, and the other to the spark plugs, carbureting system and compression.

Testing Directions

For testing the electrical generating system, disconnect the spark plug wires and connect them to the four leads running from the tester, and ground the fifth. Turn the crank, or operate the self-starter and look into the instrument.

1—A regular succession of white sparks at the gaps, accompanied by colored flashes in the four tubes, indicate a perfect electrical generating system.

2—If the sparks miss irregularly the trouble is due to a faulty distributor.

3—If the sparks skip back and forth regularly in two tubes, a loose armature bearing is indicated.

4—Sparks missing in two tubes show that the contact breaker is faulty.

5—All tubes flashing without sparks or with irregular sparks means weak batteries, magnets or loose connections.

6—Darkness in one tube—no electricity in that cable.

7—Darkness in all tubes—dead electrical generating system.

8—Sparks in any tube without a flash show that the engine tester is out of order and should be returned to the makers.

Having put the electrical generating system in perfect order connect the high-tension wires to the spark plugs and hook on the four clips. Then run the motor. Under these conditions no sparks will be seen, the condition of the motor being indicated solely by the colors in the tubes.

9—If all the tubes are flashing the same color the spark plugs are in perfect condition.

10—If the motor continues to operate badly the trouble is due to carburetion.

11—If a tube flashes and darkens irregularly there is a leakage of electricity or the plug point is dirty or too close.

12—A dark tube indicates that that plug is short-circuited.

13—A blinking tube shows that there is a loose connection.

14—A tube flashing very dull in comparison with the others indicates that there is a loss of compression.

15—If a tube sparks when the motor turns slowly it shows that the plug points are too far apart.

The motor tester is made with four, six and eight leads for motors of corresponding numbers of cylinders and it is planned to manufacture one with two leads for the cyclecar and motorcycle trade.

Gahm Auto Starter—A simple starter which is operated by a lever on the dash is manufactured by the Gahm Mfg. Co., Streator, Ill.

It consists merely of a crank that is attached to a cable running over a pulley to the dash. When the handle on the dash is pulled the motor is cranked.

To facilitate starting a primer that holds more than a quart of gasoline and connects direct with the intake manifold by a small pipe is used. Flow of gasoline to the manifold is controlled from the dash.

O-Lax Carbon Remover—A liquid oxygen carbon remover called O-Lax is being marketed by the Wilkes & Grant Co. of Louisville.

To remove the carbon the motor is run until hot, then take out the spark plugs of two cylinders, turn engine over until the valves are closed and see that the valves are seated. Put in from 2 to 3 ounces of the liquid in the cylinders, replacing the spark plugs immediately after, as the liquid changes into an oxygen gas when it touches the hot cylinders. After fixing the two closed cylinders and replacing the spark plugs, let same stand from 10 to 15 minutes, then the motor is started and the carbon blown out through exhaust by speeding up the motor. Then treat the remaining cylinders same as above until car is cleaned.

O-Lax is put up in quart sizes selling at $2.50, 5 gallon selling at $4.50 and 1 gallon selling at $8. A guarantee to refund money if O-Lax does not remove the carbon from the engine is given each purchaser.

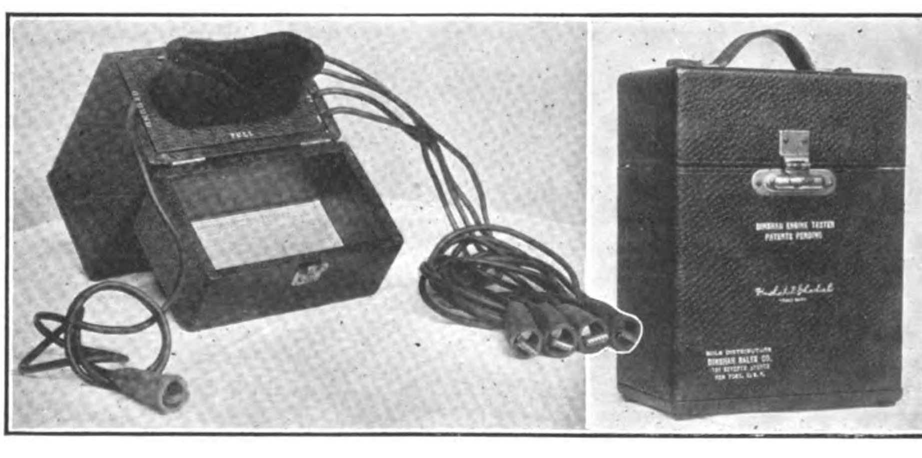

Fig. 1—Motor testing device brought out by the Dinshah company with which the cylinder conditions can be learned

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The AUTOMOBILE

Mercedes Grand Prix Racers —Their Warp and Woof

Four Steel Cylinders Used with Waterjackets Welded On— Four Spark Plugs Per Cylinder, Four Valves Per Cylinder —Mechanism Horizontal Throughout—Streamline Body

By W. F. Bradley

PARIS, July 11—A set of cars which can win first, second and third places in the greatest European road race of the year, and against the finest racing cars Europe can produce, must possess many features of interest to the average motorist, the engineer and the racing fan.

The winning Mercedes cars in the French Grand Prix were jealously guarded before the race and were even kept under close watch immediately after the contest. It has now been possible, however, to obtain some particulars of their structural features.

As is well known, this year's French rules fixed a piston displacement limit of 274.6 cubic inches and imposed a maximum weight of 2,425 pounds. Mercedes complied with the rules by building a set of four-cylinder cars of 93 by 165 millimeters, 3.6 by 6.49 inches, bore and stroke. This is a stroke-bore ratio rather above the average. With the exception of Peugeot, which had 92 millimeters bore, the Mercedes had the smallest cylinder diameter. The great majority adopted 94 by 160 millimeters. Mercedes was the only firm taking advantage of the rule allowing five cars to be entered in the race. All others were content to compete with three cars.

While these racing machines are special productions designed and prepared for the particular set of roads around Lyons, much of the experience gained in the Mercedes aviation motor has been incorporated in their design. The chassis is distinctive by being of uniform width throughout and having a double kick-up, one over the front and the other over the rear axles. The rear springs are underslung, and the mechanism is absolutely horizontal throughout.

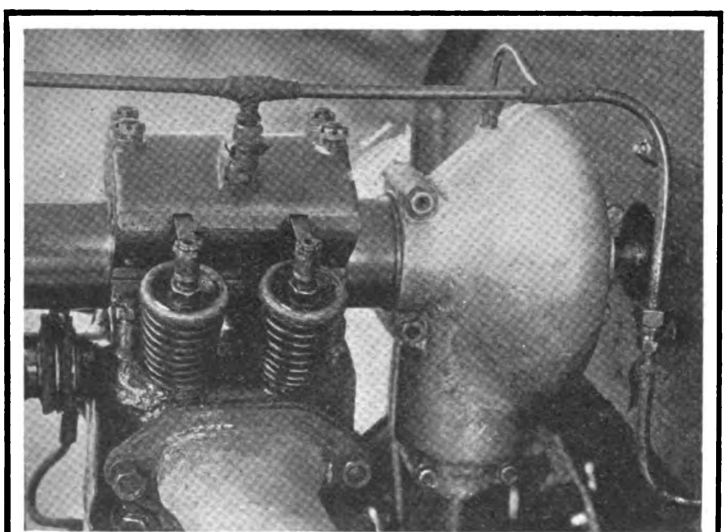


Fig. 1—Mercedes Motor—Each forged steel cylinder was fitted with two intake and two exhaust valves operated from an overhead camshaft with sixteen cams

The motors possess four separate steel cylinders machined out of the solid forging. Welded-on steel jackets are made use of; the combustion chamber is hemispheric and has four valves, two for the intake and two for the exhaust, placed in the head and inclined 30 degrees from the vertical.

Valve diameters are not known. It is estimated that they are 1.6 and 1.7 inches, but the secret is so well kept that this cannot be considered as more than an estimate.

A single overhead camshaft, with sixteen cams, operates the valves by means of rocker arms. The bronze camshaft housing is

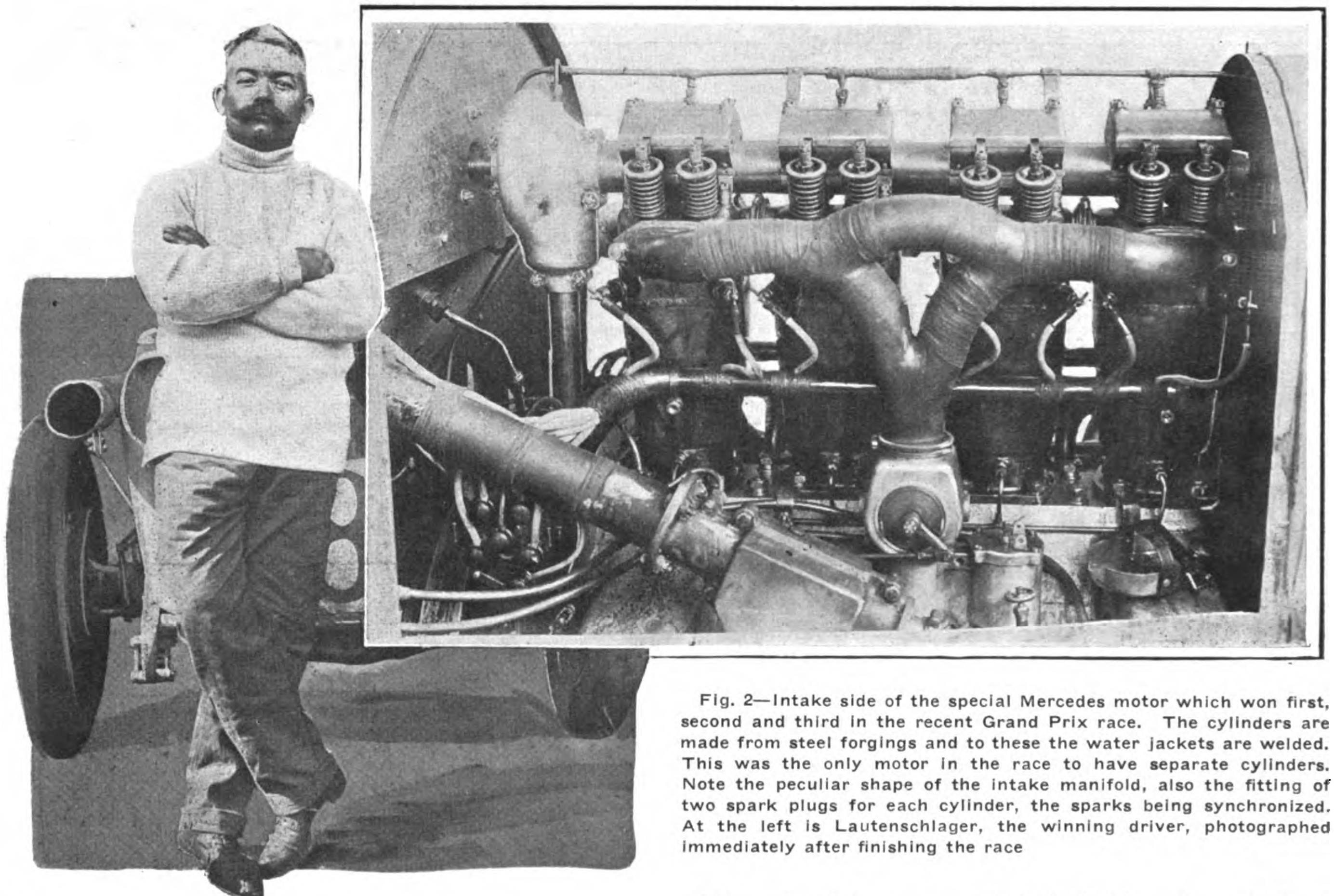


Fig. 2—Intake side of the special Mercedes motor which won first, second and third in the recent Grand Prix race. The cylinders are made from steel forgings and to these the water jackets are welded. This was the only motor in the race to have separate cylinders. Note the peculiar shape of the intake manifold, also the fitting of two spark plugs for each cylinder, the sparks being synchronized. At the left is Lautenschlager, the winning driver, photographed immediately after finishing the race

bolted to the head of the cylinders, and above each cylinder there is a detachable cover on the camshaft housing held down by four bolts and carrying the rockers. The ends of these latter thus project through the housing, and the springs are external. A vertical shaft at the rear of the motor and driven by a pair of bevel gears from the crankshaft, operates the camshaft, the upper pair of bevels being contained within an aluminum housing.

Very light cast-iron pistons are employed. The crankshaft is carried in five plain bearings and the camshaft in ball bearings.

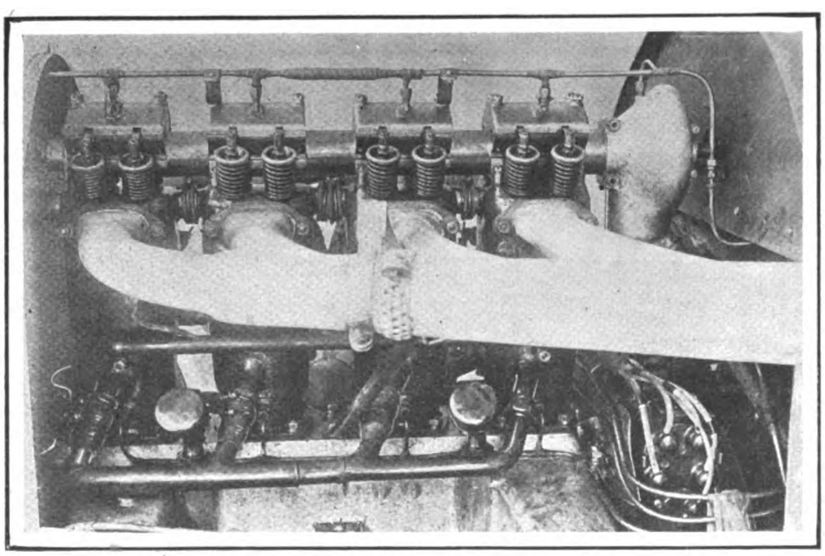


Fig. 3—Exhaust manifold of the Mercedes which is carried well out from the cylinder. Note the series water connections at the top of the cylinder jackets. Two magnetos were used, being mounted at opposite ends of the transverse shaft in front of the dash. Provision was made for four plugs in each cylinder to be fired in synchronism, but only three were used in the race

Compression is declared to be 8 kilos per cubic centimeter and the horsepower 110 to 115 at 3,000 revolutions. Several makers claim to get higher power than this, but their statements must be received with a certain amount of caution.

A transverse shaft at the rear of the motor drives two Bosch double magnetos. Provision has been made for four plugs, firing simultaneously, but in the race the cars only used three, one under each intake valve and one under an exhaust valve. The water pump is carried at the front of the motor, being on a vertical shaft driven from the front of the crankshaft. The radiator is a Mercedes honeycomb V type.

Uses Perforated Crankshaft

There are some distinctive features in the lubrication system. The crankshaft is perforated, and the oil pump, driven off the extension of the vertical shaft operating the camshaft delivers oil to the main bearings and through the internal oil ways to the connecting-rod ends. In addition there are external oil leads to the base of the cylinders on each side, to each rocker arm housing, to the upper pair of bevel pinions, and also through the hollow camshaft. While the pump takes oil from the base chamber it also draws on a reserve tank set across the frame on the floor boards just under the driver's legs. By this means a determined level of oil is always maintained in the base chamber.

On one side of the dash there is a second reserve oil tank with a foot operated plunger pump connected with it. By means of this pump the mechanic can send a supplementary supply of fresh oil to the main bearings, to the cylinder walls and to the overhead valve gear. The quantity of oil carried in the base chamber and in the main reserve tank under the men's legs is about 12 gallons. All cars went through the race without replenishing their oil supply.

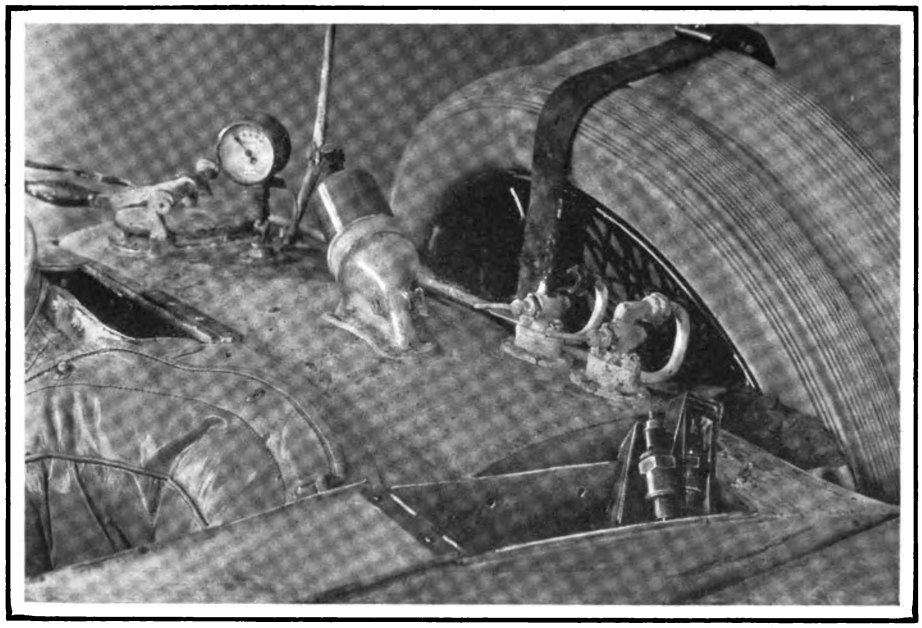


Fig. 4—Rear end of Mercedes racer showing gasoline tank mounted transversely together with various tool-carrying compartments around the tank. At the left side is a compartment for spare spark plugs and other articles. At the right is a compartment for the thermos bottle. In the center are two spaces for jack and jack lever

A separate lubricating system is provided for the water pump. Thick grease is used, but in order that the mechanic may supply this lubricant while the car is under way, the pipe from the lubricator is brought up to the dashboard and a big screw-down grease cap is provided. The supplementary oil tank also allows a delivery of oil to the forward universal joint, and on some of the cars feeds were provided to the four shock absorbers protected by leather gaiters.

Three-Point Radiator Support

The motor has rigid four-point attachment to the main frame members. The radiator on the other hand has three-point trunnion attachment to the frame. The gearbox is also a rigid four-point attachment to the frame, the connection between it and the motor being by means of double cone clutch. The flywheel is of unusually small size. A single Mercedes carbureter is made use of, the only peculiarity being the nature of the intake pipe, which can be readily seen on the illustration.

Mercedes has adhered to the firm's usual triangular attachment of rear axle, the driving shaft being within a torque tube. The axle housing comprises two units, each one being a tube and one-half of the differential housing. These parts are machined out of the solid forging and are bolted together centrally, no tie rod being used.

These were among the few cars in the race in which the drive is not taken through the springs.

The four-speed gearbox has direct drive on fourth. There is no geared-up drive.

The engineers have compromised in the matter of streamline body. The radiator is pointed, a scuttle dash is fitted, there is a complete clean cut underpan extending as far back as the rear axle, but no attempt has been made to fit a tail. While this might have been advantageous from the pure speed standpoint, it would make the wheels and tools less accessible.

The gasoline tank is therefore set across the frame, just behind the seats, and back of it is a cradle for two spare wheels. All possibility of puncturing the tank by reason of the movement of the wheels is removed by fitting a triangular tire carrier inside the cradle, and attached to the main frame members.

The gas line is double and external, both lines being connected up to the carbureter, but one of them being shut off. A big hand pump is mounted on the top of the tank with the object of equalizing pressure. The position of the tank and carbureter allows the cars to run on gravity, and when the tank was being filled the motor was not stopped.

There is a series of lockers built around the tank. On

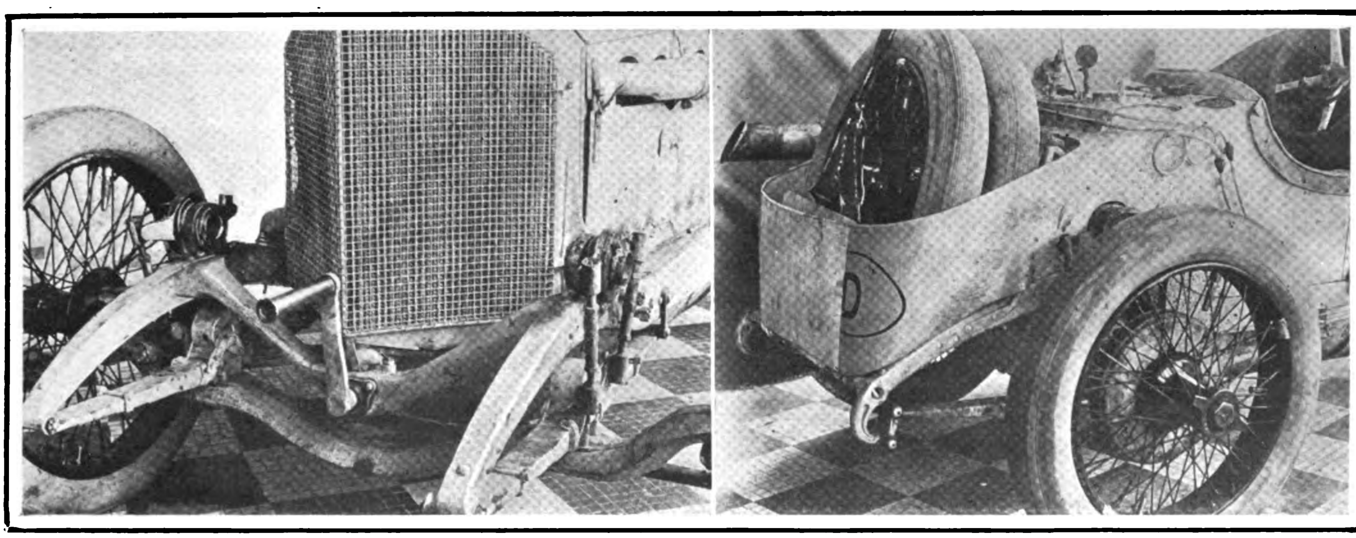


Fig. 5—Front and rear of the Mercedes racers showing how bodies were designed to eliminate wind resistance. The V-radiator was supported at three points on the frame and the underpan is continued to the rear so as to protect all of the car mechanism. The gas tank is entirely concealed between the seat and the compartment for carrying spare wheels. Note the V-shape given to forward edge of the front axle

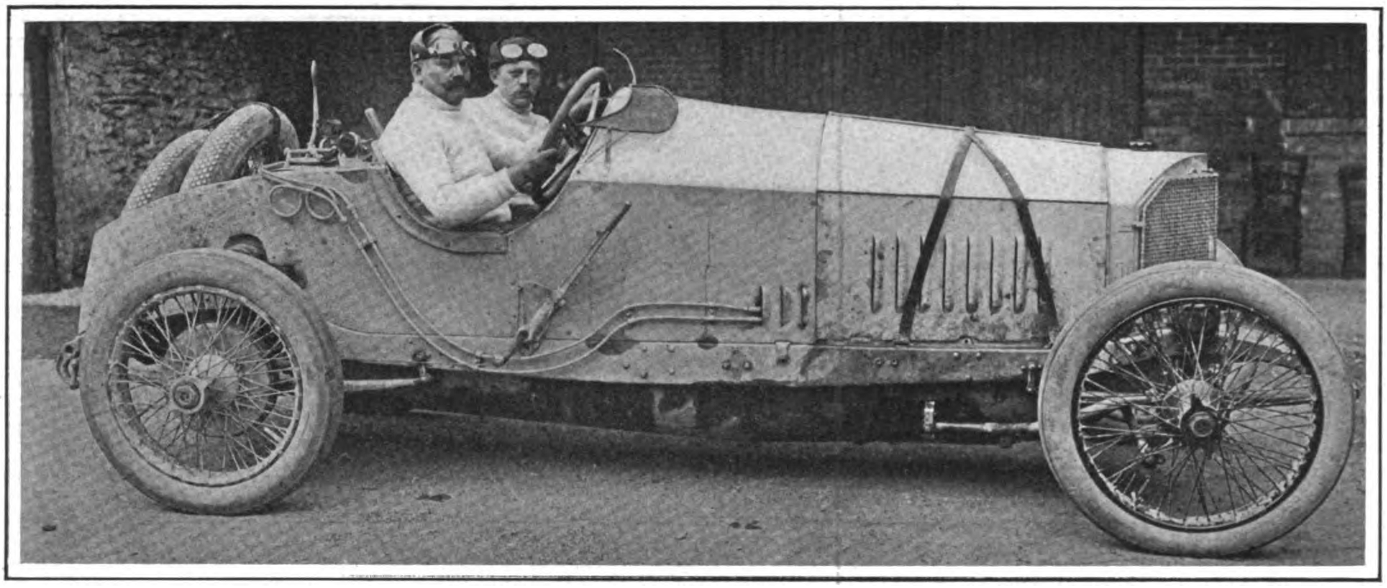


Fig. 6—Side view of Mercedes racer which won first three places in French Grand Prix race showing how the streamline design is carried out from front to rear. The rear springs are underslung and the car mechanism is absolutely horizontal throughout

the left-hand side, just behind the mechanician is a small compartment for spare plugs and other small articles. On the right-hand side, directly behind the driver, is a compartment for a thermos bottle. Some of the men had a flexible pipe attached to the bottle allowing them to drink while driving. In a central position are two holes for the jack and jack lever. Everything is readily to hand, and yet the lines of the car are as clean cut as possible. Under the dash is a small metal box, the front of which carries a set of metal tabs, numbered 1 to 10. The tabs were turned down successively, as laps are reeled off; at half distance they are all turned up again, and then successively turned down until the end of the race.

The Mercedes team ran in the race with Rudge-Whitworth wire wheels equipped with Continental tires, dimensions being 815 by 105 millimeters front and 895 by 135 rear. Lautenschlager changed at half distance as a matter of precaution. Wagner, the second man, ran through without changing at the rear and only changed front as a matter of safety.

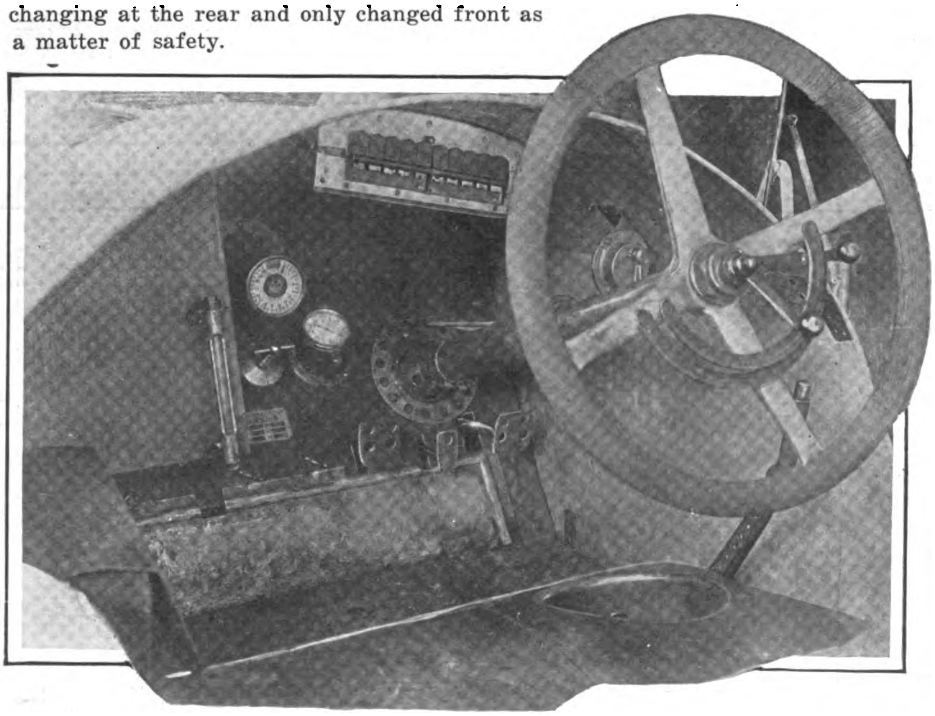


Fig. 7—Dash and control parts on the Mercedes racer. Note the counter box for keeping record of the laps in the race

Not a Spectator Injured—Drivers Only Slightly Hurt

Sporting Commission Reduced Danger To Minimum at the Grand Prix Race

PARIS, July 6—In running this year's Grand Prix race on July 4 on the 23.3-mile circuit near Lyons the element of danger was reduced to a minimum by the excellent precautionary measures taken by the Sporting Commission. At every point where people were likely to congregate the road was barred off by wood boardings. Police and troops were placed at intervals around the entire course.

A new feature this year was the placing of banks of sand or cinders on the outside of all turns and curves on the course. Thus, if a car were unable to get round the probabilities were that it would be arrested by the bank of sand without any damage being done. The sporting committee rented the land on the inside and outside of all the hairpin turns. It was thus possible to put a soldier at each of these points and absolutely prevent any person entering the danger zone.

Not a Single Spectator Injured

By reason of these excellent arrangements there was not a single accident to a spectator and the mishaps to drivers were of a minor nature. Sisz, when overtaking one of the Opel cars partly collided with this latter and suffered a dislocated shoulder. The Opel men were unhurt. Bablot, when maneuvering for a position at the pits, ran his rear wheel over his mechanician's foot. When taking a sharp turn around a wall of rock, Tabuteau struck his rear wheel against a projecting stone. The car was wrecked but the two men were hardly hurt.

Two of the hairpin turns on the course were surfaced with concrete on the top of the macadam. This gave very satisfactory results. The third hairpin turn was in a town and was paved with small smooth granite blocks. The approaching road on each of these hairpin turns was left open for a length of 50 or 60 yards, thus allowing a driver to run ahead if he discovered, on approaching the turn, that his speed was too high to get round in safety.

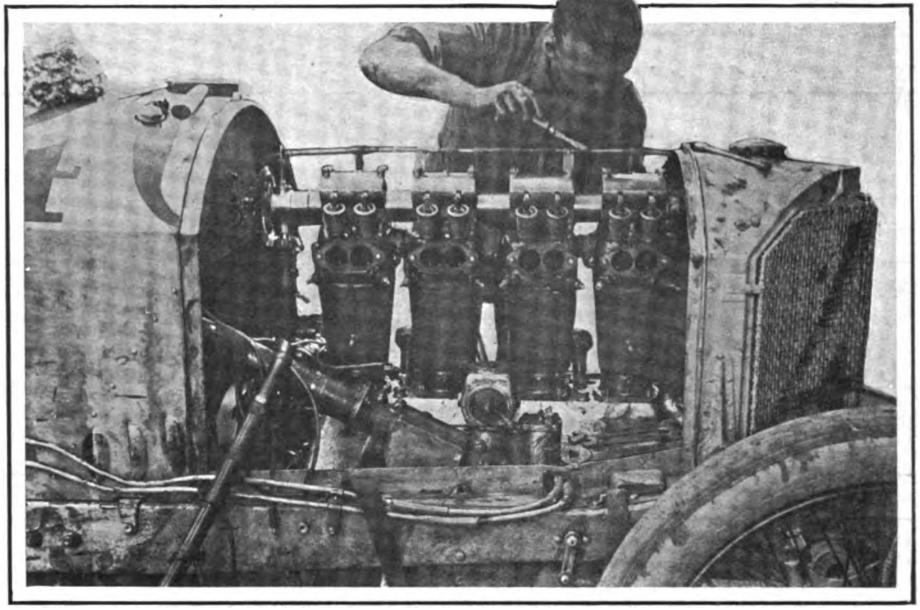


Fig. 8—Partly assembled view of the motor in the Mercedes car. The cylinders are 3.6 by 6.49 inches bore and stroke. In millimeters this is 93 by 165

Mercedes Makes Record

The lap record belongs to Seiler in 20 minutes 6 seconds, which is only a few yards short of 70 miles an hour. Wagner, when given the signal to take up the pace set by Seiler, did a lap in 20:17. The fastest lap done by any of the Peugeot men was 20:20, and as they were pushed to the limit it is evident that they were not as fast as the Mercedes. Duray furnished the fastest lap for Delage in 21:13. Lautenschlager's fastest lap was 20:33, this being when he took the lead from Peugeot. His slowest lap was the first, which he made in 22:31.

In taking account of the average speed it must be remembered that the course was an exceptionally winding one of rather a hilly nature. On the 3 1-2-mile straightaway stretch with a switchback surface the average speed of the best cars was a little more than 100 miles an hour.

Over the measured kilometer, timed in both directions and the average taken, one of the Peugeots did 112 miles an hour. In the trial work some of the Delages touched 124 miles an hour on the fastest portions of the course. In the preliminary trials a Delage averaged 73.9 miles an hour for a single lap, but this average was never made in the race itself.

It is rather difficult to get exact figures on the power obtained from the 274 cubic inch motors, for all manufacturers are not equipped for measuring power at more than 2,800 revolutions. It is certain, however, that several makers obtained more than 125 horsepower, and one maker claims to have secured 135 horsepower at 3,000 revolutions. It will be possible to make closer comparisons when these cars have been seen in the Grand Prix de France, at Le Mans. This is a fast, level course on which several races have been run, and on which the speed possibilities are a known quantity.

Firestone Has Free Library for Employees

AKRON, O., July 20—Following out its efficiency policy, the Firestone Tire & Rubber Co. has recently installed an industrial library that has many striking features, chief of which is that the provision that any one, upon request, may obtain a complete set of books or any other printed matter available on any subject he may be interested in.

Furthermore, the library staff is expected to keep in touch with all employees holding responsible positions and to know what line they are especially interested in. Whenever books or magazines are received along this line, notice is immediately sent to those interested.

A research staff is employed to look through magazines, newspapers, trade journals, etc., and cards are sent to the different individuals calling their attention to items that might be of interest to them.

At regular intervals bulletins are posted and passed around to keep every one advised as to what books are available and what recent additions have been made.

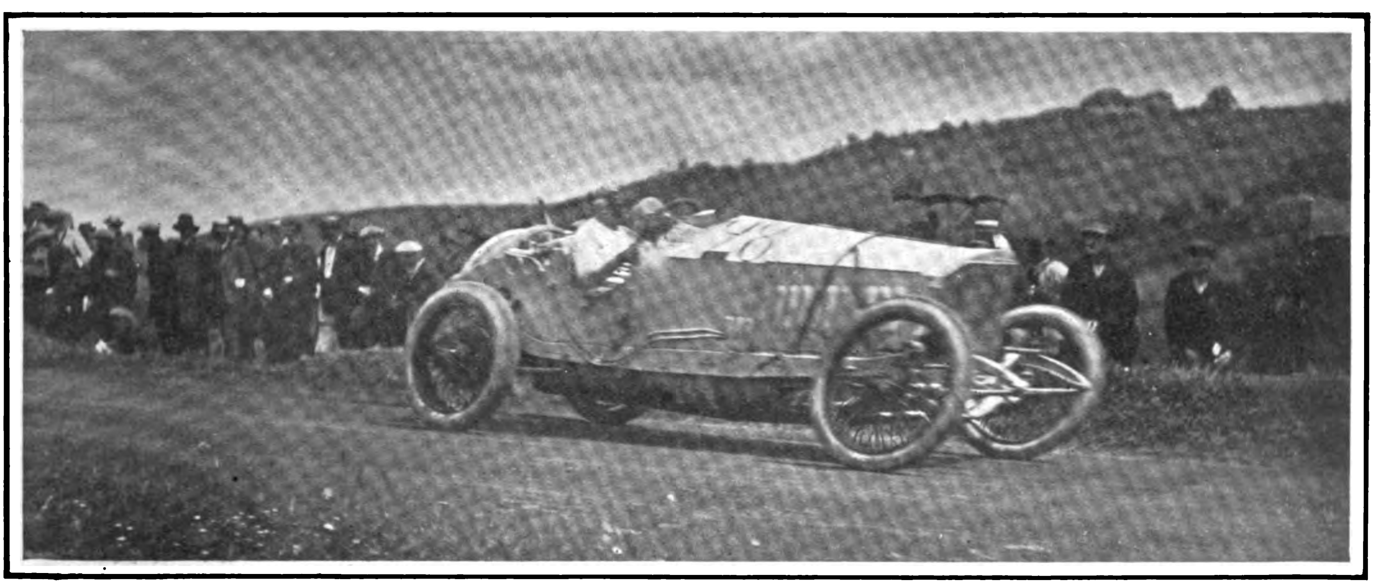
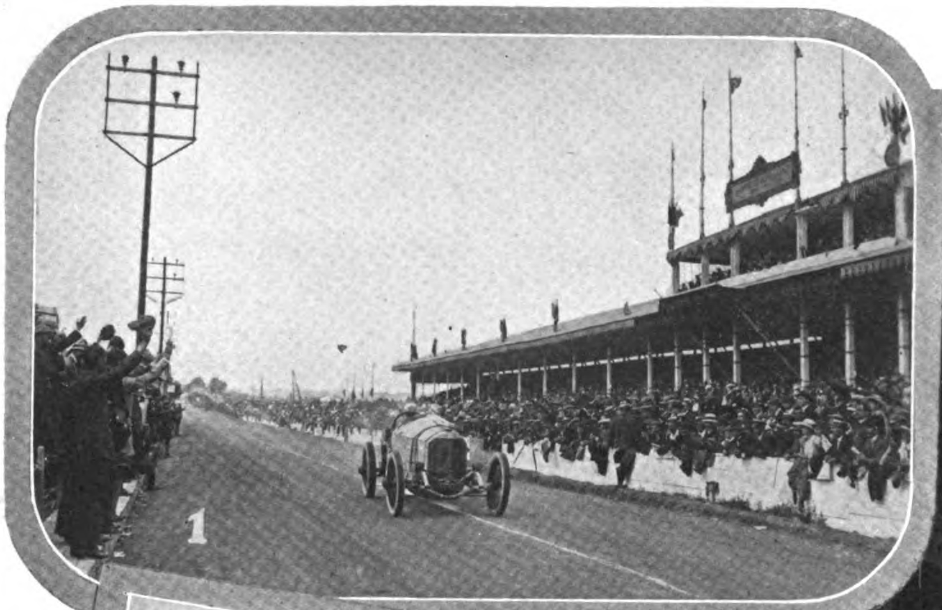
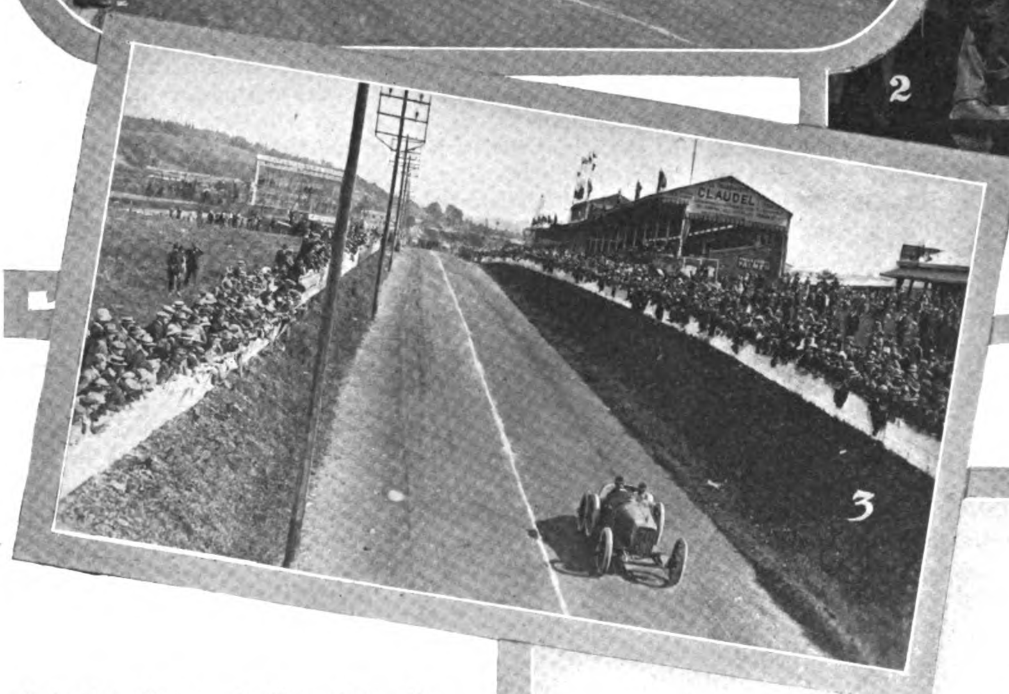
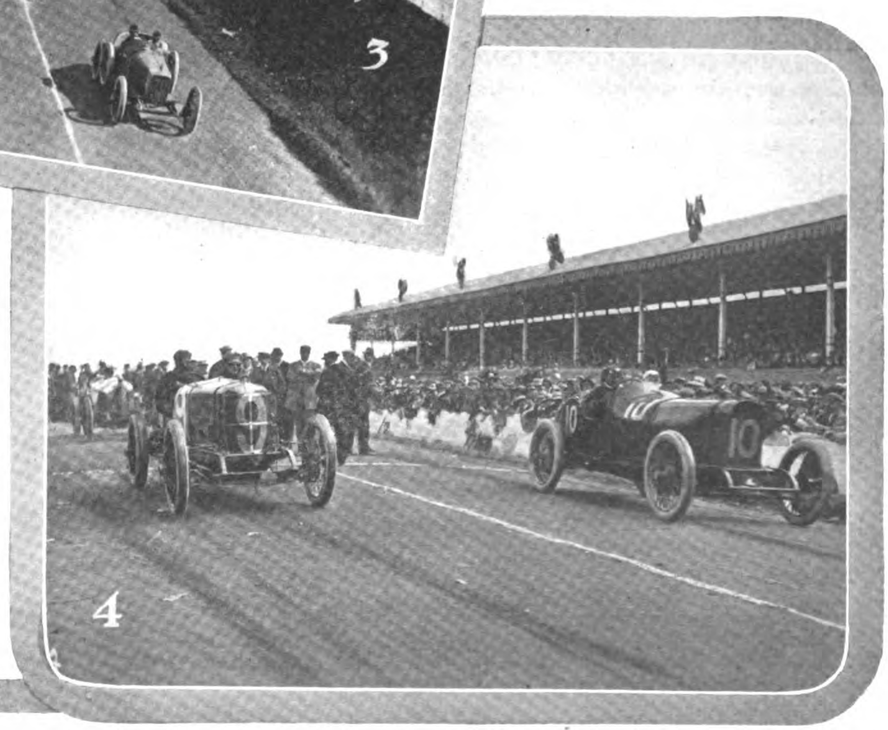


Fig. 9—Showing the Mercedes racer at full speed on the Lyons course in which it won first three places in the Grand Prix race July 4

With Europe at the 1914 French







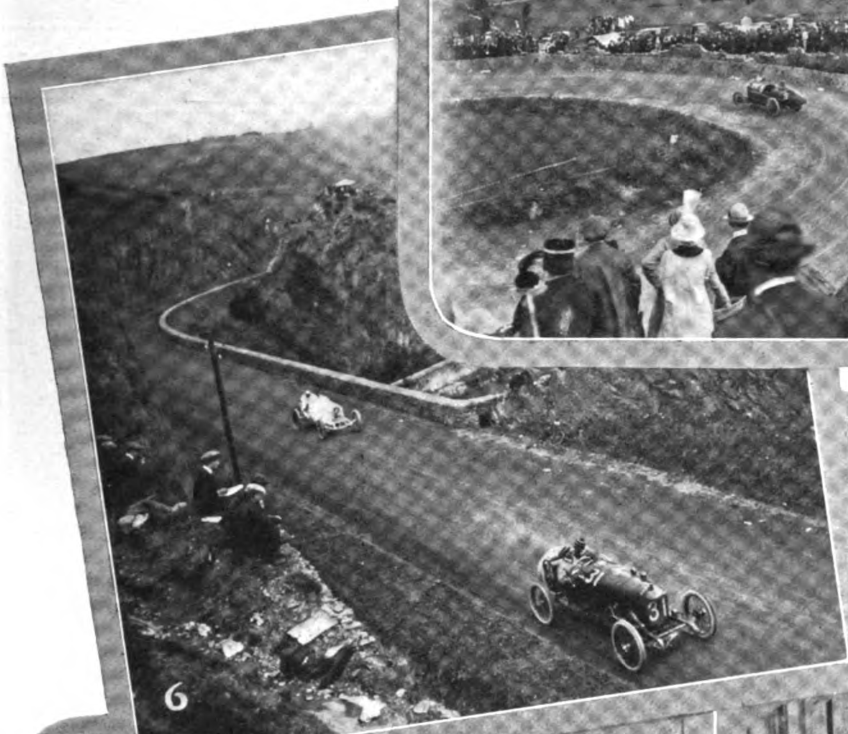
1—Lautenschlager shooting down the homestretch and winning the 1914 French Grand Prix in his racing Mercedes

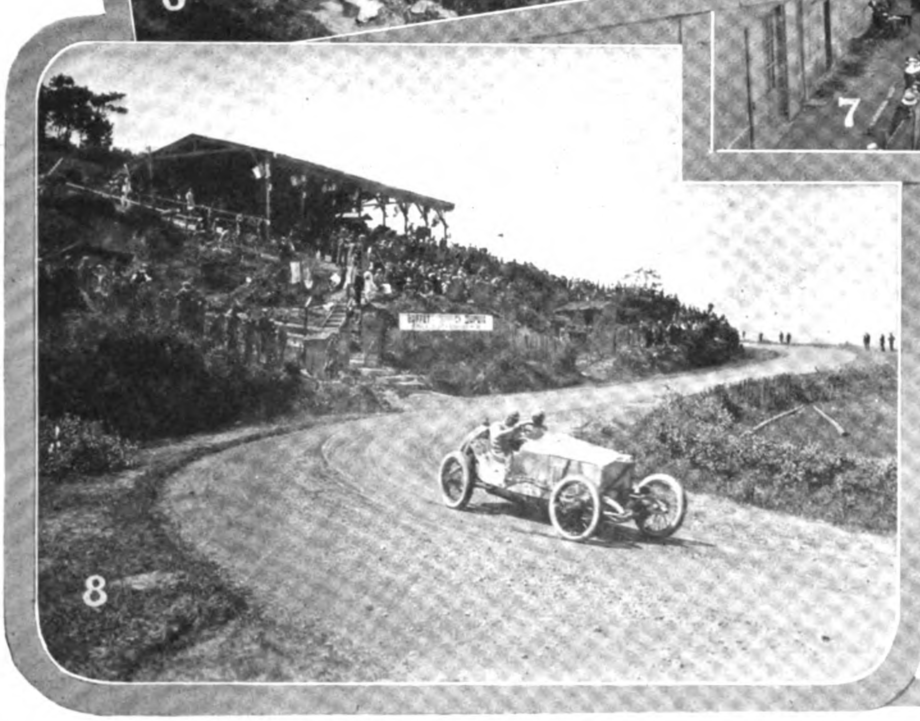
2—The happy winner, Lautenschlager of the Mercedes team, receiving hearty congratulations at the conclusion of 467.5-mile contest over the 23.3-mile Lyons circuit

3—Scales extending his Fiat to its utmost on the grandstand stretch in the French Prix race July 4

4—Chessange in the Sunbeam and Bablot in the Delage starting together in the 1914 French Grand Prix

Grand Prix on the Lyons Course



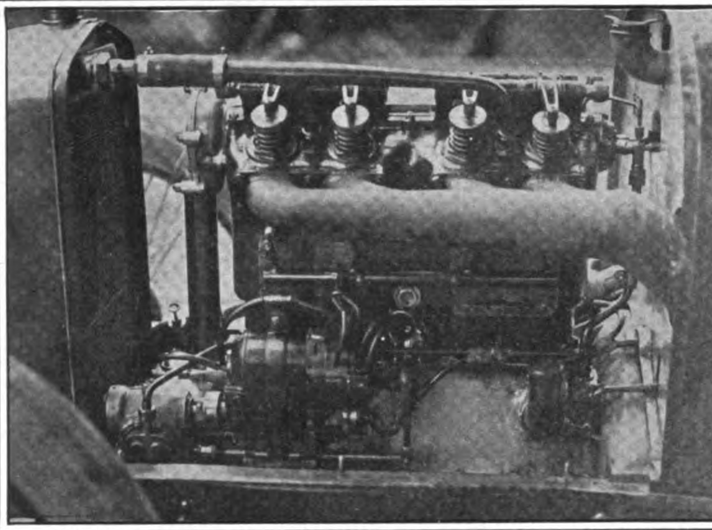


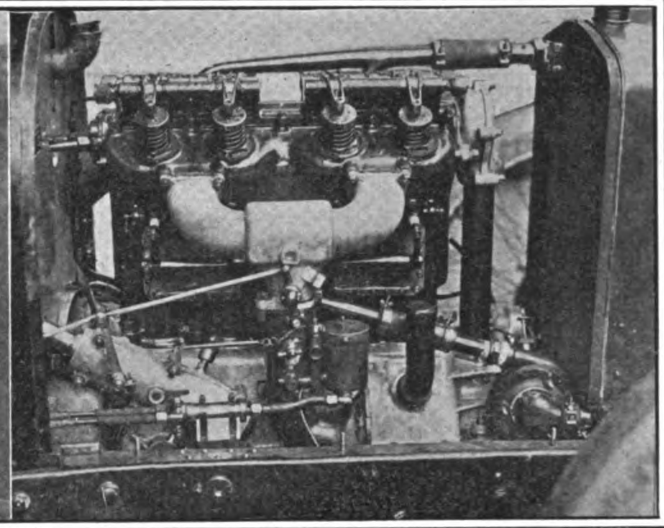
5—Boillot swinging his Peugeot around the treacherous turn called Death Corner on the Grand Prix course at Lyons

6—Joerns in his Opel chasing Watson in his Vauxhall at top speed

7—Goux sending his Peugeot over the straight-away approaching Sept Chemins hairpin turn in the Grand Prix, July 4

8—Wagner, one of the victorious Mercedes team, manipulating his mount on Death Corner in the Grand Prix race





Left—Exhaust side of Fiat motor in French Grand Prix. Note exhaust pipe under bonnet. Right—Intake side of Fiat motor

Construction Is Factor in Victory

Best Cars and Men Won Grand Prix—Mercedes Covered 30,000 Miles in Tests

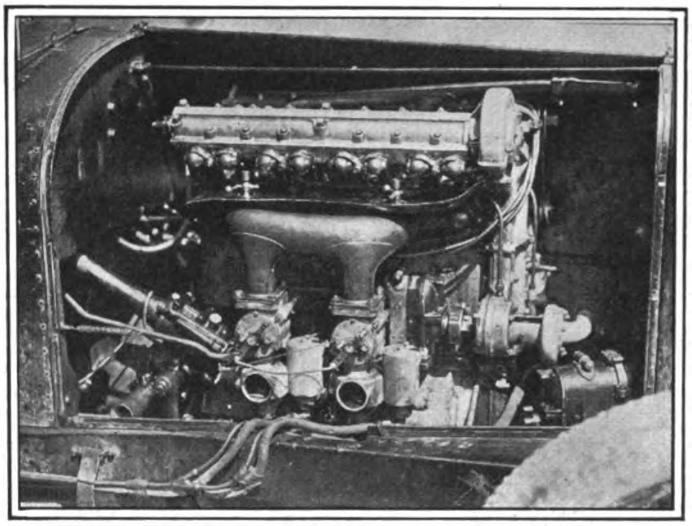
PARIS, July 6—Although it may be a severe blow to French pride, the admission has to be made in Paris that the best cars and the best men won the 1914 Grand Prix at Lyons last Saturday. There is a slight attempt in certain quarters to ascribe the Peugeot defeat to tires, but this excuse will not stand serious examination and is not even put forward by any impartially minded person.

When the race started five firms were picked out as likely to furnish the winner. They were Delage, Peugeot, Mercedes, Sunbeam, and Fiat. It was early discovered that Delage could not be relied on. During the practice period there had been a certain tendency for these motors to backfire into the carbureter, and one caught fire during the official practice. The valves are a new type with double cams giving a positive closing as well as a positive opening. It was thought that the backfiring was caused by an imperfect seating of the valves, and as a matter of precaution the timing was changed the night before the race. There was no time to try out this modification, and it was only when the cars had started in the race that it was seen to have been a most serious mistake. This move came as a great surprise, for Delage has the reputation of being the most careful race organizer in Europe.

Sunbeam experienced mechanical difficulties on two of the cars—broken piston and broken connecting-rod—and the third had some tire and plug trouble. Fiat also met with valve and plug trouble.

As to the others in the race, they were generally suffering from a lack of detail preparation and did not look upon themselves as capable of getting the first place.

Much of the success of Mercedes in this race may be attributed to the very thorough manner in which the race was entered and prepared for. As soon as the rules were announced the German factory put in the maximum number of five cars. The drivers were sent to study the roads as early as last January and two entirely different types of cars were built. One set of cars had six-cylinder motors built to the maximum piston displacement and the other set were those



Sunbeam motor. Note spare magneto and two carbureters

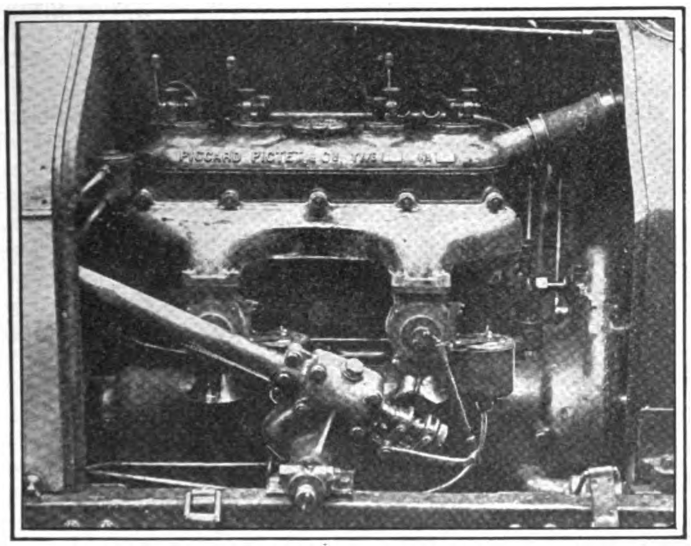
which ran in the race, and had four-cylinder motors. Both sets were completely ready 2 months before the date of the race. In addition to the five cars run in the race, a sixth reserve car was prepared and was even weighed in with the others so that it could start if an accident happened just before the race. Further, a complete chassis without motor was brought to the racing headquarters, to be used in case of emergency, a week before the start of the race. It is estimated that 30,000 miles were covered in road tests before the Mercedes team came to the starting line.

The general organization of the race was also cleverly worked out. The numbers of the cars were decided by the drawing of lots, but this drawing affected the cars only and not the drivers. Thus, at the last moment it was decided to let Sailer, a newcomer and an untried man, take the first of the Mercedes cars, and orders were given him to sacrifice everything in an attempt to run the others to death. Boillot was particularly picked out for punishment in this combination and he fell into the trap in an unusually simple manner. He started No. 5, with Sailer, No. 14, getting away 2 minutes later. As soon as the Frenchman was informed that Sailer had set up a faster pace he opened out with an eye to grandstand applause and when the German passed him on the road, his only thought was to regain the leading position. Sailer overturned after covering nearly six laps, but the German trick had been played, for Boillot had been punishing his car and himself and the three other Mercedes men, after lying back at the outset, were given the order to spurt ahead and maintain a killing pace for Boillot.

The Germans, too, showed superiority in their pit arrangements. They started out with tires of 135 millimeters section on the rear, whereas the Peugeot men used 120 millimeters, and were so undecided as to whether steel studs or smooth treads should be used that some of them made three changes in order to get comparative results. Lautenschlager made one stop for tire changes at the fourteenth lap, replacing all four wheels as a matter of precaution. It was noted that the tires were evidently satisfactory for the entire race, but having received orders to change at this point Lautenschlager carried them out.

Many Racing Precautions

Detail preparation of the racing cars was a strong feature with all of the teams. The external polish and varnish, equal to that given to show models, was merely an indication of the minute care bestowed on the essentials. The Mercedes used a double gasoline line, both completely connected up, but one of them shut off by means of a cock. This duplication was general. Sunbeam, in addition, had all copper pipes, whether for gasoline or oil, inside thick rubber tubing. These two firms carried the pipes on the outside of the frame members, with a filter and water separator so placed that it could be reached by the driver without getting from his seat. Delage wrapped all oil leads heavily in adhesive tape to prevent breakage. These arrangements were so thorough that not a single car was stopped by reason of oil or gasoline lines.



Piccard-Pictet sleeve-valve motor. Note two carbureters

Streamline Efforts General

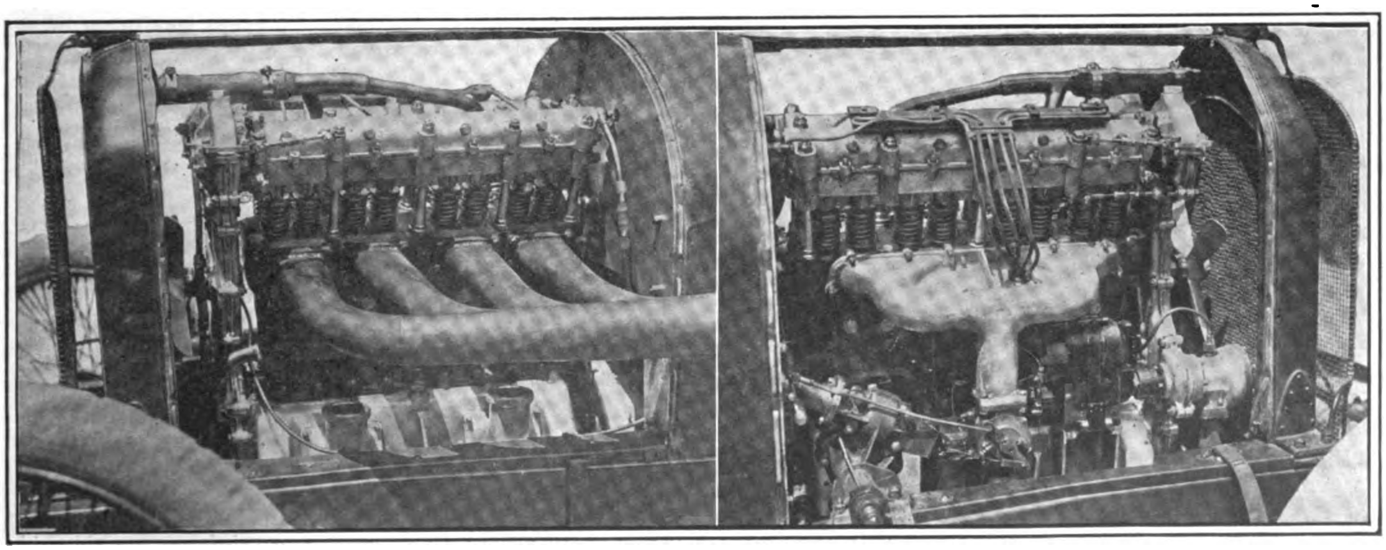
Where streamline bodies were adopted the protection of the under organs followed as a natural consequence. Fiat and Peugeot did the most original work in this connection. The former firm had a narrow radiator, a tapering hood, a scuttle dash and a cigar-shaped tail with the gasoline tank carried inside it. The streamline effect was perfect, for an underpan was fitted from the radiator to back of the rear axle, giving a circular section practically at every point of the car. The exhaust pipe, instead of being external, was kept under the hood, being passed under the dashboard and finally brought outside the underpan and carried horizontally to the rear.

While this car had the most highly refined streamline effect, some of the advantage was lost by having to carry the spare wheels one on each side, between the front and rear wheels. Peugeot got over this disadvantage by lengthening the tail and setting two wheels vertically within it, a hump being formed on the tail to accommodate them.

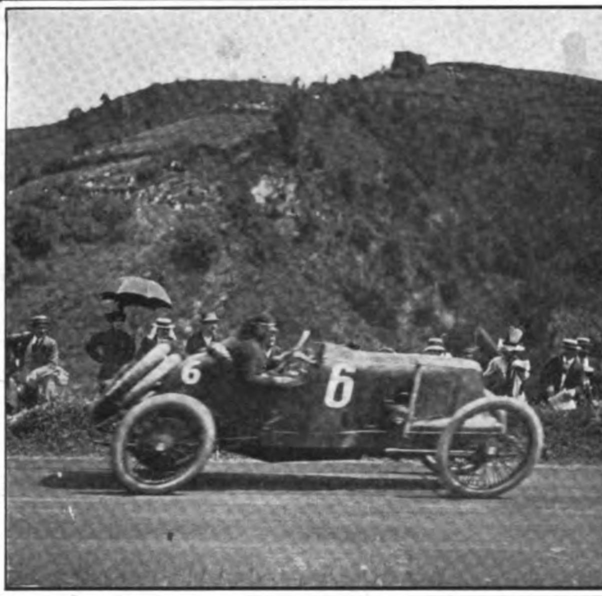
Mercedes recognized the value of a streamline body by using a pointed radiator and having a complete unbroken underpan, also wind cutters for the front axle. Back of the driver's seat, however, there was no attempt at cutting down resistance. The tank was set across the frame and back of it a cradle for two spare wheels. Within the frame work around the gas tank there were separate compartments for a jack, hammer, levers for jack, and even a pocket for a drinking bottle containing a small quantity of spirits. Delage had a similar general arrangement at the rear, the drinking bottle being replaced by a fire extinguisher.

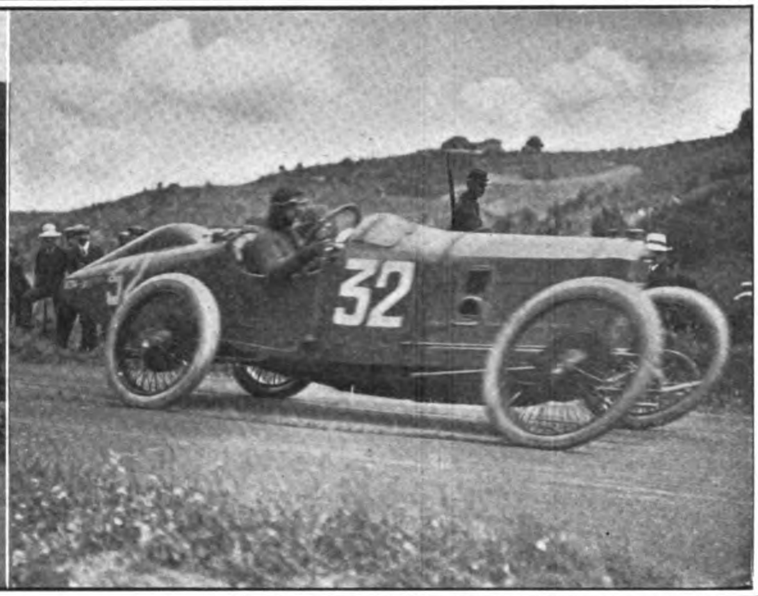
Front-Wheel Brakes Made Good

For the first time in automobile racing front-wheel brakes made their appearance on Delage, Peugeot, Piccard-Pictet and Fiat cars. Although the winning cars were not equipped with this type of brake, there can be no doubt that braking on all four wheels was decidedly advantageous. The grandstands were on a slightly down grade and as this stretch was preceded by a straightaway down grade, there was a tendency for drivers to approach their pits at too high a speed. Several of the drivers with cars having the ordinary types of brakes overshot their mark and either skidded violently or caused the back wheels to dance in a fantastic manner in their efforts to pull up. The cars with front-wheel brakes invariably stopped in a shorter space than those with only rear and differential brakes, and they never showed any tendency



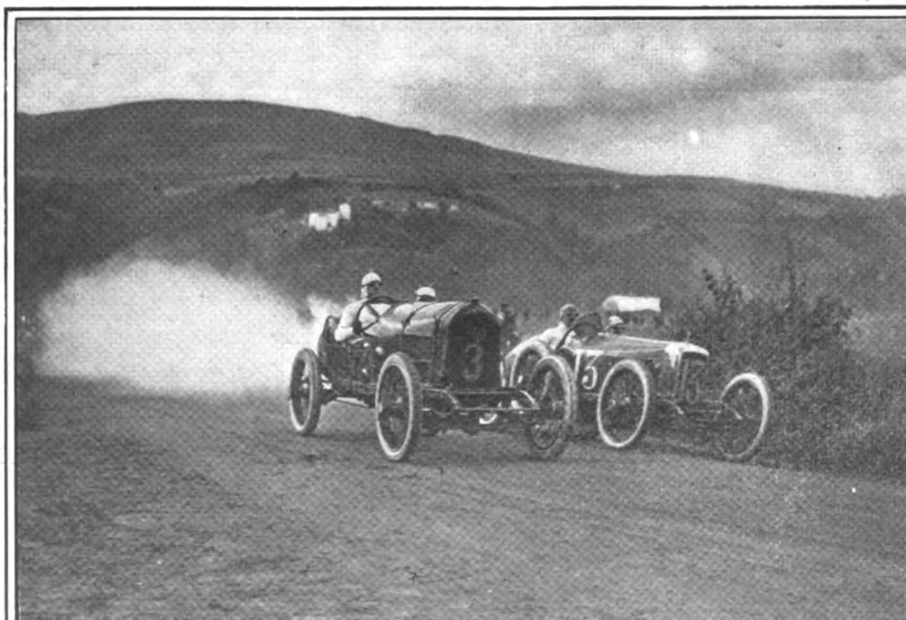
Left—Exhaust side of Nagant motor. Right—Intake side Nagant. Note fan driven off intermediate pinion





Left—Champoiseau on Schneider at speed. Right—Rigal speeding in Peugeot in the 1914 French Grand Prix

Clarke, Piccard-Pictet, Porporato, Nazzaro, and Scales, Fiat, closely bunched in the Grand Prix race



Elskamp in a Nagant and Cagno in a Fiat racing neck-and-neck in the 1914 Grand Prix

to swerve from their course. On one particular occasion when Goux was chasing Lautenschlager, he was able to pass him on a long winding down grade entirely by reason of his more efficient braking. This incident was visible from the grandstands.

Delage, Peugeot and Piccard-Pictet used internal expanding brakes of equal size on all four wheels, the brakes being fully enclosed. Fiat had smaller brakes on the front than on the rear, those on the front being exposed. Delage braked on the wheels by means of pedal, the two front and the two rears being balanced. Connections were by means of steel cables.

Practically all the cars in the race had provision for adjusting while in motion. The adjustment screws were brought through the floor boards, conveniently placed for being operated on by the mechanic.

Gasoline Consumption Low

No official account was taken of the amount of fuel and oil consumed, but it may be taken that the consumption of gasoline was at the rate of 13 to 15 miles per gallon.

The Fiats, owing to their low weight, ran nearly 16 miles to the gallon and carried the full quantity of fuel aboard when starting the race. No other teams attempted to run through without a stop for gasoline, although the feat was possible. It was considered that the disadvantages of the big tank and great weight at the outset outbalanced the advantage of being able to run through without a stop.

No Oil Supply Needed

No car took on oil during the race. The amount carried was considerable, but this was more with a view to maintaining the lubricant at a low temperature than because of the quantity consumed.

Mercedes carried 3 gallons of oil in the base chamber and between 4 and 5 gallons in the reserve tank set across the floor under the legs of the crew.

Delage had about the same quantity in the base chamber and an equal amount in the dashboard reserve tank, this latter being constantly in communication with the motor.

Fiat and Peugeot had 5 gallons of oil in a tank entirely independent of the base chamber. The Fiat supply was mounted in a tank under the scuttle dash, vents being cut in this latter to direct a current of air on the tank. Two pumps were made use of, one of these pumping oil out of the base chamber, and the other drawing the lubricant from the tank and delivering it to the main bearings.

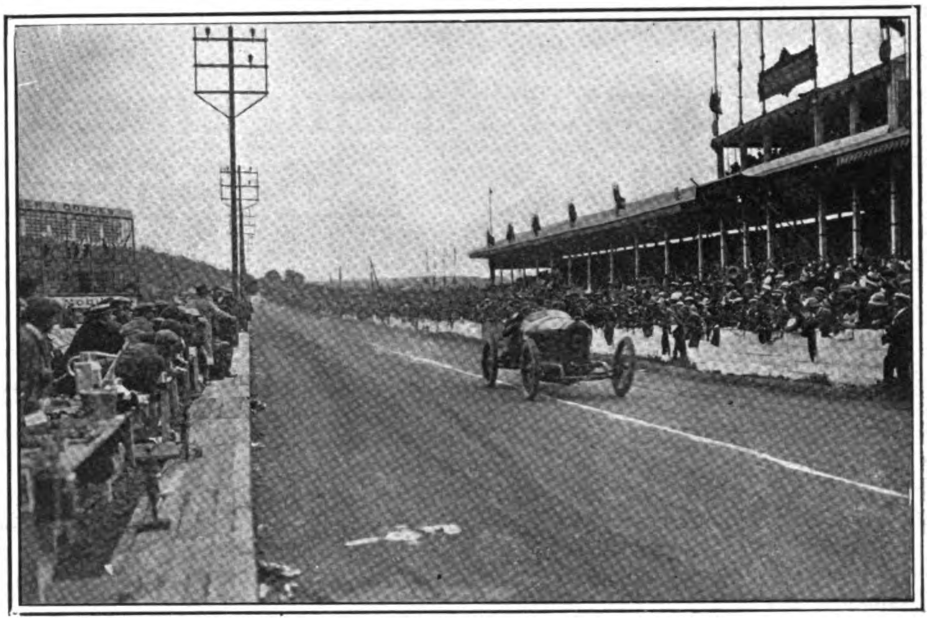
The Peugeot system was similar in its main features, with the difference that the tank was set across the frame under the driver's seat.

Sunbeam adopted the same general arrangement as Peugeot.

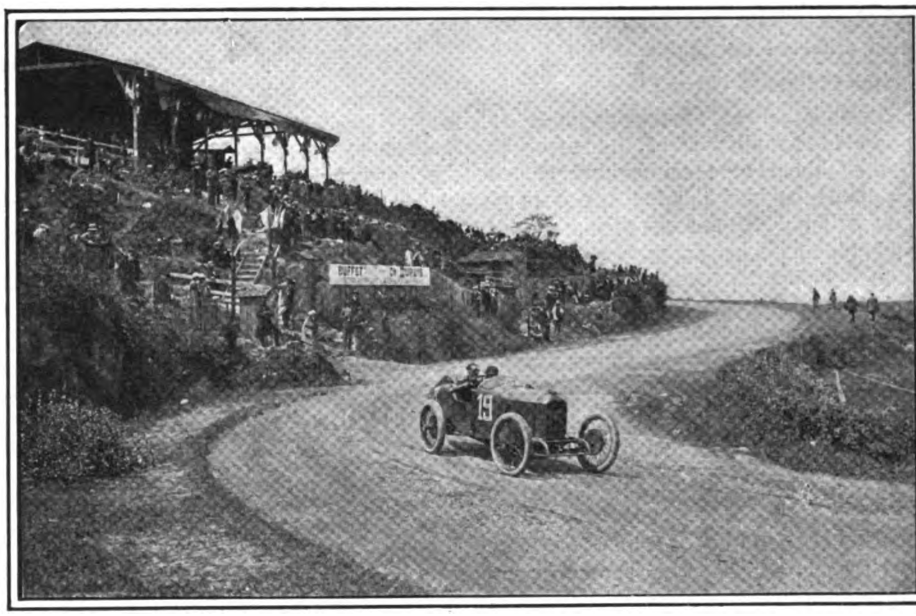
Castor Oil Everywhere

Castor oil was extensively employed. One firm used pure castor oil for not only the motor but for the gearbox and the rear axle, there being about 3 pints for the gears and a pint and a half for the axle. As this quantity was sufficient for the race, it is evident that the joints were well made.

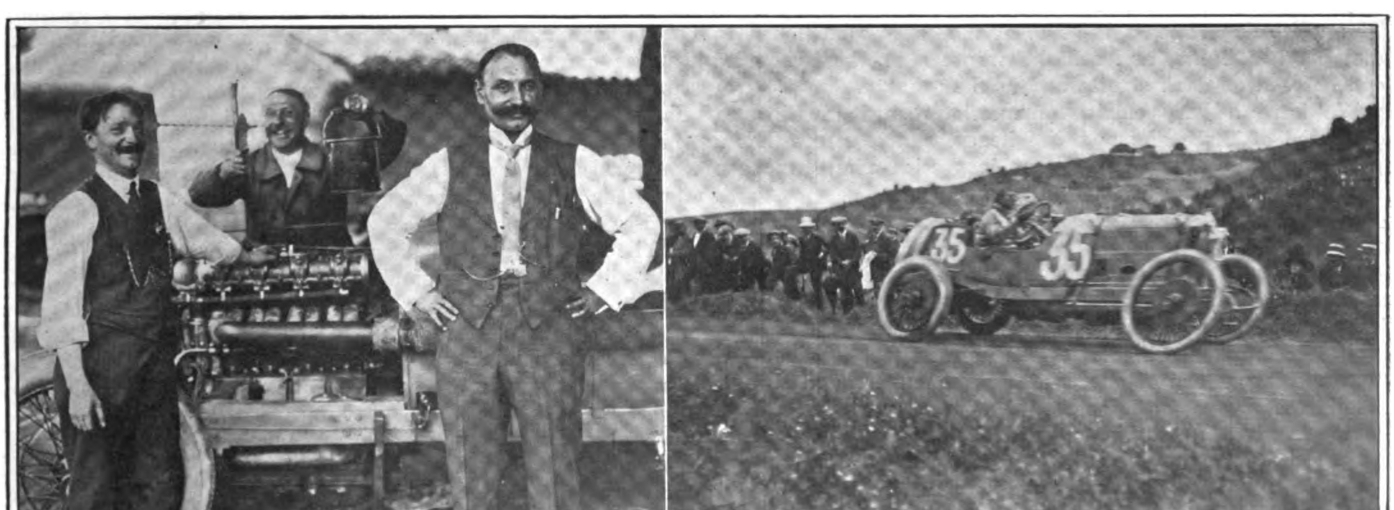
With the exception of the Piccard-Pictet sleeve-valve motors, none of the engines smoked. Even at the starting line, with nearly forty cars lined up, there was an almost complete absence of smoke—just a mere puff as some of the cars went away. On a 23-mile course it is difficult to find traces of oil drippings. Opposite the pits, where most of the stopping and starting was done, there were no indications whatever that oil had leaked.



Boillot speeding his Peugeot on the grandstand stretch of the Grand Prix course



Goux in his Peugeot taking Death Corner in the 1914 Grand Prix race



Left—Delage and Michelat. Duray is in the background. Right—Duray speeding his Delage in the 1914 Grand Prix

Poor Lever Arrangement Spoils Brake Efficiency

The Automobile Engineers' Forum

Ex-President of S. A. E. States That, for Best Operation, "Hook-Up" Must Be Carefully Worked Out—Criticizes Poor Brake Lining

DETROIT, MICH.—Editor THE AUTOMOBILE—A great many problems enter into the successful operation of brakes in service. It is frequently the case that the brakes *per se* are blamed for poor action when the trouble is not in the brakes themselves, but in the arrangement of the side rods and levers running from the brakes to the operating pedal or hand lever. The best of brakes will not give satisfaction unless what we term the "hook-up" is carefully and correctly worked out, and this varies with different conditions.

Brake Lining Is Often Poor

Another source of trouble is in the brake lining itself. There is a multitude of linings on the market, but only a few of them give all around satisfactory service. Very frequently a brake lining which is good when it is brand-new will quickly become either glazed, so as to reduce the coefficient of friction, or become impregnated with oil, likewise reducing the coefficient of friction. Satisfactory brake lining must be one of very long life which will wear only very slowly so as not to upset the original correct brake adjustment and the brake lining should have no very great reduction in coefficient of friction when it is moistened with water or covered with oil.

It is our opinion that on the whole brake sizes on the majority of cars today are ample. There are, of course, exceptions, but we believe that today automobiles on the whole are equipped with brakes of adequate size for the work required of them.

With proper material in the brake lining, proper design of brake and proper design of brake connections, the customer should have very little occasion to touch his brakes during the first season's use of the car.

Connections Do Not Receive Attention

I believe we can say, however, that one of the features of automobile design which receives less attention than it warrants is this matter of brake connections, between the brakes themselves and the operating levers. Sometimes it looks as though the expert designing engineer had spent all his time on the other features of the automobile and left this virtually important detail to some inexperienced draughtsman. The proper arrangement of levers and rods will warrant the most careful attention on the part of an experienced man, and very frequently an apparently slight change will make what appeared to be unsatisfactory brakes give proper satisfaction.— H. W. ALDEN, chief engineer Timken Detroit Axle Co.

Thinks Celluloid Disks Make Best Headlight Dimming Devices

CHICAGO, ILL.—Editor THE AUTOMOBILE—The writer has investigated and looked at so many dimming devices that are intended to prevent the dazzling of the eyes by glaring headlights that his brain is dazzled on the subject. It is a hard matter to eat your cake and still have it, and that is just what the motorist wants in reference to headlights. The police departments in some of the cities compel him to dim his headlights, and still he wants a bright light that can be used on dark streets and in the country.

We have a very efficient inspection board in Chicago, composed of three of our police heads, and it seems that a very equitable, fair and efficient inspection plan has been devised by this board.

Tested in Dark Room and on Road

First, the lamp with dimmer attached is submitted and a written application filed by the owner or maker. This lamp is tested in a dark room in the basement of the City Hall. If found at all meritorious, a road test is given the next evening in one of our parks on the Lake shore. If the second test proves satisfactory, the owner or maker of the device is given a certificate which he is allowed to reproduce.

On the subject of dimmers, our police board have decided that a metal shield or hood over the outside of the glass is 90 per cent. efficient but 10 per cent. deficient on account of a glare being thrown into pedestrians' or motorists' eyes when the automobile travels up a short incline or over a hill.

The two-bulb proposition, one being placed at the upper front edge of a parabola reflector, passed inspection, but is likely to be knocked out on account of it being regulated from switch on the dash board, it being contended that the driver can use his glaring lights and then when he approaches an officer, throw the switch over to the bulb that is out of focus and thus bring about an argument between himself and the officer. Furthermore, there is nothing to prevent a car owner from substituting a large candlepower bulb for the 4-candlepower bulb which has been authorized, and very few police officers can tell the difference.

The frosted glass has passed inspection and is satisfactory, likewise the celluloid disk, which is specified on certificate number 1.

Two or three firms submitted shutter devices that seemed to give the desired results when they were open and when they were closed, but they rattled and are expensive to make and attach.

A cone-shaped cup just large enough to clear the diameter of the bulb within the parabola reflector was tried out and proved O. K. at the test last fall, but the same has not been submitted in the recent test. The shape of this cup is like a flower pot or a Turk's cap.

Another device made of celluloid and working like a window curtain with two strings to each lamp running back of the dash board within reach of the driver was tested out last fall, but not this spring, the principle of this device being that the driver could drive it down over his headlamp or release it, and it would recoil on its roller at his pleasure. This, being seat-operating, would probably not pass at the present time.

Glass Subject to Breakage

Another firm submitted sample lamps where 2 inches of the outer edge of the glass had been frosted and 5 inches center being clear glass with a small hole drilled in the center and a ¼-inch diameter stub bolt fastened in this hole extending forward of the glass about ½ inch. Over this stud a 5-inch diameter metal disk would be attached and held in place by a knurled nut. This device passed inspection, but it was proven in the original test that the glass was subject to breakage on account of the hole, and to the further fact that the average user would draw up the nut too tight, thus forcing the saucer shaped metal disk against the glass, causing the same to crack. This, of course will be a serious objection to a device of this kind, for a motorist would be up against it if he should break his lamp glasses in putting on the disks when he approaches a town. You understand, this saucer-shaped disk is intended to be removed when a motorist drives in the country.

Glare Thrown Over Hill Crests

Another firm submitted a convex molded and frosted glass, the convex being about 4½ to a 9-inch diameter, being about two to one. Commencing in the center of this convex glass and extending down to the bottom edge and at a width of about 2½ inches is a clear spot. Through this clear spot the rays of light are projected forward and down on to the roadbed, and the effect and result is satisfactory when the car stands on level road. When the car travels up a short incline, or over a hill, the glare is thrown into the eyes of the pedestrians or motorist, just as it is when the metal shield or hood is used.

Another device or glass is called the double lens or prism. This is a molded glass and the front and back surface of each glass is a series of small raised half circles, representing half marbles of different sizes, arranged in circular form. In the center of this molded glass there is one large marble, 2 inches diameter. Arranged in circles around this center piece and reaching to the outer edge are a number of circles of marbles, commencing with the size of about ⅜-inch diameter next to the center piece, and increasing to about 1 inch diameter on the outside circle. This same effect is worked out on the inside of the glass. These glasses have not passed up to the present writing, although they have been on test several times and, according to the writer's opinion, they never will pass, for with a 16-c.p. bulb, there appears to be about ten thousand glaring streaks of light, for it appears that each marble intensifies the light and adds to the glare.

Celluloid Disk Easily Attached

The Monarch celluloid disk has met with the approval of the most critical automobile men and motorists. It can be attached or detached to a lamp in a jiffy, either inside or outside of the door, is non-destructible, is light and will not rattle, and the expense is nominal. This celluloid disk is covered by patent No. 824,603, and can be attached to the outside or inside of a door in various ways. One is to use the prongs and bend them over the door frame, then close the door with the prongs on the inside, thus clinching them between the door frame and the body of the lamp. Another way is to fasten them on the inside of the door next to the glass by the use of the prongs, and a third way is to solder three little clips on to the edge of the door frame, right next to the glass, and then nip off the prongs and spring the short ends into these little clips.

Illinois has just passed the 99,000 mark for automobile licenses, and over 1000 licenses have been issued to dealers in the state. Each dealer's license represents at least three machines, so that it is a safe bet that we have over 102,000 operating automobiles in the state right now. Of this number, authorities estimate that 55,000 are in Chicago and immediate suburbs. Figuring that about 60 per cent. of the automobiles have glaring light, the probable consumption of dimmers in Chicago will be about 33,000 pairs.

In addition to the device mentioned above, of course, you are aware that several firms are manufacturing rheostat or series switches to decrease the voltage of lamps, but these have been depreciated on account of it being possible to operate them from the seat.—H. N. Fowler, president, Fowler Lamp & Mfg. Co.

Fits Brake Shoes Steel Against Steel Like Locomotive

PHILADELPHIA, Pa.—Editor The Automobile—Your editorial on brakes, in the June 18 issue, and C. V. Beck's article on the same subject, are both in the right line. Automobile brakes have been one of the articles neglected from the very beginning, and the reason why they are fitted in duplicate today is because they are not reliable.

The remedy is not another set of the same kind, but change the kind.

Almost every vehicle in use from locomotives to log wagons, is fitted with shoe brakes, and they are not only reliable, but when they are off a glance at them insures that they are free from the wheels. The ordinary band brake drags most of the time, and Mr. Beck is quite right, that gasoline bills are much higher because of the use of the band brakes. Automobile builders have been adding much weight and complication around the hub of the wheel, trying to get in wide powerful band brakes, when it seems only reasonable that the rim of the wheel is the place for the brake. Here is where our roller drive shines again. The drive is applied to the rim of the wheel, and the brake is applied to the driven member. The result is we fit shoe brakes steel against steel, just like a locomotive. We get a most superior driving effect, positive clearance, and practically no chance for failure. Those interested in the best form of brakes will do well to consider the shoe brake in use everywhere, and as fitted to Duryea cars.—Chas. E. Duryea.

Censures Complication of Light Cars and Cyclecars

GALVESTON, Tex.—Editor The Automobile—Although not a real automobile engineer, I would like to talk to some of the designers of our modern automobiles, especially to the men who are planning and building the so-called light cars and cyclecars. The avowed purpose of these men is to turn out cars that will be light, easy on tires, small consumers of fuel, and generally simple in construction and operation.

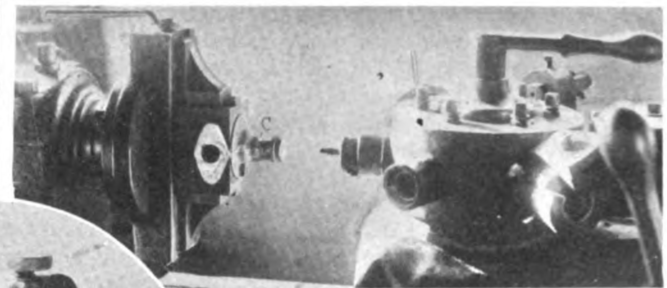
Yet one of the first things these engineers do is to complicate their would-be simple car by the addition of such complications and weight adding devices as starting and lighting systems, which are as useless as they are expensive and unhandy on a car of this type.

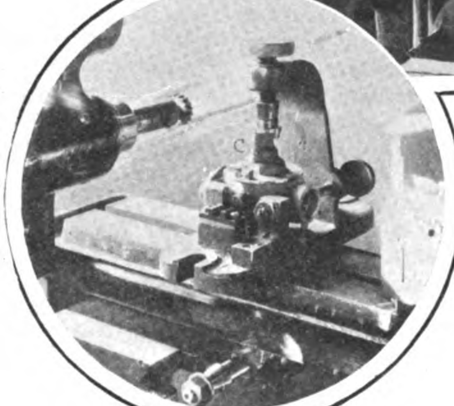
If a man has a big, heavy machine with a high-compression motor he probably needs a starter, and a lighting system is well worth while, but with a little car and a small motor, what is the use?—E. F. Benson.

Accuracy—The Holley Byword

Many Parts of Holley Carbureters Manufactured Under Limits of Accuracy to .001 Inch—Some Parts Have .0005-Inch Limit

SPEED and accuracy in Holley carbureter production are secured by jigs, fixtures and inspection. Thousands of parts must follow each other with the uniformity of the shots of a gatling gun. Each must be alike. The same amount of time should be spent on each, and when all the parts come together in the assembly room they should fit with perfect interchangeability.





In the Holley shops. A casting in position on a monitor ready for several operations such as drilling, turning and threading. Note the special fixture for quickly and accurately fixing the piece in the revolving head of the lathe

How a milling operation is performed on the bowl of a Holley carbureter. A special form of jig quickly positions the piece on the bed of the machine in correct relation to the cutter

Three Manufacturing Departments

Three departments enter into the actual manufacture of a carbureter. They are the foundry, the machine shop and the assembly. These three departments form a Y-shaped scheme. The foundry and machine shop are the two branches and the assembly the root. The two branches must flow smoothly into the root and the entire layout must be symmetrical. The machine shop and the foundry should work together and finally join at the root of the Y in a smooth, steady stream from the assembly department into the shipping room.

The whole scheme is similar to a railroad at a given point of which two branches come together, forming the Y. Two trains start at the same time from each end of the Y, are coupled together at the junction and pass on to the terminal. The starting point is the entrance of raw material into the plant, the stations along the way are the inspection stops, the junction is the entrance to the assembly department, and finally the terminal is the shipping room.

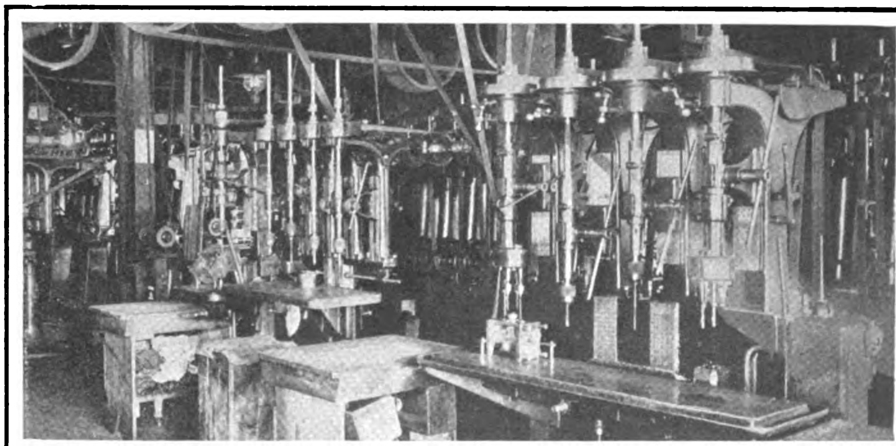
To expedite the passage of the train there are the shortcuts of manufacture, including the jigs and fixtures in machine work, the efficient motions of the workmen, the employment of high-speed machines, etc. All these parallel the fine road equipment of a railroad, shortening the time spent on the road, at each of the inspection stations along the way at the point of juncture at the asembly plant and finally into the terminal shipping room.

The carbureter plant of Holley Bros. Co. has recognized these principles of accuracy manufacture, linking with them quantity output. From the plant 1400 to 1500 carbureters emerge daily, and sometimes when demand is very heavy the working schedule is stepped up to as high as 1,800 a day.

Yet this quantity side of it seems to be secondary to accuracy. Perhaps the secrets of Holley success may best be summed up by saying that the copious use of jigs, good inspection methods and efficiency are at the bottom of it all. The Holley carbureter to be ready for the market must undergo a large number of careful inspections in its progress through the plant, and many of these hold the limits of accuracy to .001 inch, one or two parts, such as nozzles, etc., being deemed so important as to require half a thousandth-inch limit. The parts are subjected to jig treatment for nearly every operation, and such methods are reflected in the product.

The visitor to the Holley plant sees many examples of productive efficiency; sees how time is saved wherever possible without sacrificing accuracy; sees everywhere the results of specialization on the making of a single product.

The embryonic Holley instrument is a form of alloy which comes to the



A part of the Holley machine shop where drilling of the many different sized holes in the carbureter is taken care of with the greatest accuracy and speed. These multiple-spindle drills are molded in connection with jigs which assures correct position of the holes plant in the shape of 25-pound "pigs" of even analysis. These pigs have this composition: copper, 85 per cent.; lead, zinc and tin, each 5 per cent.

Seven or Eight Pigs Melted at Once

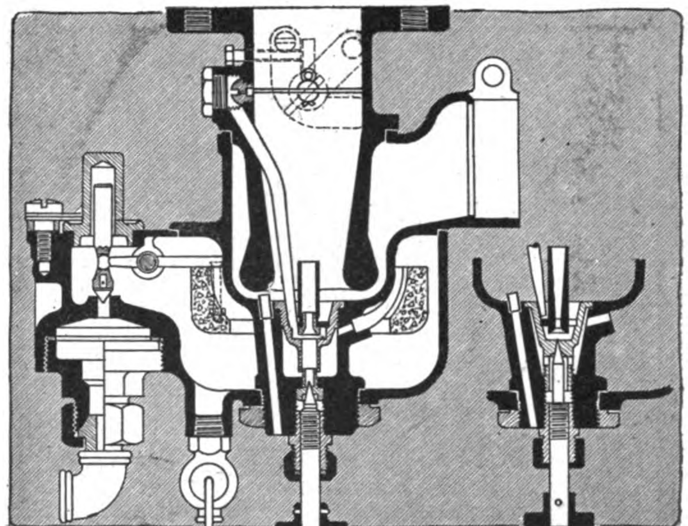
The pigs are melted in crucibles which are placed in oil-burning furnaces. There are half a dozen of these occupying one end of the foundry. Seven or eight pigs are placed in each crucible and heats are made three times a day, this giving time for making of a number of molds between each heat, and everything is thus in readiness for the pouring when the metal is reduced to a molten condition. It is carried to the molds in ladles which are mounted in long-handled holders to protect the two men doing the pouring from the excessive heat. This is in accordance with regular foundry practice.

There are fourteen Tabor molding machines in the foundry. These are very efficient machines for putting up flasks, one man being able to average a mold every 3 minutes. In the making of carbureters most of the pieces are small, hence the molding plates used contain from six to 120 pieces, all connected by little channels so that the metal can flow from one to the other. For instance, one plate has on it eight strangling tubes, another twenty-five pet cocks, and so on. Thus, when a flask is filled with molten metal, a number of these small parts are cast at the same time.

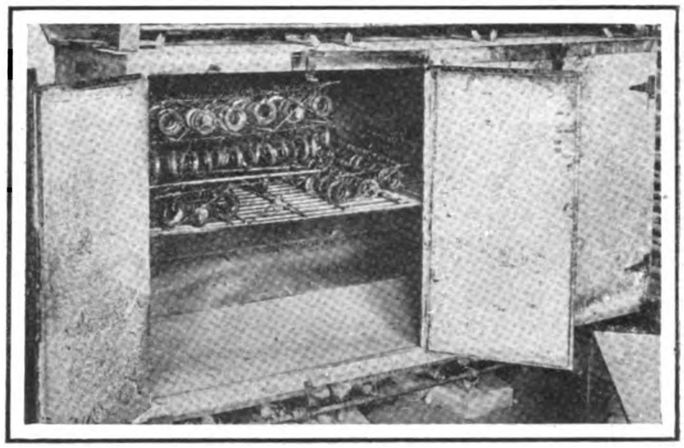
Patterns Are Carefully Guarded

These multiple-pattern plates, which are of uniform size so as to fit into the molding machines, are very expensive, and hence in the Holley foundry there is a regulation type of vault, in which they are kept. This has 18-inch fireproof walls of safe construction, so that in the event of a fire the large outlay for patterns would not be lost. To facilitate the procuring of any desired pattern plate, each is numbered as well as the racks on which they are arranged. A card index is kept of the patterns, and it is a simple matter to refer to this index to locate any one of the hundreds of plates in the racks.

A number of the castings used in the making of the carbureter require cores. These are simply baked sand forms, which are placed within the moulds to make hollow centers to the pieces when cast. It keeps the core room busy making these for the foundry. Here there are sixteen core makers, each provided with an individual bench. Special core forms are provided, in which the cores are made, then placed on racks to dry before being placed in the core ovens.



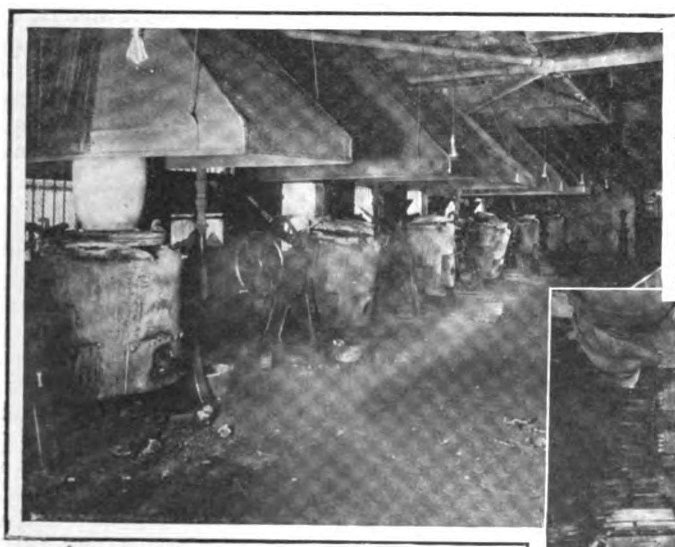
Sectional view of the Holley carbureter showing complete assembly



The cork float baking ovens. After receiving a coat of insulating varnish, each float is baked for 24 hours at 210 deg. F. It is then again varnished and the same baking repeated. These ovens have a capacity of 2,000 floats per day

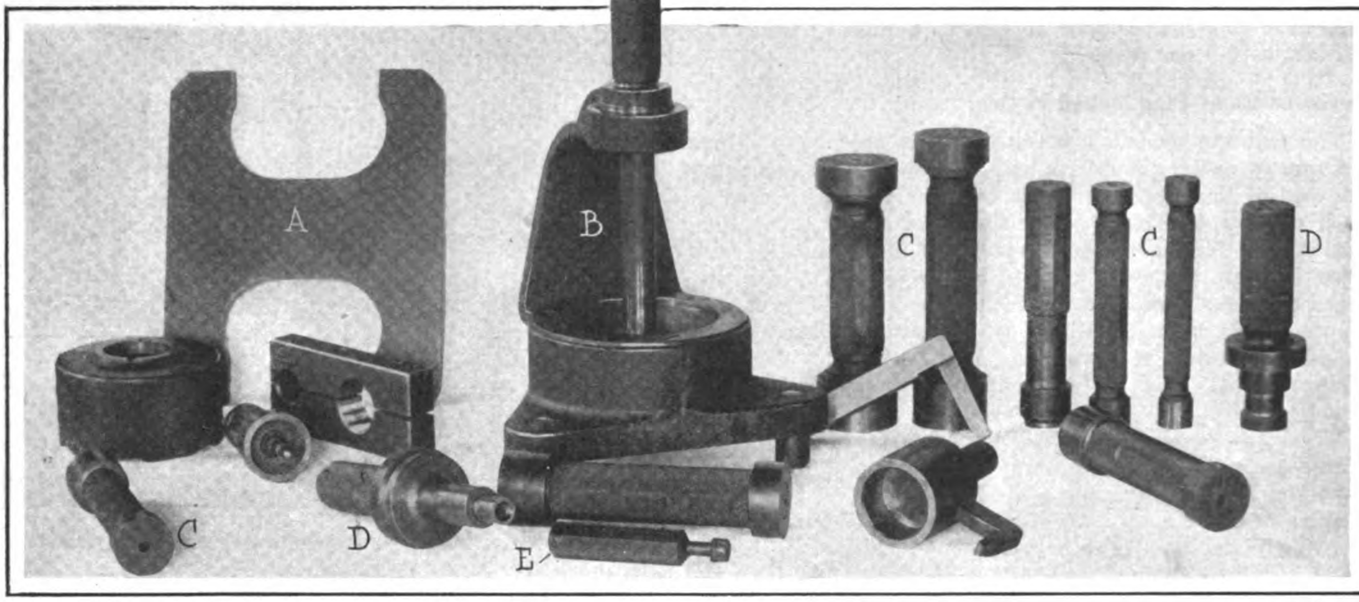
Crude Oil Used in Core Ovens

These ovens use crude oil for attaining the baking temperature of 300 degrees Fahrenheit. There are eighteen compartments to the oven structure, and in them the cores are baked for lengths of time, dependent upon their size. Small cores require but 10 minutes to be hardened sufficiently while some of the larger ones take as much as 1½ hours. When sufficiently baked, a core is almost unbreakable.

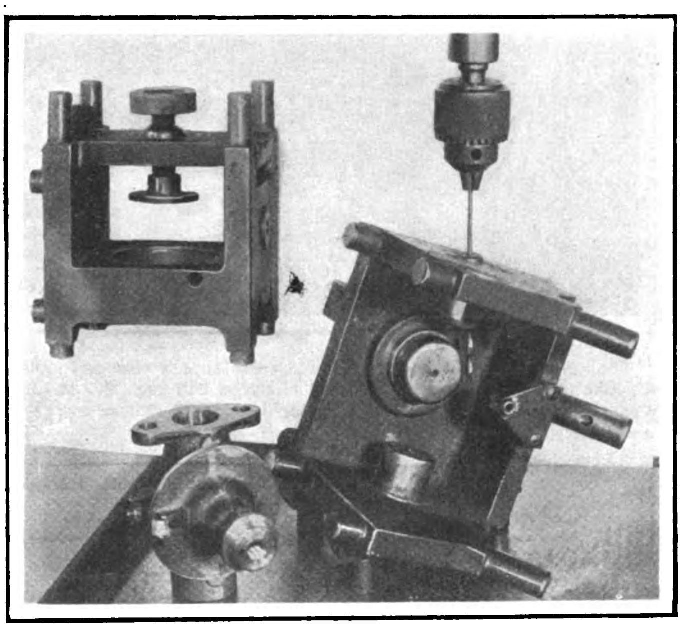


A corner of the Holley foundry where all carbureter castings are made from molds

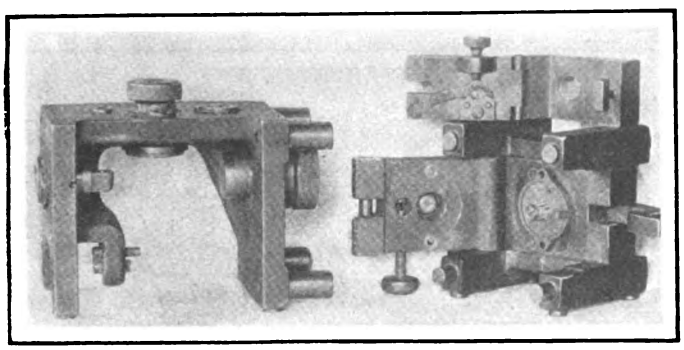
The furnace room of the Holley plant. Six oil furnaces melt the metal in crucibles from which it is carried in ladles to the molds



An array of gauges for testing various dimensions of the Holley carbureter to a thousandth of an inch. Most of these work on the "Go" and "No Go" principle. A—External diameter or width gauge. B—Distance gauge. C—Plug gauges for internal diameters. D—Depth gauges. E—Thread gauges. The rest are special gauges for testing certain parts.



How a jig works. The piece is first fitted within it and clamped, thus locating the drill points. The drill may then be inserted and the operation performed. Such jigs are very costly, this particular one, which is an average affair and not specially complicated, costing the Holley concern $250



Jigs abound in the Holley plant. These are typical of the great number of costly devices of this kind for the accurate positioning of holes and the like in the various parts of the carbureter. The piece is fitted in the jig, which then locates the drilling positions, making it an easy matter to drill the various holes and to make every piece a counterpart of every other similar one

Compressed Air Hammer Loosens Sand

After pouring, the molds are allowed to cool before the sand is broken away from them. Some pieces with cores in them are troublesome in that the core sand is hard to remove. The old method was to rap the pieces with a hammer until the sand was sufficiently loosened to come out. This is a slow process, and the Holley foundrymen have devised a quicker and better method. The pieces are hung on a standard and a small compressed-air hammer held against them long enough to completely loosen the sand. This takes but a few minutes, and one man does the work which would require three men in the old way. Efficiency here scores again.

Having cleaned them of sand, the next step is to shear off the "runners," which separates the individual pieces. They then go to the sandblast, where all foundry dirt is taken off, and are made ready for machining, as any dirt or sand would injure the tools. A New Haven sand blast machine of barrel form, 36 by 46 inches, takes the place of four men at this casting cleaning work. The barrel or drum into which the pieces are placed rotates at two revolutions a minute, and into it are injected sand blasts under a pressure of 80 pounds per square inch. The strong blast of sand, coupled with the rotary movement of the barrel, smoothes and cleans the castings thoroughly. The machine can handle 1,200 pounds of castings at one time, they being subjected to this treatment for 20 minutes.

Finishing Castings by Hand

The castings next visit the grinders, where the fins are taken off, after which they go to the burring bench, where such projections as cannot be reached by the grinding wheels are filed away by hand.

The foundry processes are now complete, and the rough parts go from here to the machine shops for finishing. These are the most extensive part of the plant, and it is here that accuracy of production comes into its own.

On graduating from the foundry, the parts are placed on specially constructed wooden racks which are so made as to admit of piling one rack on top of another. A bank of them is placed upon a truck and the whole transferred to the machine shops. These racks form an important part of the production, in that the pieces as they advance from one machine process to another travel in them, they being their constant companions until assembly is in order. This makes for much quicker handling and better routing efficiency all around.

Much of the machine work is done on lathes, although, due to the great number of holes of varying sizes required in a carbureter, drilling is also a very important part. There are in all about 100 back-gear monitor lathes and some fifty multiple drills, to say nothing of the numerous other types of machine tools.

Lathe processes are standard in every way, the workmen exhibiting remarkable skill in making accurate pieces. They are all provided with the proper gauges to check their work. To see that his tool is cutting accurately, each workman tests every tenth piece he makes. This testing is only preliminary, however, as a very careful inspection by trained inspectors takes place later on, as we shall see.

Multiple Drills Play Big Part

The multiple drills are one of the biggest factors for rapid production in the Holley plant. In each part of the carbureter there are a number of holes of different sizes to be drilled. Wherever possible a single multiple drill is set up to take care of all of this drilling in any one piece. Each spindle is provided with one or more drills, depending upon whether the position of the casting when ready for any particular hole to be made will admit of others being drilled at the same time. If this is the case, a multiple head is used, which turns several drills from the same spindle. In this case all are pressed down into the casting at the same time.

The drilling is arranged in the best possible sequence; that is, figured from the standpoint of making every move of the piece count, the work is done in that order which will require the least shifting around of the piece following each successive drilling operation. This saves time.

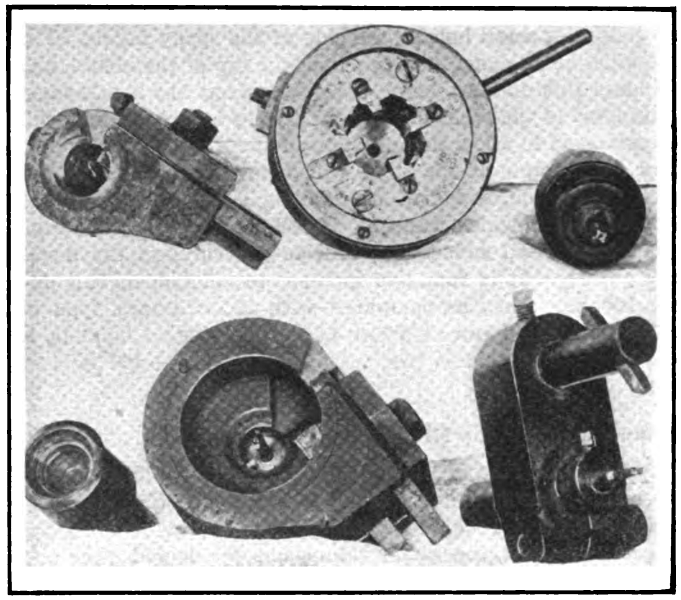
Special Jigs for All Parts with Holes

No drilling is done without the use of jigs. There is a special jig for every part requiring any holes to be made in it, which insures absolute uniformity among the pieces. By their use the operator has but to put the drill in the right hole in the jig, which insures its correct location in the casting within.

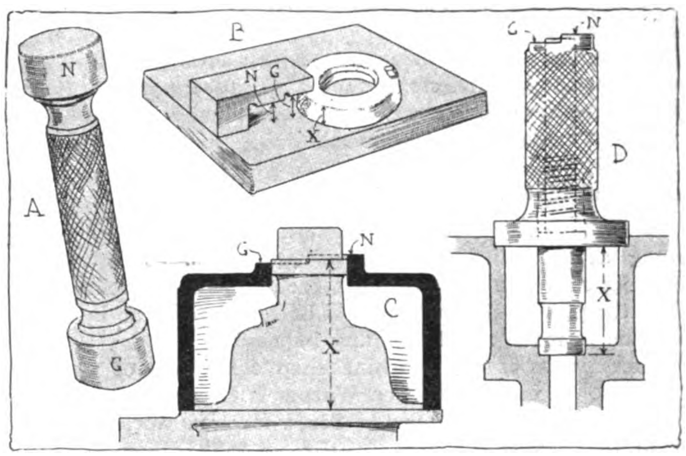
Many special drilling processes have been developed. For instance, one special jig allows for the simultaneous drilling of four holes $\frac{1}{8}$ inch in diameter. All these holes are of different depth, varying from 1.4 to 2 inches, and all are at different angles in the casting. A multiple head on the drill spindle aids the jig in this.

A Foolproof Jig

There is a special jig for elbows, to insure the two drillings at right angles coming together within the casting. There is a special drill for mixing chamber caps, the jig taking care of these drillings at once. Another jig is called a foolproof



Some of the special tools devised by the Holley Bros. Co.

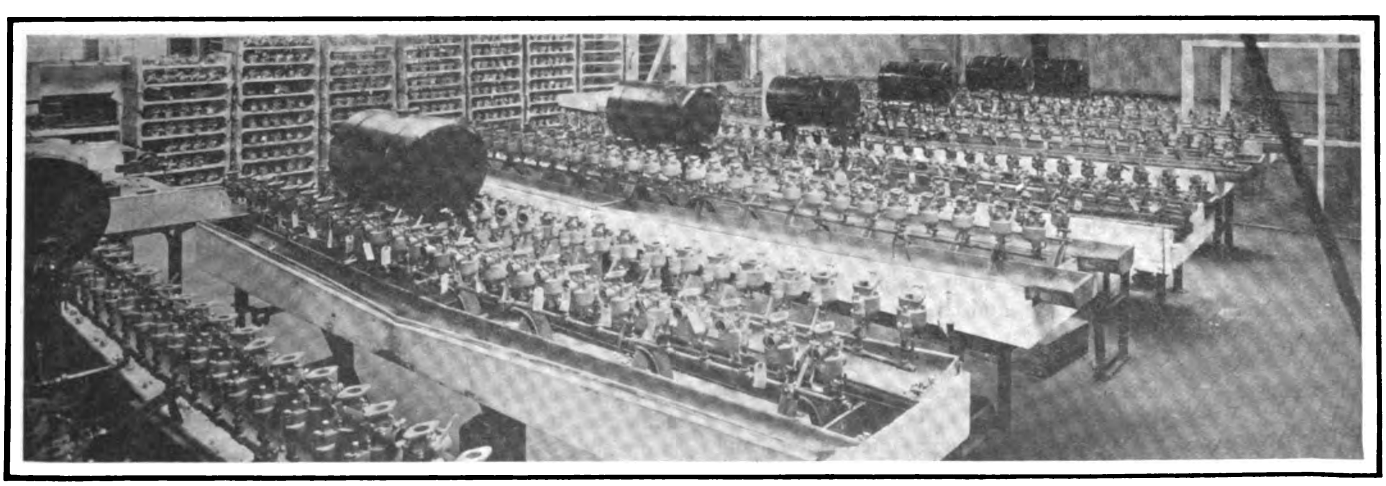


A—This is a plug gauge for internal diameters. The gauge end G should pass through the hole, while the end N should not

B—Float thickness gauge. X—Height of float which, if correct, should pass under that position of the gauge marked G and which cannot go under part N, which is only slightly lower

C—External height gauge. The piece is laid on the flat surface and gauge placed over it. Distance X must be accurate and should be between limits G and N

D—Depth gauge for determining accuracy of distance X. When shoulder of gauge rests on upper part of hole, lower end of plunger or gauge must rest on lower part so that upper end of plunger is within limits G and N



Testing rack where for 2½ hours each finished carbureter is tested for leaks and proper float level affair, because the operator cannot go wrong. This is used for drilling a small hole in the side of the spray nozzle. The hole must be an exact distance from the top of the nozzle, and to insure this distance being absolute correct the nozzle must be inserted to the right distance in the jig before the hole will be uncovered to allow the insertion of the drill.

As an example of the steps which have been taken to get quick production, one drill for making a 1/16-inch hole has been installed, which runs at 10,000 revolutions a minute. This great speed causes the drill to get through the metal very quickly. It is found to increase production of this one hole 100 per cent., as compared with the ordinary type of drill which would run at about 3,500 revolutions. That is, it goes through the pieces just twice as fast, due to the greater speed.

Teamwork Speeds Up Drilling

In some cases the drilling of a part is very rapidly done by two men. One man loads the jigs while the other does the actual drilling. To operate this way, two jigs of the same kind are required, the loader taking out the drilled piece and replacing it with another ready for drilling while the other man is at work drilling the piece in the other jig. Sometimes one loader can keep two drill men busy, provided the drills are arranged so that each can be readily reached from the loading table.

Because of these various schemes, developed through specialization, the drilling is done with great rapidity. One multiple drill, which is about an average, handles 800 castings a day and drills nine holes in each.

All Jigs of Macadamite

All the jigs are made of macadamite, an alloy which is as strong as steel but lighter than aluminum. This makes handling easy and is therefore a factor in rapid production. Were the jigs of steel they would be so cumbersome in some cases as to make rapid handling impossible.

Other parts of the machine shop take care of special processes. A bank of sixteen Warner & Swasey hand screw machines produce small parts. Screw machine work is cared for by four National Acmes, two Brown & Sharpe automatics and two Cleveland automatics, which are ever operating with human intelligence and superhuman speed.

After machining, the burring department burrs off any sharp edges due to cutting tools. Then all finished holes are plugged and the pieces sandblasted to even up the color. Then before they are touched they are lacquered with an air brush and dried. This insures a uniform color over the entire piece and gives a finished appearance.

Tool Department a Big Saving

Besides this room there is also a tool stock room where all tools not in use are kept. When a workman is put on any operation he obtains an order signed by his foreman for the taps, dies, jigs and other fixtures needed for that operation. All these are kept together in one pan, and the tool stock keeper needs only to get the particular pan bearing the required operation number. This saves much time in providing the men with the needed apparatus, which must be returned after the job is completed.

Finished parts after lacquering go to the inspection department, where twenty experts pass upon them. Preliminary inspection has already been made, and the pieces come to this final inspection with traveler system tags upon them. On these tags are noted the date of making, the workman's number and operation number. Thus there is a complete check on the work.

Limit gauges, snap gauges, plug gauges, micrometers and other special testing apparatus is at the command of the final inspectors. Variations of over .001 inch are not tolerated and spell rejection. The low-speed plugs have an even more rigid test. They must have an accuracy to plus or minus .0005 inch. Some of the special gauges and the methods of using them are shown in the illustrations.

Check on Inspectors Also Kept

On the examination of each piece coming to him the inspector is required to make a notation on the inspection report. He must enter the part number, its symbol, the number called for in the order, the number received, the department or sub-department from which received, the number passing inspection, the number returned for proper finishing, the number too imperfect to admit of refinishing and which must be scrapped, and the inspector's number.

Following this rigid inspection, parts are remanded to the stock room, from which they are requisitioned for assembly as needed. Only enough stock to fill an order can be drawn.

The progressive assembly system is employed in the putting together of the Holley instruments. The trays of parts are placed at the beginning of the line of assembly benches. Each man has his part to do, after which he passes the instrument on to the next man. One puts the levers on, the next drills cotter holes, succeeding ones put in the cotter pins, assemble strangling tube, spray nozzle, elbows, inlet needle seat. At the other end of the line of assembly benches they go into waiting trays again.

Meanwhile, in another part of the factory, the cork floats are being made so as to meet the partially assembled instruments at the final assembly benches. This float manufacture is an interesting process. Nine girls are engaged in the work. The cork is first turned into its correct form, which is followed by an inspection for thickness and diameter. The first of these inspections requires a special gauge which has two heights—a "go" and a "no go" height. The cork must just go under the correct height, but not under the incorrect one.

Double 24-Hour Baking at 210 Degrees F.

After the float is manufactured to size it is given a coat of special insulating varnish by hand brush. It is then baked for 24 hours at 210 degrees Fahrenheit. Varnishing is now repeated and the float again baked under the same conditions. This varnish process coats the float with a preservative which is said to withstand almost an acid test.

Following the two varnishings, the lever for float regulation is added by a girl who uses a power screwdriver. With the lever in place, the final varnishing and baking for another 24 hours takes place. If baked less than this time there is danger of the varnish peeling off, and if baked longer there seems to be little advantage. For this baking process there are six gas ovens which have a capacity of 2,000 floats a day.

Having united the carefully made floats with the other part of the instrument, assembly is complete and the carbureter is ready for testing with gasoline for leaks and fuel level. The test racks for this process have room for 780 carbureters, each of which is connected to the gasoline supply contained in a 5.gallon tank mounted on the test table. Below the racks on which the finished carbureters are mounted there are troughs which catch the gasoline overflow and return it to another tank ready for re-use after straining.

Each instrument undergoes this leak and level test for 2½ hours. After standing with gasoline in it for this length of time a level gauge is applied. This is a pointed plunger gauge which rests upon the top of the float chamber as a positioning point. When in position the point should just escape the level of the liquid, but when the plunger is pressed down the point should touch this level. This admits of very little variation.

Having satisfactorily passed this examination, the instrument goes to the polishing room, where the bowls are buffed as an added touch to appearance.

Then the carbureters are mounted on another set of leak and level testing racks and supplied with gasoline. Following this final make-sure test they are ready for shipment.

Germany's Elaborate Statistics

Latest Official Data on the Production and Utilization of Motor Vehicles in German Empire, with Interesting Figures on Traffic Troubles and Enforcement of Legal Responsibilities

OFFICIAL statistics with regard to motor vehicles in circulation in Germany on January 1, 1914, and motor vehicle traffic from October 1, 1912, to September 30, 1913, have made their appearance. Distinctions are made between (1) automobiles for the transportation of persons, and these are in this rendering of the statistics termed Motor Cars, (2) motorcycles, which comprise vehicles with a saddle for the driver, not more than three wheels and a weight not exceeding 150 kilograms (in case of electric power the weight of battery not included), (3) motor vehicles for the transportation of goods, which are here termed Motor Wagons, and (4) motorcycles for the transportation of goods, which are here termed Motorcycle Carts.

NUMBER OF MOTOR VEHICLES IN USE IN GERMANY

Jan. 1, 1913		Jan. 1, 1914
49,760	Motor Cars	60,876
20,325	Motorcycles	22,457
7,704	Motor Wagons	9,739
123	Motor Cycle Carts	100

The leading figures are given in the brief list above. From this it is at once noticed that the increase in motor cars for 1913 is only 11,116, which figure thus represents the production in this class of all the German automobile factories plus importations but minus exportations and the discard of old vehicles. [Exports reach the sum of $24,000,000.—ED.]

Motorcycles show the considerable increase of 2,132, which is probably to be ascribed to the introduction of sidecars, as 1910, 1911 and 1912 showed a decrease in this classification in comparison with the number in use on January 1, 1910.

The increase in motor wagons is substantial, but relates more to delivery wagons and light trucks than to the heavier type, as appears from the weights of the vehicles, as scheduled later in this account. Load capacity usually exceeds weight.

Motorcycle carts number only 100, while in 1907 they numbered 254, and have dwindled to insignificance as a class. The explanation is probably that the three-wheeled vehicles used for delivery purposes or other transportation of goods now weigh more than 150 kilograms and are classified under motor wagons.

Among the observations of general interest to which the figures of the census give rise in the matter of traffic accidents there is one which seems to clash with commonly accepted belief, to the effect that motorcycles are much less dangerous than the other forms of vehicles.

Out of the total number of motor cars those which were implicated in traffic troubles have dropped steadily from 30.1 per cent. in 1908 to 17.8 per cent. according to this year's figures. The motor wagons in this respect show a percentage of 17, which is not a betterment on previous years on the face of the report. It is thought that the longer hours during which motor wagons are operated per day and their greater weight offset their lower speed in the matter of the liability to accident for each individual wagon.

The motorcycles show the low percentage of 1.1, which is about the same as for previous years. In other words only 1 out of every 100 motorcycles gets into traffic trouble each year. No clue is given to this comparative freedom from accidents in the motorcycle class, but it may be surmised that it is due to three main factors: Motorcyclists ride little in the crowded streets; they are as a rule persons of athletic inclinations and skill, and they are about on the same level as pedestrians and do not so easily overlook them.

Chart 1 gives the number of motorcycles and of motor cars registered each year since 1907. The increase in motor cars from year to year since 1908 is seen to have varied considerably and has come down to 22.8 per cent. for the past year. The motorcycles which represented more than 60 per cent. of the total in 1907 now represent only 26.9 per cent., while their absolute number, 22,457, is slightly higher than ever before, after some retrogression in the

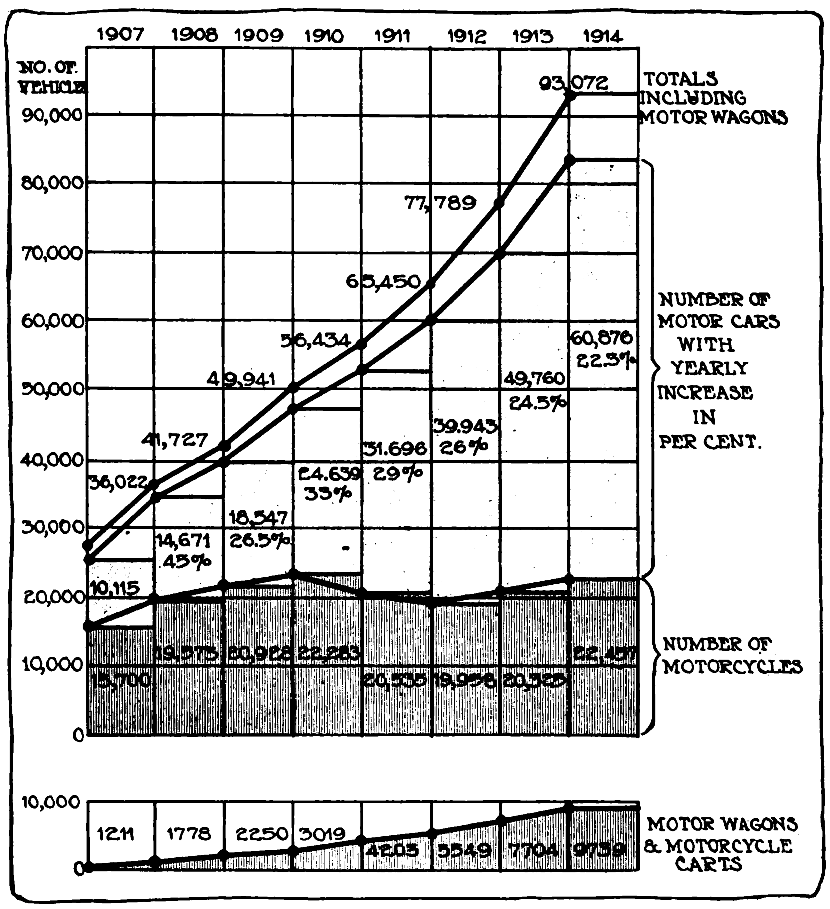


Fig. 1, A—Number of motor vehicles in circulation on January 1 of each year since 1907

Fig. 1, B—Motor wagons and merchandise carts for same period years 1911, 1912 and 1913. Sidecar attachments are gaining. The motor wagons and motorcycle carts are shown separately underneath the main chart and their influence on the totals is indicated again by the top curve in the main chart, showing the total of all motor vehicles for each year.

Power of Vehicles Steadily Increased

Chart 2 shows the distribution of motor cars according to horsepower rating, from which it appears that the increase in numbers is greater for the more powerful cars than for those rated below 8 horsepowers. In reality the tendency to higher power must be still much more pronounced than the figures indicate, because these take no cognizance of the advancement in construction, by virtue of which the actual horsepower is from two to three times greater than the rated one, which was not the case in the earlier years included in the chart figures. With regard to the reading of the chart it may be noted that, as one class of vehicles is superimposed upon the previous lower one, it is not the inclination of the curves to the horizontal which shows the increase within each class, except in the lowest one, but the inscribed figures and the forms of the spaces between curves, while the top curve shows the total increase in the ordinary way by its angle of rise.

Chart 3 shows similarly, but on a larger scale, the distribution in power classes of the motor wagons, the motorcycle carts being omitted. It is noticed that the motor wagons below 8 horsepowers which once constituted 42.6 per cent. of the total now represent only 20.7 per cent., besides being equipped with better motors having a much higher power reserve than formerly, and that the wagons in the 16 to 40 horsepower class now make up 46.7 per cent. of the total.

This is largely due to the subsidizing of heavy trucks to form a reserve for the army. But hereafter the army will use trucks as small as 3½ tons capacity.

Locations Favorable to Trucks

From the statistics referring to the distribution of the vehicles among the component provinces and states of the German empire, which are not here reproduced, it is noticed that the motor wagons represent 10.5 per cent. of the total number of motor vehicles in the empire as a whole but that certain districts utilize motor wagons to a considerably greater extent. In Hamburg and in Bavaria they form thus 17.2 per cent. of the total and in Württemberg about 14 per cent.

Out of the 9,639 motor wagons of this year 6,105, or 63.3 per cent., weigh less than 2,500 kilograms; 1,400, or 14.5 per cent., weigh between 2,500 and 3,500 kilograms and

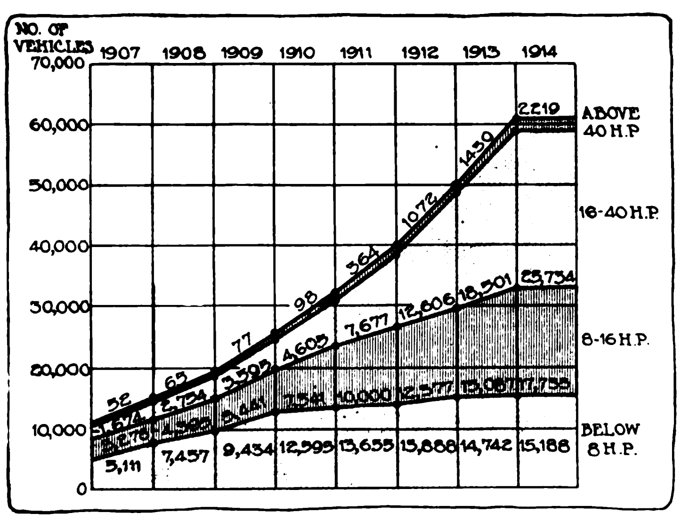


Fig. 2—Census of motor cars classified according to their horsepower, showing that popular preference runs steadily to higher power

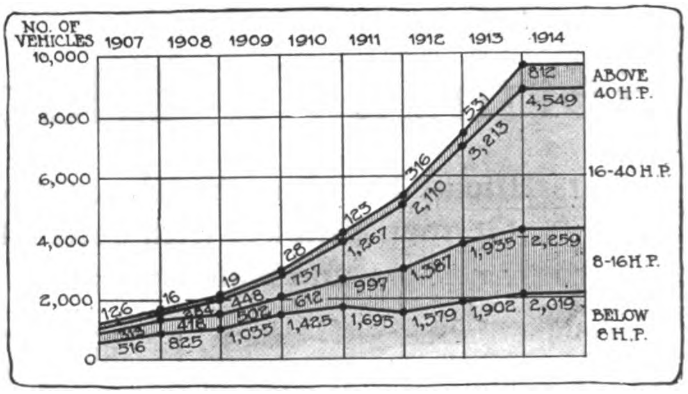


Fig. 3—Census of motor wagons, including trucks, classified by horsepower

2,134 represent the heavy truck class, weighing more than 3,500 kilograms.

How Motor Cars and Motorcycles Are Utilized

The German authorities inquire about the purposes for which motor cars are mainly employed by their owners, and information on this point is given in Charts 4 and 5 for the past year. It is understood that the motor cars which are listed as employed mainly for trade purposes are also occasionally used for mere pleasure, and that the obverse also holds true, but the division gives a clue to the incentives for purchase and the average mode of utilizing the vehicles. By comparison with figures given for previous years the utilitarian uses of motor cars are seen to be gaining slightly over the pleasure purposes. Only the figures for the past year are here shown.

In the available tables of figures no distinction is made between motor cars and motorcycles, and it is these figures which are represented in Chart 4. The most interesting question, as to how many motor cars are employed in Germany at present for sport and pleasure purposes, can be answered only by eliminating the motorcycles. This is done in Chart 5 on the supposition that one-third of the vehicles used in trades and commerce, for professional purposes and by public officials are motorcycles. In this manner it is found that only 22,464 motor cars are used chiefly for sport and pleasure, while 6,426 are used by physicians, surveyors, ministers, lawyers, etc., in their vocations, 21,624 to expedite

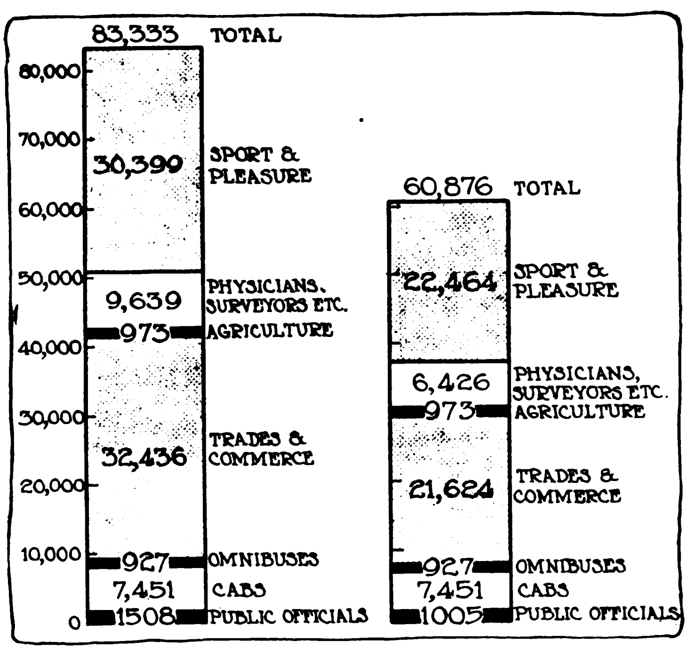


Fig. 4—Uses of motor cars and motorcycles, grouped together. Fig. 5—Uses of motor cars; motorcycles being eliminated by estimate

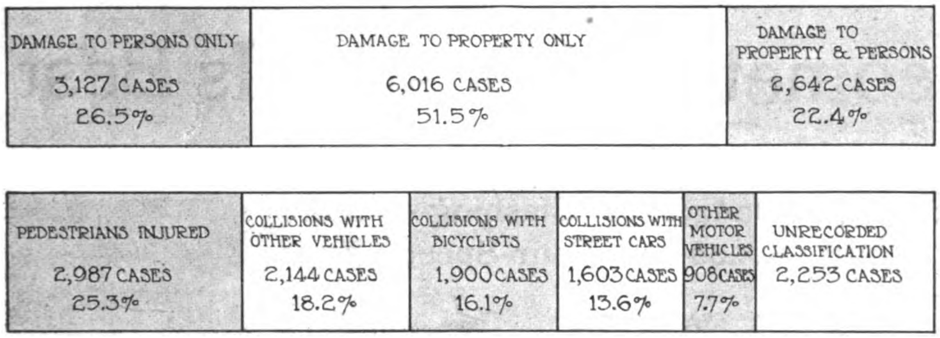


Fig. 6—Effects and nature of 11,785 traffic accidents involving 12,772 motor vehicles

trades and commerce through the transportation of individuals engaged in these pursuits, 7,451 as taxicabs, 927 as omnibuses, 973 in agriculture and forestry and 1,005 by public officials.

On the other hand this way of reckoning leaves 503 motorcycles for the use of officials, 10,812 for trades and commerce, 3,213 for professional persons and 7,935 for sport and pleasure, the total of which tallies with the official count of 22,457 motorcycles in all.

The classification of motor wagons according to their uses is more summary. Out of the total of 9,739, including the 100 motorcycle carts, 8,799, or more than 90 per cent., are listed as employed for commerce in general, while 761 are used by public officials, 81 in agriculture and forestry and 98 for diverse purposes.

International Traffic and Touring

During the year, from October 1912 to October 1913, 24,647 non-German motor vehicles crossed the boundaries of the empire. Among them were 1,522 motorcycles and 232 motor wagons. The increase over the previous year was 2,321, making 10.4 per cent. but this increase is the smallest for the past six years, indicating that Germany is not gaining in favor as a touring ground for people of other nations. Against the 232 motor wagons which entered Germany stand 148 motor wagons for the previous year, showing a substantial increase in the international trade traffic. Among the non-German vehicles 7,685 came from France, 7,300 from Austria, 2,962 from Switzerland, 2,268 from Holland, 723 from Great Britain and 342, or 1.4 per cent., from the United States. The foreign traffic was concentrated to the extent of about one-half in July, August and September.

Destructive Incidents and Accidents of the Motor Vehicle Traffic of Germany, October 1, 1912, to September 30, 1913

During this period there came to official notice 11,785 accidents—or, as they are more accurately termed, destructive incidents—in which motor vehicles were involved. The number of motor vehicles implicated in these incidents causing damage to persons or property was 12,772, as in 948 of the cases two motor vehicles were concerned in the accident, in 16 cases three of them, in 1 case four and in another single instance five of them.

The detail figures show plainly that each motor vehicle becomes a safer member of the traffic as their number increases.

If there were as many motor vehicles in the German traffic as there are pedestrians and other kinds of vehicles, the relatively small number of cases in which one motor vehicle collided with another—the exact number of these cases being 908—would go far to indicate that speed in itself is a small factor in causing accidents, since the relative speed is doubled where a collision of two rapidly-moving motor vehicles is concerned. In the statistics the probable reason for each accident is given in only about half of the cases. Excessive speed accounts for 1,103 cases, being 9.4 per cent., lack of skill or caution accounts for 2,626 cases and the action of third persons or the inattention of the injured persons is given as the reason in 1,391 instances.

Some data on the nature and cause of the incidents are given in Chart 6. Of the 12,772 motor vehicles implicated in them 233 were motor bicycles, 10 motor tricycles, 10,835 motor cars, 1,636 motor wagons and 4 motorcycle carts. In 54 instances the nature of the vehicle was unrecorded.

Only 78 of the vehicles were known to be domiciled in other countries than Germany, but in 259 cases the home of the vehicles remained unknown.

The total number of persons injured was 6,313, among whom 503 were drivers of the motor vehicles, 1,107 occupants of the same and 4,623 outsiders. The killed were in all 504, among whom 34 drivers, 61 passengers and 409 outsiders. The total of 6,817 killed and wounded represents an increase of respectively 62 and 771.

The damage to property foots up, according to the estimates, the sum of 2,771,688 mark (nearly $700,000) out of which 83 per cent. falls on destroyed and injured motor vehicles, a small amount on property carried in these and 16 per cent. on the property of outsiders. As compared with former years the losses fall more on the motor vehicle owners and less on outsiders. The average damage to property, when any was inflicted, amounted to 320 mark (about $80), and this amount is somewhat higher than in other years, mainly owing to the higher cost of the motor vehicles.

(*Continued on page* 182)

PERCENTAGE OF MOTOR VEHICLES WHICH HAVE BECOME IMPLICATED IN DESTRUCTIVE TRAFFIC INCIDENTS EACH YEAR FROM 1907 TO 1913, INCLUSIVELY

		1907	1908	1909	1910	1911	1912	1913
Motor Cars	In general	30.1	25	23	19.7	19.2	18.6	17.8
" "	Below 8 H.P.	12.9	12.2	10.7	10.2	9.9	9.5	9.1
" "	8-16 H.P.	42.9	36.9	31.1	27.6	21.5	16.5	12.3
" "	16-40 H.P.	46.9	34.7	38.9	24.2	25.3	26.2	25.8
" "	Above 40 H.P.	70.8	49.4	42.9	13.5	16.2	18	16.1
Motorcycles		1.5	1.2	1.1	1	1.1	1	1.1
Motor Wagons	In general	15.4	15.3	13.3	14.9	18.3	17.9	17
" "	Below 8 H.P.	12.1	12.6	9.5	11.2	14.6	13.6	11.8
" "	8-16 H.P.	20.3	25.9	20.8	18.7	18.7	17.1	17.4
" "	16-40 H.P.	18	10	14.4	16.4	20.8	19.4	18.5
" "	Above 40 H.P.	12.5	....	6.9	16.3	15.8	25.4	19
Motorcycle Carts		31.1	25	35.2	18.2	2.5	3.3	4

Gearset of Geometrical Design Is Best

Makes Gearshifting Easier Than the Arithmetical Design with Less Danger of Clashing — More Power on Third Speed of Four-Speed Type

By W. C. MARSHALL

Part II

INTERMEDIATE gear ratios are determined in an arbitrary fashion by taking for a four-speed car the figures which are arithmetical means of 35 and 7.4 viz. 16.6 and 25.8 the engine being supposed to run at a constant speed of 1,000 revolutions per minute. This gives the points *c* and *d* and enables the lines to be drawn for second and third speeds.

How Motor Speed Changes

Let us analyze the change in motor speed when the change speed lever is moved through all four positions.

Starting from first or low speed from rest the clutch must slip some for the motor speed must not drop below a certain figure which we will say is 400 revolutions per minute. The clutch engagement cannot then be final only after the car has reached a corresponding speed which from the figure is found to be 3 miles per hour or an acceleration of

$$\frac{3 \times 5280}{60 \times 60} = 4.4 \text{ feet per second.}$$

The speed still accelerates until the motor is turning 1,000 revolutions per minute and the clutch is thrown out of gear in order to change to second speed. As the car is running 7.4 miles per hour the motor must slow down to a speed corresponding to the car speed of 7.4 miles per hour (which will keep up due to the inertia), in order to slip in the second gear.

The motor speed will have to be 445 revolutions per minute.

As soon as the clutch is let in the motor speeds up to 1,000 revolutions per minute which means a car velocity of 16.6 miles per hour. To make the shift to third speed the clutch is released and the engine slowed down to a speed sufficient to correspond to the third ratio, namely 616 revolutions per minute.

Speeding up to 25.8 miles per hour at 1,000 revolutions per minute, and changing to fourth speed reduces the engine to 741 revolutions per minute which increases to 1,000 revolutions per minute when the car is running 35 miles per hour.

The actual gear ratios are 14, 6.33, 4.04, 3.

From the above we see that for the third speed change to high or fourth the drop in motor speed is much less than for other changes.

Evidently this is not logical.

It is necessary to equalize the reductions of speed and reduce them to a minimum in order that one speed change shall not be more difficult than another.

On the majority of vehicles in fact it is stated to be easier to pass from third to fourth than from first to second. For heavy, slow vehicles, the intermediate speed should be equalized in order to equalize the wear and reduce the motor speed as little as possible after the car has once started. The problem resolves itself into the equality of lines *A E*, *H F* and *D G* as shown in Fig. 5.

Let V_1, V_2, V_3, V_4 be speeds corresponding to a fixed motor speed V and let V^1 equal the uniformly reduced motor speed.

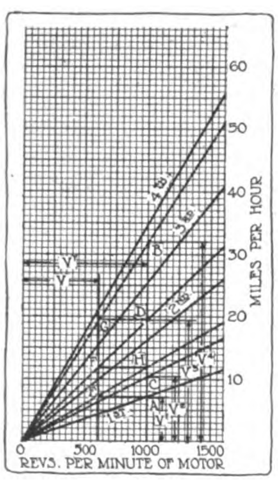
The similar triangles of the Fig. give $\frac{V^1}{V} = \frac{V_1}{V_2} = \frac{V_2}{V_3} = \frac{V_3}{V_4}$ from which $V_2^2 = V_1 V_3$ *and* $V_3^2 = V_2 V_4$.

Substituting, $V_2 = \sqrt[3]{V_1^2 V_4}$, $V_3 = \sqrt[3]{V_4^2 V_1}$ *and* $V^1 = V \sqrt[3]{\frac{V_1}{4}}$

In the case of three speeds only we have $V_2 = \sqrt{V_1 V_3}$ and $V^1 = \sqrt{\frac{V_1}{V_3}}$

Less Shock on Teeth

By this method the intermediate speeds would be the geometrical means of the extremes instead of the arithmetical means. One advantage of



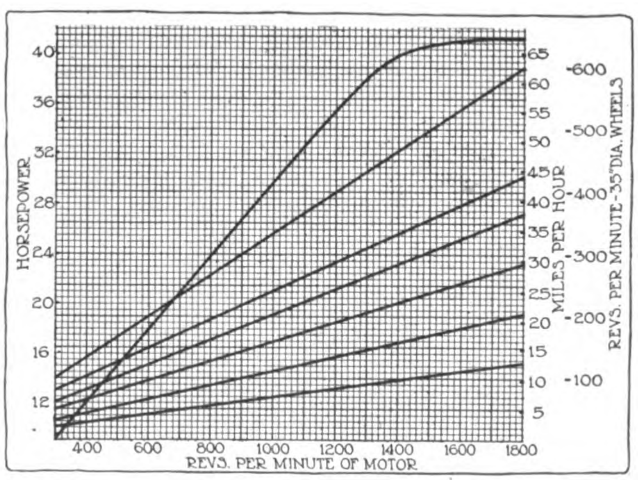


Fig. 5—Left—This is a diagram showing the changes in motor speeds in shifting gears in a geometrical gearset, and the line A-E representing the change in motor speed when shifting from first to second, and the line F-H when shifting from second to third, and the line D-G when shifting from third to fourth, are practically all of the same length, this being the desirable factor obtained in a gearset with geometrical gear ratios

Fig. 6—Right—This curve is to prove graphically the superiority of the gearset with geometrical gear ratios as compared with another gearset with arithmetical ratios. It accomplishes this proof by bringing together all of the factors entering into this question. On top is shown the horsepower curve of a motor 4 1/8 x 5 1/4 inches, and below this are given curves of gear ratios for both arithmetical and geometrical gearboxes, these being used with a car having 35-inch wheels and traveling at a speed up to 35 miles per hour. Further, this diagram is used to work out the power at the clutch of the car, as shown in Fig. 7

this method would be to diminish the shocks to the teeth, from the fact that variations between motor speed and car speed would be reduced to a minimum mean. Is there need to proceed in this manner for light, rapid automobiles? In the face of the general practice of the first method it would hardly seem so. Nevertheless if one considers that in these vehicles one establishes the fourth speed with a certain margin and that there is advantage in making use of the second as little as possible, it will perhaps be found advantageous to increase the ratio between fourth and third in such a way as to extend the field of action of the third. Nothing would then prevent bringing the second toward the first and arriving at the conclusion of our method by different considerations.

In the case of the car cited above, the speeds of the car would be 7.4, 12, 21.2, 35 miles per hour by the geometrical progression. This would give change in motor speed from first to second (assuming revolutions per minute of motor at the car speed for the miles per hour given) of 385 revolutions per minute. From second to third 434 and from third to fourth of 390 which is nearly a constant speed when compared with 555, 384 and 259 for the arithmetical ratio.

The minimum revolutions per minute of motor would be 566 as compared to 445 in the former case.

If the ratios of gears were 14, 8.5, 5.1 and 3, the minimum revolutions per minute during gear shifting would be 590 and would take place during the shift from third to fourth. From first to second the motor would drop from 1,000 to 605, from second to third the drop would be from 1,000 to 600. This shows an improvement at low speeds.

If it is desired to shift gears as soon as possible and not allow the motor to drop in speed below 400 revolutions per minute, the first change will occur when the car reaches a velocity of 5 miles per hour, the second change at 8.17 miles and the third at 14 miles per hour.

With the arithmetical progression the first change could be made at 6.5 miles per hour, the second change at 10.3 miles and the third at 14 miles per hour.

This comparison shows clearly that a driver could get into third speed quicker with the geometrical progression than with the arithmetical. The accelerating power of the car would also be greater and the speeds at which the changes could be made would be more quickly reached because of the greater power of the motor at higher speeds. The motor speeds at the times of throwing out the clutch to make the gear changes in the geometrical case would be 673, 666 and 684, while in the arithmetical the speeds would be 870, 625 and 543.

A Car Comparison

Let us examine the performance of the two types of gear set under road conditions. In order to present this in a form readily understood at a glance, it will be necessary to start

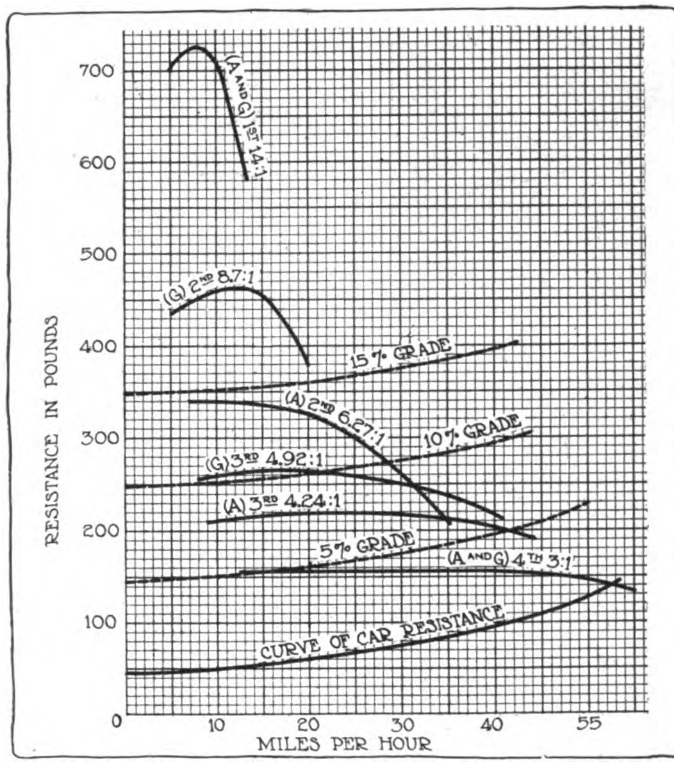
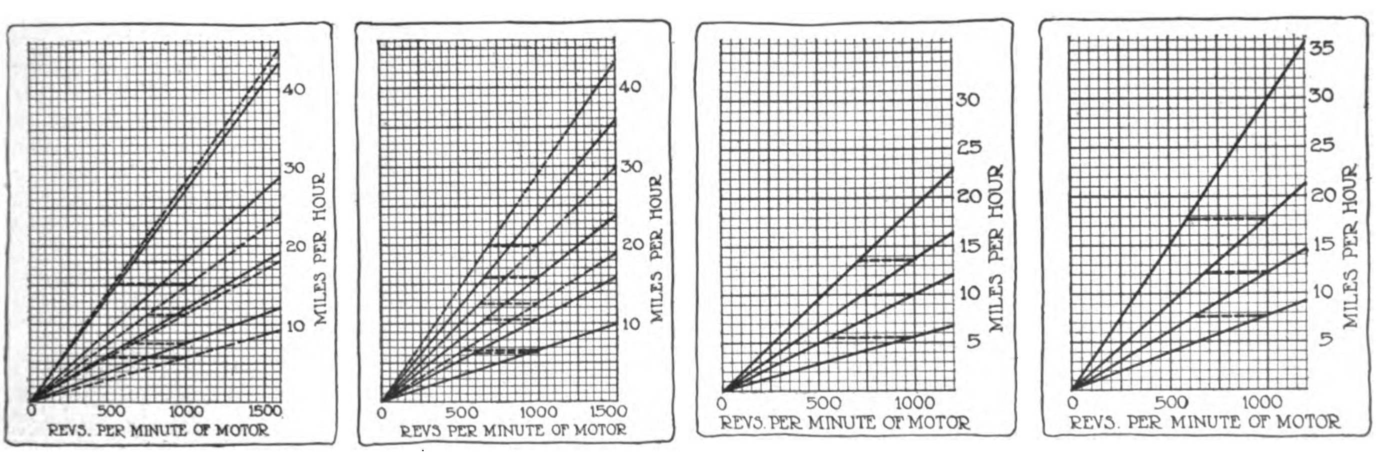


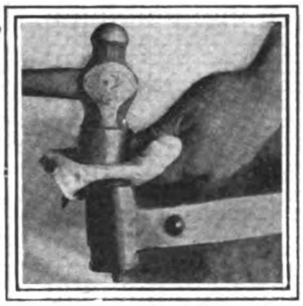
Fig. 7—This diagram is for the purpose of comparing the power at the clutch of the car obtained with arithmetical and geometrical ratios gearbox and the actual resistance of the car and, further, to show the superiority of the geometrical over the arithmetical type of gearbox. It also shows the speeds at which a car could ascend different road grades with the two types of gearbox and, further, shows the maximum grade that can be ascended with these two kinds of gearboxes for each gear ratio. For example: On third speed the car with the arithmetical gearbox can just ascend a 5 per cent. grade at 41.5 miles per hour, but could not ascend a 10 per cent. grade, whereas this car fitted with a geometrical gearbox would ascend the 5 per cent. grade at 41 miles per hour and the 10 per cent. grade at 20 miles per hour. Further, the car using the arithmetical gearbox and in second speed could not ascend a 15 per cent. grade, whereas with a geometrical type of gearbox it could ascend a 20 per cent. or steeper grade at 15 miles per hour. In low and direct drive, there is not any difference between an arithmetical and a geometrical gearbox, the difference lies only when using second and third speeds in a four-speed box

with the torque curve of the motor. Fig. 6 shows the actual horsepower curve of a 4 1-8 by 5 1-4-inch motor. The gear ratios of the arithmetical ratio box were 14, 6.33, 4.04 and 3. Using these with 35-inch diameter wheels gives the revolutions per minute of motor for car speeds from 5 to 35 miles per hour when running with the different speed reductions.

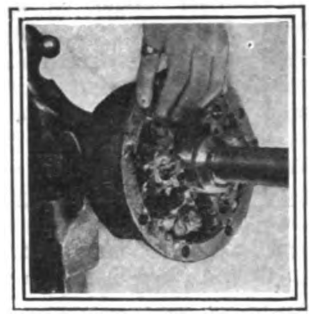
(*Continued on page* 183)



Figs. 8, 9, 10, and 11—The gear ratios on several foreign cars are plotted in these illustrations



The Rostrum



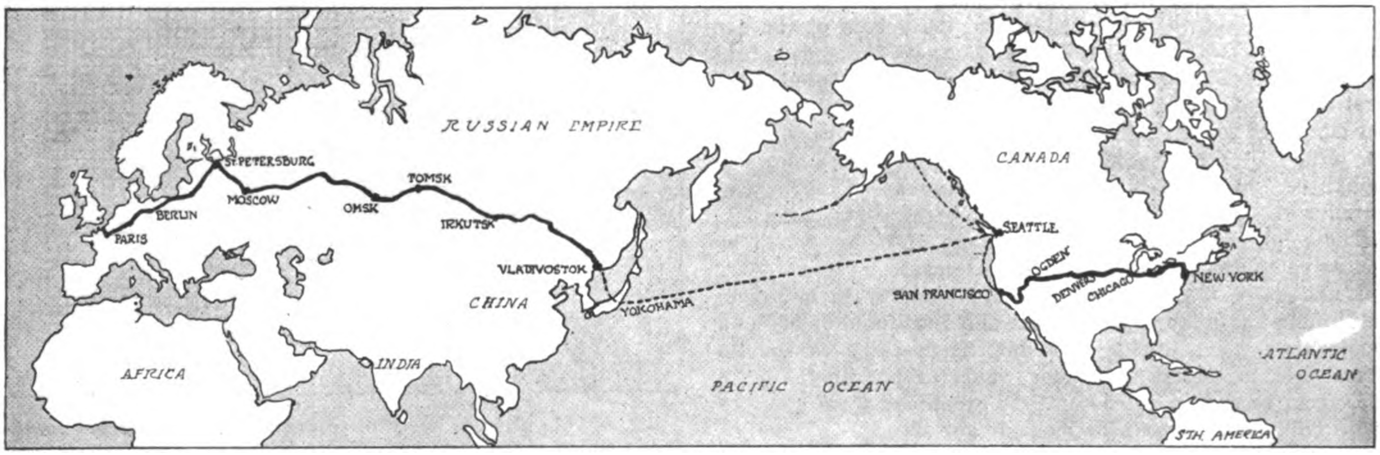


Fig 1—Map of the course taken by the contestants in the New York-to-Paris race in 1907

Pierce Prefers Semi-Floating Axle

EDITOR THE AUTOMOBILE:—1—Explain by aid of a diagram the construction of the Pierce-Arrow semi-floating type of rear driving axle, used at present time, and state if possible the reason of the Pierce-Arrow Motor Car Co., for continuing the use of this type of axle in preference to the floating type employed by most makers.

2—If possible explain by aid of diagram the construction and working principle of the Diesel internal combustion engines.

3—Please publish the weights of the following automobiles in the touring models with full equipment and tanks empty.

Pierce Arrow	Packard	Peerless
38 H.P.	38 H.P.	38 H.P.
48 H.P.	48 H.P.	48 H.P.
66 H.P.		60 H.P.

4—State the course taken, cars run, and order in which cars finished, in the New York to Paris race several years ago in which the Thomas Flyer was the only American car entered.

FORD P. DECKER.

Elmira, N. Y.
R. F. D. No. 2, Box 34.

—1—The reasons for the use of the semi-floating axle and the construction of the type used in the Pierce-Arrow cars are best explained in the words of David Fergusson, chief engineer of this company.

Floating Axle on Trucks

"We use a semi-floating axle on our pleasure cars. On our trucks we use the full floating type. We have designed and made floating axles for experimental pleasure cars, the same in every other respect as the semi-floating and found them to be much more complicated and to weigh very considerably more than the semi-floating type. The weight of the axle is of utmost importance, this being unsprung weight and the effect of this on pneumatic tires is very destructive. The extra weight on the solid tires of a truck is of small consequence. We will therefore discuss this construction entirely in regard to pleasure cars.

"The semi-floating axle gives two less loose joints (the hubs being securely fixed to the ends of the live axle) to cause rattle and clatter. It gives very much steadier and truer running rear wheels and therefore a more stable car, this due to the axle bearings being so far apart. This construction is very much lighter, giving longer tire life. It is altogether more simple there being far fewer parts and what is more, it is no experiment, as it has been successfully used by some of the highest grade manufacturers for many years and is employed in the heaviest and most powerful cars in the world, which have an enviable record for long mileage and freedom from trouble.

Only Takes Torsional Strains

"The theory of the full floating axle is to utilize the live axle for torsional strains only and the axle case tube for the dead load of the car only. To fulfill this condition each car wheel should be mounted on two ball or roller bearings on the tubular extension of the case, making adequate provision for taking care of end thrust and the live axle must be slightly free in both the compensating gearcase and the hub of the car wheel. There is a tendency to make the wheel bearings on the small side in order, to keep down the diameter and length of the hub; this gives very poor support to the wheel and it is liable to wabble on the axle case extension and severely overload the bearings.

"In order to make the wheel more stable some designers secure the outer ends of the live axle direct to the hub of the wheel. This is very bad practice where the standard two bearing hub is used, as it is very difficult to line up the live axle sufficiently accurate, when secured to the hub without tendency to bind the bearings in the hub, also any deflection

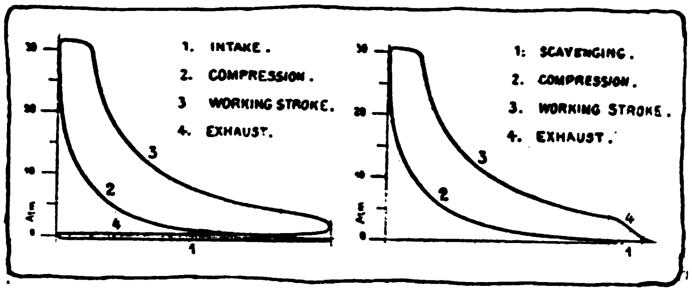


Fig. 2—Diesel engine cards, left four cycle, right two cycle

of the axle case causes a bending moment in the live axle and an excessive binding in the bearings in the wheel hubs, in fact these bearings may be frightfully overloaded in this manner. This construction really defeats the object of the full floating type which is to relieve the live axle of everything but torsional strains.

Diameter Should Be Larger

"In none of the above arrangements is provision made for resisting the bending moment that is imposed upon the live axle towards the outer ends when the wheel strikes the curb or is running in a rut with the car swaying from side to side. The diameter of the live axle at the hub should be at least from .25 to .375 inch larger in diameter than the diameter of the small end of the live axle when this is designed to resist torsion alone. Of course, this could readily be done, but designers appear to be more interested in keeping down the diameter of the bearing and thereby making a neater and lighter hub.

"The above constructions are all supposed to be developments of the semi-floating axle. In many cases they are not nearly as good.

"There are many points in favor of the older design when it is modified as shown in Fig. 4. Here the center line of the rear wheel is brought as close to the center of the outer axle bearing as possible, the diameter of the live rear axle is made very large at the outer ends in order to securely attach the hub and to adequately take care of the bending moment imposed upon it, not only by the overhang from the bearing but due to the rear wheel striking the curb or running in ruts with the car swaying.

"The inner end of the live axle is made smaller in diameter as this end has little more to do than take the torque of the engine. This live axle is made of the very finest chrome nickel steel, heat treated to give an elastic limit of not less than 110,000 lbs. per sq. inch with a reduction of area of not less than 55 per cent.; it is therefore well calculated to withstand any torque and bending moment that may be imposed upon it. The diameter of the live axle at the outer bearing is more than sufficient to admit of using a bearing abundantly capable of taking both the radial and thrust loads. This construction admits of a very short and stiff axle case tube.

Alignment Permanent

"It allows of a very small and light hub which may be quickly withdrawn by means of a wheel puller provided in the tool kit. The case securing the outer bearing can then be unscrewed and the live axle withdrawn without dismantling the rear axle housing. A slight yielding of the rear axle casing does not materially affect the alignment of the outer bearing. In good cars the live rear axle is generally made of high grade alloy steel. Very little extra weight is required to make this axle .25 to .375 inch larger at the outer end and this amount admits of this live axle taking care of both bending moment and dead load, in addition to the torque, much more effectually than can the tubular part of the rear axle case, which is seldom made of a material of greater strength than 70,000 pounds per square inch elastic limit and which is usually swaged down to a much reduced diameter to admit of using reasonable sized bearings, in the case of the full floating design.

"From the above it will be seen that the last described construction is really the most logical to adopt, as although some floating types give similar advantage, yet they will probably weigh more if they are properly designed. The outer ends of these live axles when secured to the rear wheel hubs must be made as previously mentioned, from .25 to .375 inch larger in diameter to adequately take care of the great bending moment occurring when the rear wheels are running in ruts and the car swaying. This would necessitate a much larger diameter bearing than indicated in these illustrations and it is only reasonable to infer that the load imposed upon the outer ends of these live axles is far greater than the combined torque and vehicle load, that if the axles were capable of taking this strain, they are certainly capable of carrying the weight of the vehicle which will really impose no additional load on these live axles than what they already must be capable of carrying. Why not, therefore, utilize these already enlarged live axles on which to apply the bearings that carrry the weight of the vehicle?"

Diesel Engine Principles

2—The Diesel motor is operated either on the four-stroke or two-stroke principle and the operations of the motor in each of these cycles are shown respectively in Figs. 3 and 5.

The primary differences between the Diesel engine and the ordinary type of gasoline engine is in the injection of the fuel under pressure and the firing of the charge by the heat of high compression. Starting with the engine on the firing stroke, the charge is fired by the high compression heat. The compression in the Diesel engine is 500 pounds to the square inch. As the piston is forced downward some of the energy is absorbed in putting pressure into the fuel oil tank. This pressure is 800 pounds to the square inch, which is sufficient to overcome the compression pressure in the cylinder.

At the end of the firing stroke the exhaust occurs in the usual manner throughout the entire range of one stroke. On the next out stroke the engine draws in a charge of pure air

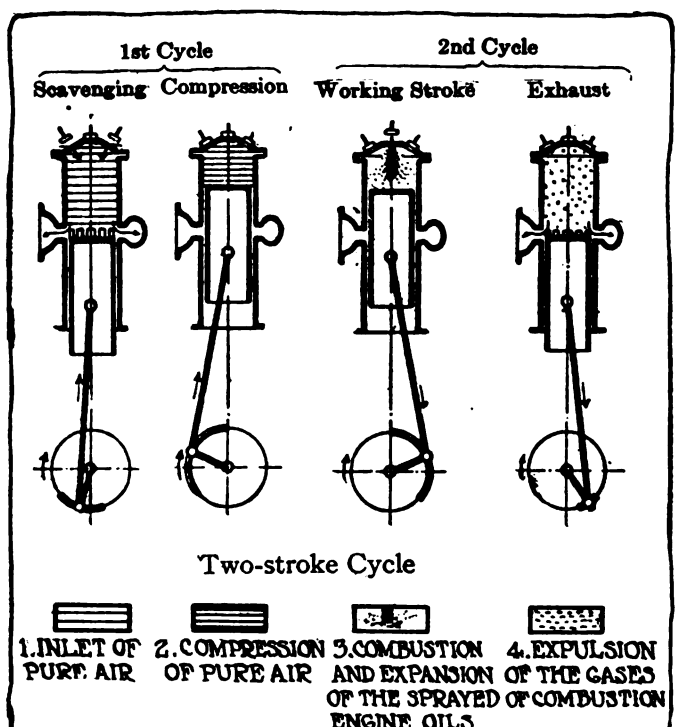


Fig. 3—Diagram showing the operation of the Diesel engine with a two-stroke cycle

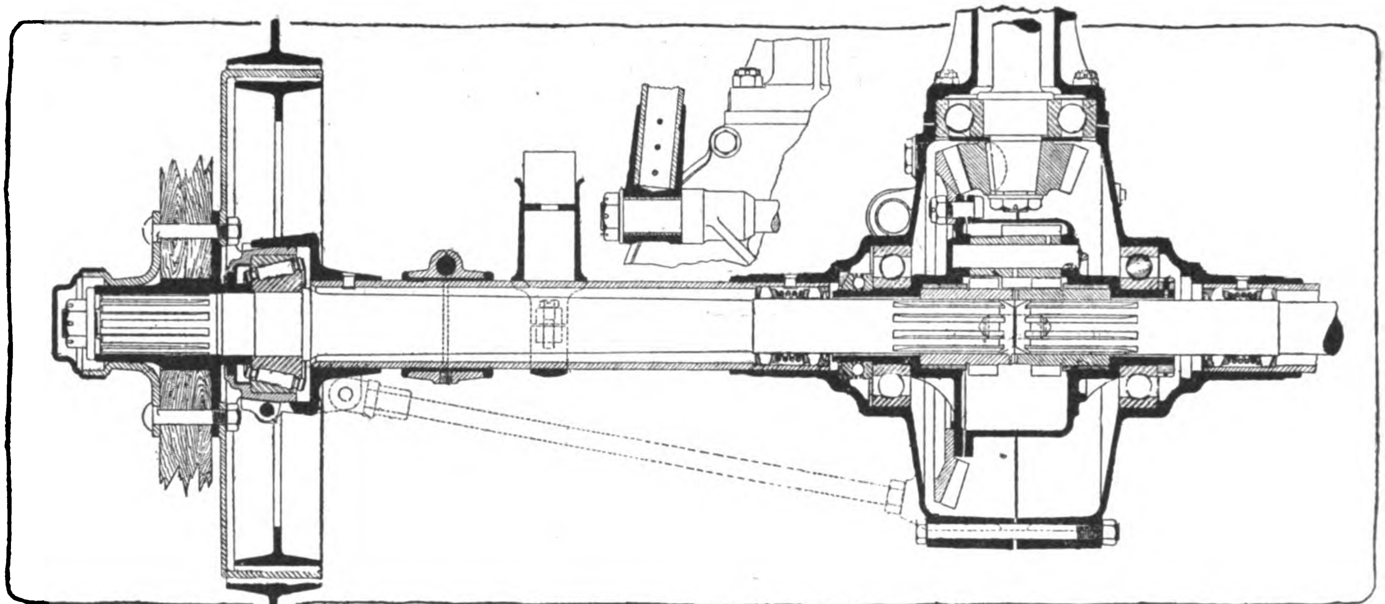


Fig. 4—Sectional view of the semi-floating axle design as incorporated in the Pierce-Arrow car

through the intake valve, which is opened at the conclusion of the exhaust stroke.

The next stroke is the compression stroke in which the pure air is compressed up to a pressure of 500 pounds to the square inch. When the piston has reached the top of the stroke the fuel valve opens and the charge is injected into the cylinder. The fuel forms a combustible mixture with the air in the cylinder and at the pressure in the cylinder begins immediately to burn. The burning in the Diesel engine must be distinguished from the explosion in the ordinary gasoline engine.

Two-Stroke Cycle

On the two-stroke cycle the strokes are divided into two parts, that is, two functions are performed at each stroke. referring to the diagram, Fig. 2, it will be seen that the first part of the up stroke is devoted to scavenging the motor. The second part of the stroke compresses the pure air. On the downstroke the first part is the working stroke and the second part is the exhaust.

The reason that Diesel engines are not used successfully in automobile work is because all the disadvantages of the type are most accentuated in the small units that would be necessary. In the first place, the high compression and the pressure under which the fuel must be forced into the cylinders gives rise to requirements in construction which would make the engines too cumbersome and unwieldy for a motor car. The difficulties also apply to the construction of the pistons, valves, fuel pumps, etc.

3—The average weights full equipped are as follows:

Pierce		Packard		Peerless	
Model	Weight	Model	Weight	Model	Weight
38	4400	38	4400	38	4400
48	5100	48	4700	48	4800
66	5400			60	5100

4—The course of the New York to Paris race was from New York City to Albany, Buffalo, Cleveland, Toledo, Chicago, Omaha, Cheyenne, Granger, Ogden, Reno, Carson City, Goldfield, Crucero, Daggett, Mojave, Saugus, Santa Barbara, San José, San Francisco, then across the Pacific by vessel to Kobe, Japan; Tsuruga, Vladivostok and by way of Harbin, Tschita, Irkutsk, Omsk, Tomsk, Tiumen, Ekaterinburg, Nijni-Novgorod, Moscow, St. Petersburg, Berlin and Paris. See Fig. 1.

This is a total distance of 21,000 miles, 13,000 miles on land and 8,000 on water as the crow flies. Many miles were spent, however, in detours made necessary by misdirection and unforeseen obstacles.

The contestants were as follows: De Dion, Moto-Bloc, Sizaire-Naudin, Zust, Protos and Thomas. The time and order of finish were as follows: Thomas, 42 days; Zust, 53 days; De Dion, 56 days. The Protos quit at Seattle, Moto-Bloc at Cedar Rapids, Ia.; Sizaire-Naudin at Red Hook. N. Y.

To Paint Brass Black Saving Polish

Editor THE AUTOMOBILE:—I have bought a new Ford car, and I would like to paint black the brass trimmings, such as the radiator, headlights and so on. I would be pleased if you could tell me what kind of paint to use that would do a nice job and stand the heat of the lamps and radiator.

Beaumont, Tex. A. T.

—The simplest method of preparing a black varnish for brass is to fuse 3 pounds of asphaltum, and after it has been melted add .5 pound of shellac and 1 gallon of oil of turpentine.

Does Not Favor Muffler Cutout

Editor THE AUTOMOBILE:—I note the assertion in The Rostrum that I did not read the article on the muffler cutout throughout, and in reply will say that I noted the "loop-hole" before writing you.

The tone of the whole article was in favor of the use of the muffler cutout and therefore my protest. How would it be possible to make a driver hear on the road, in case you wished to pass him, if he had his cutout open and the road was so narrow that you could not run alongside of him?

Rockville, Conn. ALLEN HAMMOND.

—The muffler cutout question has been argued pro and con for some time and there does not seem to be any better solution of it than that it should not be used where it interferes with the safety or comfort of others. In municipalities of any size they have recognized this fact and have barred the use of muffler cutouts.

There can be no doubt that with some drivers the noise of the exhaust of the engine is as music to their ears. This is particularly noticeable in the neighborhood of races. At the recent Indianapolis race hundreds of cars were parked in the infield of the Speedway, and fully eighty out of every hundred were operated with the cutout open. The drivers of these cars were victims of the psychological spell of the races and took a keen delight in the noise which was suggestive of speed.

In running along the average country road the muffler cutout can do no harm except in such a case as you mention, where the road is so narrow that a car coming up from behind wants to pass. But on the other hand, the man who drives with his cutout open is generally the kind of man who is driving so rapidly that you would hardly care to pass him on a road of that width.

New York Dealers' Licenses $15

Editor THE AUTOMOBILE:—In obtaining agency for a car, what is the first process in regarding license number, to whom and when do I make application for same, and the cost of same in New York State? What particular form of license do I apply for? A license number for dealers taken out in August or September expires when? Is there any rebate from the State license price when taken out late in season as above? As a rule does the dealer pay the freight charges on a car sold to owner from factory?

Auburn, N. Y. SUBSCRIBER.

—In applying for a dealer's license you should forward your application to the secretary of state at Buffalo, N. Y., who will give you an application blank to fill out. The cost of the license is $15 for the first pair of plates and $2 a pair for each extra set of license plates. The same pair of plates can be used on several cars for demonstrating purposes. The license expires the first of February following the issuance of the license. There is no rebate on dealers' licenses when they are taken out late in the season.

Dealer Does Not Pay Freight

The dealer does not as a rule pay the freight on cars which are purchased from him. He sells the cars f.o.b. the city in which they are manufactured. It is the general practice to secure one-third the purchase price on receipt of the order and the remaining two-thirds on delivery of the car.

How To Time a Ford

Editor THE AUTOMOBILE:—Would like to ask what is the correct timing on the Ford. Would it increase the power to file the valve stems so as to close the exhaust valve on top dead center?

San Diego, Cal. J. SCOTT.

—Set the camshaft so that the exhaust valve is just beginning to close when the piston is on top dead center. The intake valve should begin to open when the piston has moved down 1-16 inch from this position. Filing down the valve stem would decrease the power unless the stems are so long that the valves cannot seat at all.

Two Gears Shift at Once

Editor THE AUTOMOBILE:—1—Will you kindly tell me how I can repair my car? When I change from intermediate to low, or from high to low very quickly, the gears go in high and low both. The car stops with a jerk and I cannot change to neutral until I get underneath the car and kick out high. I have tried everything that I can think of, but it has no effect. As long as I change slowly it works all right. I shortened the rods, put more tension on the lock springs and moved the forks, but it made no difference.

2—Is there any way of adjusting the spring tension on the clutch of this car?

3—How can I replace the felt grease retaining washers in the six and also in the model S-20 1912 Studebaker?

4—What effect have moth balls on gasoline? I have some friends who put moth balls in their gasoline, and they say they get more power from their engines.

Sterling City, Cal. ELMER MARION.

—1—Either the shifting rods are not the right length or the springs that bring them back to neutral are weak. Replace these springs, and if this does not remedy the difficulty try adjusting the lengths of the rods.

2—The tension of the clutch spring can be adjusted by screwing up on the nut that holds the thrust bearing in place. It is possible that this will not make the clutch hold. If it does not, then the clutch leather should be replaced. To do this it will be necessary to remove the clutch cone. Take the universal apart and then unscrew the bolt that holds the thrust bearing in place. After this the clutch spider can be removed.

3—You do not state where these washers are, although you probably mean the washers in the wheel hubs. These may be replaced after the wheels are removed.

4—The use of moth balls will increase the power slightly, but they have a corrosive action and tend to carbonize the motor.

Where To Obtain Spark Gaps

Editor THE AUTOMOBILE:—I would like to know where I can buy auxiliary gaps to be placed in the high-tension cables. Ones that can be opened and closed at will, so that one can determine whether the plugs are sparking or not.

Cleveland, O. O. P. WARNER.

—Spark gaps, such as you describe can be obtained from any of the following concerns, according to the Automobile Trade Directory:

Bremer & Mooney Mfg. Co., 538 Muskego street, Milwaukee, Wis.

Champion Spark Plug Co., 134 Upton avenue, Toledo, O.

Cut-Out Switch Co., Broadway and 195th street, New York City.

Dalitz Mfg. Co., 3134 Payne avenue, Cleveland, O.

Hemmeter Spark Gap Mfg. Co., Dime Bank Bldg., Detroit, Mich.

Herz & Co., New York City.

George W. Manville, Bridge street, Towanda, Pa.

Lee C. Mapes, 16 Fulton avenue, Rochester, N. Y.

Eugene D. Means, Towanda, Pa.

A. R. Mosler & Co., Mt. Vernon, N. Y.

H. M. Sheer Co., Quincy, Ill.

Smith & Gunn, 22 E. Broad street, Burlington, N. J.

Toledo Auto Devices Co., Gardner Bldg., Toledo, O.

These gaps tell exactly what is happening at the plug and by their use many ignition troubles can be traced.

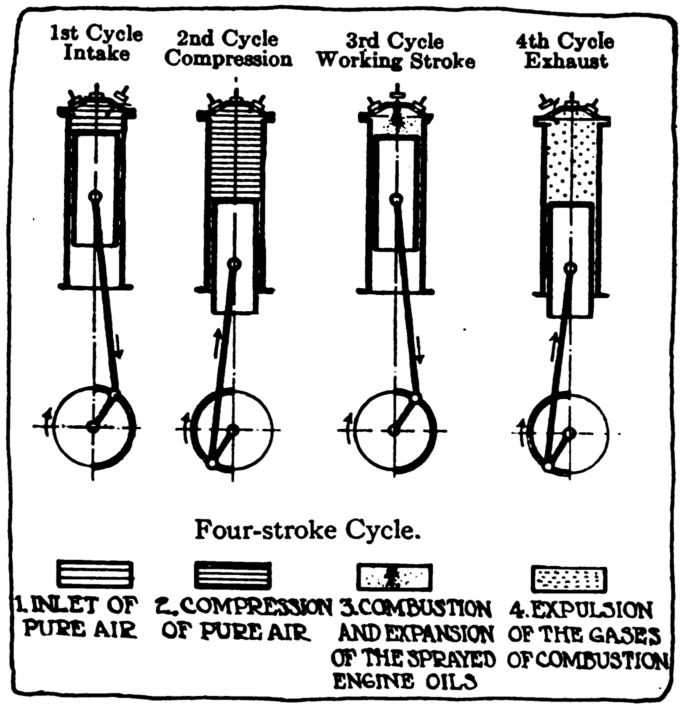


Fig. 5—Diagrammatic illustration of the principle of the four-stroke cycle Diesel

The Engineering Digest

Synthetic Rubber Unsettles the Market But Technical Facts Fail to Support Faith in Its Quality

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RAPID OXIDATION THE BANE OF ARTIFICIAL GUMS

ONE thousand tons per week is the amount of Pavea Synthetic Rubber which, it is stated, will be turned out regularly before the end of this year at large works near Manchester, England, by a one-million dollar corporation. It is also stated that the cost of production for this substance will not exceed 8 cents the pound and that it will be marketed at 10 cents below the current quotations for first Para latex, whatever these may be at any given time in the future. Samples of the product have been distributed among rubber buyers and, according to the London correspondent of *The India Rubber World*, there is no doubt that the apparent quality of these samples has had the effect of depressing the price of plantation rubber at least 2 cents per pound; nor that the raw rubber merchants will delay their purchases this year and await the developments of the Pavea concern. Various vegetables and wild plants are mentioned as the source of the new rubber, and all the officials of the manufacturing company have been sworn to secrecy with regard to the nature of the raw material and that of the production process. The inventor is a Mr. Russell.

Commenting editorially upon these reports *The India Rubber World* in its issue of July considers that Para and Singapore would do well to maintain their dock facilities for yet a little while, as good samples of synthetic rubber have been distributed before without any consequent disturbance of the rubber market. "And then, as noticed last month," it adds, "this new rubber has a very considerable constituent of resin, which gives rise to the conjecture that it is somewhat more akin to natural rubber than to the products of synthesis."

The promised production of one thousand tons per week calls for a vast amount of raw material to be handled, and a material which must be of exceeding cheapness to realize a final production cost anywhere near 8 cents per pound. These things, all considered, narrow the surmises down to a choice between a great fundamental discovery and an industrial hoax. If the reports are accepted at somewhere near their face value, a discovery of some importance must have been made, but even in that case the question remains whether the technical properties of the product have been fully ascertained. With the application to automobile tires in view it is important whether the product shares in the peculiar shortcoming which has so far characterized all synthetic rubbers, though it escapes observation that does not extend over some length of time. This is the tendency to relatively rapid oxidation and hardening.

What German Investigators Found

In this respect a lecture delivered January 23 this year by Dr. A. Holt before the Heidelberger Chemical Society illuminates the probabilities by showing facts in connection with the properties of other synthetic rubbers which it proved most difficult to discover. With elimination of the most severely technical features, the lecture, which was supported by the showing of a large number of rubber preparations, conveyed in substance the following general information:

The difficulties of the subject are illustrated through the fact that we still know very little about the structure of guttapercha, except that its properties are very different from those of rubber while its chemical composition seems to be identically the same.

With regard to the hydrocarbon base of rubber we know with certainty only that 2 molecules of isoprene are changed into 1.5-dimethylic molecules of octo-cyclic formation. Starting from this bit of knowledge, Fritz Hoffman and after him many others succeeded in producing rubber from isoprene. The raw material for isoprene was turpentine but had to be abandoned as too costly and relatively scarce, although it was finally made to yield 65 per cent. of isoprene. Elberfelder Farbenfabriken then got isoprene from acetone. Badische Anilin und Soda-Fabrik made it from hydrated benzols or phenols. Neither quantity nor quality was satisfactory by these methods.

Where Standard Oil Products Come In

A great improvement was realized when the Badische, in working with fusel oil, devised a method for chlorating trimethylethylenes in vacuum and another kindred process. This gave a pure isoprene, but fusel oil was too scarce. Petroleum was taken up instead. It was eventually found practicable to transform by the chlorating method all the important constituents in petroleum—not only the isopentane—into pure isoprene, by way of trimethylethylene. This seemed to solve the question of raw material, as the United States alone can furnish 300,000 tons of pentane per year.

To polymerize isoprene into rubber proved a more stubborn task. Hoffman's original method was to heat the isoprene for a considerable time. Matthews, Strange and Harries discovered almost simultaneously the polymerizing effect of the alkali metals, such as sodium. But after all the hydrocarbon base of natural rubber could not be reproduced from the sodium-isoprene rubber and there was in the latter a corresponding lack of elasticity and an irregular resistance to vulcanization.

The Badische found two methods which led back to the natural rubber base. One consisted in the treatment of isoprene with the ozonides of terpene. The ozonide rubber obtained was tougher and more elastic than that obtained by heating, and, in contrast with the latter, did not dissolve in benzol but only formed a colloid. The second method consisted in using an alkali metal, especially sodium, in the presence of carbonic acid. The reactions were totally different from those obtained with sodium without carbonic acid. The product has a normal hydrocarbon rubber base and can neither be dissolved nor emulged in benzol, while made without the carbonic acid it has an abnormal base and is easily solvable. The carbonic acid rubber is similar to the natural Kondakow rubber.

Lack of Complete Identity Finally Shown Chemically

These three varieties of synthetic rubber—the heat-rubber, ozonide rubber and carbonic acid rubber—have different appearance and physical properties and also act differently with the usual rubber solvents. All of them have a tendency to oxidation, while natural rubber is much more indifferent to the oxygen of the atmosphere. Chemically they show great similarity. Harries had shown that, by an ozonizing process, levulinaldehyde and levulinic acid can be obtained from heat-rubber as well as from natural rubber. It was now demonstrated that these substances also could be obtained by cracking the ozonide and the carbonic acid rubbers, but in the case of the latter abundant quantities of acetonylacetone and succinic acid were produced at the same time. This led to the discovery that in all of them there was not only the 1.5-dimethylic hydrocarbon base of the natural rubber but also a 1.6 dimethylic base, from which alone the acetonylacetone and succinic acid could have been derived. By further experiments it was found, to the surprise of the investigators, that these substances also could be obtained from heat-rubber and from ozonide rubber, and in all cases in about the proportion of 8 to 2, which corresponds to the proportions of the two bases. On the other hand, it was found impossible to find even a trace of the 1.6-dimethylic base in natural rubber.

Complete identity with natural rubber does not therefore exist in any of the synthetic rubbers mentioned, and this accounts also for their shortcomings in physical properties. They are about equal in value to medium good natural rubbers and could be produced cheaply in any desired quantity if the steadily increasing production and steadily falling prices of natural rubber did not rise as an obstacle to the financing of their manufacture. Dr. Holt also thought that the infinitely large supplies of rubber which can be obtained from nature by cultivation would continue indefinitely to interfere with artificial production.—From *Kunststoffe*, March 1.

Lamplugh's Differential with Worm Drive and Silent Gear Reduction

MANY designers seek the ideal differential which will act as the standard differential does where the road friction is secure at both wheels but will lock itself wherever there is a tendency for one wheel to slip or spin around in the air. In some instances the proposed special designs are combined with gear-reduction devices in order to obtain a desired transmission ratio with a bevel-gear driving-mechanism of moderate dimensions. This is the case with the Renault differential for trucks and with that used on one of the Mercedes truck models. In both of these, which have been described in these columns, it may also be an object to divide the ordinary driving-stresses between two bevel-gear wheels, so as to be enabled to use smaller dimensions and gear teeth. In other cases the purpose is only to obviate the undesirable action of the ordinary differential which arises when road friction at the wheel rims does not check its freedom of movement, and the method adopted is to supply this check by other means. The Romeiser differential brake tried in the German army and described in THE AUTOMOBILE of June 11 belongs to this class as well as the Eden hydraulic check described in THE AUTOMOBILE of June 25. Romeiser's device produces only a constant friction which acts to equalize in some measure any unequal resistance to movement of the two driven vehicle wheels, while Eden aims to make excessive differential action check itself.

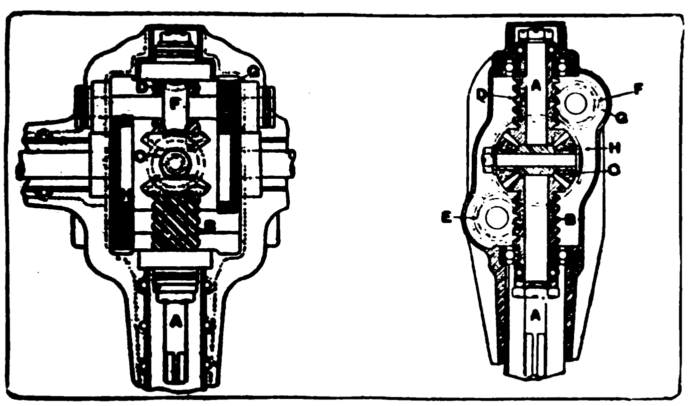


Fig. 1—Lamplugh differential with worm drive

F. Lamplugh of England now proposes a device in connection with worm drive which in other respects resembles that used in Mercedes "colonial" trucks. The claim is made that its use has been proved to increase the life of tires 100 per cent. and to reduce the fuel consumption 20 per cent., these results being obtained through the neutralizing of end-thrust in the worm drive and reduced slippage of the wheels. The construction is shown in Fig. 1 and may give a clue to the basis for these claims.

The drive shaft A extends through the rear-axle gear-casing, and a double stub shaft C is secured to it transversely, carrying the two driving pinions of the bevel-gear differential. In front of the transverse pin there is journaled upon A the left-threaded worm B integral with one of the driven pinions of the differential and behind it similarly the right-threaded worm D with the other driven pinion. B meshes with wormwheel E below it and D with wormwheel F above it. Upon one end of the shaft for wormwheel F there is mounted the plain spur pinion G which meshes with a spurwheel secured upon the inner end of the drive shaft for the left side vehicle wheel, and similarly a pinion H on the end of the shaft of E drives a spurwheel secured upon the right side wheel shaft.—From *Automobil-Welt*, July 3.

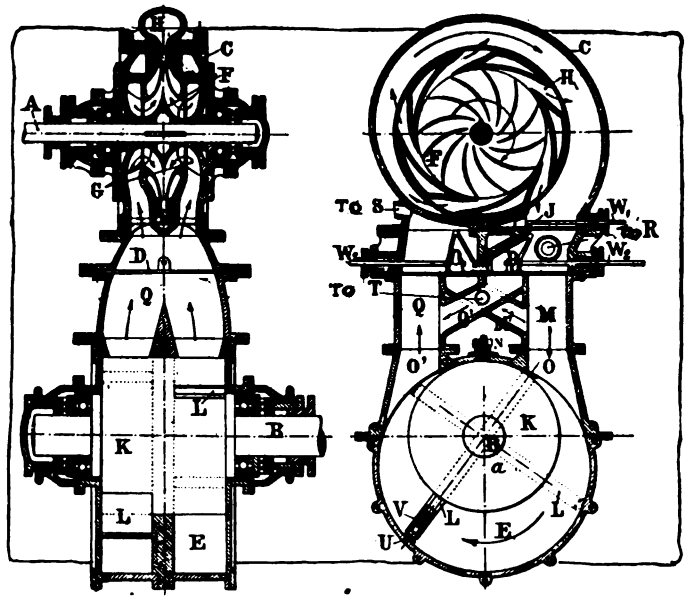


Fig. 2—Tourreil's hydraulic transmission "liquid belting"

Tourreil's Hydraulic Reducing Gear or "Liquid Belting"

THOUGH intended especially for reducing the speed of the propeller shaft in boats equipped with steam turbine engines the hydraulic reducing gear invented by Maurice Tourreil of France commands an interest outside of marine engineering circles for being a transmission mechanism by which the power of the engine is taken to the driven member in a manner not absolutely positive but susceptible of yielding when the resistance met is greater than that which can be overcome, in the same manner as in fire engines with centrifugal pumps where the accidental freezing of a hose nozzle or other clogging of the water channel causes neither the bursting of the hose nor the stopping of the engine. Drives of this character are by some authorities in the automobile technical world—Dr. Riedler of Berlin, for example—considered desirable for automobile trucks but have not so far been made practicable on the small scale required for this purpose. The hydraulic drives in actual operation all have the positive action of pumps with reciprocating pistons.

Tourreil calls his construction the *Courroie Liquide* or "liquid belting" and is able by means of it to make a propeller shaft revolve at a speed of 100 revolutions per minute when the steam turbine is operating at 2,500 revolutions per minute. The Melville gear installed in the American collier Neptune reduces 1,250 revolutions to 135, handling 6,700 horsepowers, and the Föttinger transformer, which is hydraulic in principle, has transmitted 9,000 horsepowers, reducing the speed from 850 to 135 revolutions with an efficiency of 90 per cent. for forward and 80 per cent. for reverse driving.

The construction of the "liquid belting" is shown in Fig. 2. The centrifugal pump C is actuated directly from the turbine shaft A and delivers the power through a rotary motor of a well-known type with paddle blades K, this motor being keyed upon the shaft B of the screw propeller. The conduit M establishes the connection from the pump discharge to the admission gate O of the motor, and the conduit Q completes the circuit by connecting the discharge gate O′ of the motor with the admission channel of the pump. The centrifugal pump comprises a wheel with two sets of vanes F with opposite pitch, so that the end-thrusts neutralize each other, two distributers G and a diffuser H, formed with partitions.

The rotary motor comprises the cylindrical body K in which two blades L can slide in and out at right angles with each other but each in its own plane. The space E, instead of having the circular form shown in the illustration, is elliptic and the shaft of K is placed in the minor axis of the ellipse so as to reduce to a minimum the variations in the length of the active portions of the blades. The jointed contact-shoes U in the ends of the blades are pushed outward by springs V to secure tightness and a similar contact-shoe N separates the admission channel from the discharge. By displacing the connected vanes D by means of rods W_2 the conduits M and Q are blocked and the oblique conduits M′ and Q_1 are opened. This reverses the direction of movement of the liquid and consequently of the transmission. To vary the speed of the motor member of the mechanism the throttle vane J is operated by means of rod W_1, so as to reduce the delivery from the pump member, the speed of the motor being reduced in the same proportion. A safety valve T establishes a connection directly from M to Q when a sudden reversal of the mechanism causes pressures too high for the organs of the motor. Two air reservoirs R and S, not shown in the drawings, are connected with channels M and Q and serve to regulate pressures, forming at the same time fluid reserves to compensate for losses by leakage. Heating of the mechanism is obviated by having a portion of the fluid bypassed through a cold-water cooler.

The efficiency of this transmission, when it is made in such large dimensions that the maximum pressure on the fluid does not exceed 10 kilograms per square centimeter, is said to be 90 per cent. for the rotary motor, 90 per cent. for the centrifugal pump—which under these working conditions does not need to have more than one wheel—and 96 per cent. for the conduits, giving a total efficiency not below 75 per cent., which however is lower than that of the Föttinger construction.—From *Le Génie Civil*, June 27.

Germany's Elaborate Statistics

(*Continued from page* 173)

In the district of Berlin, out of every 100 motor cars 45.1 were implicated in some destructive traffic incident during the year and out of every 100 motor wagons 20.9 were so implicated, but these proportions are much reduced in the country as a whole, being due largely to the great number of taxicabs in the metropolitan districts. Taxicabs show in fact the greatest liability to accidents of all motor vehicles, motor omnibuses excepted. Out of 100 taxicabs 66.4 were in accidents at one time or another during the year, and out of 100 motor omnibuses 79.2. This unfavorable showing for the public vehicles is ascribed less to any lack of skill of the drivers than to the fact that these vehicles operate in the closest population and as many hours every day as they can be kept going.

The 22,457 motorcycles of the empire were engaged in only 243 destructive traffic incidents and the 100 motorcycle carts only in 4. This leaves, out of 10,257 accidents standing on record against motor cars and motorcycles combined, 10,014 against motor cars alone. The number of motor cars being 60,876, it follows that out of every 100 motor cars 16.4 participated in destructive accidents. Similar reasoning shows that 17 per cent. of the motor wagons were in accidents, since a total of 9,639 motor wagons were in 1,636 accidents. The possibility that some of the vehicles may have been in accidents repeatedly and may thus have made the score worse for the average is unconsidered.

[An error in the statistical method may here be noted, which consists in figuring the liability to accident on the basis of the accidents which took place from October 1912 to October 1913 and at the same time on the basis of the number of vehicles recorded for January 1, 1914. Considering that the increase in motor cars during 1913 was 22.3 per cent., the recorded numbers relating to accidents should properly be figured against a correspondingly reduced number of cars; which would make the showing worse.—ED.]

A further analysis of the figures brings out that the liability to accident is influenced by the power of the vehicles but also that great improvement in the avoiding of accidents has been brought about since 1907. The figures bearing on this side of the subject are given in the appended table, which shows that among motor cars those ranging in power from 16 to 40 rated horsepowers are now more dangerous than either those with lower or those with higher power, though the latter formerly were recorded in a proportionately larger number of accidents. The slight discrepancy between the percentage of 17.8 given for motor cars in general in this table and that of 16.4 as figured above is not accounted for.

The Legal Responsibility

The owners of the motor vehicles engaged in accidents were reached in 12,464 out of the 12,772 cases. The drivers were detained without difficulty in 11,974 cases, while 190 tried to escape and 608 succeeded in escaping by flight. Out of these 608 who fled 356 were afterwards arrested. The percentage of drivers who escaped after an accident has fallen from 9.8 in 1911 to 5.3 in 1912 and again to 4.8 in 1913. Singling out the motorcycles, it is found that while their accidents are few 10 per cent. of the drivers flee from an accident when it occurs.

On account of the accidents police fines were imposed in 1,245 instances, but in 259 of these cases it was the drivers of other vehicles or outsiders who were fined.

Criminal prosecution was ordered in 3,976 cases, and 2,797 of the actions were taken against drivers of the motor vehicles, 251 against third persons and 28 against "John Doe."—From text and tables in *Automobil-Rundschau*, June 30.

Gearset of Geometrical Design Is Best—Part II

(*Continued from page* 175)

By means of these revolutions per minute and the horsepower curve, the power at the clutch is worked out for each case and gives the car resistance to movement in pounds.

Where Geometrical Gearset Is Better

The curves thus obtained are plotted in Fig. 7 and marked A. The resistance curve of the car is drawn and then several other curves parallel to it representing the total car resistance when ascending grades having a slope from 5 to 15 per cent.

These curves show us that the car cannot ascend a 15 per cent. grade except on low gear. It could not ascend a 10 per cent. grade in second speed faster than 32 miles per hour. A 5 per cent. grade would probably necessitate changing the gear from fourth speed to third in order to ascend comfortably. The curves marked G show the traction resistance overcome when geometrical progression is used in the gearbox. This car could easily mount a 15 per cent. grade on second speed at 20 miles per hour, whereas the arithmetical gearbox would only permit this on first speed and that at 12 miles per hour only.

The high or fourth speed must be changed to third at a 4 per cent. grade but after changing, the range of G is greater than A which means a change again for A sooner than for G, the difference being about equal to a 2.5 per cent. grade in favor of G. This would be of advantage to G when touring through country where the grades as a rule did not exceed 8 per cent.

The usefulness of third speed gears on G would be greatly extended over that of A, as the maximum speed of A on second would only be 20 to 30 miles compared to 30 and 40 miles for G.

As an example of road practice let us take an imaginary road, the cars starting from rest along a level stretch.

A starts on first and goes on through second and third into high.

During this change his motor runs up to a 1,000, drops to 445, runs up to 1,000, drops to 616, speeds up to 1,000 and drops to 741, the car then running at 25.8 miles per hour.

A grade of 4 per cent. is reached followed by an 8 per cent. grade. Gear is changed to third and the motor speed rises to 1,000. At 8 per cent. grade the gear is changed to second, the motor speed increasing to 1,500 but car speed remaining at 25 miles per hour. Level is reached and speed changed to third, motor revolutions per minute dropping to 1,000.

Then the driver changes to fourth speed, the motor speed having decreased to 720 and then increased to 1,000 with car travelling 35 miles per hour. Now let us try G on the same stretch of road. He starts on first going through into high with the motor speed dropping from 1,000 to 600 at each gear shift. The last shift is made at 14 miles per hour which shows that less time has elapsed for the gear shifts than for A.

Following Motor Speed

On reaching the 4 per cent. grade, gear is shifted to third speed, the motor speed rising to 1,650. At the 8 per cent. grade the car is running 35 miles per hour without the necessity of dropping into second speed as the motor is turned 1,410 revolutions per minute. On reaching the level, gear is changed to fourth speed and the motor drops its speed to 1,000 revolutions per minute. In the case cited above G has made two less gear shifts than A but the motor has run at higher speed as well as the car.

For purposes of comparison the gear ratio charts of several foreign cars are plotted in Figs. 8-11. These were taken from the details of the cars published in the *Automobile Engineer Year Book.*

87% of Drivers Careless at Crossings

NEW YORK CITY, July 17—Railroad officials throughout the country note that accidents to automobiles on grade crossings appear to be increasing at an alarming rate. An official of one of the principal roads in the country is authority for the statement that fifteen out of every hundred persons killed or injured in grade crossing accidents are occupants of automobiles. On this basis there were approximately 300 persons killed and 750 injured driving automobiles over grade crossings in the two years ending June 30, 1912, and, while complete figures for the succeeding years are not available, the frequency with which such accidents occur would indicate there has been no diminution but rather an increase in this class of accidents.

On three important crossings on a large eastern railway system a test was recently made to determine with what degree of care the average person approached and crossed the tracks. During a period of 8 hours 923 automobiles crossed the tracks. Of that number the drivers of 701 cars or 87 per cent. did not look in either direction along the tracks before crossing. There were 83 of them or 9 per cent. who looked in only one direction, while only 39 or 4 per cent. took the precaution to look both ways. The automobile accidents that occur on crossings are most lamentable, the victims usually being men or women of intelligence and good social standing. What makes it all the more distressing that these accidents should occur, is the fact that a little ordinary care and caution on the part of the drivers of cars would prevent them.

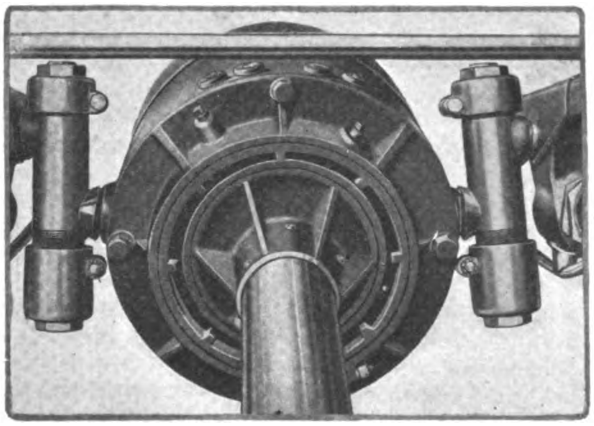
Only 2% of Drivers Careful at Crossings

EL PASO, TEXAS, July 18—The Safety First Department of the El Paso & Southwestern Railroad is collecting some interesting and valuable statistics on the probable cause of automobile accidents at railroad crossings. This department recently stationed a representative at the crossing of its track on Oregon street in this city for the purpose of keeping a record of the manner in which each motor car driver approached the crossing. During a given time this man was on duty, a total of 3,607 automobiles crossed the track and each driver was classified as to his regard for safety and carelessness. The figures show that 80 per cent. of the drivers in crossing the tracks, did not look in either direction; 17 per cent. looked in one direction and but 2 per cent. of the whole number looked in both directions before crossing. A total of 290 crossed the tracks at a speed greater than 20 miles an hour, without looking in either direction. Six saw a flagman posted at the tracks and crossed despite the warning. In a statement issued by the El Paso & Southwestern Railroad, it is shown that during the 2 years ending June 30, 1912, 300 motorists were killed and 750 injured by being struck at railroad crossings. No figures of a later period are available but it is said that the large increase in the number of automobiles would naturally lead to the conclusion that there was a considerable increase in the number of accidents. It is in order to educate the people along its line to have a better regard for the rules of safety in driving their cars that this campaign has been inaugurated by the Safety Department of the El Paso & Southwestern.

New Woods Electric Uses Worm Drive

New Spring Suspension—Motor Suspended on Ball Joints —42-Cell, 13-Plate Batteries Now Employed

THE Woods Motor Vehicle Co., Chicago, Ill., has entirely remodeled its line of electric cars for the 1915 season and incorporated a series of refinements. A new type of spring suspension is used, the drive is now by worm instead of bevel gears, the brakes are better, the motor supports stronger and the bodies more attractive and more comfortable. The result of this refinement is the production of a higher grade vehicle at a somewhat advanced price.



Motor suspension on the Woods electric showing the ball joint hangers upon which the motor is hung

The new Woods electrics are called: 1501, which has dual drive; 1503, with front drive; 1504, with rear drive; all of these being five-passenger broughams, while the two remaining cars are a four-passenger brougham with rear drive and a three-passenger roadster. The roadster is the only car of the line which uses bevel rear drive. All have lever steer.

One of the features of the construction is the spring suspension, in which an inverted U-shaped frame channel houses the springs. This calls for a departure from usual practice, in that the channel portion of the frame points downward. This is used for the front springs which are elliptic as well as the elliptic rear. In the front this saves almost 6 inches across, allowing the car to have a turning radius of 34 feet. In the rear it permits of using a wider body. The springs are merely set in the frame channel and two spring clips fastened around the frame.

Aside from the springing, a very important and effective construction is the means of propulsion. The rear springs are fastened to torque members instead of the rear axle housing, as used previously, and which construction is in use on most cars of today. The drive is taken through these torque members instead of the springs as it was before.

The motor is suspended upon ball joints, considered better than the brass-bushing method used on the 1914 models. The motor and supports rest upon a sub-frame attached to cross members and the sub-frame acts as a housing for one end of each torque member, as shown in an illustration herewith.

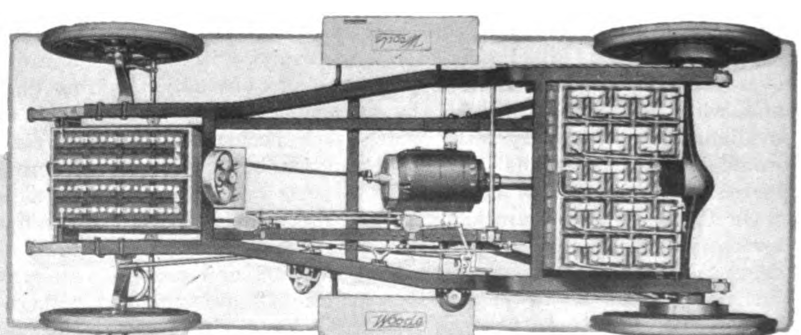
All Woods electrics, with the exception of the roadster, now are equipped with a worm-drive rear axle with the worm wheel on top and the driving worm on the bottom.

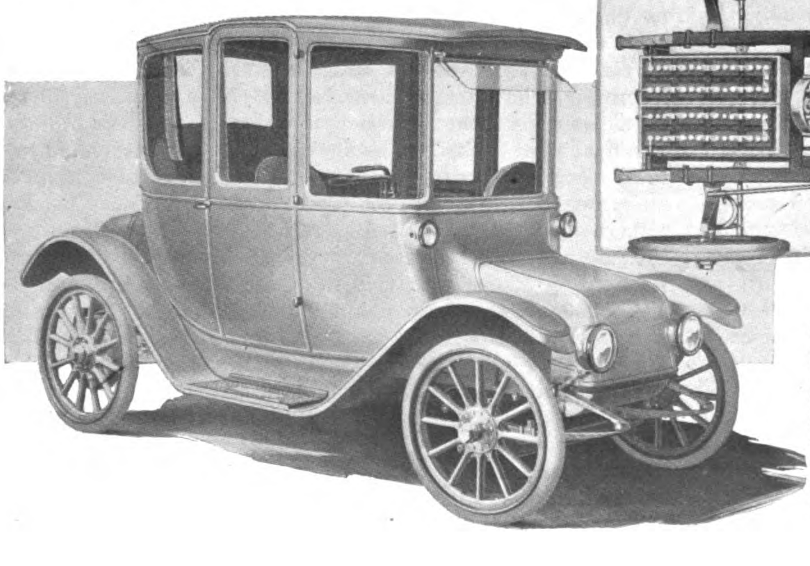
The brakes have been redesigned and the bands increased in size from 14 by 1 3-4 inches to 16 inches diameter by 2 inches wide. The cross-members of the frame are acetylene welded to the inverted U main frame. Rivets are used as an additional means of securing the parts.

The battery set is larger than used heretofore, the 1915 cars coming through with forty-two-cell, thirteen-plate batteries, while the previous models had forty-cell, eleven-plate accumulators. The batteries and the body are made in the shops at Chicago.

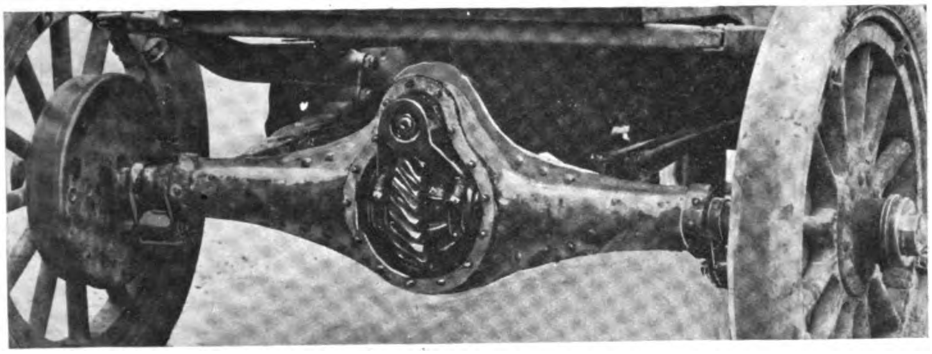
All cars have five forward and five reverse speeds, are equipped with 34 by 4-inch tires in front and 38 by 4 1-2-inch in the rear. The five-passenger broughams have a 110-inch wheelbase, the four-passenger 100-inch and the roadster 92-inch.

The new prices are as follows: Five-passenger brougham with dual control, $3,250; five-passenger brougham with either front or rear drive, $3,150; four-passenger rear drive brougham, $2,875, and the three-passenger roadster, $2,300.





Left—The 1915 Woods electric. Note the set-in front lamps, an exclusive feature. These lamps form an integral part of the front hood. Above—Plan view of the chassis used in the 1914 Woods electric, showing the position of the worm underneath the axle and the mounting of the rear springs on radius rods. Rear batteries are placed forward of rear axle. This illustration gives another view of the motor suspension shown in detail above. Note wideness of frame at rear, made possible by new spring suspension



Overhead worm drive axle used on Jeffery Chesterfield six for 1915. This replaces the bevel gear drive used on the 1914 Jeffery

Jeffery Six Has High-Speed Motor and Worm Drive

Block Motor Makes 2,500 R.P.M.—Cantilever Springs—Four-Speed Gearbox

JEFFERY has invaded the low-price six-cylinder field with its Chesterfield model selling at $1,650. This car is replete with features new to the Jeffery line. It has a 3 by 5-inch, L-head, block motor capable of running at 2,500 revolutions per minute; Daimler-type leather universal; four-speed gearbox; worm-drive rear axle; cantilever rear springs; Bijur starting and lighting system; 122-inch wheelbase and 33 by 4-inch tires. Fully equipped the car weighs but 2,850 pounds. In addition to the Chesterfield the two older Jeffery models, one a six and the other a four, are to be continued.

Equipment on the Chesterfield is unusually complete, the features of which are the combination speedometer light and trouble light on a spring wheel, fitted inside the cowl, English vanity case containing toilet articles, Collins quick-acting curtains, one-man top, headlight dimmer, and Folberth power tire pump. Roadster and five-passenger touring bodies of the full French streamline type are fitted.

2,500 R.P.M. by Chesterfield

The new Chesterfield engine has developed a crankshaft speed of 2,500 revolutions per minute according to the Jeffery engineers. The factory gives its horsepower rating at 35 to 42. On account of its late design and its great stroke-bore ratio, this is half again as much as the A. L. A. M. rating, which is 21.6.

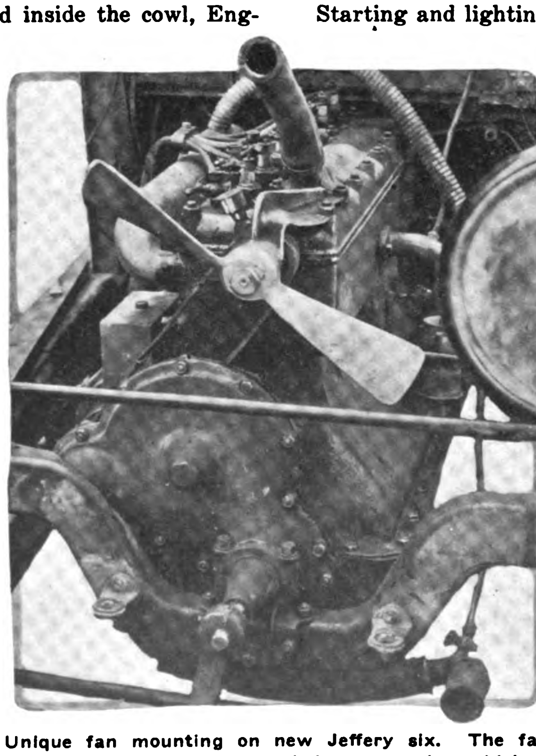
Light Reciprocating Parts

The engine presents a number of features worthy of notice. The entire upper portion of the crankcase and the block of six cylinders, is a single casting. The lower portion of the crankcase is an aluminum casting and a single removable plate opens up the cylinder heads. Particular attention has been given to the production of light reciprocating parts, and to secure an even balance of pistons and connecting-rods so that there may be no undue vibration to cut down engine speeds, and thus limit the power output. That efforts in this direction have met with success may be taken for granted from the statement of Jeffery engineers that the engine has been turned up to between 2,400 and 2,500 revolutions per minute without showing a drop in the power output. Naturally such speed cannot be obtained without larger valves than usual, and these are of Rich tungsten steel. Cooling is cared for by a pump circulating system with a honeycomb radiator through which the air is drawn by a two-bladed aviation type propeller fan. The mounting of this fan is unique in that the fan shaft and its pulley are carried on a bracket which is a single casting held by the cylinder head bolts at the front end of the engine. An eccentric bushing permits adjustment to take up whatever looseness develops in the belt which drives the fan from the magneto shaft.

Ignition is the Bosch independent system, and the Bosch equipment is carried throughout in spark plugs and cable.

Lubrication is by a constant level splash and gravity feed system in which there is a reservoir under the crankcase containing the oil supply. An open-end tube projects from the connecting-rod and leads to the connecting-rod bearing. At each revolution of the crankshaft this tube dips into the pan and the oil runs directly into the connecting-rod bearing. The cylinders receive their oil from the splash as in the ordinary splash system. There are only three gears in the timing system and these have helical teeth for quietness.

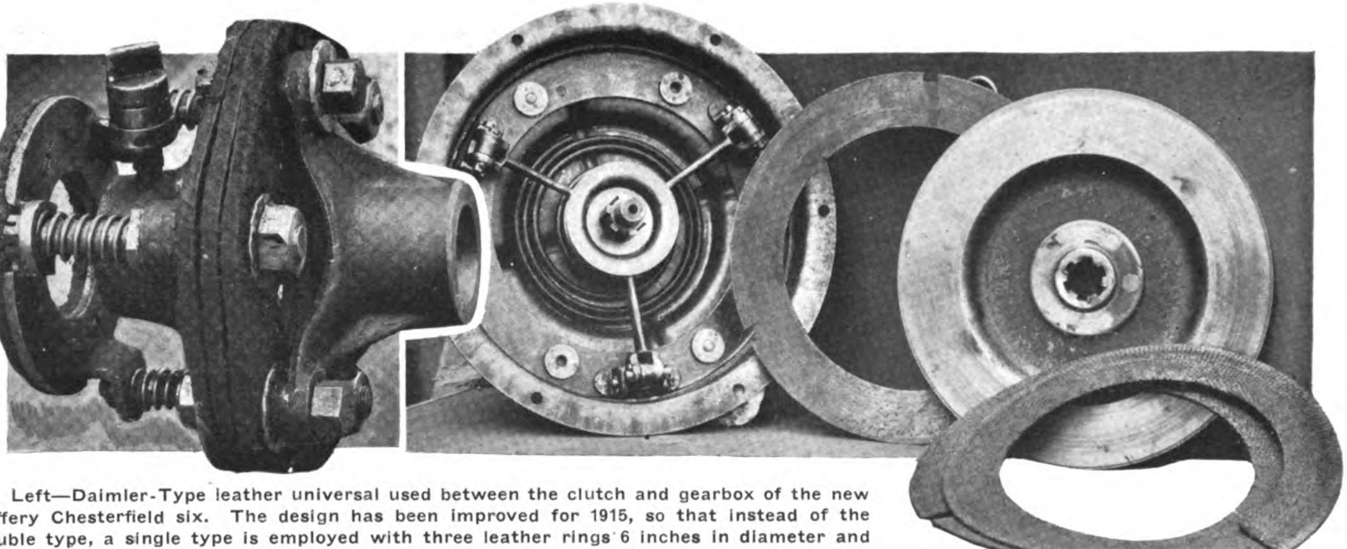
Starting and lighting is the Bijur system and consists of a generator and starting motor with control switch and Willard battery. The generator is mounted on the right side of the engine, and driven through the timing gears. When the engine attains a speed corresponding to between 7 and 8 miles per hour car speed, the regulating device contained in the rectangular box on the top of the generator begins to act, closing the circuit between the generator and battery, and maintaining a constant voltage at the generator regardless of speed or condition of the battery.



Unique fan mounting on new Jeffery six. The fan shaft and its pulley are carried on a bracket which is a single casting held by the cylinder head bolts at the front end of the motor. An eccentric bushing permits adjustment for looseness in the belt

Battery Is Well Protected

This constant voltage results in the battery receiving a charging current varying according to the condition of the battery, that is, when the battery is low the charging current will be high and when the battery is fully charged the charging current will be low, so that a low battery will be brought rapidly to a condition of full charge and thereafter will not be overcharged needlessly. The regulating device also performs the duties



Left—Daimler-Type leather universal used between the clutch and gearbox of the new Jeffery Chesterfield six. The design has been improved for 1915, so that instead of the double type, a single type is employed with three leather rings 6 inches in diameter and 3-16 inch in thickness. Through these pass bolts which are extended to form the clutch brake. The flexible leather takes up any misalignment between clutch and gearset and makes the clutch action smooth. Right—Three-plate dry-disk clutch used on Jeffery Chesterfield for 1915

of an automatic cutout, disconnecting the generator from the battery when the engine is stopped and preventing the discharge of the battery and the burning out of the generator. When the lamps are lit and the engine is running the output of the generator automatically is increased to take care of the additional lamp load.

The starting motor, which is mounted on the left side of the engine, has a square armature shaft on which is a sliding pinion. The latter meshes with gear teeth on the flywheel. The armature is designed to stand the momentary high speed when the engine first begins to fire and before the starter is released.

When the starter pedal is pushed down the switch makes preliminary contact, closing a circuit through a resistance which cuts the current sufficiently to cause the armature to rotate slowly until the gears are meshed, when the final contacts are made and the engine rotated at about 165 revolutions per minute.

Six Degrees of Headlight Brilliancy

Lighting is controlled by a switch by which various combinations of lamp filaments are obtained to provide six different degrees of brilliancy. There are no side lamps. The headlamp bulbs each have two filaments, one of which is at the focal point of the reflector, and the other about 1 inch ahead of this point. The filament in focus throws a beam of light directly ahead of the car for country driving, while the one out of focus is used for city driving, and gives a light which is not dazzling, and which will pass the requirements of most city ordinances. If a still dimmer effect is desired, this may be secured by other positions of the switch. In fact, six different degrees of brilliancy are obtained by different combinations of the four filaments in the two bulbs. The filaments can be used separately, in series parallel, or all four in series, or all four in parallel.

Tapering Charging Is a Feature

Tapering charging as worked out in the Bijur system is a feature in that voltage regulation is obtained instead of current regulation, so that the quantity of charge varies with the needs of the battery. Curves taken at the Jeffery plant of the generator output at varying speeds show a maximum of 14 amperes available with a battery at 1.150 gravity. The maximum output of the generator is 25 amperes, leaving an ample reserve for light.

With the battery discharged, the generator output is 12 amperes, which decreases as the battery is charged until a point of 2 amperes charge is reached, at which it remains constant. If during this time, the lamps are lit, the generator output will increase by the amount of the lamp load up to the maximum capacity of 25 amperes.

Clutch Action Is Smooth

Between the three-plate dry-disk clutch and the gearset is a new form of the leather universal coupling which made its first American appearance on the 1914 Jeffery cars. However, the design has been altered somewhat, so that instead of the double type, a single type is employed in which there are three leather rings about 6 inches in diameter and 3-16-inch in thickness. Through these pass bolts which are extended to form the clutch brake. The flexibility of the leather is depended upon to take up any misalignment between the clutch and the gearset, and makes the transmission of power from clutch to gearset soft, so that the effect is the same as if an even smoother clutch action were obtained.

The bolt passing through the couplings are longer than necessary for this purpose, but carry at their forward ends a pad held on the bolts by springs. This, when the clutch is released, presses against the clutch and prevents clutch spinning.

Four-Speed Gearbox with Center Control

The gearshift lever has been arranged for central control on the four-speed gearbox, and is a part of it, that is, it extends directly from the latter without cross rods. Power is transmitted from the gearset to the axle through a propeller shaft in which a special universal joint is incorporated at each end. An unusual feature is the fact that the propeller shaft is tubular instead of the solid cross-section usually employed. This makes a light shaft and one which is very rigid.

At the rear end of the propeller shaft is mounted the over-type worm and gear of the axle. The worm drive which replaces the bevel gearing of the 1914 Jeffery is an unusual construction in cars of the price classification into which the Chesterfield falls.

Gear ratios provided through the four-speed gearset and the worm final reduction are 13.77 to 1 on first, 7.71 on second, direct on third at 4.50 to 1, fourth 3.73 to 1.

The floating axle has shafts of chrome-nickel steel mounted on imported annular ball bearings. The frame is of unusually heavy pressed channel steel and is arranged to come directly under the sills of the body to make the whole car more rigid. This is a new feature in the Jeffery design.

Suspension in the Jeffery, six-cylinder car is a departure for the Kenosha factory in the employment of the cantilever type of rear spring. The factory officials call it the floating cantilever because of the particularly easy-riding qualities it gives the car. The rear springs are 48 inches long and 2 1-2 inches wide. Front springs are conventional and are 37 inches in length and 2 inches in width.

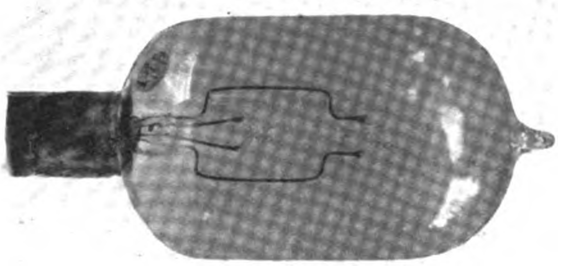
Gemmer worm and sector type of steering gear is employed having an 18-inch wheel with corrugated rim and with the electric horn button located at the top of the post. There are two sets of brakes, both internal expanding, operating on pressed steel drums 14 by 2 inches. Demountable rims, of a type which the Jeffery people say is not addicted to squeaking, are part of the stock specifications.

Streamline Bodies and Crowned Fenders

Bodies are of the streamline type, fenders are crowned, and are stamped in one piece. Running boards are clean, and the lines of the cars as a whole are particularly smooth. In the touring car, which is marketed as a five-passenger car, there is sufficient room in the tonneau for two extra disappearing seats, and these are supplied at a slight additional cost. The five-passenger in touring trim tips the scales at 2,850 pounds.

Speedometer Has Empico Drive

Aside from the rather unusual equipment which already has been mentioned, there is supplied a Stewart speedometer with the Empico drive through the steering knuckle and axle shaft, a Weston ammeter, sight-feed oil indicator and Klaxet horn under the hood.



Bulb used in new Jeffery headlights. The bulbs each have two filaments one of which is at the focal point of the reflector and the other about 1 inch ahead of this point. The filament in focus throws a beam of light directly ahead of the car for country driving, while that out of focus is used for city work and gives a light which is not dazzling and which will pass the requirements of most city ordinances. Still further dimming may be effected by other positions of the switch by which, in fact, six different degrees of brilliancy may be obtained by different combinations of the four filaments in the two bulbs. The filaments can be used separately, in series parallel, all four in series, or all four in parallel

New Moon Equalizer Has Twenty-Eight Less Parts

ST. LOUIS, MO., July 20—The tendency of the automobile manufacturer of today to lessen the number of parts in his car in order to make it as trouble-proof as possible is indicated by the adoption by the Moon Motor Car Co. of a patent brake equalizer, invented by Chief Engineer Goodspeed. The new equalizer will be a part of the regular equipment of all Moon cars.

The new equalizer has twenty-eight less parts than the one in ordinary use, having only twenty-two parts as against fifty, including brake arms, eveners, bolts, rods, springs and cotter pins.

The ordinary equalizer connects the hand lever and pedal with the rear rod by four connecting rods, necessitating an extra pair of brake levers and eveners, connected with a shaft running across the center of the frame, and giving indirect brake action.

The Moon equalizer has the eveners located in the connection with the rear rod and only two brake levers and two rods are used. The new arrangement gives more direct action and eliminates danger of the mechanism binding.

In THE AUTOMOBILE for June 25 an article entitled The Best Automobile Upholstery Leather Comes from France, should have been credited to President Joseph W. Moon, of the Moon company. Through an oversight, credit was not given.

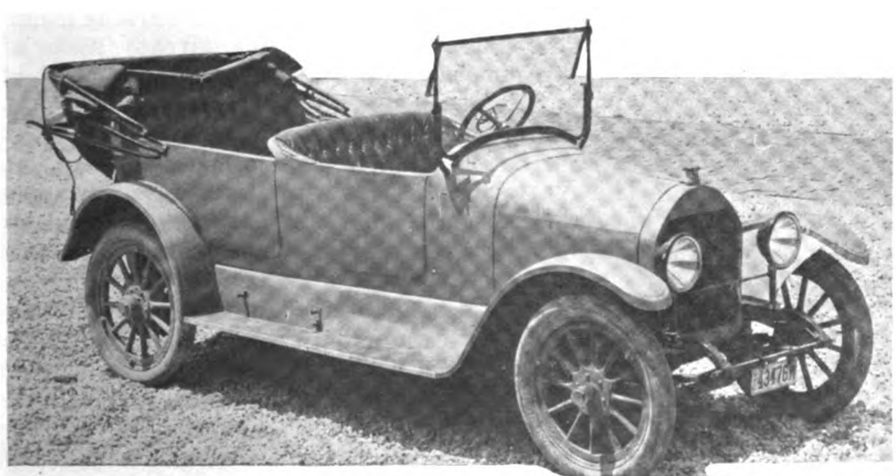
Hudson Distributor Installs New Service

NEW YORK CITY, July 20—The A. Elliott Ranney Co., distributor of the Hudson car in this city, has announced a new service plan, beginning Aug. 1, 1914, which will greatly benefit its customers. By this new plan the customers' cars will be kept in first-class running order and free from undue "lay-ups."

According to the new policy cars will be tested at least once every 30 days and such minor adjustments as may be found necessary will be made free of charge to the owner from 1 year from the date of delivery.

All parts proved to be defective will be replaced free of charge, this question to be determined by an expert from the Hudson factory, who will visit the service department at least once each week regularly throughout the year.

This inspection will be made under systematic arrangements, which have been inaugurated in the form of a card system bearing the name and address of the owner, the date of delivery and the date in each month when the car is to be brought in by the owner for inspection.



Left—Jeffery 1915 Chesterfield six with touring body. Note streamline design, flush doors and clean running board. Right—Rear view of the same car showing the accessible gasoline tank fillers and spare tire carrier hung directly on the rear of the frame members

The AUTOMOBILE

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The Use of Tire Flaps

SCORES of owners are almost daily experiencing troubles with pinched inner tubes due to not using flaps in the casings. It is practically impossible to avoid pinching the tubes if flaps are not used, and this is particularly true with over-size tires in which a smaller tube is used. Using a tube fitted to the size of the casing will not entirely eliminate the difficulty, in fact, there is but one sure way to avoid pinching and that is using the flap.

Flaps like all other parts of the tire require occasional attention. The edges of the flap get dried and curl up, it often happening when the flap is put in place after the tube is in the casing, that the thin edge of the flap does not lie straight in the casing and may have a wrinkle or two in it. Wrinkles in the flap will pinch the tube just as surely as wrinkles in the fabric of the casing will do so.

Not infrequently a flap gets torn in case of a puncture, where the car may be traveling rapidly and the brakes are too suddenly applied, or the power left on after the tire has become deflated. It is but natural to return the torn flap and to endeavor to adjust it within the casing, but it is most common to have a pinched tube as a result of this.

Tube pinching is one of the most prolific of tire difficulties and it can to a large measure be overcome by very careful attention to the flaps.

Positively-Operated Valves

TWO cams for the actuation of each valve, one cam to open the valve and the other cam to close it, give promise of attracting very general attention in engineering circles in Europe where the development of specially high-speed motors is in question.

Five cars started in the recent French Grand Prix race with positively-operated valves, and, although none of them proved winners, the method of valve actuation was not only demonstrated to be feasible but entirely satisfactory. The failure of the cars fitted with positively-operated valves was not in any sense due to troubles with the valves but rather with other parts of the cars.

The entry of positively-operated valves in these days when regulations are cutting the dimensions of motors for racing down to limits unthought of 5 years ago, comes at a most opportune moment.

Heretofore the closing of the valve has been the one great limiting factor in speed; in fact, it is today a greater problem to be reckoned with than the reduction of weight in reciprocating parts. Several years ago one of the foremost American racing concerns demonstrated to its own satisfaction that when its motor was working at over 2,500 r.p.m. the exhaust valves were not seating at all. A condition of this nature meant considerable loss in power due to loss in compression, and what the speed possibilities might have been had the compression been conserved remains to be estimated. The same was true with regard to the intake valves.

The positively-operated valve gets away from the trouble of failure of closing. It makes the poppet valve as positive as the sleeve valve, but leaves as it has been the question of relative area of opening afforded by the valves.

The positively-operated valve is today much more of a reality than the use of four valves to one cylinder. There are restricting factors of expense to be considered when placing four valves in each cylinder, but on the other hand the cost factor in installing an extra set of cams with the necessary actuating parts is not so great.

Should the positive-operated valve be adopted in stock models there promises to be considerable litigation in the patent circles because already some of the large European interests have gotten control of the basic patents on this design and with many concerns entering the field there would, without question, be a bewildering turmoil of patent litigation.

This year's Grand Prix race is today justifying the predictions made concerning it, namely, that its limitations of piston displacement and weight would bring factors into the automobile field that up to the present have received but scant attention. Much good has already come from the race and the lessons of it are but in the primary stages. It has opened new possibilities in the automobile field, and whether these lessons receive early application in regular models or not, the fact remains that new avenues of motor design have been opened by the race and its regulations.

Exports of Cheaper Cars Increasing

Shipments Abroad of Passenger Cars Made in the United States Grow from 3,036 in May, 1913, to 3,256 in 1914, But Value Is Less—Fewer Commercial Vehicles Moving

WASHINGTON, D. C., July 18—While the exports of commercial cars show a sharp decline in May last as compared with May a year ago, pleasure car exports show a decided increase in number but a slight difference in value. The figures for these periods, together with those for the 11 months ended May, 1913 and 1914, as compiled by the federal bureau of statistics, are presented below.

Exports of tires for motor cars show a slight decrease in value, according to the latest figures compiled by the federal bureau of statistics. The figures show that these exports were valued at $396,816 in May, 1913, while in May last they were only valued at $368,745. During the 11 months' period ended May the exports decreased in value from $3,512,095 in 1913 to $3,052,089 in 1814. The figures, by countries, are given below.

Exports of parts, not including engines and tires, increased in value from $537,511 in May, 1913, to $600,793 in May last, and from $4,690,983 to $6,150,264 during the 11 months' period. These figures in the tabulation tell the story how imports of cars have fallen off.

CAR EXPORTS	May 1913 Number	May 1913 Value	May 1914 Number	May 1914 Value	Eleven Months Ending May 1913 Number	Eleven Months Ending May 1913 Value	Eleven Months Ending May 1914 Number	Eleven Months Ending May 1914 Value
France	108	$72,149	275	$146,785	753	$571,049	1,268	$835,256
Germany	192	145,799	206	162,552	692	632,247	1,391	1,003,000
Italy	5	12,500	33	25,846	276	247,863	326	228,894
United Kingdom	473	354,686	663	556,753	3,593	2,737,438	6,850	5,532,533
Other Europe	294	236,447	445	356,091	1,601	1,368,654	2,686	2,133,917
Canada	862	1,255,771	764	941,345	6,829	8,636,880	4,243	5,259,072
Mexico	6	5,110	4	3,601	265	496,981	164	252,098
West Indies and Bermuda	45	47,591	34	31,374	415	430,106	491	468,467
South America	213	248,707	180	169,107	2,650	2,978,020	1,909	1,888,529
British Oceania	234	220,372	466	416,259	2,744	2,582,239	3,819	3,325,902
Asia and other Oceania	282	272,174	118	124,910	2,025	1,944,287	1,993	1,927,157
Other countries	322	283,883	68	50,002	1,288	1,196,018	1,860	1,628,610
Total cars	3,036	$3,155,189	3,256	$2,984,625	23,132	$23,821,782	27,018	$24,583,435
Commercial	141	236,383	99	127,024	878	1,569,750	694	1,061,354
Passenger	2,895	2,918,806	3,157	2,857,601	22,254	22,252,032	26,324	23,522,081
Parts *	..	537,511	..	600,793	..	4,690,983	..	6,150,264
Total cars and parts *	..	$3,692,700	..	$3,585,418	..	$28,512,765	..	$30,733,699

CAR IMPORTS	May 1913 Number	May 1913 Value	May 1914 Number	May 1914 Value	Eleven Months Ending May 1913 Number	Eleven Months Ending May 1913 Value	Eleven Months Ending May 1914 Number	Eleven Months Ending May 1914 Value
France	17	$49,515	7	$9,971	337	$799,099	124	$287,351
Germany	8	21,154	2	2,559	90	235,526	19	43,387
Italy	9	23,615	3	3,407	112	198,782	50	73,475
United Kingdom	3	6,300	2	1,485	77	216,632	40	115,042
Other countries	5	13,153	4	1,490	88	203,825	45	69,492
Total cars	42	$113,737	18	$18,912	704	$1,653,864	278	$588,747
Parts (except tires)	..	26,946	..	131,776	..	251,831	..	715,344
Total cars and parts	..	$140,683	..	$150,688	..	$1,905,695	..	$1,304,091

TIRE EXPORTS	May 1913 Value	May 1914 Value	Eleven Months Ending May 1913 Value	Eleven Months Ending May 1914 Value
Belgium	..	$301	$385,430	$15,730
Germany	$37,317	20,341	373,161	125,595
England	132,879	148,512	981,631	1,310,930
Canada	150,046	112,365	1,166,101	792,961
Mexico	16,282	3,483	182,280	109,371
Philippine Islands	13,874	5,808	82,879	127,165
Other countries	46,418	77,935	340,613	570,337
Total	$396,816	$368,745	$3,512,095	$3,052,089

DETAILS OF EXPORTS TO THE NON-CONTIGUOUS AMERICAN POSSESSIONS								
Hawaii—Cars	33	$64,029	58	$52,694	664	$1,111,753	638	$782,259
Parts*	..	8,675	..	5,696	..	101,468	..	78,773
Porto Rico—Cars	20	25,018	25	20,590	307	381,711	272	302,899
Parts*	..	8,537	..	8,186	..	86,699	..	65,569
Philippines—Cars	56	75,095	22	30,313	466	562,930	610	716,334
Parts*	..	2,842	..	1,937	..	46,239	..	63,328
Alaska—Cars	1	600	10	12,704	8	10,850	40	47,193
Parts*	..	125	..	3,280	..	2,089	..	6,755
Total cars	110	$164,742	115	$116,301	1,445	$2,067,244	1,560	$1,848,685
Total parts*	..	20,179	..	19,099	..	236,495	..	214,425
Total cars and parts*	..	$184,921	..	$135,400	..	$2,303,739	..	$2,063,110

*Does not include engines and tires.

Cadillac Engine Runs 90 Days at 600 r. p. m.

JERSEY CITY, N. J., July 18—After running 90 days and reeling off 50,000 miles, the 1914 Cadillac stock engine that was started on the morning of April 8, ceased to revolve last evening. The engine, after being placed on exhibition for a while at the Crescent automobile showrooms, 2565 Boulevard, this city, will be shipped to the Cadillac plant, Detroit, for a thorough inspection.

The motor has been run at from 600 to 700 revolutions per minute, making about 535 miles a day, or a little over 22 miles per hour.

Ohio City Cars Must Be Registered

COLUMBUS, OHIO, July 20—Attorney-General Hogan was called upon recently to give an opinion on the question if cars owned and operated by municipalities in Ohio would have to be registered. The same question was brought before the attorney-general several years ago and decided that all motor cars in the state must be registered. The city solicitor of Cincinnati was not satisfied with this opinion and the question was again opened. Attorney-General Hogan ruled that all municipal motor cars must be registered with the state department.

Addition to Stearns Factory of 500,000 Square Feet

Five Stories of Latest Design Will Be Begun in August—Will Mean Doubled Output

CLEVELAND, O., July 18—The F. B. Stearns Co. will break ground in August for a new factory building to adjoin the present plant at 12963 Euclid avenue. The new plant will have 150 feet frontage on Euclid avenue and contain 500,000 square feet of floor space.

Plans for the structure were drawn by Albert Kahn, Detroit architect, who designed buildings for Chalmers, Ford, Hudson and other manufactories. Bids have been received from a number of contractors. The new addition will be five stories high, of concrete and steel construction and absolutely fireproof. The designs call for unique type of building work and were determined upon only after Stearns officials visited a number of automobile factories over the country.

President F. B. Stearns declared the output will be more than doubled by means of the new buildings and that the 1915 series prospects make the move for more room imperative. "We have been unable to meet the demands for our cars," said he. "That is why we believe we suffered last winter from moral depression rather than business languour."

Over $1,000,000 in New Machinery

The Stearns company placed orders for more than $1,000,000 worth of new machinery and planned building expansion several months ago.

Along with the Ford assembly plant and the establishment of the Richard Automobile Co. in a factory of its own as prospects of the immediate future, several other Cleveland makers are said to be planning factory expansion.

New Medium-Priced Car in the Fall

The fact that the Stearns factory is making ready to produce for fall sales a medium-priced car has direct bearing on the demand for more space.

The body department which has been maintained in the old Royal Tourist plant will be removed to the parent factory as soon as the new addition is completed. The separation of this from the other departments of the Stearns plant has always been considered inconvenient.

Market Reports for the Week

Prices in general were steady in this week's markets. Pennsylvania petroleum dropped $0.05 per barrel due to overproduction, with a like reduction in Europe in sympathy with that on this side. Antimony came down $0.00 1-2 per pound, closing at $0.05 1-4. Both electrolytic and Lake Coppers declined, the former $0.00 1-5 and the latter $0.00 1-4 per pound. Cottonseed oil closed at $7.23 a barrel, a loss of $0.09 for the week. Tin rose $0.10 per 100 pounds. The crude rubber market was dull without features. Up-river Para rose $0.01, closing at $0.71.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¾	.05¾	.05¼	.05¼	.05¼	.05¼	—.00½
Beams & Channels, 100 lbs.........	1.26	1.26	1.26	1.26	1.26	1.26	....
Bessemer Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	....
Copper, Elec., lb.	.13⅗	.13¹¹⁄₂₀	.13¹¹⁄₂₀	.13½	.13½	.13⅖	—.00⅕
Copper, lake, lb..	.13¾	.13⁷⁄₁₀	.13⁷⁄₁₀	.13⅝	.13⅝	.13½	—.00¼
Cottonseed Oil, bbl.	7.32	7.30	7.25	7.15	7.20	7.23	—.09
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	....
Gasoline, Auto, bbl.	.14	.14	.14	.14	.14	.14	....
Lard Oil, prime..	.93	.93	.93	.93	.93	.93	....
Lead, 100 lbs.....	3.90	3.90	3.90	3.90	3.90	3.90	....
Linseed Oil	.55	.55	.55	.55	.55	.55	....
Open-Hearth Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	....
Petroleum, bbl., Kans., crude...	.75	.75	.75	.75	.75	.75	....
Petroleum, bbl., Pa., crude	1.70	1.70	1.70	1.70	1.70	1.70	....
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	....
Rubber, Fine Up-River, Para....	.70	.70	.70	.71	.71	.71	+.01
Silk, raw, Ital....	..	4.95	..	..	4.95	4.95	....
Silk, raw, Japan..	..	4.38	..	..	4.35	4.35	—.03
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	....
Tin, 100 lb......	31.55	31.75	31.90	32.10	32.13	31.65	+.10
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	....

Overland Plant To Be World's Largest

TOLEDO, O., July 18—Within a few weeks when the main building of the several which are under construction for the Willys-Overland Co. iscompleted the home of the Overland will have over 1,000,000 square feet more space and will occupy all-told 60 acres of floorspace distributed among 64 buildings. It will make the local automobile concern one of the largest of all manufacturing plants in the world, all industries considered.

The new main building is a four-story structure 500 feet long and 410 feet wide, built entirely of reinforced concrete on a foundation of concrete piling. The four floors will be used for body building, upholstering, painting, assembling and machine shops, while the basement will be used as a storage room.

The second largest new building will have two stories, 400 by 200 feet, and will be used exclusively for making coupés and open bodies.

The new power plant of structural steel faced with brick will be 162 feet long and 134 feet wide, the power being furnished by 4 McNaul water tube boilers, each capable of developing 500 horsepower. The chimney, 205 feet high, will be one of the highest in this part of the country.

In the rear of the new body plant a drying kiln, 236 feet long and 144 feet wide, has been installed. It has a capacity for handling 12,600 feet of 1-foot lumber per 24 hours. The blacksmith shop is being enlarged through the addition of a two-story building having 7,000 square feet of floorspace. Under the railroad tracks a tunnel is being constructed which will permit mechanics to take the cars to and from the testing oval without crossing the tracks.

General Motors Cancels $2,000,000 in Notes

NEW YORK CITY, July 20—The General Motors Co. has purchased for the sinking fund $2,000,000 of its 6 per cent. first lien 5-year gold notes in anticipation of its obligation to pay $2,000,000 cash October 1 to the trustee for sinking fund purposes.

With the cash deposited, a total of $7,099,000 notes have been purchased, leaving outstanding $7,901,000 of notes which mature on October 1, 1915.

The current fiscal year, which ends July 31, is proving a very prosperous one for the company.

There were originally issued $15,000,000 of the notes. The sinking fund requirements were as follows: $1,500,000 cash to be paid to the trustee on or before October 1, 1911; $1,500,000 cash on or before October 1, 1912; $2,000,000 on or before October 1, 1913, and $2,000,000 on or before October 1, 1914.

Ford's Sales for 9 Months, 203,194 Cars

DETROIT, MICH., July 21—The Ford Motor Co. has built and sold 203,194 cars from October 1, 1913, to July 1, 1914. In other words, an average of better than 22,500 Fords have been built and sold every month for the first 9 months of the company's fiscal year. Last year's production of Fords was about 185,000 cars. This mark was passed by this year's production in the middle of May.

Lansden Co., Ltd., Moves to Brooklyn

NEW YORK CITY, July 22—The Lansden Co., Ltd., has been formed by J. B. Wickery and associates, who have purchased the rights, patents and parts of the former Lansden company, of Newark, manufacturer of the Lansden electric truck. Mr. Wickery has removed the business to Brooklyn, where he will hereafter manufacture that vehicle and conduct a general garage and repair station.

Mr. Wickery has been manager for the trustee of the old Lansden company, since the trusteeship was created about a year ago. At the sale of the property on July 13, he purchased the name and good will of the company and has since acquired all patents, parts, patterns and plans which were purchased at the same sale by the New Jersey Machinery Exchange. The incorporation of the Lansden Co., Ltd., is now in progress with a capital stock of $250,000.

The property has been removed to Flatbush, where the company has leased the factory buildings between Flatbush and Nostrand avenues and the Long Island Railroad, formerly occupied by the J. R. Corbin Co. This property has a floor space of over 13,000 feet with direct trackage to the Long Island system.

The new company is not only in the market with the new Lansden truck, but proposes to conduct a general repair business in both gasoline and electric trucks at once. The new line will comprise electric units from 1,000 pounds to 5 tons capacity. There are about 1,000 Lansden cars in operation now.

Pope Plant To Be Auctioned in Month

HARTFORD, CONN., July 18—Col. George Pope, receiver for the Pope Mfg. Co., has been authorized by the court to sell at public auction that personal property of the company which is in Hartford, Conn. It is likely that it will mean the end of the Pope company as a motor car manufacturing enterprise. Other property, including the bicycle plant, is located in Westfield, Mass., but this is within the jurisdiction of Massachusetts courts. The motor car plant is in Hartford.

Colonel Pope regards it as better to sell the machinery and equipment in small lots to avoid its being taken in one parcel by junk dealers. He expressed his belief that the small lot sale will bring in a greater return and it is hoped to secure a small payment for the preferred stockholders. Under all plans previously proposed it had not seemed possible to secure much, if anything, for them.

Business at the Hartford factory, which has been continued in part by Colonel Pope, is to be discontinued as soon as possible. It is expected that the plant will be shut down by August 20. The receiver has $130,000 on hand and a dividend will be paid to creditors before September 30, it being regarded as more advisable to pay out the money than to keep it and pay taxes on it.

Warm-Hand Steering Wheels for All Cars

POUGHKEEPSIE, N. Y., July 18—The Warm-Hand steering wheels which have been marketed for 2 years for Ford cars will be supplied as interchangeable wheels for Overland and Studebaker cars this fall. The Warm-Hand Steering Wheel Corp., Poughkeepsie, N. Y., manufacturer of these wheels, is further going to supply specially constructed wheels to fit any make of car. These wheels will be interchangeable with the standard steering wheels, the same as on Fords, Overlands and Studebakers. The heating device in these wheels consists of two electrical resistance coils inserted at opposite points in the rim of the wheel. Electric current to heat these coils is furnished from the battery.

Swinehart Tire & Rubber Co. Dividend Paid

AKRON, O., July 18—Shareholders of the Swinehart Tire & Rubber Co. have received checks for the usual quarterly dividend of 1½ per cent. a month ahead of time. The company has decided to discontinue the policy of paying the dividend a month after it is due. The last previous payment was made on May 10.

Automobile Securities Quotations

NEW YORK CITY, July 22—The automobile securities market for the past week showed practically the same inactive tone which has been apparent for some time. The feature of the week was the slight gain by the tire companies, Goodyear common gaining 4 points and the preferred 1-2 point. Goodrich preferred showed a gain of 3-8 while the common dropped 2 1-4. Oil stocks continued weak, vacuum oil losing two points, while Texas remained unchanged. The stocks of the automobile and truck manufacturing companies suffered practically no change, the entire market for these stocks being very inactive. The general weak tone of the market affected Willys-Overland, the common losing 1-4 point and the preferred 1 1-2 points. Full quotations for the past week follow:

	Wednesday		Thursday		Friday		Saturday		Monday		Tuesday		Week's	1913	
Security	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Change	Bid	Asked
Ajax-Grieb Rubber Co. com	220	..	220	..	220	..	220	..	220	..	220	..	..	145	160
Ajax-Grieb Rubber Co. pfd	98	..	98	..	98	..	98	..	99	..	99	..	+1	94	100
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	97	100
Case T. M. Co., J. I.	83	92	82¼	85⅛	82¼	85¼	82¼	85¼	82¼	85¼	82¼	85¼	—1¾	..	..
Chalmers Motor Co. com	101	103	101	103	101	103	101	103	100	103	100	103	—1	105	112
Chalmers Motor Co. pfd	94	95½	94	95½	94	95½	94	95½	94	96	94	96	..	98	102
Electric Storage Battery Co	51	51½	51	51½	50¾	51½	50⅝	51	50¾	51¼	50¾	51¼	+ ¼	..	..
Firestone Tire & Rubber Co. com	305	308	305	308	305	308	305	308	305	310	305	310	..	275	281
Firestone Tire & Rubber Co. pfd	108½	110	108½	110	108½	110	108½	110	108	110	108	110	— ½	103	105
Garford Co. pfd	75	85	75	85	75	85	75	85	75	85	75	85	..	85	95
General Motors Co. com	91	92½	91	92½	90	92	90	91½	90	92½	90	92½	—1½	27⅞	29¼
General Motors Co. pfd	91	93	91⅝	93	91⅞	92¼	91½	91⅞	91½	93	91½	93	— ½	73	74
B. F. Goodrich Co. com	26	27	25¼	25¾	24¼	25	24½	25⅛	23¾	24	23¾	24	—2¼	29	30
B. F. Goodrich Co. pfd	88	89	88⅜	90	88⅝	90	88⅜	90	88⅜	88½	88⅜	88½	+ ⅜	90⅞	92
Goodyear Tire & Rubber Co. com	170	174	170	174	170	174	170	174	174	178	174	178	+4	310	316
Goodyear Tire & Rubber Co. pfd	97	98½	97	98½	97	98½	97	98½	97½	99	97½	99	+ ½	98½	99½
Gray & Davis Co. pfd	98	102½	98	102½	98	102½	98	102½	98	102½	98	102½	..	..	..
International Motor Co. com	..	3	..	3	..	3	..	3	..	3	..	3	..	3	5
International Motor Co. pfd	3	9	3	9	3	9	3	9	3	9	3	9	..	18	25
Kelly-Springfield Tire Co. com	55	60	54	56	54	70	50	60	50	55	50	54	—5	..	..
Kelly-Springfield Tire Co. 1st pfd	70	80	70	80	70	80	70	80	72	80	70	80	..	..	..
Kelly-Springfield Tire Co. 2d pfd	90	100	90	100	90	100	90	100	90	100	90	100	..	..	..
Lozier Motor Co. com	..	18	..	18	..	18	..	18	..	14	..	14	..	15	20
Lozier Motor Co. pfd	..	41	..	41	..	41	..	41	..	40	..	40	..	..	90
Maxwell Motor Co. com	14¼	14½	14¼	14¾	14¼	14¾	14¼	14½	14	14⅝	14¼	14¾	— ½	2¾	3½
Maxwell Motor Co. 1st pfd	43¼	44	43	45	43	45	43	45	43	45	43½	45	..	24	26
Maxwell Motor Co. 2d pfd	17	19	17	19	17	19	17	19	17	19	17	19	..	6	8
Miller Rubber Co	138	140	138	140	138	140	138	140	138	140	138	140	..	133	137
New Departure Mfg. Co. com	125	127	125	127	125	127	125	127	124	126	124	126	—1	..	..
New Departure Mfg. Co. pfd	105	108	105	108	105	108	105	108	105	108	105	108	..	..	..
Packard Motor Co. com	103	112	103	112	103	112	103	112	103	112	103	112	..	..	..
Packard Motor Co. pfd	97	100	97	100	97	100	97	100	97	100	97	100	..	98	102
Peerless Motor Co. com	10	17	10	17	10	17	10	17	10	17	10	17	..	45	50
Peerless Motor Co. pfd	..	50	..	50	..	50	..	50	..	50	..	50	..	..	96
Pope Mfg. Co. com	..	1	..	1	..	1	..	1	..	1	..	1	..	9½	10¾
Pope Mfg. Co. pfd	..	3	..	3	..	3	..	3	..	3	..	3	..	28	33
Portage Rubber Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	..	45
Portage Rubber Co. pfd	..	90	..	90	..	90	..	90	..	90	..	99	..	..	90
*Reo Motor Truck Co	11½	12½	11½	12½	11½	12½	11½	12½	11½	12½	11½	12½	..	..	11
*Reo Motor Car Co	18	19	18	19	18	19	18	19	19	20½	19	20½	+1	19	21
Rubber Goods Mfg. Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. com	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	52	53	52	53	52	53	52	53	51	52	51	52	—1	..	..
Stewart Warner Speedometer Corp. pfd	99	101	99	101	99	101	99	101	99	101	99	101	..	..	..
Studebaker Co. com	30¾	31½	30½	31¼	28¾	30⅜	29⅞	30½	29½	30¼	29½	30¼	—1½	23	25
Studebaker Co. pfd	82½	86	83	86	82½	86	83	86	82½	86	82½	86	+ ½	82	86½
Swinehart Tire & Rubber Co	85	87	85	87	85	87	85	87	85	87	85	85	..	85	88
Texas Company	139½	140	139½	140	139	140	139	140	135	135⅛	135	135⅛	—6	..	..
U. S. Rubber Co. com	56	56⅜	56	56¾	56	57	56	56½	56	57	56	57	—1½	60½	60¾
U. S. Rubber Co. 1st pfd	100⅛	102	101	102	101	101¾	100⅞	101¾	100¼	100⅞	100½	100⅞	—2½	104	104½
Vacuum Oil Co	218	221	217	220	219	220	217	220	217	220	216	219	—2	..	..
White Co. pfd	107	110	109	110	107	110	107	110	107	110	107	110	..	102	104
Willys-Overland Co. com	90⅜	91	90¼	90½	89	90	89	90	89¾	90½	89¾	90½	— ¼	56	62
Willys-Overland Co. pfd	95	97	94½	95½	93½	95	93	95	93½	95	93½	95	—1½	84	90

*The par value of these stocks in $10; all others $100.

Detroit's Exports in 6 Months $3,154,875

Michigan Export of Cars and Trucks for Half Year Total 4,207—3,324 of These Manufactured in Detroit

DETROIT, MICH., July 18—During the first 6 months of 1914 out of 4,207 pleasure and commercial cars which were exported from the state of Michigan to foreign countries, 3,324 or 79 per cent. were manufactured by concerns located in Detroit. The value of the cars exported by Michigan manufacturers is $3,942,423, of which $3,154,875 is to the credit of Detroit. Including parts and accessories the total export for the state was $5,819,489 of which $4,752,268 is credited to Detroit manufacturers.

A comparision with the export business during the first 6 months of 1913 for the whole state of Michigan is not possible as only since the beginning of this year the customs department is keeping a separate record, but the figures were obtained for the city of Detroit.

From January 1, 1914, to June 30, Detroit manufacturers exported 3,205 pleasure automobiles valued at $3,030,251 or an average of $945 per car while during the corresponding period in 1913 a total of 2,149 pleasure cars were exported having a total value of $2,542,937 or an average of $1,183 per car. The increase in pleasure vehicles exported this year is thus 49.1 per cent. In total value it represents an increase of 19.1 per cent. The number of commercial cars exported was 119 having a value of $124,624 or an average of $1,047 per vehicle, while during the first half of last year 177 utility cars having a value of $165,209 were exported, their average price being $933. There has thus been a falling off of 32.8 per cent. in the number exported and 24.5 per cent. decrease in total value.

Automobile parts and accessories of a total value of $1,597,393 as against $1,404,082 for the first half of 1913, have been exported which represents an increase of business of 13 per cent. in favor of this year.

Of the 3,205 pleasure vehicles exported between January 1, and June 20, 1,785 or 55.5 per cent. went to England. Their total value was $1,302,868 or $780 per car; 1,056 or 32.8 per cent. having a total value of $1,359,529 or $1,297 each, were shipped to Canada; 184 or 5.7 per cent. having a total value of $133,033 or $723 each, went to Australia; 95 or 2.9 per cent. went to South Africa, their total value being $72,676 or an average of $714 per car; 78 were exported to New Zealand, their value being $63,170 or $810 each; 6 cars of an average value of $801 each were sent to Japan and one went to China being valued at $4,169.

Of the 119 commercial vehicles exported 87 or 73.1 per cent. went to England. They had a total value of $71,702 or $824 per vehicle; 30 were shipped to Canada, their total value being $50,773 or $1,693 each; one went to New Zealand valued at $1,248 while one was shipped to South Africa, it being valued at $901.

Of the $1,597,393 worth of parts 90 per cent. is credited to Canada, 3.5 per cent. each to England and Australia and the remaining 3 per cent. is divided among South Africa, New Zealand and Japan.

Chamber of Commerce in Summer Session

CHRISTMAS COVE, ME., July 21—*Special Telegram*—Samuel Miles, erstwhile general manager of the National Automobile Chamber of Commerce, and previous to that manager of the Automobile Board of Trade, and the National Assn. of Automobile Manufacturers, is entertaining officers of the N. A. A. C. and their guests to the number of twenty-two at his summer home, Clifton, overlooking the Atlantic Ocean at this point.

Entertainment is one of Mr. Miles' strong factors, and since the arrival of the guests here last Saturday, both he and Mrs. Miles have been excelling themselves. Fishing, baseball, shooting and swimming, have been the recreation, the blues beating the grays in the annual baseball struggle.

But it is not all pleasure as the N. A. A. C. will devote one day to business routine, this meeting taking the place of one of the regular ones in New York.

Among those present are: Col. Chas. Clifton, president, N. A. A. C.; W. C. Leland, first vice-president; H. H. Rice, second vice-president; and directors C. C. Hanch, W. E. Metzger, and L. H. Kittredge. Among the others present are: R. D. Chapin, Thos. Henderson, H. M. Swetland, S. D. Waldon, D. J. Post, Chas. Thadeus Terry, Geo. Pope, Albert Pope, W. M. Sweet, F. C. Billings, F. A. Nickerson, S. Edwards, Chas. E. Thompson, Robert E. Garden and T. Wetzel. Alfred Reeves, general manager of the N. A. A. C., is acting as Master of Ceremonies.

Chalmers Men Optimistic on Trade Conditions

DETROIT, MICH., July 21—*Special Telegram*—About 450 dealers from all over the country attended the annual convention of the Chalmers Motor Co. held at Cedar Point, O., July 17 to date. The new models were shown for first time on the boat taking party to convention place.

President Hugh Chalmers in his address said: "If anyone questions the economic soundness of the automobile industry I recommend him to visit Detroit. Detroit is the biggest part of the automobile industry and Detroit is more prosperous right now than scores of cities with big manufacturers in other lines. The country envies Detroit its prosperity, simply because Detroit men have been wise enough to build up in their city this great industry which is the wonder of the world. With crops reaching a record mark, I do not see how the country can endure any serious or protracted slump."

Preliminary Injunction for National Carbon

NEW YORK CITY, July 17—A preliminary injunction has been handed down in favor of the National Carbon Co. in its suit against the Bright Star Battery Co. in the U. S. District Court for the Southern District of New York. The suit, which involves the use by the Bright Star Company of the words "Mars-Chlor" and "Tun," as well as the use of certain numbers, was brought June 29. The preliminary injunction is issued under date of July 17.

In the terms of the injunction, the Court enjoins the Bright Star Battery Co. and all its agents, employees, etc., at the end of 20 days and during the pendency of the suit from using the word "Mars-Chlor" or the syllable or word "Tun" on "batteries, or on the cartons, containers or wrappers or on price lists, circulars or other printed or written matter in connection therewith, or the numbers from 1,600 to 1,699 or from 1,700 to 1,799 in the positions in which they have been heretofore used."

Two Receivers for U. S. L. Company

BUFFALO, N. Y., July 22—*Special Telegram*—Judge John R. Hazel of the Federal Court here, has appointed James E. Roberts and James O. Moore receivers for the United States Light and Heating Co. of Niagara Falls, N. Y. Louis S. Posner, of the law firm of Dos Passos Bros., of New York City consented to the appointment of a new receivership upon the filing of an equity action against the company by Alfred Stickney, of New York City. The action was instituted by the Central Trust Co., which has a claim of $450,000, said to be a preponderance of the indebtedness of the company. Yesterday Mr. Posner made a motion to have stricken from the records of the court the answer of A. Henry Ackerman, of Niagara Falls, vice-president of the company, admitting allegations of fraud and mismanagement in actions brought by the Picher Lead Co., of Joplin, Mo., and consenting to a receivership. Mr. Moore was appointed receiver last week.

Walpole Creditors May Get 10 Per Cent.

BOSTON, MASS., July 20—Attorney R. G. Curtis, representing the reorganization committee, informed Judge Dodge in the U. S. District Court today that if the reorganization of the Walpole Tire & Rubber Co. as planned was effected, creditors would get 10 cents on the dollar. Claims amounting to approximately $1,750,000 have been presented and it is estimated that these claims will be reduced $500,000 before they are allowed.

The receivers report cash on hand amounting to $130,000 and cash on special deposit of $63,000. On the question of additional compensation for the receivers, attorneys for the creditors suggested $5,000 each for the receivers and $10,000 counsel fees.

Pending an agreement on what should be paid at this time the matter was continued, the receivers have requested $35,000. They have already received $18,000.

New Packard Patent Has Broad Claims

DETROIT, MICH., July 20—I notice in your current issue your reference to another patent of Edward P. Cowles, which was issued to the Packard company on the 14th instant. The inference might be drawn from your article that this patent relates only to removable and interchangeable wheels, whereas as a matter of fact some of the claims cover the steering knuckle and bearing arrangement without regard to the removability of the wheel.

A close analysis of the patent shows that claims 7 to 11 and 16 to 18 relate to removable and interchangeable wheels, and claims 12 to 15 to removable wheels regardless of interchangeability.

Claim 5 also covers a detachable wheel but relates more particularly to the arrangement of the trunnions of the steering knuckle between the inner and outer hub members.

Claims 1 to 5 and 6, I believe, cover broadly the use of a wheel and steering knuckle in which the inner of the two ball bearings is approximately vertically in line with the point of contact of the tread of the wheel with the ground, and claims 2, 3 and 4 relate to such a wheel and bearings with an inclined steering spindle.

I think claim 4 is a fair example of this group of claims, and reads as follows:

> "In a motor vehicle, the combination with the front axle, the stepped spindle pivoted thereto, a large bearing mounted at the base end of said spindle, and a smaller bearing mounted at the outer end of said spindle, of a wheel having a hub mounted on said bearings and inclined so that the point of contact of the tread thereof with the ground is approximately vertically in line with the inner and larger of said bearings."

While undoubtedly the detachable and interchangeable wheel feature of this patent is of considerable interest to the industry due to the fact that the wire wheels that are now being introduced are made both removable and interchangeable, yet I believe that the inclined steering knuckle feature is fully as interesting, and is likely to prove as important, or more so, to the industry at large.—Packard Motor Car Co., MILTON TIBBETTS, patent counsel.

Four-Wheel Drive Co. Holds Annual Meeting

CLINTONVILLE, WIS., July 17—The annual meeting of the stockholders of the Four-Wheel Drive Auto Co. was held in this city on July 14. Chas. Hagen, of Black Creek, Wis., and Chas. Folkman, of this city, who have been identified with the company since its organization, were re-elected. The board of directors was increased from seven to nine members. A. Kuckuk, of Shawnee, Wis., and A. W. Priest, of Appleton, Wis., were elected as directors.

W. A. Olen, John Kalmes, Frank Gause and D. J. Rohrer were respectively re-elected president, vice-president, secretary and treasurer.

The company expended about $50,000 in the past year for permanent improvements to its factory and in machinery. A dividend of 4 per cent. on all stock outstanding on June 30, 1914, was declared and paid in cash.

The sales for the past year for its trucks showed an increase of 165 per cent. over the previous year.

Changes Name to Metal Auto Parts Co.

INDIANAPOLIS, IND., July 17—The Schiedel-Thompson Mfg. Co. has changed its name to the Metal Auto Parts Co. The management and stockholders remain the same as in the old company.

Marsh To Make the Caesar Light Car

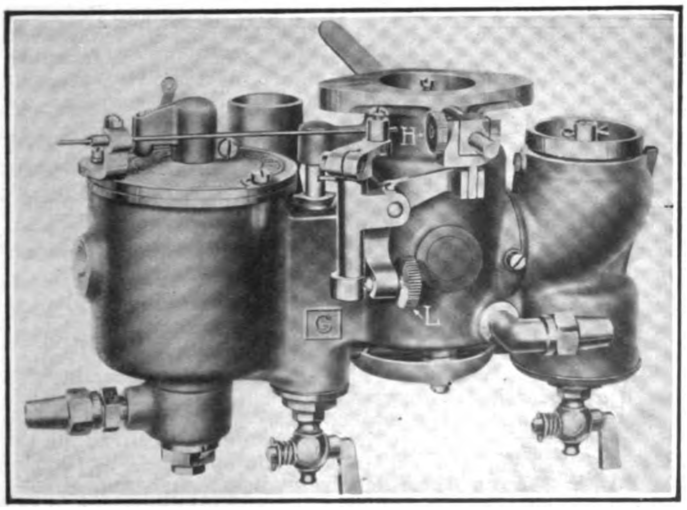
ANDERSON, IND., July 16—A. R. Marsh, formerly connected with the Vulcan Mfg. Co., Painesville, O., maker of the Vulcan car, has disposed of his interests in that company, which he organized and whose product he designed throughout. He will enter the field of lighter, lower-priced cars. The new car will be called the Caesar.

Two Jets and Three Air Valves on New Rayfield

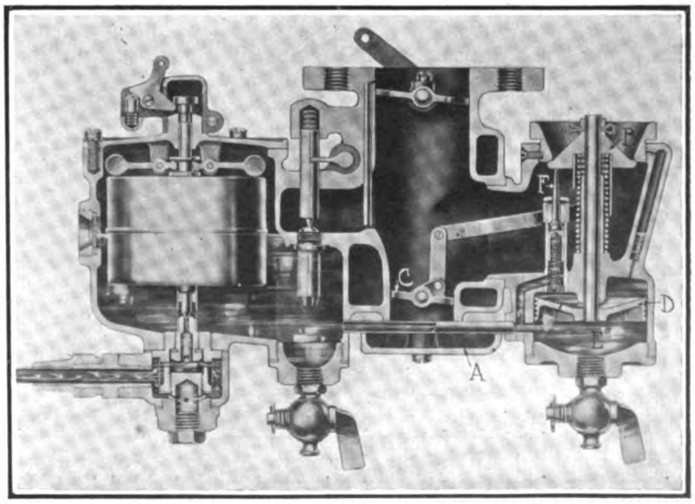
CHICAGO, ILL., July 20—The new Rayfield model G carbureter, which is the successor to the model C made by the Findeisen & Kropf Mfg. Co., is characterized by three air valves and two gasoline jets. The carbureter is similar to the model C, and the adjustments are the same except that the air valve adjustment has been eliminated entirely. The primary jet supplies all the gasoline required when the motor is idling and the auxiliary jet is controlled by a metering pin which is gradually brought into play as the speed of the motor increases.

The three air openings are also automatic. The primary air opening is fixed and the other two are operated by the suction of the motor. These valves are shown in the sectional view on this page. The fixed air opening is at A, and the auxiliary air valves B and C operate together in connection with the piston D in the auxiliary gasoline chamber E. The purpose of the piston is to prevent the air valve from fluttering on sudden throttle changes or other difficult conditions. The upper air valve B operates the metering pin F, which supplies an increasing amount of gasoline in direct proportion to the amount of air admitted. This auxiliary jet is not in operation until the motor has increased its speed sufficiently for the suction to open the valve B.

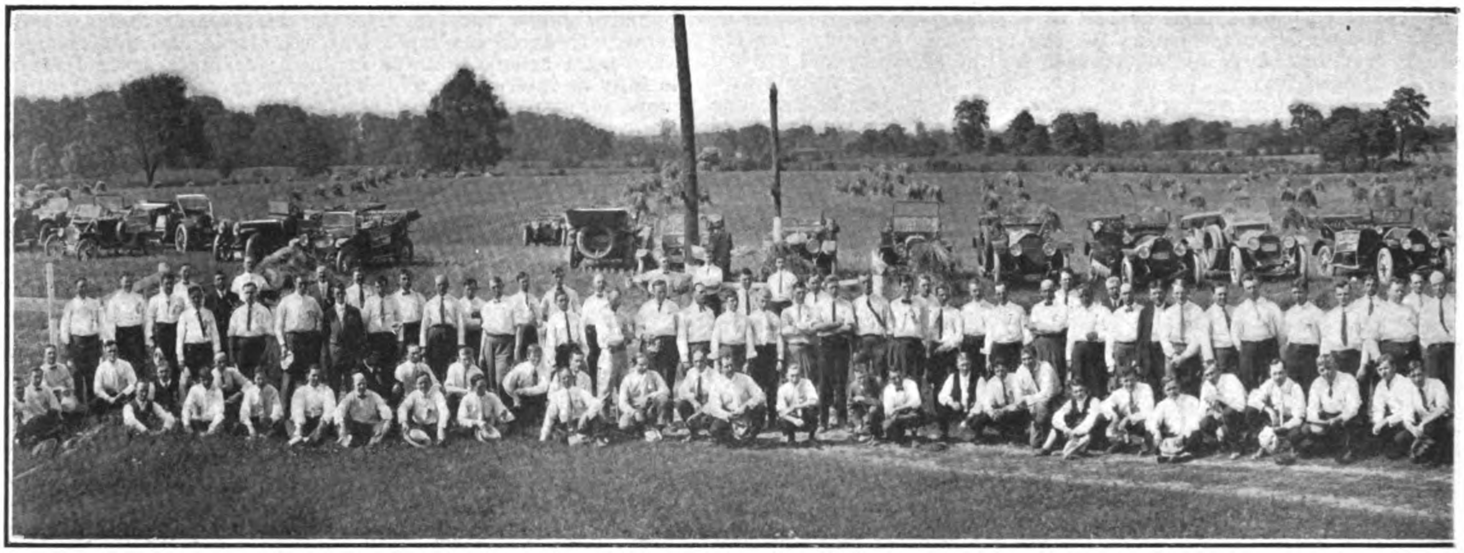
There are only two adjustments, low and high. Both control the amount of gasoline. These adjustments are shown on the exterior view of the carbureter at L, and H L controls the low speed and H the high speed. These carbureters have been adopted as standard on the Winton, Chandler, Chalmers, National, Jeffery, Lozier, Haynes and other cars, and negotiations are under way for other makes.



Exterior view of new model G waterjacketed Rayfield



Sectional view of the new model G Rayfield carbureter



Superintendents and foremen of the Firestone Tire & Rubber Co., Akron O., grouped at the old Firestone Homestead, the home of H. S. Fire
where a fine dinner and

A New World's Dirt Track Record—25 Miles in 22:07 1/5

Barnes in Romano Establishes New Mark at Portland, Ore., in Struggle with Tetzlaff and Carlson in Maxwells

TACOMA, WASH., July 20—In the free-for-all at the Rose City track, Portland, Ore., July 12, Percy F. Barnes, in his Romano, hung up a world's record for 25 miles on a dirt track of 22 minutes 7 1-5 seconds. He drove a sensational race against Tetzlaff and Carlson in their Maxwell mounts.

This is the fastest time ever made on the Portland track. Tetzlaff suffered a slight engine trouble on the twenty-first mile which lost him a quarter of a lap and the race. Brock, in his Wright special, traveling in second place in the sixth lap, went out in the seventh with a flat tire.

In the first heat of the 3-mile event Tetzlaff won from Brock in 2 minutes 37 seconds. In the 5-mile race from a standing start Barnes in Romano won in time of 4 minutes 30 seconds. The second heat of the 3-mile free-for-all open was won by Tetzlaff, thus giving him the race without a deciding heat. He did the 3 miles in 2 minutes 36 2-5 seconds, Brock again taking second and Barnes third.

"Plucky" DeAlene went into the race with a badly crippled Marmon, but managed to make the circuit twenty-five times without going through the fence, although his transmission was faulty and several spokes in his rear wheels broken. The attendance was fair for a combination motorcycle and motor-car exhibition.

A series of accidents occurred on Saturday, July 11, at the Rose City track. Ray Brock, in backing up to the starting line, broke a magneto shaft, which put him out of the race. Kennedy, in his Chalmers six, was just starting when the differential housing gave way and he was No. 2 out in the same race. In practice H. Goetz in a Nyberg Special threw a wheel, and car was unsafe to run and he was out of race.

Of the three Maxwells which started in the first race, only one, Tetzlaff's No. 3, was in running order at the finish. In consequence the program was badly shot to pieces. The track was in fairly good condition, being well oiled.

Maxwell To Retract Speedway Advertising

NEW YORK CITY, July 21—The Maxwell Motor Co., Detroit, has agreed to retract its advertising which followed the Indianapolis race, May 30, when the Maxwell car No. 25 which finished in the race was advertised as the Maxwell "25," which is the regular model of the company.

The contest board of the American Automobile Assn. took the matter up at its meeting last week and decided that the Maxwell company would have to publicly retract by publishing an advertisement in one of the daily papers in each city and town in which the original advertisements had been published. In addition the retraction will be made through the weekly and monthly class publications. With the retraction goes a cash fine of $500.

The advertisement frankly states that there is not any similarity between the Maxwell No. 25 which finished the Indianapolis race and the Maxwell "25" which is being regularly sold to the trade.

Clifford Ireland, Peoria, Ill., was appointed contest board representative for Illinois.

Omar Taft was suspended by the board until Jan. 1, 1916, for his connection with the entry of a Delage car and its failure to take part in the recent Santa Monica races.

The Detroit track, on which the recent cyclecar meet was held July 4, was suspended until January, 1915, this being a licensed track under the A. A. A. The suspension was for issuing sanction to the cyclecar organization which sanctioned the meet.

Firestone Factory Foremen Hold Outing

AKRON, O., July 21—A party composed exclusively of 170 superintendents and foremen of the Firestone Tire & Rubber Co., this city, held an outing on July 11 at the Old Firestone Homestead, 80 miles away, H. S. Firestone was host. After dinner there was a ball game. There were also many other games.

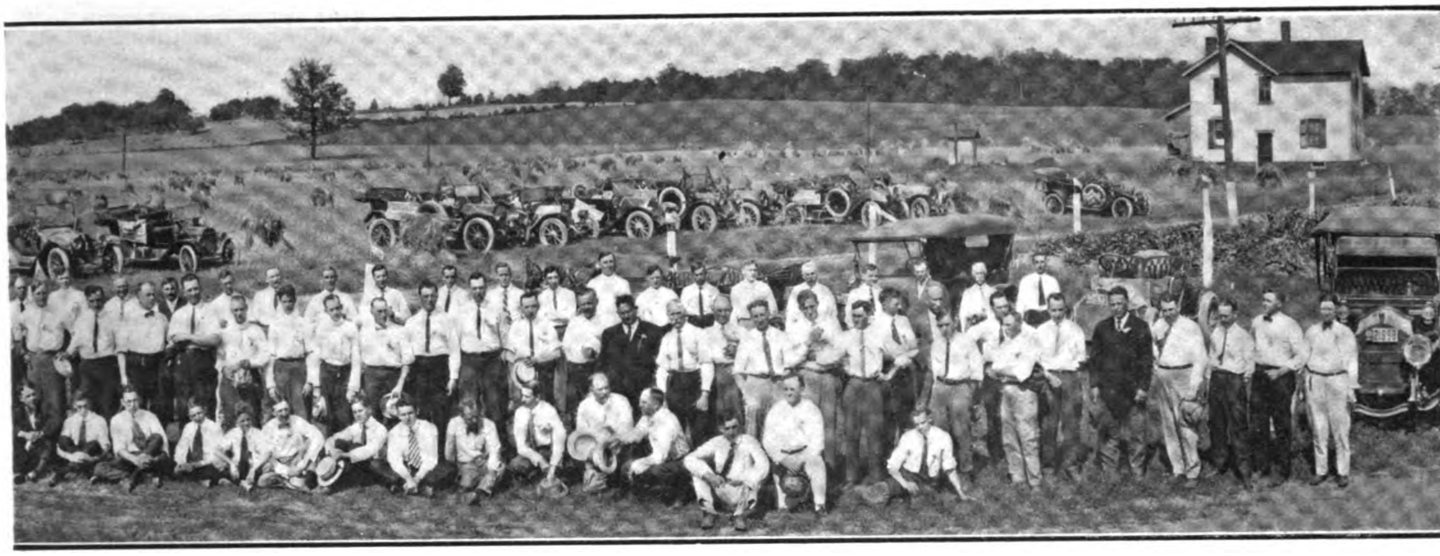
DePalma and Burman in Elgin—10 Entered

CHICAGO, ILL., July 21—Ralph DePalma with the German Mercedes that won the French Grand Prix, and Bob Burman with the Peugeot, are the latest entrants for the Elgin Road Races, August 21-22, each being entered in both events. This makes ten entered to date: Two Marmons, two Peugeots, two Sunbeams, two Stutzes, the Mercedes and Rickenbacher's Duesenberg. The Rudge-Whitworth Company, Ltd., which announced that it would offer prizes for the first race, has extended its offer to cover both races. Prizes are to the car coming in first, $200; second, $100.

It is expected that two Mercer cars again will be entered. Spencer E. Wishart, who is now spending his honeymoon in Europe, will return to this country in ample time to tune up one of the Mercers for the Illinois meet, and Edward Pullen, driver of the winning Grand Prize Mercer, is now on his way back from the Pacific Coast and will get the second car in shape.

3-Day Economy Run for Stock Cars Planned

MILWAUKEE, WIS., July 20—An economy run for strictly stock cars, lasting 3 days and covering approximately 575 miles, is planned by the contest board of the Wisconsin State Automobile Assn., as a revival of the annual contest for the *Milwaukee Sentinel* $1,000 trophy, hung up in 1910 by Charles F. Pfister, Milwaukee millionaire and publisher, and already contested for three times in reliability competitions. The running of the event was called off in 1913 because of the



stone, President of the company. There were 170 guests in the party riding in forty automobiles from the factory at Akron to the Homestead, sports were enjoyed

failure of the A. A. A. to issue a sanction because it had no stock car registrations, and the same condition existed this year. So great was the demand of dealers for a Badger contest of some kind that the state contest board today decided to try an economy run. The donor of the trophy has consented to a change in the deed of gift to make this possible. In fact, Mr. Pfister suggested the idea of substituting an economy test for the reliability tour when he was advised that the reliability was an impossibility.

Tentative plans for the 1914 tour fix the dates for Thursday, Friday and Saturday, September 3, 4 and 5. The first day's route is from Milwaukee to Green Bay via Algoma, Wis.; the second, from Green Bay to Madison through the Fox river valley, and the final day from Madison to Milwaukee by way of Janesville, Beloit, Kenosha and Racine. The total mileage of this trip would be 475.

Only stock cars, equipped per catalogue, will be eligible to enter and contesting cars will be graded according to price, number of cylinders, weight including occupants; piston displacement, etc. There will be technical examinations before and after the run and penalties will be inflicted for broken or inoperative parts. The rules will be original with the Badger association, although the 1911 contest regulations of the A. A. A. will be applied to some extent.

Rickenbacher and Mulford at Galveston

NEW YORK CITY, July 21—The entry of Eddie Rickenbacher with his Duesenberg car, Ralph Mulford with his Peugeot and Mel Stringer with another Peugeot, has brought the entry list in the Galveston Beach races on July 29 and 30 and August 1 and 3, up to fifteen.

The list includes the following drivers and their cars:

DRIVER	CAR	DRIVER	CAR
E. Rickenbacher	Duesenberg	Joe Le Cain	Chevrolet
S. F. Duesenberg	Duesenberg	Charles Keene	Beaver Bullet
Bill Endicott	Duesenberg	Conde Moseley	Studebaker
Not named	Duesenberg	H. L. Kindred	National
Joe Horan	Metropol	George Clark	Texas
Not named	Metropol	T. C. Jones	Mercer
Not named	Metropol	Not named	Delage
Chandler	Braender Bull Dog		

It is expected that the crowd at Galveston this year will be greater than at any previous meet. The big event will be the Cotton Carnival Sweepstakes, for which cash prizes amounting to $3,250 are offered. Sixteen events are on the list for the 4 days' racing, and the cash prizes amount to $4,650, in addition to which a number of valuable trophies will be hung up.

Barney Oldfield is expected to participate in the races. At present he is endeavoring to secure a fast car for the meet.

The grandstands, with a seating capacity of over 4,000 people, are more than half completed, and are being built this year of sufficient strength to hold up 8,000.

Brooklyn Dealers Play for a Day on Long Island

NEW YORK CITY, July 21—More than 150 dealers, members of the Brooklyn Motor Vehicle Dealers' Association attended the third annual outing of the organization which was held today at Witzell's Grove, College Point, L. I. The start was made at 10 o'clock from Grant Square in Brooklyn, the procession of about forty automobiles taking well-traveled roads to the Long Island Sound meeting place. In the morning there were two baseball games. Wm. Ellenbeck's team defeating Wm. Severn's 11 to 3 and the Martin-Evans team defeating the Julius Bindrim team 5 to 2; in the play-off, the Martin-Evans team won, the score being 6 to 0. During the afternoon there was the usual program of sports including running, rowing, swimming and wrestling. All told there were more than fifty prizes distributed, most of which were donated by members of the Brooklyn Trade. The affair was brought to a close at a late hour with a vaudeville entertainment and two 10-round boxing bouts.

Overland Business Gains 40 Per Cent.

NEW YORK CITY, July 20—The Willys-Overland Co. closed its fiscal year on June 30 with an increase in output of cars of slightly over 40 per cent. and nearly as large a gain in gross earnings. It is considered the best year in its history.

The net profits are expected to run between $6,500,000 and $7,000,000, or better than 30 per cent. on the $20,000,000 common stock, now paying regular dividends of 6 per cent. The common stock has advanced from 57½ to 90.

Motor Truck Club Discusses Service

NEW YORK CITY, July 21—A meeting of the Motor Truck Club on the evening of July 15 was attended by more than forty representative members and guests. Service, its uses and abuses, was the subject of discussion. Four papers were presented. D. O. Skinner, advertising manager of the International Motor Co., presented a brief paper, in which he described the system of service in vogue at the new plant of that company at West End avenue, 63d and 64th streets, this city. He stated that it was a separate and distinct branch of the business, responsible only to the executive department, and in no sense auxiliary to the sales department. W. L. Day's paper on service from the manufacturer's standpoint was read by C. B. Warren, manager of the New York City branch of the General Motors Truck Co., while J. W. Perry's paper on the same subject was read by D. C. Fenner. Mr. Perry is manager of the New York Lippard-Stewart agency.

Prior to the reading of the papers, President G. H. Duck began the discussion by a strong plea for standardization of service as one of the most important of the tasks now before the motor truck industry. He decried the lethargy of the majority of those interested in the development of the business and urged that manufacturers and dealers and even owners get together and discuss the question with a view to definite action.

Following the reading of the papers, the subject was discussed. The opinion seemed to prevail that efficient service is indispensable, but that it is not fair to render it free to an extent limited to the discretion of the local service manager or of the sales manager. It was agreed that the workmanship and material guarantee should be rigidly adhered to, some even favoring guaranteeing the truck for life in these particulars; but free service was universally condemned.

Sixteen Perfect Scores in Trans-Alpine Run

Of Five American Cars Among Seventy-Five Entries, Only Three Cadillacs Finish

VIENNA, July 5—After 8 days of actual road traveling during which they covered 1,832 miles through the most mountainous sections of Austria, sixteen among seventy-five cars which started in the fifth annual Alpine tour finished with perfect scores. These are: four Audi, one Benz and one Opel cars—all German; three Austrian Daimler, three Italian Fiat, two Belgian Minerva-Knights and one British car, a Rolls-Royce.

Of the five American cars which started in the trial—three Cadillacs, an Overland and a Chevrolet—one of the Cadillac cars finished as a contestant, while the other two completed the tour as non-contestants, after having reached a night control after the scheduled time, and also after having been ditched. One of these Cadillacs also had the misfortune of being supplied with paraffin instead of gasoline, and this was the cause of troubles. The other two American cars met with road accidents on the first day and were withdrawn.

All the cars were driven by either the owner or some gentleman or amateur driver, and this reason accounts for many cars losing points on account of the drivers taking too great chances on the difficult, hilly route.

Few Serious Mechanical Troubles

There were very few cases of serious mechanical troubles, the worst being broken piston rods, broken oil pipes, while there were plenty of minor troubles such as sooted spark plugs, a clogged jet, a leaky gasoline tank. The ditching of cars was also the cause of many points being lost.

The tour was the severest as yet promoted in Europe for ordinary stock cars. Of the 1,832 miles comprising the route, there were 530 miles or 28.9 per cent. over passes of which there were twenty-seven of more than ordinary importance. The slope varied from 1 in 16 to 1 in 4.5. On the Niederalp there were stretches with a 24 per cent. gradient, on the Tauern 23 per cent., and on the Seeberg about 21 per cent. grades were ascended.

Eight cars which had completed the entire route without the loss of a point lost their perfect scores in the final appearance examination, and this gave way to much protesting, as the contestants rightly claimed that the tour was a road test and not an appearance contest.

Sixty-two Cars Completed Tour

From the seventy-five cars which started, sixty-two completed the tour, but of this number only fifty as contestants, the other twelve having lost so many points that they were only considered as non-contestants. Two cars—an N. A. G. and a Laurin-Klement—were disqualified for violation of the rules governing driving through towns. There were 13 cars which did not finish.

Of the 1,832 miles of the tour, 743 miles were over roads which had not been included on previous Alpine trials.

The novelty of this year's tour was the hill climb, and speed trial over a level stretch. The climb was made over a course of about 5.6 miles on the Katschberg, the slope being 1 in 4.8 maximum. A minimum time was allowed each car, being based on the cylinder area, a car with a cylinder area of 2,000 c.c. was allowed 40 minutes while one with 8,500 c.c. or over was allowed but 10 minutes to make the ascent. The fastest time was made by the Rolls-Royce, having a piston displacement of 7,410 c.c. and making the climb in 7 minutes 18 seconds or 4 minutes 27 seconds better than the allowed time. The car which made the best record against its allotted time was the Austin, with a piston displacement of 3,160 c.c., by covering the course in 11:58 or 12:32 better than the scheduled time.

The most difficult part of the tour was the ascent of the Turracher Pass, 38 miles long, with a maximum slope of 10 per cent., but with so many difficult turns, donkey-back bridges, caniveaux and other natural road difficulties, that about 30 per cent. of the contestants lost their clean score in this ascent. Many had recourse to horses to pull their car either because they could not get a going up hill or because they stalled and could not restart.

Contestants were started at an interval of 5 minutes in order to prevent the course being blocked. On some of the other passes the cars were started at 10 minutes' interval.

It was resting day on the third in Trieste and on the next morning the trip to Toblach, 248 miles, was made. The Cadillac driven by Mrs. Boston skidded into soft earth and could not move out without outside assistance. After being again on the course the car came near running down a deep embankment and only a heavy, big stone retained it from a serious accident.

On the ninth day the tourists drove 214 miles. This was the most strenuous part of the tour. The Turracher Pass of 38 miles with its donkey bridges, caniveaux, turns, curves, caused more losses of points than all the other passes caused. Imagine a rise of 2,440 feet within a stretch of 4.8 miles, with several other rising stretches but not quite as bad.

On the tenth day, 221 miles, the speed trials were held over a distance of 3.1 miles. Here, like in the climb, each car was allowed a limited time to cover the distance. The Rolls-Royce covered the 3.1 miles in 2:43 3/5 or 12 seconds ahead of its minimum time. It represents a speed of 68.9 miles an hour. The little Singer made the distance in 4:10 or 49 1.5 seconds better over its schedule.

The Perfect Scores in the Alpine Tour

Car	Bore &	Stroke	Cylinder Displacement
Rolls-Royce, 1	4.48	4.76	7,410
Benz, 1	3.74	5.5	3,970
Audi, 4	3.54	5.5	3,560
Austro-Daimler, 3	3.50	5.5	3,480
Fiat, 3	3.34	5.9	3,400
Minerva-Knight, 2	3.54	5.1	3,310
Opel, 1	3.07	6.1	2,980

Syndicate Buys Sioux City Speedway

CHICAGO, ILL., July 21—E. R. Schultz, secretary of the Sioux City Automobile Club and Speedway Assn., and who managed the recent Speedway and Sioux City race, is at the head of a syndicate which has bought the stock of the other members. The syndicate will convert the present dirt track into a speedway and promote a race next year. A purse of $25,000 may again be offered and the distance will be increased from 300 to 400 miles. It is planned to incorporate for $100,000 with $50,000 paid in. The new company will take charge within 30 days.

$5,000 in Prizes for Motor Pageant

NEW YORK CITY, July 21—Five thousand dollars in prizes to be awarded by the Tercentenary Commission for the best decorated cars in the forthcoming Motor Carnival during the last week in September in connection with the Commercial Tercentenary Celebration. The prizes are to be in the form of trophies or cups for private owners and cash for professional chauffeurs driving the cars which are adjudged winners.

There are to be ten divisions, including those for florally decorated touring cars, florally decorated runabouts, cars with other than floral decorations, ladies' division, electric car, grotesque and burlesque, cyclecar, advertising section, and a division for out-of-town automobile clubs, a large number of which will strive to win one of the three handsome trophies offered in this division.

First prize in the touring car division is valued at $500. In each division there are upwards of seven prizes, in addition to cash awards for chauffeurs. No entry fees will be charged. Artists will design floats free of charge.

Ohio Newspaper Announces Reliability

COLUMBUS, OHIO, July 20—The *Ohio State Journal*, of Columbus, Ohio, is planning to hold a two-day "automobile boosters' tour." Prizes will be given to the winners of the event which will be in the nature of a reliability contest. The dates will be July 29 and 30. The route covers Newark, Lancaster, Circleville, Washington, London, Springfield, Mechanicsburg, Marion, Mt. Gilead, Mt. Vernon and Delaware.

Little Giant Truck on 3,000-Mile Tour

CHICAGO, ILL., July 17—Leaving August 1 a stock four-cylinder Little Giant 1-ton truck will be sent out on an endurance circle tour through the East and Middle West. It will carry a full load of sand bags and will be in charge of Messrs. Giroux and Carlson.

Maps showing the route to be taken will be posted in all of the Little Giant agencies and branches, the progress being traced on them daily in colored pencil. At the conclusion of the trip a booklet, showing the costs and other details of the run, and illustrated from photographs, will be circulated.

Factory Miscellany

FLINT Employing 2,700 More Men—According to an investigation made in the Flint, Mich., automobile and motor car parts plants there were about 2,700 more men employed in these plants July 1, of this year, than on July 1, 1913, and judging from the increasing business there will be more men employed by the end of the year than during any previous year. In January there were about 170 less men employed in the various plants than in January 1913; in February there were about 200 more than last year; in March the increase had reached about 900 men and it has been increasing ever since, until now when about 12,000 to 12,500 men are being employed all told. In most of the factories it is stated that the season is about 60 days ahead of last year's.

Rutherford Plant for Tires—Middleton & Sharpe, Rutherford, N. J., will build a plant for the manufacture of rubber tires.

Bay City Co. Erecting—Stroud, Bridge & Connors, Bay City, Mich., will erect a two-story factory, 90 x 110 feet, for the manufacture of automobile accessories.

Rim Concern Building—The Lookout Bending Co., Chattanooga, Tenn., will erect a plant at Sulphur Springs, Ga., to manufacture automobile wheel rims and spokes.

Addition for Body Co.—The Gustav Schaefer Wagon Co., Cleveland, O., manufacturer of wagons and automobile bodies, will erect a three-story addition, 65 by 70 feet, to its plant.

Walker-Weiss Axle Adds—An addition to cost about $20.000 will be built to the plant of the Walker-Weiss Axle Co. Flint, Mich., whose business has been very good thus far this year.

Auto-Lock Co. Erects—The Common Sense Auto-Lock Co., Ltd., Spokane, Wash., recently incorporated with a capital stock of $1,000,000, by W. H. Purcel, R. B. Weber and others, will soon erect a factory.

To Build Largest Plant in U. S.—The American Aluminum Co. has announced the purchase of a $400,000 strip of land in Edgewater, N. J., as a site for a $2,000,000 plant to be erected in the fall. It will be the largest aluminum manufacturing plant in the United States, it is said, and will employ from 2,000 to 3,000 men.

U. S. Truck in Covington—The United States Motor Truck Co., Covington, Ky., has filed articles of incorporation. It has a capitalization of $250,000. R. C. Stewart and others are the incorporators, and it is understood that the plant of the Stewart Iron Works in Covington will be used temporarily for the manufacturing operations.

Storle's New Engine—The Storle Gas Engine Co., Kewaunee, Wis., is preparing for a large production of internal combustion engines of a new type perfected by O. O. Storle, and to be built both for stationary and movable purposes. The motor has a new valve arrangement concerning which little will be divulged until final patents have been applied for and the production started.

Buys American Welding Equipment—The Western Fixture Co., 573 East Water street, Milwaukee, Wis., a large welding concern, has bought the equipment and stock of the defunct American Welding Co. of Milwaukee and will double the size and capacity of its plant. The Western company is one of the first in the middle west to undertake the modern method of welding.

Johnson Carburetor Organized—The Johnson Carburetor Co. has been organized in Detroit, by C. F. Johnson, expert carbureter engineer of the Cadillac Motor Car Co.; Harry Potter, sales manager of the McCord Mfg. Co., and Rex Johnson, production manager of the Cadillac Motor Car Co. The plant is located at 272 Harper avenue. H. W. Farr is sales manager, with offices in the Union Trust building.

Holihan Co. Moves—The Holihan Mfg. Co. has removed to its new plant on Jefferson avenue, west, and Twenty-first street, Detroit, Mich. This concern which manufactures radiators, hoods, tanks, fenders has been growing exceptionally fast. "We started in business only last January," said President J. A. Holihan, "and we had a force of ten men. Now we have close to 100. We now have three times as much floor space, have added much new machinery and are well equipped to take care of any amount of business."

Will Manufacture Electric Motors—The Marathon Electric Mfg. Co. has been organized at Wausau, Wis., with $150,000 capital to manufacture electric motors, generators, and general electrical equipment of all kinds. Justin Lebovici, until recently electrical engineer for the Westinghouse and Crocker-Wheeler companies, has been appointed general production manager, designer, and chief engineer. E. M. Bischoff, formerly in charge of the manufacturing and sales department of the Crocker-Wheeler company, is secretary, treasurer and general manager. The concern is backed by a number of the largest business men and manufacturers of Wausau and Marathon county. The new forest products laboratory built by the government for research and experimental work in pulpwoods by the forestry division of the department of the interior, has been purchased outright with equipment and will be equipped for electrical manufacture. The laboratory was put on the market because the pulpwood work was finished and the government had no further use for the plant.

The Automobile Calendar

July 25-26	Belgium Grand Prix Road Races.
July-August	French Army Truck Subsidy Trials.
Aug. 1-3	Galveston, Tex., Beach Races.
Aug. 2-9	Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16	Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17	Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupé de l'Auto Race.
Aug. 27	Brooklands Track, England; Annual Automobile Race.
Aug.	Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug.	Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7	Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15	Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2	S. A. E. European Trip.
Oct. 16-26	Paris, France, Automobile Salon.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
November	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14	London, England; Olympia Show.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
November 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
November 15	Paris, France, Kerosene Motor Competition.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in  the Industry

Motor Men in New Roles

MURPHY Chief Engineer for Franklin—Ralph Murphy has been appointed chief engineer of the H. H. Franklin Mfg. Co., Syracuse, N. Y., manufacturer of the Franklin automobile. He has been for the last 2 years head of the service department. He succeeds Arthur Holmes as chief engineer. Mr. Holmes for the past 6 months has been vice-president and sales manager of the company.

Austin With Grant—Ray Austin, who was formerly connected with the Studebaker Corp., has accepted a position as assistant engineer for the Grant Motor Co., Findlay, O.

Moore Moon Manager—L. B. Moore, formerly district salesman for the Moon Motor Car Co., Cleveland, O., has taken the management of the Sixth City Motor Co., distributor of Moon.

Shoup Oakland Branch Manager—L. S. Shoup, formerly sales manager of the John Deere Plow Co., has been appointed branch manager of the Oakland Motor Co., Indianapolis, Ind.

Higginbottom With Marmon—Herbert Higginbottom formerly with the Ranier and later with the Abbott-Detroit is traveling in the Northwest for the Nordyke & Marmon Co., Indianapolis, Ind.

Brown Goes to New Haven—Frank L. Brown, formerly with the Alvan T. Fuller Co., Boston, Mass., agent for the Packard, is at New Haven where he has charge of the distribution of Stutz cars.

Benson Manager for Partridge Concern—F. G. Benson, identified with the automobile business in New York and New Jersey for the last 9 years, has been appointed wholesale manager of Partridge, Clark and Kerrigan, Inc.

Sitgreaves Heads Mercer Agency—The Trenton Motor Sales Co., Cleveland, O., has been organized and incorporated to succeed the Mercer Auto Sales Co. and handle Mercer cars for that territory. G. L. Sitgreaves is manager.

Duck to Manage Cushion Wheel Co.—George H. Duck, who has been identified with the motor truck industry for several years, has been appointed manager of the Sewell Cushion Wheel Co., New York City, with offices at 1790 Broadway.

Holton Monarch Sales Manager—Hoover Holton, who has formerly been associated with the American Motors Co. and the Empire Automobile Co., Indianapolis, has taken full charge of the sales for the Monarch Motor Car Co., Detroit, Mich.

Kent Leaves Pierce-Arrow—F. C. Kent, general superintendent of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., has severed that connection to become works manager of the Lodge & Shipley Machine Tool Co., Cincinnati, Ohio.

Reed Resigns from Norwalk—W. S. Reed, for 3 years chief engineer of the Norwalk Motor Car Co., Martinsburg, W. Va., has resigned to take a similar position with the Cowles-MacDowel Engineering Co., Chicago, Ill., the change being effective July 15.

Coy Buick Sales Manager—J. B. Coy, Louisville, Ky., for several years district manager for the International Harvester Co., has been appointed sales manager for the Milwaukee, Wis., branch of the Buick Motor Co. M. J. Monson is general manager of the branch house.

MacManus Makes Change—T. F. MacManus, formerly president of the MacManus Advertising Company, Detroit, Mich., which is well known in the automobile trade, has become affiliated with the Dunlap-Ward Advertising Co., also well known in the automobile trade.

Montgomery Heads Detroit Krit—The Krit Motor Car Co., has recently opened a new local branch at 1225 Woodward avenue, Detroit, Mich., under the management of K. R. Montgomery. H. L. Davies, manager of the used car department of the Krit company, will be in charge.

Hood Detroiter Sales Manager—W. C. Hood, one of the veterans in the automobile business, having started as an experimental worker on some of the first steam motor cars in 1898, has been appointed sales manager of the Briggs-Detroiter Co., Detroit, Mich., which makes the Detroiter car in Detroit.

Vedder Studebaker Manager—E. G. Vedder, formerly assistant manager for the Gray Motor Co., distributor in the Twin Cities for the Studebaker car, has been made manager at St. Paul, transferring from the Minneapolis office. P. W. Perlstrom has been transferred from the Minneapolis shop to the St. Paul mechanical department.

Cadillac Agency Reorganized—The Cadillac agency in Boston has been reorganized and a new company incorporated for $100,000 with A. L. Danforth as president, J. James McGregor, treasurer and B. K. Danforth secretary. President Danforth took charge of the agency a few months ago following the retirement of Alfred Measure.

Change in Bosch Officials—A. H. D. Altree, former branch manager at Chicago, has been appointed to the office of vice-president of the Bosch Magneto Co., New York City, and will be located at the main offices of the Bosch company at Nw York. F. D. Norman, previously in charge of the Bosch company's Toronto office, has been appointed branch manager at Chicago.

Penn Resigns—Ralph Penn has resigned as manager of the Milwaukee branch of the Ralph Temple Automobile Co., Chicago, to become Milwaukee representative of the Baker electric. Mr. Temple has taken quarters at 137 Oneida street, the home of the Baker electric for several years. A. H. Esbenshade, who has been agent for the Baker, has retired to devote his entire attention to his other extensive business interests.

DuComb Joins Barthel & Daly—W. C. DuComb. Jr., formerly assistant engineer of the Standard Roller Bearing Co., and engineer of the Royersford Foundry & Machine Co., has become a part of the organization of Barthel & Daly, New York City, sole importers of Schafer ball bearings, and will act in the capacity of mechanical engineer. Mr. DuComb will shortly make an extensive trip through the automobile trade in the interests of Schafer ball bearings.

Oakland Branch Managers Meet—At the annual meeting of branch managers of the Oakland Motor Car Co., Pontiac, Mich., the 1915 models were shown for the first time and were explained to the visitors by chief engineer N. E. Wahlberg. Fred W. Warner, general manager, gave his views on the automobile business in general and explained the company's policy for 1915. It was reported that the company will more than double its output for 1915.

Garage and Dealers' Field

Overland at Pacific Exposition—The Willys-Overland Co., Toledo, O., has made application for 1,500 square feet of space for its automobile exhibit at the Panama-Pacific exposition, San Francisco, 1915.

Prather Building Demountable Rim—Prather Bros., Georgetown, Ky., have leased a building and will equip it with wood and metal working machinery for the manufacture of a demountable automobile wheel.

Reo's New Newark Bldg.—The Reo Motor Car Co., Newark, N. J., has acquired property at 39 William street and will establish a large sales room and repair plant. The repair plant will be equipped for all classes of work. W. E. Dunsenberry is manager.

New J-M Service Station—The H. W. Johns-Mansville Co., New York City, distributor of automobile accessories, announces the opening of a new store and service station at 1,930 Broadway. The former quarters at Broadway and Seventy-sixth street long ago proved inadequate.

Kansas City Dealers Building—Several new buildings for different dealers are under construction in Kansas City, Mo. now. The Hupmobile company is building at 1819 McGee street. The Republic Tire Co. is completing new quarters at 1813 Grand avenue and the Federal Rubber Co. is preparing to move into its new building at 1825 McGee street. The Case company already has occupied new quarters at 2117 Broadway.

Ford Buys Plot in Brooklyn—The Ford Motor Co., Detroit, has completed negotiations for the purchase of a site in Brooklyn, in which wil be erected a six-story brick and steel salesroom and service station.

The company bought the plot at the northwest corner of Sterling place and Bedford avenue, Brooklyn, 44 by 100 feet. Plans were filed for enlarging the Long Island City plant by an eight-story addition, to cost $650,000.

Accessories for the Automobilist

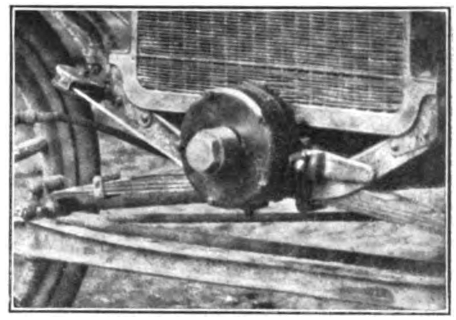


Fig. 3—Mogul starter for cyclecars and automobiles of the smaller type, made by Mogul Starter Co., Chicago, Ill.

POSITIVE Steam Tube Vulcanizer—The Positive Supply Co., Davenport, Iowa, maker of portable steam vulcanizers and kerosene garage heaters, has recently brought out a small steam tube vulcanizer for use in private garages and small repair shops, Fig. 1.

The new Positive is the only vulcanizer, it is said, made expressly for repairing inner tubes and uses the steam principle of vulcanizing. It is a complete steam vulcanizing plant put up in small box, so it can be carried in a tool kit of a car. The Positive consists of a metal body, with a compartment for water and another for fuel. The water compartment is between the inner tube and the flame, where it equalizes the heat generated. It vulcanizes a patch that actually becomes a part of the tube, without danger of burning or scorching.

It is so constructed that it may be firmly mounted on any work bench or post and thus avoiding all tendency for damaging the tube, as it cannot upset. To vulcanize a repair, the repair rubber is put on the tube and the vulcanizer clamped on. The proper amount of gasoline and water is placed on the vulcanizer and ignited. No further attention is required. The vulcanizer weighs 30 pounds and will vulcanize a surface of 12 square inches in one setting and larger ones by resetting. It will repair automobile, cyclecar, motorcycle and bicycle tubes.

The new Positive lists for $1.50 and is sold under a money back guarantee of satisfaction.

Fuel Economizer—Acting on the idea that hot, moist air will increase the power of the motor, the J. H. Forsythe, Alliance, O., is making a device, Fig. 2, that takes warm moist air from the upper part of the radiator. Referring to Fig. 2. The suction of the engine draws it through tube A to the inlet of the economizer, thence through baffle plates where it comes into contact with the hot water pipes and thence through a thermostatic valve which admits air at a temperature somewhere between 105 and 175 degrees, thence through a two-way valve to the intake manifold of the engine.

Lesoyl Lubricating Compound—A lubricant, in the form of a semi-liquid graphite compound, has been brought out by the Lumen Bearing Co., Buffalo, N. Y., under the name of Lesoyl. This substance is designed to be mixed with

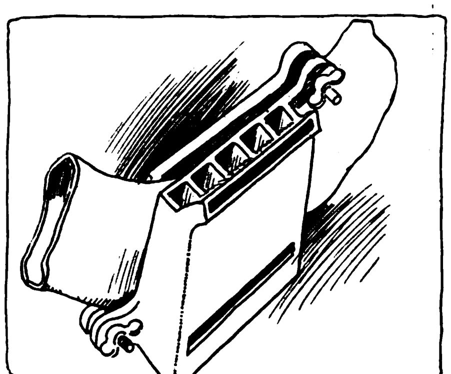


Fig. 1—Positive steam tube vulcanizer for use in private garages and small repair shops made by Positive Supply Co., Davenport, Ia.

lubricating oil or grease in order to perpetually suspend the graphite and lubricate the wearing surfaces in the same way apparently as is accomplished by the use of deflocculated graphite. It is stated by the maker that better lubrication is obtained than by the use of oil alone, owing to the fact that the graphite is carried to the bearing surfaces and the oil film remains unbroken. A can containing the proper amount of Lesoyl to be mixed with 5 gallons of oil sells for $1.

Folding Sub-Car—The "Get out and get under" fever has evidently been making its way to Ohio, where the Auto Folding Sub-Car Co., at Zanesville has announced the Folding Sub-Car, a device which permits of making easy repairs and adjustments underneath a motor car. The feature of this device is that it may be folded so as to be but 18 inches long and hence may be carried in the car at all times. This car sells for $5 and should be especially valuable to those contemplating long tours.

Mogul Starter—A starter, Fig 3, that is operated by a pedal is now manufactured by the Mogul Starter Co., 1323 Michigan avenue, Chicago, Ill., for cyclecars and automobiles such as the Ford, Krit, Roe, Overland, Maxwell, Mitchell, The price of the automobile starter complete with primer is $30, and for cyclecars it is $12 to $15 without equipment.

Demountable Hub for Ford Wheels—The Allen Machine Co., Detroit, Mich., is manufacturing a special hub, Fig. 4,

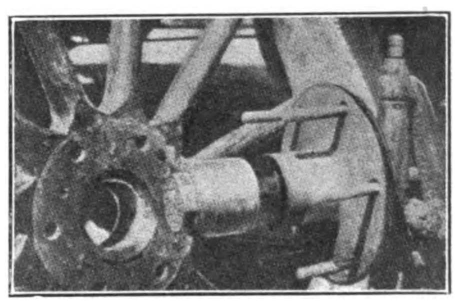


Fig. 4—Allen demountable hub for Fords

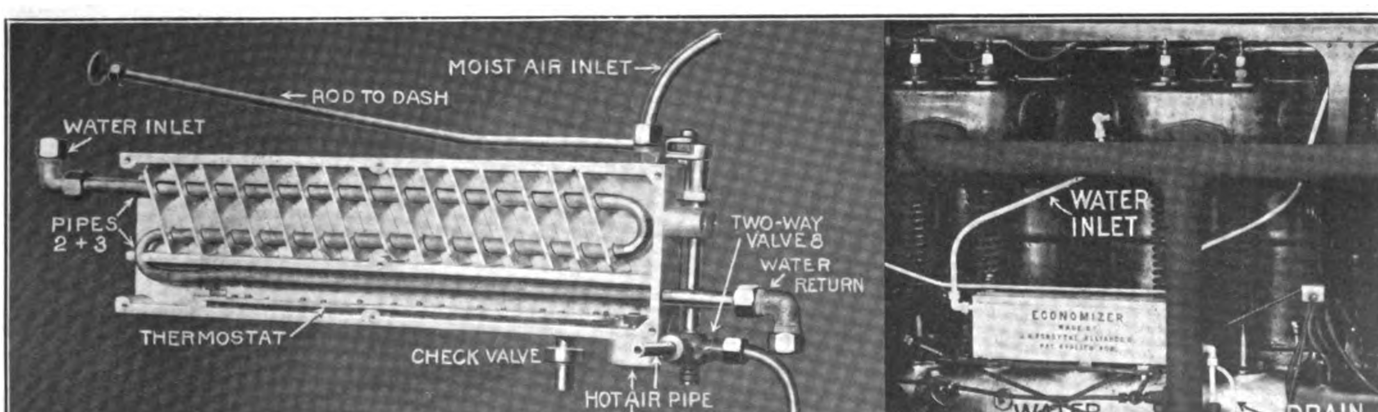


Fig. 2—Left—Cross-section through the Forsythe fuel economizer which acts on the idea that warm, moist air will increase motor power. Right—The economizer applied to a motor

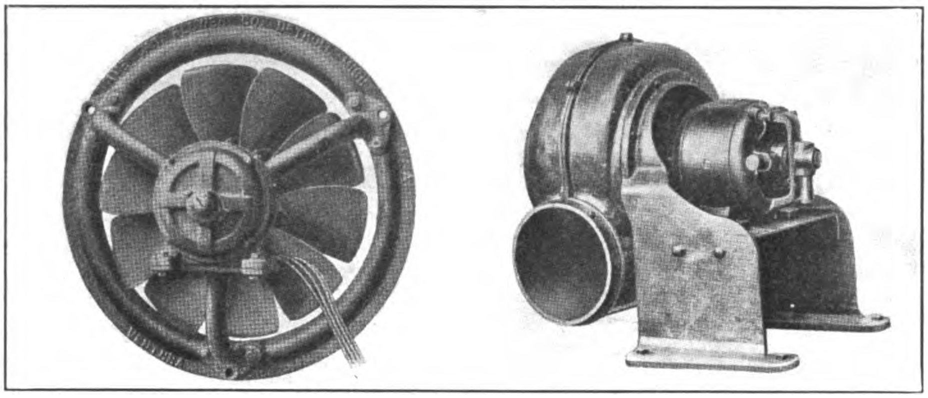


Fig. 5—Two new types of Westinghouse small motor-driven fans, the Ventura at the left and the Sirocco Blower at the right. Made by the Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

for attachment to Ford wheels, that allows the wheels to be demounted. It is furnished in a set of five, which includes an extra wheel and the necessary parts for making all the wheels demountable. To remove a wheel fitted with the Allen device it is necessary only to unscrew six cap nuts, when the wheel slides off easily; the replacement is a reversal of this process and there are no tight parts to make the operation difficult.

The essential feature of the Allen appliance is the metal ring located back of the inside hub flange and carrying six bolts which pass through the hub of the wheel. These bolts take the place of the ordinary hub bolts, which have their nuts on the inside. The unscrewing of the special nuts permits the wheel to slide off leaving the bolts in place; the metal hub with its ball bearings is not disturbed.

Westinghouse Fans—An extensive line of small motor-driven fans is manufactured by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. These outfits are compact, quiet running, clean and efficient, it is stated. They are made in two types to suit all conditions of service, one the Ventura Fan and the other the Sirocco Blower, Fig. 5. Both types can be supplied from direct or alternating current circuits and all can be operated from electric lighting circuits. The motors are specially designed for the service and are characterized by great reliability, it being claimed that they will operate for years with practically no attention, except occasional oiling.

Monarch Headlight Dimmer—The city of Chicago has made it imperative that every motor vehicle be equipped with headlights whose light is not blinding and only those lamps which have been inspected are permitted to be used. The manufacturers of such devices offer the glare removers for inspection and upon the presentation of a certificate the manufacture and sale is authorized. A certified dimmer is being made by the Distributors and Manufacturers Co. and is called the Monarch. It consists of a circular piece of celluloid composition, bound with a metal rim from which three metal flexible arms protrude. These arms, shown in Fig. 6, are designed to be clamped to the lamp rim. The celluloid disk, which is finished on one side and dull on the other, has a white spot in the center varying in size with the size of the lamp equipment. This white spot is made by the use of white printer's ink. Aside from its being an effective glare remover, the Monarch has the feature of being applicable to either inside or outside of the lamp lens, and it

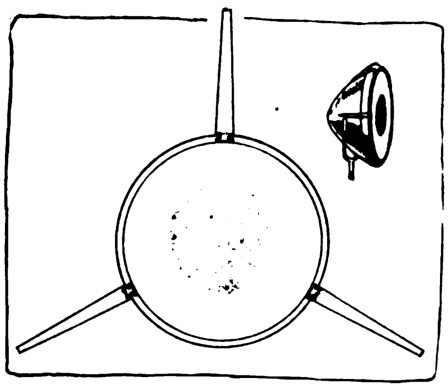


Fig. 6—Monarch headlight dimmer of celluloid composition made by the Distributors and Manufacturers' Co., Chicago, Ill.

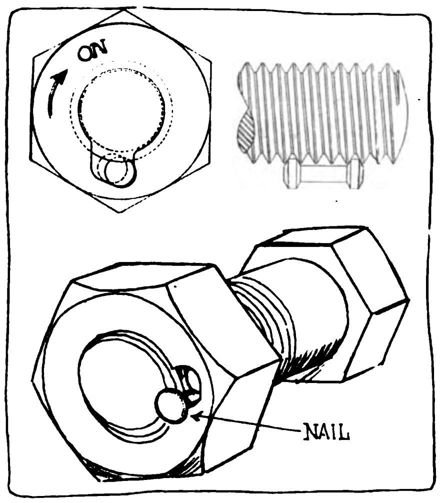


Fig. 7—Absolute lock-nut made by the American Lock-Nut Co., Chicago, Ill.

appears it is better adapted for the inside where it cannot be interfered with. An added feature is its price, a pair selling for $2.

Absolute Lock-Nut—By the use of a slotted nut and a roller fitted as shown in Fig. 7, the American Lock-Nut Co., Pullman Station, Chicago, Ill., claims to have a lock nut that will hold under all conditions of service, the locking action being obtained by means of the roller which fits into the threads of the bolt and also rolls in the recess cut in the nut. The nut is continuously and automatically locked against backward motion because such motion only wedges the pin tighter into the threads of the lock.

To remove the nut from the bolt, a nail or brad of sufficient size is inserted between the wall of the shallow portion of the recess and the locking pin permitting the nut to be easily removed.

Twentieth Century Steam Curing Bag—A device, Fig. 8, that will enable the repairman to cure the inside of a tire just as well and as easily as the outside and thus makes it possible to do both inside and outside at the same time is made by the K & W Rubber Co., 1545 Broadway, Denver, Col. It is called a steam curing bag and consists of a flexible cylindrical bag that can be inserted in the shoe and as it is flexible it takes the shape of the interior automatically. An inlet and outlet steam connection are provided. All parts are made of metal except the curing surface.

It is stated that this device saves time and doubles the capacity for repair work, as it eliminates the changing of moulds.

The prices vary from $20 for the 2.5-inch size to $35 for the 5.5-inch size.

Keyless Auto Lock—The Factory Sales Co., Cleveland, O., is putting on the market an ignition lock, Fig. 9, that is opened by a combination the same as is a safe. This feature does away with the necessity for a key and removes the possibility of not being able to start the car because the key is in another suit of clothes or lost. The device is composed of metal throughout and is said to be indestructible. It sells for $7. It is equipped with a small electric light so that the dial can be seen at night. Two types of locks are made: one for cars that can be locked by breaking the low-tension circuit and another for cars that cannot be locked by this method. In this case the high-tension circuit is locked. The former type can be used on all ignition systems except Bosch, Mea and Eisemann magnetos, which require the latter.

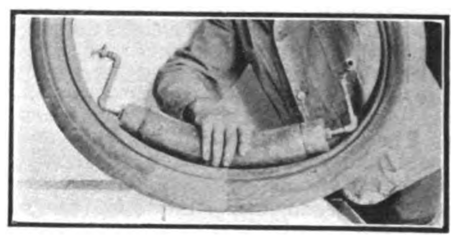


Fig. 8—Twentieth Century Steam Curing Bag for curing the inside of a tire as well as the outside, made by the K. & W. Rubber Co., Denver, Col.

Fig. 9—Keyless Auto Lock for locking the ignition made by Factory Sales Co., Cleveland, O.

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The Automobile

How Weight Distribution Affects Skidding

Heavy Rear Less Liable To Skid But More Dangerous—Braking and Acceleration Must Be Gradual

By the Late E. P. Batzell

THE most desirable distribution of weight in an automobile is an interesting problem. Much guessing could be attached to it and the only way to obtain much valuable information would be to appeal to all interested for their views.

Although it looks simple at first, the problem involved cannot be disposed of lightly, for instance, by stating the requirement of a center of gravity, located above the ground and near it. The advantages connected with proper weight distribution are far too great for that, because here is concerned not merely the running of the car on the road, but the ability of the car to keep to its given and desired direction.

Little Attention for Weight

As a general rule the designer brings out a car with insufficient attention given to the matter of weight distribution, locating parts and accessories according to his judgment and the space available. Then the car is tried on the road and sometimes it will be satisfactory, and in other instances it might have many defects, such as easy skidding, a tendency to leave the road at certain speed, hard steering, etc. Considering that these defects can be largely due to incorrect weight distribution, this at once brings into prominence the problem mentioned. The fact that there are cars which perform very well and others which leave many things to be desired in this respect proves that a proper handling and analysis of the situation might enable everybody to enjoy the stable type of automobile.

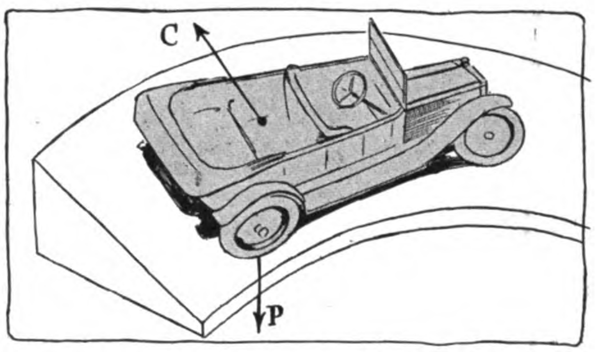


Fig. 1—In turning to the right on a road surface which is inclined so that the inner rear wheel receives a greater part of the load, P, there will be no danger of skidding in accelerating, despite the uneven traction on the two rear wheels, because the centrifugal force, C, tends to equalize the load on the wheels

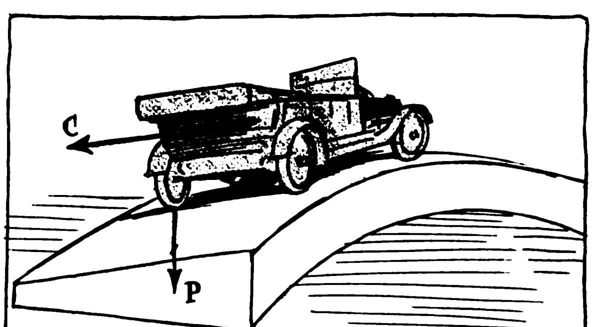


Fig. 2—But in turning where the outer wheel is lower than the inner the situation is extremely unstable, because the centrifugal force, C, in addition to the force of gravity, assists outward skidding

In view of the fact that the biggest value of the discussion is attached to the performance of cars when running no reference will be made to their stability when standing.

For the sake of simplicity it is assumed that the center of gravity in various cases is located in the middle plane of the automobile, that is, the vertical plane which passes through the middle of the front and rear axles when the car stands on level ground. To simplify matters further no reference will be made to the overturning of cars when running, this being governed by conditions which are obviously more or less understood. *Chief interest is concentrated on the skidding of the car.*

This phenomenon is to be con-

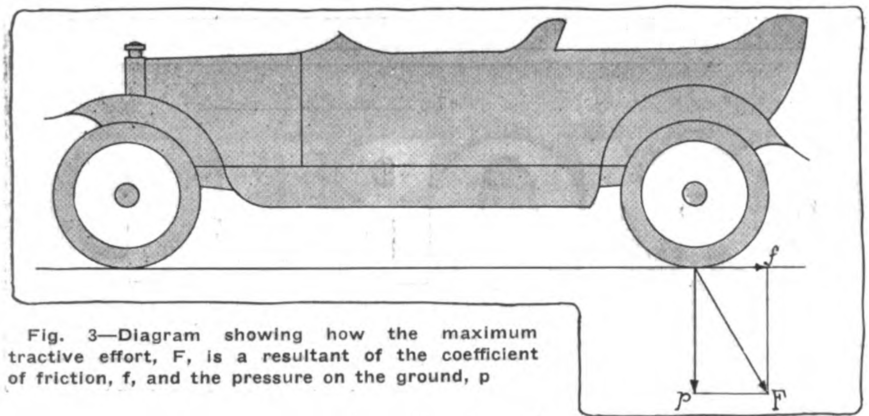


Fig. 3—Diagram showing how the maximum tractive effort, F, is a resultant of the coefficient of friction, f, and the pressure on the ground, p

sidered separately for a straight direction of travel, for passing on curves and for level and sidewise inclined roads.

Skidding Defined

The term skidding as used here is generally too well understood to require explanation. Let it be said that it refers to that motion of a vehicle when the center of gravity of the latter ceases to follow the direction imposed by the steering apparatus.

The skidding can take place at all wheels at once, or separately at the front or the rear wheels or one of either. The driving force exerted upon the vehicle and the application of brakes influence the rate of skidding at the front and at the rear end, therefore, the most favorable weight distribution in that connection. Supposing a driving wheel, Fig. 3, is exerting a pressure upon the ground. With a co-efficient of friction f between the wheel and the ground, the maximum tractive effort to be transmitted by this wheel is $F = p \times f$. Also if there is a force present, which acts sidewise upon this wheel, the latter will retain its adhesion to the ground as long as the supplied tractive effort in connection with the sidewise force result in a combination effort which is not more than $F = p \times f$. When the latter is reached, the wheel slips against the ground, in other words, it loses its grip upon the latter, and has a tendency to move sidewise under the influence of these acting forces.

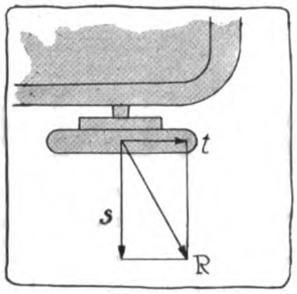


Fig. 4—Plan of the rear wheel in Fig. 3, showing the resultant, R, of the tractive force and a side force, s. It is this force, R, which causes skidding as soon as the wheel loses its hold on the ground

Fig. 4 represents the plan view upon the wheel of Fig. 3. With any given tractive effort t there will be found existing such a sidewise effort s which will combine with the former into a resultant force r equal to $F = p \times f$, consequently forcing the wheel to skid. From Fig. 4 it is seen that with increasing tractive force t less sidewise strain is necessary to bring the wheel into skidding. No doubt readers will have noticed this occurrence in practice, for instance, when leaving a level road for a hill. Although more weight is thrown upon the rear axle, in going up grade, this increase of load carried is not in proportion to the increased traction effort, whereas if the car is going as directed on the level it starts to skid on the up grade if conditions favor the origin of side efforts upon the rear wheels.

Applying Brakes Hard Is Dangerous

Acceleration of the motor also tends to throw an added weight upon the rear axle which increases the tractive effort practically in proportion to the weight carried. In this instance, the skidding is not made easier because the sidewise strain s which could cause it, must increase in the same proportion as the weight and tractive effort forces. On the contrary, the application of the brakes will have the opposite result, favoring the easier skidding under certain given side strains.

The truth of the above is retained only as long as the wheels have full adhesion to the ground until the skidding starts under the influence of acceleration or braking. The conditions are somewhat different when one accelerates or applies the brakes after the skidding has already taken place.

Heavy Rear Resists Skidding

The foregoing, which refers to the origination of skidding at the driving wheels indicates that there is less chance of such skidding with a greater load near the driving axle, the rear axle. This is easily confirmed by practical experience when driving a light car. One will have noticed that such a car without passengers in the rear easily develops the tendency to jump and slide at the rear end upon a more or less uneven road, when going at a high rate of speed. At the same time the well loaded front, namely, the steering wheels, permit controlling the direction of the car without difficulty, even with the sliding rear end.

On the other hand, the same car with passengers on the rear keeps to the road much better and steadier but in event of its going off from the desired direction the righting of it is much more difficult.

Weight at Rear Has Many Disadvantages

The concentration of the load at the rear end has also other disadvantages connected with it besides the steering. Its greatest disadvantage lies in the behavior of the car once it started to skid because the heavy rear end has a greater tendency to continue in its skidding motion overpowering the influence of the front end steering. During a skid one must consider that the skidding wheels have practically no adhesion to the ground, therefore, as will be seen from Fig. 6, during a skid, the car, with its weight concentrated at the rear end on the point R tends to turn round its front axle with an effort equal to the inertia of its mass acting upon a lever of the length a. Another car with its weight concentrated nearer to its middle generally will have a smaller acting effort of the inertia of its mass because its skidding motion at this new center of gravity M is less rapid than at the point R. Besides this smaller effort acts upon a shorter leverage b, which connected with better traction at the front wheels permits straightening of the car from the skid much easier than in the first case—with a heavy rear end. Notice the difference in efforts required, when skidding on a wet asphalt pavement with or without passengers and with smooth tire equipment.

Heavy Front Awkward But Less Dangerous

The concentration of the weight very near to the front end of the car is undesirable, also when considered in connection with a front skid with the natures of the rear and the front skidding being mostly different, there is less danger with a heavy front than with a heavy rear end, whereas the rear skid forces the car from its assumed direction, the front skid generally covers that case when the car continues to travel in a previously acquired direction even when the steering wheels are turned to the other end. Here the steering effort of the wheels, which is not the same as their traction, multiplied by their distance from the rear axle, forms a steering moment acting upon the car which is not sufficient to direct the motion of the latter mass from its assured way. The concentration of the mass further forward increases the leverage upon which it tends to concentrate the steering movement.

On the other hand, the forward location of the center of gravity giving greater weight upon the front wheels also increases their tendency of adhesion to the ground, namely, their steering movement, and it generally reduces the chances for a dangerous front skid.

Inertia in Skidding

Acceleration or the application of brakes during a front skid are more or less inert in their efforts and are not influenced by the concentration of the vehicle weight in any point in the middle plane of the automobile. Their action produces inertia forces acting in the direction of the maintained vehicle motion. The increasing tendency of the vehicle to adhere to this wrong direction during the braking could be offset by the simultaneously increasing load upon the front axle, and naturally on the front wheels. *In some cases this braking can even stop the skid by increasing the load upon the steering wheels to an extent when they will regain their grip on the ground.* During acceleration the inertia of the mass gives a more undesirable effect by reducing the load carried by the steering wheels. In fact, one can start a front skid by acceleration on unfavorable conditions when the wheels otherwise still retain their adhesion to the ground.

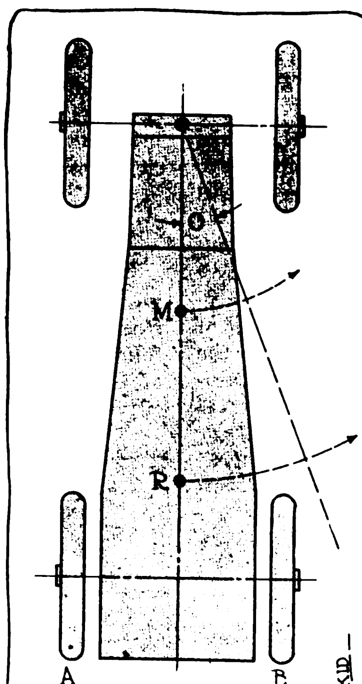
In the event of a complete rear skid both the acceleration and braking produce markedly bad effects which at the same time are further impaired by the weight near the rear end. When both rear wheels lose traction this is a complete rear skid. Then, as a matter of fact, no acceleration can be produced in the full sense of the word. But the swifter rotation of these wheels, or their faster skidding relatively to the ground, reduces the already small co-efficient of friction between the two. *Thus chances are reduced to stop the slipping.* When the rear skid is caused by one of the rear wheels starting to slip, the car assumes a direction of motion at its rear end, such that the slipping wheel travels inwards following the motion of the other wheel, which moves outward. If in Fig. 5 the slipping wheel is A and the driving wheel is B, the accelerated motion on the latter increases the skid for obvious reasons, the skid being originated through the difference in the traction of the two wheels B and A. The concentration of weight near the rear axle in this case is of some slight advantage, because it takes a greater amount of work to pivot the car round the front axle on any given angle O, the displacement of the concentrated weight being greater with the increase of its distance from that latter axle. *A slight application of the rear brakes might help to righten the car, as long as the brakes do not lock. But the application of brakes as soon as one wheel begins to slip is apt to cause a worse skid than when the car is left entirely free with motor out as well.*

THE APPLICATION OF BRAKES DURING A COMPLETE REAR SKID IS VERY DANGEROUS. It cannot produce any great effort at the rear wheels, because the latter have very little adhesion then, but whatever effort is produced by the remaining slight friction adds to the force of inertia created by the skid for no advantage to the car. It tends to throw the weight of the car forward opposite to the direction as the braking acts upon the rear wheels. *Thus the rear end is materially lightened, its traction decreased and it is left more freely to skid in the started direction.* The concentration of weight at the rear is less desirable here because it retains the greater tendency to continue a skid with brakes applied, over that shown by cars with the center of gravity further ahead. Every day's practice confirms the above as well as the other cited examples.

The rather harmful influence of braking with both wheels slipping is easily experienced, also the resulting greater skid with a heavier load at the rear end. These items are particularly noticeable when the road conditions are more or less favorable for causing the skidding, for instance, when the car is on a sidewise incline like the street surface dropping towards the curb.

Rear Skids More Easily Than Front on Curves

The passing of a car on a curve gives another instance when the question of weight concentration could offer much material for discussion. With reference to Fig. 6 the load when concentrated at the rear exerts a centrifugal force acting sidewise upon the car and applied on a greater leverage to the pivoting point at the front axle than would be the case were the load placed nearer to the front. The rear end generally shows a greater tendency to skid on a curve than the front. That is explained by the discussion referring to Fig. 4, when it was shown that a smaller sidewise effort will cause a skid when the traction effort of the wheel is increased. The front wheels, having no tractive effort, can withstand a greater sidewise strain of the centrifugal force on curves than the driving wheels stand. *That is why it would make a more stable car for passing on curves to have the load concentrated amidship or slightly ahead of it.* Other things being equal, the practice when the load is decreased on the rear axle, the actual limit of the latter tractive effort will be reduced



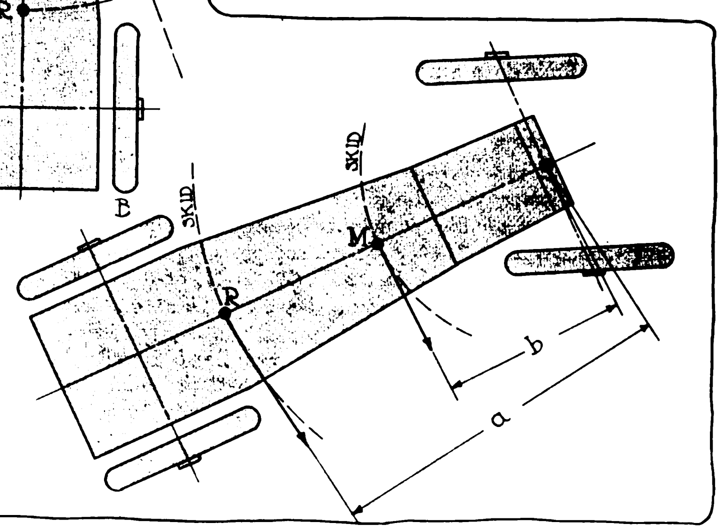


Fig. 5—Above—Diagram showing how a skid started through a slipping wheel, A, is increased through the accelerated motion of the other wheel, B. The rapidity of the skid depends largely on the position of the center of gravity, R or M

Fig. 6—Below—During a skid, when the wheels can be considered to have no adhesion to the ground, the car, with its weight concentrated at R, tends to turn around the front axle with an effort equal to the inertia of its mass acting on a lever of the length, a. With a more forward position of the center of gravity, M, the skidding action is correspondingly less rapid through the lessened leverage, b

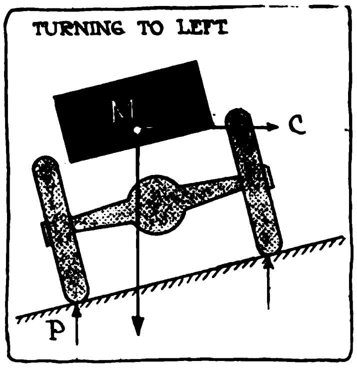


Fig. 7—Showing how the loss of traction on the raised outer wheel in turning and the consequent tendency to skid is counteracted by the centrifugal action of the mass M acting in an outward direction

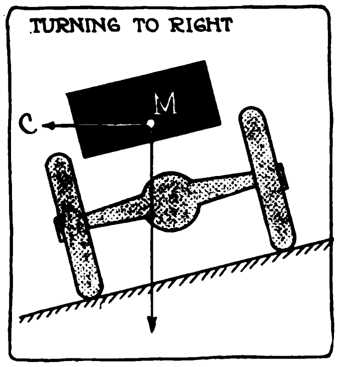


Fig. 8—In turning to the right, however, on the same slope, the tendency to skid is much increased since the centrifugal force, C, is assisting gravity to reduce the adhesion of the inner raised wheel

also, making a proportionally easy skidding car on account of the reduced grip of the wheels to the ground. The weight distribution apparently would become noticeable in its bad effects only when the wheels lose their adhesion to the ground at the time of passing curves.

THE CONCENTRATION OF WEIGHT IN FRONT WOULD BE MORE DANGEROUS FOR A FRONT SKID AND THE CONCENTRATION AT THE REAR END WOULD BE MORE LIKELY TO CAUSE A REAR SKID, WHICH OCCURS MORE OFTEN.

When passing a curve with a simultaneously sidewise road inclination the driver is required to act differently to preserve the stability of the car, whether the inner or outer wheels are on the up grade. *With the outer wheels higher than the inner ones, acceleration just before striking the incline increases the stability and braking tends to pull the car inward.* It is clear from Fig. 7 that on this incline the left wheel receives a greater part P of the load M, hence the addition of a greater centrifugal force C to equalize the loads upon the wheels. *The greater traction on the inner wheel when accelerating cannot cause a skid because its action is directed against that of the centrifugal force, but the skid would have to be expected when the car is traveling in a straight line. Here the inner rear wheels would slide down when accelerating.*

When braking on a curve or on a straight stretch in both cases a front skid can occur.

Centrifugal Force a Factor on Curves

The situation represented in Fig. 8 when the outer wheel on a curve is lower than the inner is extremely unstable, the centrifugal force of the vehicle assisting its skidding outwardly together with the action of the gravity force. *It is best to avoid that situation or apply the brakes before reaching it.* In any event, the braking, even when on this curve, is advantageous, the action being opposite to the centrifugal force. In all cases, a more or less even load distribution would be best because once a skid is started the weight concentration in the rear offers greater difficulties to the steadying of the vehicle.

Further illustration of the two actions referred to above is given in Figs. 1 and 2.

Center of Gravity Ahead of Rear Axle

When concentrating much load at the rear end one has to be very careful to retain the center of gravity more or less ahead of the rear axle, which is absolutely essential for proper stability. The limit which the center of gravity may occupy will be largely determined considering the vehicle upon a grade: Referring to Fig. 9, where C represents the location of the center of gravity, there will exist an angle A with the horizontal when practically no load will be carried on the front end of the car, or steering wheels. A steeper grade with an angle B will, in fact, cause the lifting of the front end of the car from the ground *because the line of gravity action intersects the ground behind the rear wheels at a point* M.

The danger of such conditions is obvious. To prevent them one can build a car of longer wheelbase and with a lower center of gravity the latter has to be close to the rear end. However, it would be preferable at the same time to concentrate the weight more amidship. One must keep in mind that even if the static treatment of the problem shows the line of gravity action intersecting the ground well ahead of the rear axle under assumed extremes upon a grade there remain the forces of inertia when accelerating and the force of wind resistance, which form another component adding weight to the rear and tending to lift the front end.

Goodrich Pay Car Has Safety Bulletin

AKRON, O., July 27—A new device in the field of big manufacturing has been brought out by the B. F. Goodrich Co., Akron, O. It consists of a safety bulletin attached to each pay record card. The pay record card is designed to help the employee keep track of the number of hours he has worked each day, the amount of piece work he has finished and the daily earnings that result.

In addition, however, the card carries a safety talk, touching on a different topic each issue and a new card is published every half month. One safety bulletin tells how to care for a certain ailment, the next what to do to prevent infection of wounds and a third will give advice on the efficiency and possibility of increasing production on piece work.

Electric Vehicle Show October 7-17

NEW YORK CITY, July 27—The Electric Vehicle Show will he held in Grand Central Palace, this city October 7 to 17, starting on a Wednesday evening and closing on the second following Saturday night. The show is under the direction of Charles Parker, care of the New York Edison Co., this city.

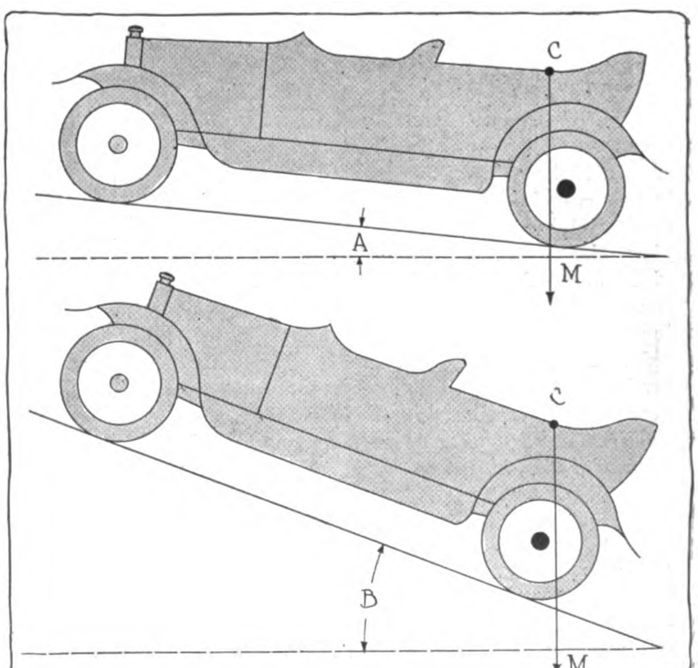


Fig. 9—Diagrams bringing out the necessity of keeping the center of gravity in front of the rear axle. On an incline the effect is equivalent to bringing this point further back

N. A. C. of C. in Summer Session

NEW YORK CITY, July 24—At the business meeting of the directors held at Christmas Cove, Me., on July 21, Dodge Bros., manufacturers of automobiles, in Detroit, were admitted to membership in the National Automobile Chamber of Commerce.

A Truck Convention

The directors endorsed the plan of the Commercial Vehicle Committee for a convention of commercial vehicle interests to be held some time in the fall, the date and place to be selected at the September meeting of the Chamber.

Besides routine matters there were interesting reports from committees on patents, traffic, good roads, legislation and shows. The members were the guests of Samuel A. Miles.

President Charles Clifton presided, while the others in attendance included: S. D. Waldon (Packard); Wm. E. Metzger (Argo); Albert L. Pope (Pope); H. H. Rice (Waverley); Wilfred C. Leland (Cadillac); Roy D. Chapin (Hudson); L. H. Kittredge (Peerless); C. C. Hanch (Marmon); Col. George Pope, Treasurer; S. A. Miles; Alfred Reeves, General Manager; Charles Thaddeus Terry, Counsel; and by invitation, Thomas Henderson (Winton).

Sports a Feature

Keen competition in outdoor sports by leading automobile manufacturers who combined business and pleasure, was a feature of the meeting.

There were three days of the house party, with the directors' meeting held on Tuesday, July 21.

Everyone participated in the sports, there being a tie between the Blues and the Grays, with 20 points each, necessitating a run off at the meeting next summer.

The clam bake in full swing at Christmas Cove

Col. Pope demolishing clams at the clam bake on S. A. Miles' estate

Chas. Thaddeus Terry, counsel, at ease on the rocks of Christmas Cove, Me.

By a score of 6 to 2 the Blues captured the baseball games, being credited with 5 points; the pool and billiard contest, by 150 to 143, taking 10 points and a victory in the water sports netting 5 points.

Clam Bake Great Success

The Grays scored first in the clay pigeon shoot by 27 to 26, receiving 10 points; their team caught the greatest number of fish—104 to 67, for 5 points, while they were credited 3 points for second place in the water sports and 2 points for jumping the bar. The clam bake was held on Sunday and fishing contest and fish fry on Monday.

The manufacturers assembled at Portland last Saturday, going to Bath in motor cars and from there to Christmas Cove by boat.

Left—The party of the National Automobile Chamber of Commerce at S. A. Miles' estate. Top row—Nickerson, Sweet, Garden, Thompson, Post, Reeves, Kittredge and Rice. Middle—Hanch, Wetzel, Budlong, Col. Clifton, Swetland, Edwards, A. L. Pope, Billings and Metzger. Lower—Mrs. Margaret Pratt, S. A. Miles, Henderson, Leland, Col. Pope and Mrs. S. A. Miles. Right—Miles and Waldon consuming lobster, etc.

Springless Valves Are Latest Racing Development

Positively Operated Types Will Probably Not Be Confined to Racing Cars—Were a Success in French Grand Prix for 1914

PARIS, July 17—Multiple overhead valves, front wheel brakes and positive operation of valves on both opening and closing movements constituted the mechanical novelties of the cars taking part in this year's French Grand Prix and intended for the other European road races of the season.

Valves Success in Race

Although positively-operated valves were not found on the winning machine, they, nevertheless, constituted the greatest technical development in connection with the race, and gave promise of an extended application in the near future. Two makes of car used this type of valve arrangement: Delage and Th. Schneider. The valve system was not at fault in the failure of these two makers to win the race.

The Th. Schneider motors were designed and built by G. Michaux, an independent automobile engineer, who was responsible for the rise and success of Peugeot in the racing field. Peugeot first entered racing with single-cylinder, long-stroke motors, developing to twins, and then to fours. It was with these machines produced by Michaux that Boillot and Goux gained the experience which enabled the former to win the Grand Prix 2 years in succession.

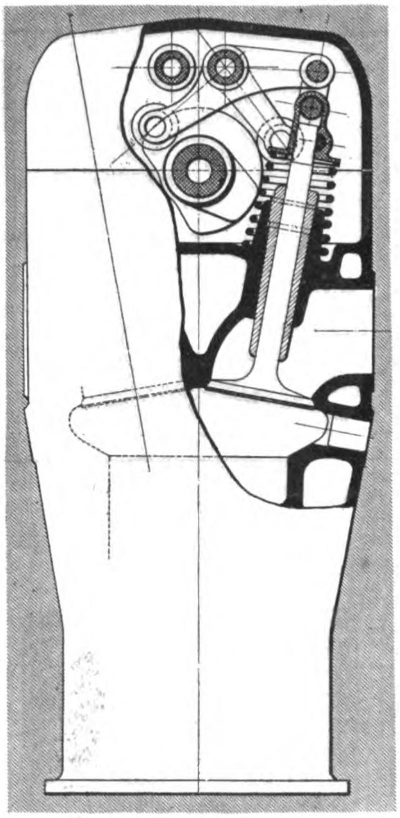


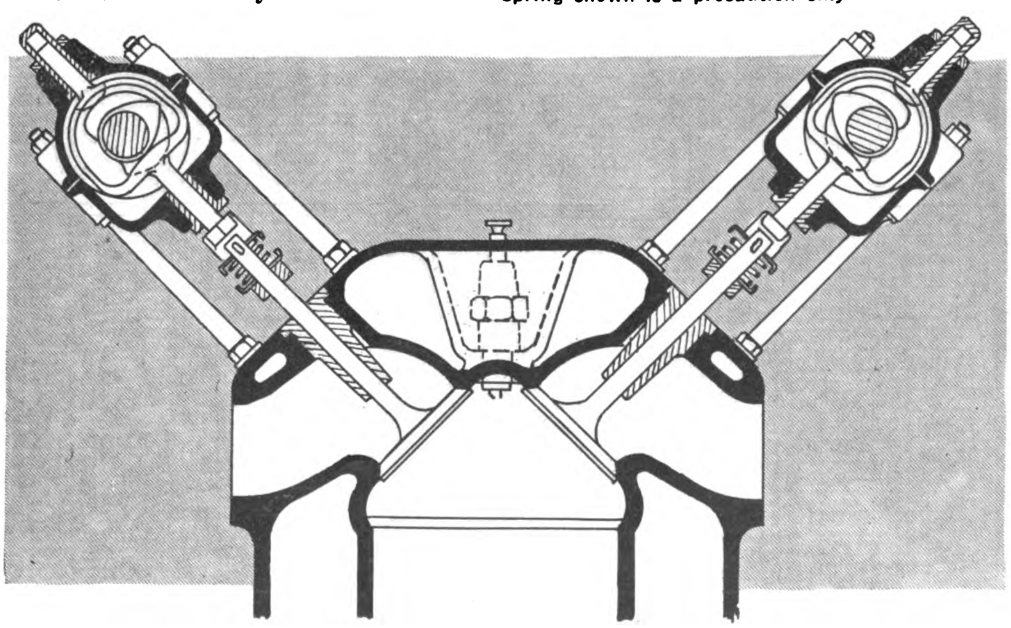
Fig. 1—Section through cylinder head of Schneider motor, showing overhead cam and positive operation of valves. Spring shown is a precaution only

Since severing his connection with Peugeot, Michaux has devoted considerable time to the development of the high-speed motor with positively-operated valves. He has secured patents on the detail construction of this valve gear, and evidence that the device is not likely to be confined to racing cars is to be found in the fact that a leading French firm never having taken part in a road race has secured an option on the purchase of this patent.

Cam Opens and Closes

The positive-valve motor differs from the others by having no necessity for valve springs, a cam not only assuring the opening of the valve but causing its return to the valve seat. In this respect it is similar to the sleeve-valve motor, where the uncovering of the ports is positively assured.

Claims made for this type of valve mechanism are a higher number of revolutions, a greatly increased factor of safety and higher power. With the spring-controlled, single-cam valve, a point is reached when the spring is incapable of seating the valve before the cam has again begun its opening movement. Light valves and strong springs have made it possible to extend the limits considerably, but the valve still remains the limiting factor in



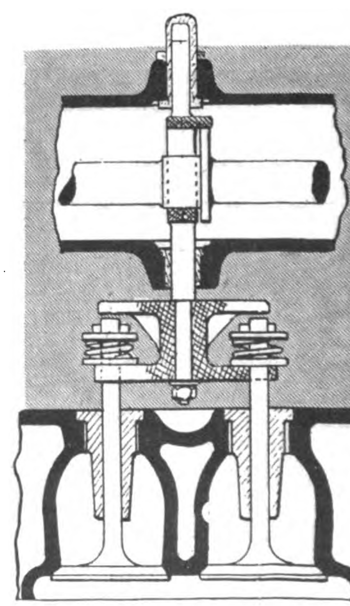
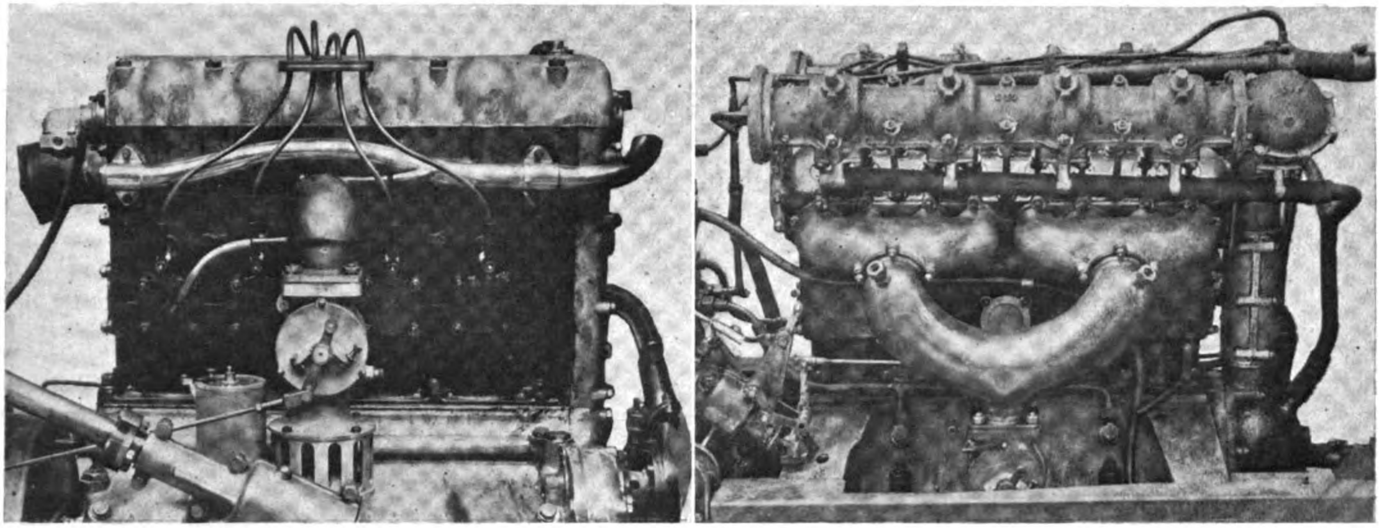


Fig. 2—Arrangement of the springless inclined valves in the Delage, which has two overhead camshafts and sixteen valves.
Fig. 3—Showing how each cam operates a pair of valves on the Delage



Figs. 4 and 5—Left, intake side of Schneider racing motor used in the Grand Prix, showing arrangement of overhead camshaft. Right, intake side of Delage motor, showing the two overhead inclosed camshafts

the speed of the motor. With the positively-operated valve it is no longer the valve which limits the speed of the motor.

The No-Spring Scheme

The Michaux arrangement is shown in Fig. 1. There are two valves per cylinder inclined at 10 degrees from the vertical. With a cylinder diameter of 94 millimeters, the valve diameter is 60 millimeters. The valve stems are of big diameter. Owing to positive control there is no necessity to lighten this part in an unusual degree. With such a diameter valve stem breakage is not to be feared.

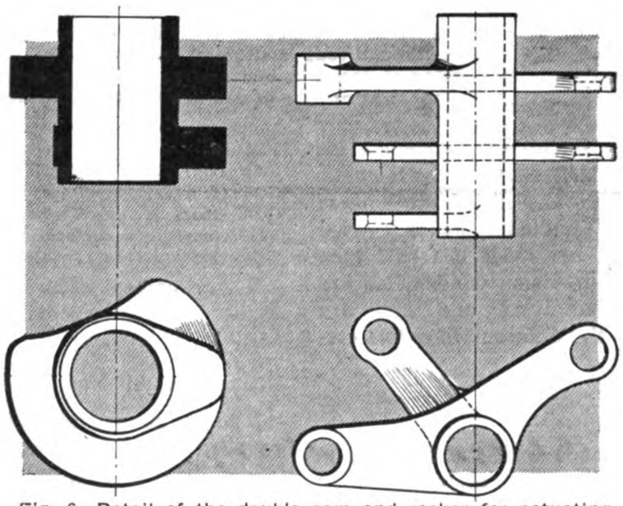


Fig. 6—Detail of the double cam and rocker for actuating the Schneider valves

A single overhead camshaft has eight pairs of cams; these are shown in detail. Also for each valve there is a three-arm rocker, one arm of which is positively connected to the stem of the valve, and the two others are in contact respectively with the opening and the closing cams. A short connecting link is screwed on the end of the valve stem and locked in position, the other end being attached to the rocker arm. This allows adjustment to be made between the valve and the rocker.

Rocker Follows Cam Profiles

One cam and one rocker arm assure the opening of the valve and the corresponding rocker and cam assure its closing. The closing cam has exactly the opposite profile to that of the opening cam. Thus, considering the opening cam as having a convex profile, the closing cam has the corresponding concave profile. Thus the rocker constantly follows the profiles of the cams; there is no moment when it is left free to be operated on by a valve spring.

It will be noticed, however, that a light valve spring is shown in the drawing. This is provided to give a final seating to the valve after it has been closed by the cam. As proof that it is not necessary for valve closing, it may be mentioned that on Champoiseau's car, which finished ninth, one of these springs broke and worked up around the connecting link, where it was entirely inoperative. The breakage was not discovered until 3 days after the race, when the motor was entirely dismounted for a detail examination.

The whole of the valve mechanism is contained within an overhead aluminum cover, and every part is lubricated, the return of the oil being by way of the timing gears at the front to the basechamber.

The camshaft is hollow and is carried in four ball bearings—one at the rear, one in the center and one on each side of the camshaft pinion. The two shafts carrying the two sets of rocker arms are also hollow, and oil grooves are bored in the rockers themselves, so that lubricant is delivered direct to the rollers. There is no valve cage, and the bronze guide for the valve stem is of slightly taper section and is screwed in position.

Owing to the absence of suitable appliance for making brake tests at 3,000 r.p.m. and more, it has not been possible to get comparative data on the power developed from the motors run in the Grand Prix and those of equal dimensions with spring-controlled valves. It is claimed, however, that the power curve will show a much more steady rise than that of a spring-valve motor and will continue rising where the latter begins to fall off.

Apart from the valve arrangement, this motor is interesting by reason of the use of roller bearings for the crankshaft. These bearings are of the R. B. F. make and have been used for crankshafts the first time this year. By reason of their use it has been possible to get the shortest crankshaft of any motor in the Grand Prix, and also to employ a single-piece crankshaft. With ball bearings the shafts were all of the built-up type. The only difficulty in connection with this bearing was the placing of the central one.

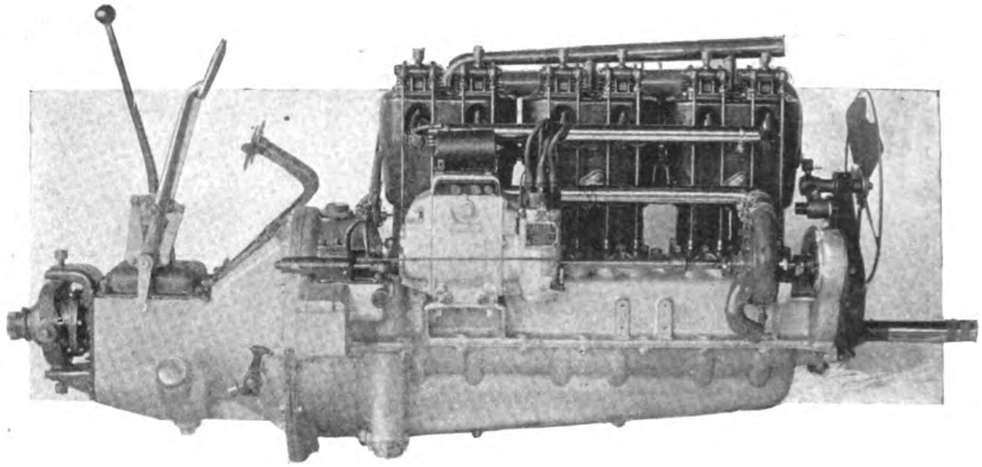
Camshaft Drive by Gears

A train of spur pinions communicates the movement from the crankshaft to the overhead camshaft. These intermediates have a ball bearing each side of them, one bearing being received in the cylinder casting and the other in the aluminum cover. The same applies to the camshaft pinion.

On the right side the water pump is driven off the train of pinions and on the opposite side the high-tension magneto is driven in a similar way. The revolution counter is driven directly off the end of the camshaft.

Lower Prices Feature New Buick Line

Tungsten Steel Replaces Nickel Steel in Valves—Multiple Piston Rings—Pistons 1 Inch Longer—New Upholstery and Equipment



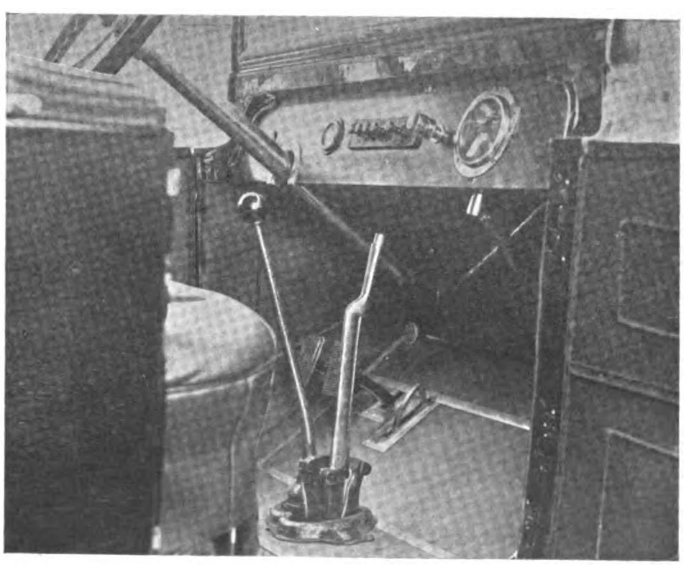
Right side of Buick six-cylinder unit power plant. The camshaft operating the overhead valves through rods is situated on this side as well as the Delco electrical system. Note mounting of gearshift and emergency brake levers and gearbox. Also specially designed universal joint at rear of gearbox for relieving the driveshaft of torsional strain

BUICK has reduced the prices on all of its models for 1915 and in addition has added many improvements. Tungsten steel valves replace the nickel steel ones; multiple piston rings succeed the individual types; improved piston lubrication is added; pistons are made nearly 1 inch longer; new upholstery is added; rain-vision windshields are fitted; inside top curtains have been fitted; and there are other minor improvements local to the different four and six-cylinder models.

Non-Skid Tires on Rear Wheels

The 1914 line of models is continued with the same trade nomenclature and the same general design. Motor sizes are the same, tire sizes have not been altered except that non-skids are now used regularly on the rears and plain treads in front; in a word, the 1915 models are refined continuations of the 1914 line.

The prices of the models have now been cut as follows:



Cowl board and control features in the new Buicks as found on the large four and six. Note mounting of speedometer in cowl board face

Model	Body	1914	1915	Reduction
C-55 (six)..........	Touring	$1,985	$1,650	$335
C-36 (four).........	Roadster	1,235	1,185	50
C-37 (four).........	Touring	1,335	1,235	100
C-25 (four)..........	Touring	1,050	950	100
C 24 (four).........	Roadster	950	900	50

The greatest price reduction has been made in the six, $335. Touring car prices are cut $100 and roadster prices, $50.

Bodies Are All New Designs

The bodies are all newly designed. Radiators have been rounded fully at the top; their edges have been coped over; hoods have been given more of a slope, and nowhere are there any protruding points to disturb the general impression of smoothness.

The upholstery on the larger cars is of modified European form. The formerly used leather padding extending over the edges of the body has been cut out and the upholstery is kept within the body lines of the car. Leather beading on the body edges without padding replaces the formerly used trim stick, and gives a distinctive touch.

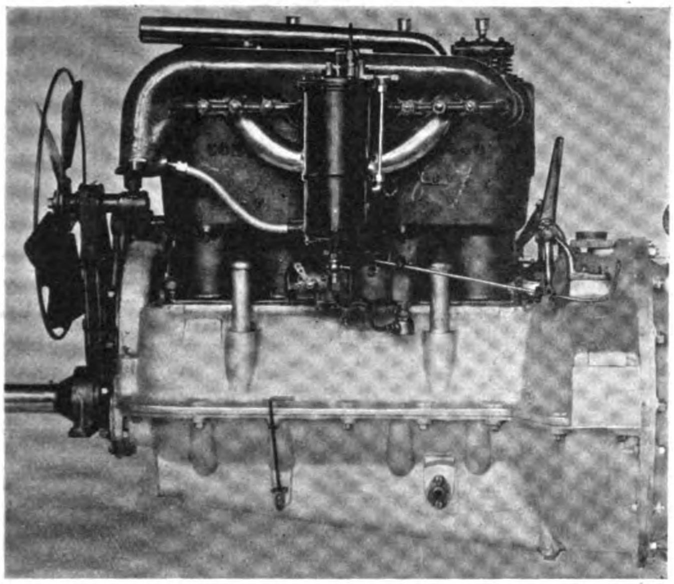
Cowl Board Added to Four

Concealed hinges are on doors of the fours, the six having them this season. Another four improvement is the addition of the cowl board which was used only on the six this year. This cowl board is very well arranged. One feature of equipment is the new type of sight feed used for determining if the oil is circulating. This little instrument has vanes rotated by the flowing oil. These also rotate a pivoted flat piece of metal rubbing on the inside of the glass face. Thus the glass is kept clean and the oil flow can always be seen.

New Ventilating Windshield

A rain-vision, ventilating windshield is new to all models, and adds to the appearance. Inside-operating curtains are another feature of the equipment, which is really complete in every detail. Special rigid tire carriers are fitted to the rear of the cars.

Although somewhat altered in body design, the changes in the mechanical features of the Buicks are very slight. Motors have come in for practically no alterations except minor



Manifold side of Buick four-cylinder unit power plant as used on models C-36 and C-37, showing vacuum gasoline feeder mounted above carbureter. This is a part of the Stewart gravity fuel feed system used on these cars

ones. The distinctive type of overhead-valve engine with gearset in unit is still rigidly adhered to, there being no differences in the cylinder dimensions. The type of drive inclosing the propeller shaft in a torsion tube also remains.

Pistons Lengthened 1 Inch

But what changes there are in the engine are well worth mentioning. In order to give a greater bearing surface to the pistons of the large four- and six-cylinder motors, and to eliminate any possibility of piston slap, the pistons have been lengthened 1 inch to 5 inches, and a new oiling feature has been incorporated in these pistons. On either side and directly above the piston pin bearing a gash has been made with a No. 3 B & S cutter. Drilled diagonally in the center of this gash a hole runs through the boss and opens into the bearing. Further, a relief groove is cut one-quarter around the circumference of the piston below the lowest ring slot. This scoops the oil on the cylinder wall and sends it to the gash where it passes through the drilled hole to the piston-pin bearing. Thus, little or no oil is wasted and smoking is nearly impossible, for any excess oil is trapped and must go within the piston.

New Type of Piston Ring

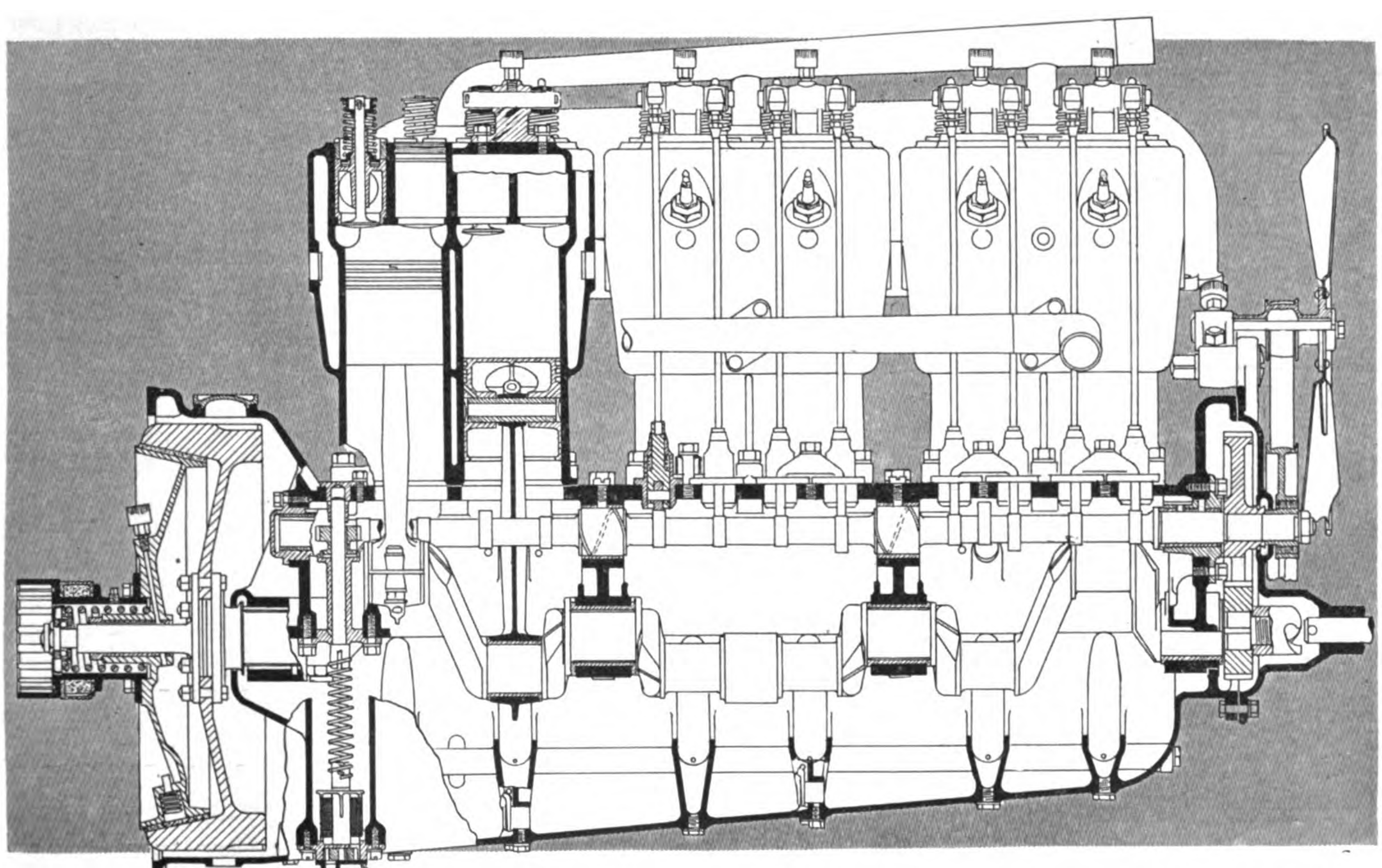
A new type of piston ring which is being adopted by many of the best known car manufacturers is used. Three thin steel rings are placed in each of the three ring slots per piston. These are a cold-rolled steel stock which is first coiled and then sawed, giving the separate rings. These are said to run in quicker, to hold the compression much better and they also take any wear.

Cylinders Cast in Pairs

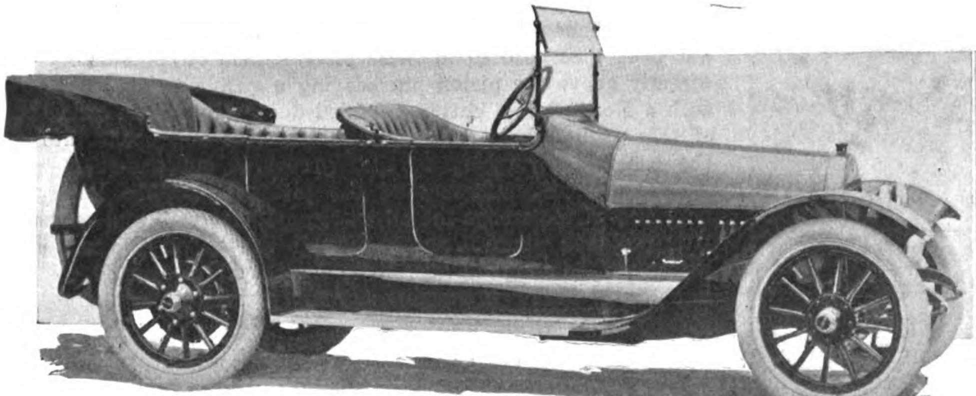
Reviewing the mechanical features of the two larger models, the six and the big four, there is really no difference except in the number of cylinders and the size of some of the parts, and in the rear springing which has already been commented upon.

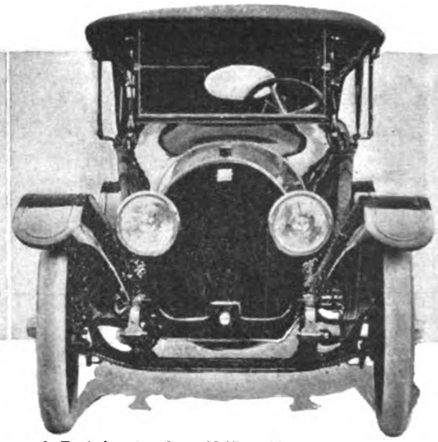
Cylinders of these motors are cast in pairs, their size being 3.75 inches bore and 5 inches stroke, giving the six a displacement of 331.35 cubic inches and the four, 220.9 cubic inches. Block tests have developed 42.5 horsepower for the four and 62-horsepower for the six, despite the fact that the formula ratings are 22.5 and 33.75, respectively. The stroke-bore ratio of 1.33 has much to do with this.

There has been no alteration of the valve mechanism. Ball-and-socket joints on the rods and rockers are used, which



Part sectional view of six-cylinder motor used on Buick C-55. This engine has developed 62 horsepower on the block. The cutaway section through the two end cylinders gives an excellent idea of the typical overhead valve construction used in Buick motors





Left—Side view of 1915 six-cylinder Buick model C-55, selling at $1,650. Right—Front view of Buick six for 1915. Note stream lines and attractive head-on appearance

make the working parts noiseless. The rockers are pivoted at their center to an arm common to each set of valves, which arm bolts to the top of the cylinder.

Exhaust Discharges Formed from Cylinders

The manifolding is peculiar in that the exhaust, with a separate opening into the header from each cylinder is carried above the intake which has a common opening for each cylinder block. The exhaust manifold also departs from the conventional in that the connection to the exhaust pipe is at the front end instead of the rear, that is, the gases pass forward to their outlet instead of back.

The combination Delco cranking, lighting and ignition system is with the Buick again, though much simplified over a year ago. It is of the 6-volt, single-wire type with grounded return circuits. The ignition part on the large fours and the six is now fitted with an automatic spark advance in addition to the regular hand advance on the steering wheel. Naturally this tends to more efficient motor performance, the automatic advance feature giving the needed spark variation above or below the set point as determined by the hand spark lever and within certain limits of this set point.

Simplified Delco Electrical System

The Delco apparatus has been greatly simplified by the elimination of the ignition relay and the cut-out relay, the operation now being through the switch on the dash which closes the ignition and generating circuits.

The unit incorporates a new system of current regulation which has for its main advantage the fact that battery charging is made easier, causing greater output at lower speeds than heretofore. To do this, the automatic spark advance and the ignition control are operated in combination by a centrifugal governor. This regulation shows a current output curve with a peak at speeds of from 1,000 to 1,200 revolutions a minute. This is at car speeds of about 10 to 12 miles an hour.

The model C-24 and C-25 Delco unit has its current controlled by a bucking coil, and the automatic spark advance feature is not used.

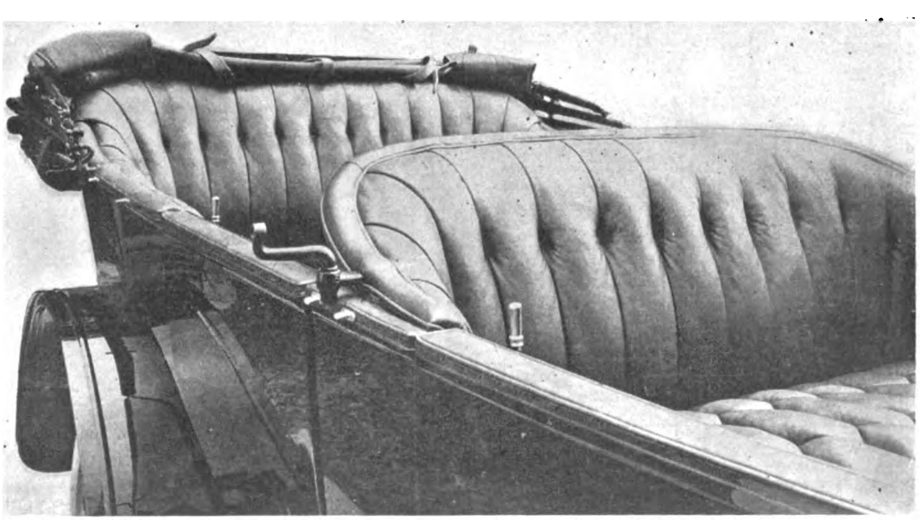
The cranking is done by connecting the electrical unit, which is temporarily operating as a motor, to the flywheel face gear by means of a pedal. Preliminary downward pushing sends a small current to turn the electric motor slowly and thus to readily mesh the gears, while complete downward pressure sends the full current for cranking.

Generator Runs at Engine Speed on Fours

The generator speed is the same as that of the engine with the four-cylinder types, while that of the six is run at one and one-half times engine speed. The gearing ratio for cranking, however, is the same for both the big four and the six, namely, 21 to 1. Eighteen to 1 is the reduction with the small four.

The storage battery used is an Exide located under the front floor boards. It is rated at 80 ampere-hours and is of the three-cell type. This unit is the same for all cars.

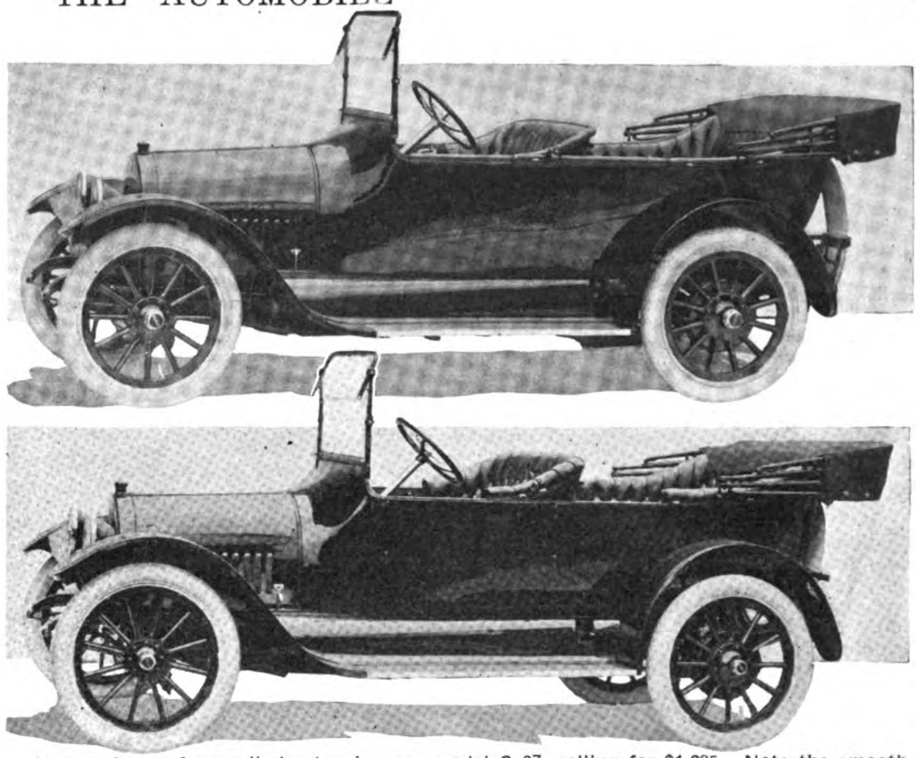
One special feature of note in connection with 1915 Buick wiring is that all wires are inclosed within conduits, even the connections between any two wires being within small T or L connectors. This should make the system proof against all conditions. Headlights are provided with dimmers, there being no side lights fitted.



Showing the new type of upholstery used on the larger Buicks. The leather cushions do not extend over the edges of the bodies and the leather trim of the edges replaces the trim stick

On the larger four-cylinder models and the six a new method of delivering the gasoline to the carbureter is employed. While the gasoline tanks are still carried at the rear and hung below the frame level, the force feed has been replaced by a modification of the Webb Jay, or Stewart, method of vacuum feed. The vacuum apparatus is mounted on bosses cast on the intake manifold, and is high enough so that the fuel can flow from it to the carbureter by gravity. The device is really a method of automatically creating a vacuum within it, thus utilizing atmospheric pressure to send the fuel to it. This gets away from all the troubles experienced with pressure feed due to leaks, pressure pump failure and the like.

As to the oiling system: A constant-level splash system with the lubricant circulated by a gear-driven pump operated by bevel gearing from the rear end of the camshaft is used. A distributing pipe located along the inside of the crankcase supplies oil to the several splash troughs under the connecting rods. The oil, which is splashed up into the cylinders and which finds its way through the gashed pockets in the sides of the pistons, flows down the inside of the crankcase where it is caught in ducts which convey it to all of the motor bearings.



Upper—Large four-cylinder touring car model C-37, selling for $1,235. Note the smooth-edged upholstery on the body; also rounded-over radiator and flush doors. Lower—Small four-cylinder touring car model C-25, selling for $950

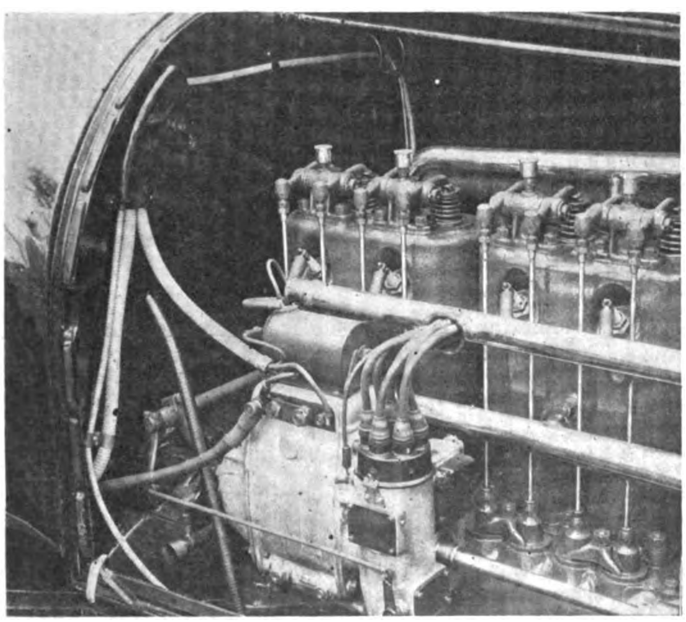
Three-Point Suspended Power Plant

The motor, gearset and clutch unit is three-point suspended conventionally from the main frame. The intake and exhaust manifolds are located on the left of the motor. The right is given over to the long push rods extending up from the camshaft to the rocker arms operating the valves and to the Delco electrical unit and water pump.

There is a change in the rear spring construction on the six-cylinder model only. Cantilever springs replace the three-quarter elliptics used this year. These are pivoted at both ends and have a length of 50 inches with a width of 3 inches. They have eight leaves with the shortest on top in the usual way. The lower leaf is rolled up at its ends to form a bearing for the spring bolts attaching it to axle and frame.

Little Four Has Separate Gearset

It should be mentioned here that the smaller four-cylinder chassis has a motor of the same overhead-valve type but its gearset is not in unit, nor is the piston stroke as long, although the bore is the same as the others. The stroke is 3.75 inches, giving a piston displacement of 165.6 cubic inches, and according the engine a horsepower of 30 on the block. While the motor has the new style of steel piston rings, its pistons are not gashed as are the others, nor is the vacuum system of fuel feed incorporated. The carbureter gets its gasoline by gravity from the tank under the seat on the touring car and back of the seat on the roadster. Pistons have come in for 1-2 inch of lengthening for the same reasons as set forth for the increased length on the larger motors.



Delco electrical unit as mounted on the larger Buicks for 1915, showing the inclosure of all wires in conduits. The unit is driven by a shaft from the timing gears and is mounted at the right rear of the motor, the starting motor operating on the flywheel

There is no difference in the drive or frame members of the chassis of any of the models over this year. The gearset is substantially the same for all with the exceptions of necessary size increases with the bigger cars. Center control is used, and with 7-8-inch face gears, shifting to one or the other of the three speeds is very efficient. Transmission gear ratios are 3.36 to 1 on first, 2.23 to 1 on second, and 4.32 to 1 on reverse. The clutch cone is of pressed steel instead of cast aluminum.

Instead of the regular strap fuses heretofore used, the switch on the cowl board is provided with a circuit breaker. This protects all the circuits except the generator circuit, in which the current flows both ways.

Special Universal Relieves Driveshaft Strain

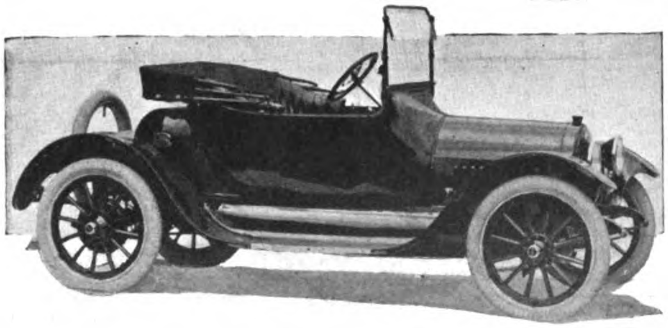
Drive is direct to the bevel gears in the rear axle, the usual construction of having a universal joint at the front end when the shaft is inclosed being used. The specially-designed Buick universal bearing on the front end of the third member relieves the universal joint of the driveshaft of any strain.

The fours have three-quarter floating axles with heat-treated nickel steel axle shafts carried on roller bearings. The six is fitted with a floating axle, its shafts being of nickel steel carried on annular ball bearings.

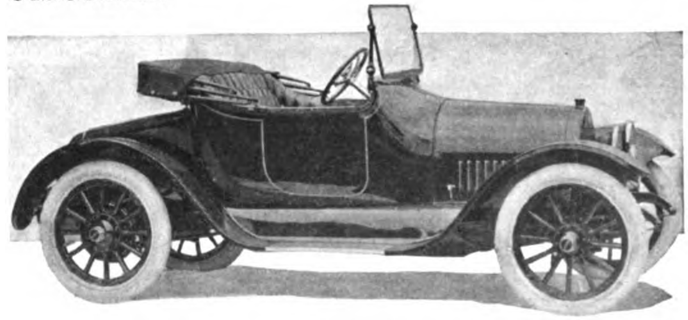
There is no change in wheelbase of any models with the exception of that of the small fours. The dimension has been made 106 inches instead of 105 inches. The other fours have 112 inches between wheel centers, and the six is still 130 inches.

Demountable Rims Are Standard

Tires have been retained at 32 by 3 1-2 for the small fours, 34 by 4 for models C-36 and C-37 and 36 by 4 1-2 for the six. Non-skids are fitted to the rear of all cars, the fronts being plain treads. Demountable rims are standard as formerly.



Small four-cylinder roadster Buick model C-24, selling at $900. Note the new rain-vision ventilating windshield



Larger four-cylinder roadster model C-36, selling at $1,185. Note the streamline body with rear deck

The Buick crankshaft for either four or six is a three-bearing one, the supports being of ample size. The camshaft has an equal number of bearings. Some motor dimensions follow:

	Six	Large Four	Small Four
Front crankshaft bearing..	1 7-8 x 2 7-16	1 7-8 x 2 7-16	1 5-16 x 3 5-16
Center crankshaft bearing.	1 7-8 x 2 1-2	1 7-8 x 2 1-2	1 5-16 x 2 3-8
Rear crankshaft bearing...	2 x 3 21-32	2 x 3 21-32	1 5-16 x 3 1-4
Front camshaft bearing...	1 3-16 x 29-64	1 3-16 x 2 29-64	1 x 2 11-16
Center camshaft bearing..	1 27-32 x 1 5-8	1 27-32 x 1 5-8	1 11-16 x 1 1-2
Rear camshaft bearing....	1 5-16 x 1 7-8	1 5-16 x 1 7-8	1 1-8 x 1 7-16
Crank pin bearings.......	1 7-8 x 2 1-4	1 7-8 x 2 1-4	1 3-8 x 2
Wrist pin bearings........	15-16 x 2 3-8	15-16 x 2 3-8	3-4 x 1 3-4
Valve diameter	1 1-2	1 1-2	1 1-4
Valve lift	9-32	9-32	1-4
Flywheel diameter	16.44	16.44	13.7
Flywheel weight	81 pounds	81 pounds	58 pounds

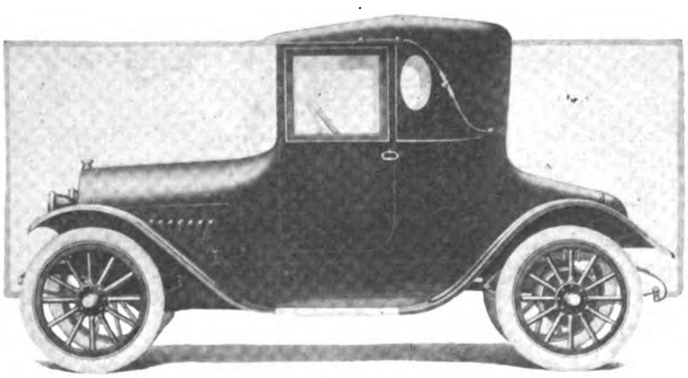
Bearing diameter is first dimension given.

Krit Company Adds a Cabriolet Body to Its Line

DETROIT, MICH., July 27—A three-passenger cabriolet body has been added to the Krit line and will be ready for delivery shortly after September 1. This body has been designed to meet the needs of physicians and others desiring a low-priced closed design. It will sell for $1,350 equipped with Disco starter and generator.

Streamline Type of Body

The radiator, hood and front end of the body are the same as those on the front of the roadster and touring designs which now make up the line. The entire exterior of the car is of curved design, giving a streamline form from the radiator to the end of the tapered rear deck. The driver's cushion is 16 inches wide and is placed slightly forward of the cushion for the other passengers. The larger seat for the two passengers is 32 inches in width. All the passengers face forward.



New cabriolet body seating three passengers, which has been added to the Krit line. This body is especially designed to meet the needs of physicians and others desiring a low-priced closed car. The price is $1,350 with Disco electric system. Deliveries will begin September 1

The upholstery used in the car is optional and may be of hand-buffed leather or cloth. The car is finished in blue with black running gear and gray wheels.

The Krit chassis which was described in THE AUTOMOBILE for November 13, 1913, has a four-cylinder L-head block, 3 11-16 by 4-inch motor. The motor, clutch and gearbox are a unit and are suspended from the chassis at three points. A notable feature of the motor is that the crankshaft is carried on two ball bearings. It is capable of 3,100 revolutions per minute. The rear axle is semi-floating. The car is driven from the left side and also has left control.

The Krit Co. state that although they got a late start for the 1914 season, only being able to supply a few demonstrators last November, business has been very good, foreign business having gone beyond the company's expectations while the domestic business is on the increase.

30 per Cent. Ahead of Last Year

The actual increase in volume for the past seven months is very close to 30 per cent. over that of the same period during the 1913 season. It is true that there has been, during the past few weeks, a slight falling off in some sections of the country but this does not seem to be universal, in fact business in some sections of the country with us is much better now than at any previous time during the season.

Aluminum Continued for Castings

Although many manufacturers of moderate-priced cars have discarded the use of aluminum for their crank and gearcases for some reason or other, the Krit company is still using this metal throughout the entire power plant wherever practical so that the power plant complete, including transmission, carbureter, magneto and fan, weighs but 368 pounds. The five-passenger touring car weighs less than 2,100 pounds, with standard equipment and only about 70 pounds, more when equipped with electric self-starter and generator.

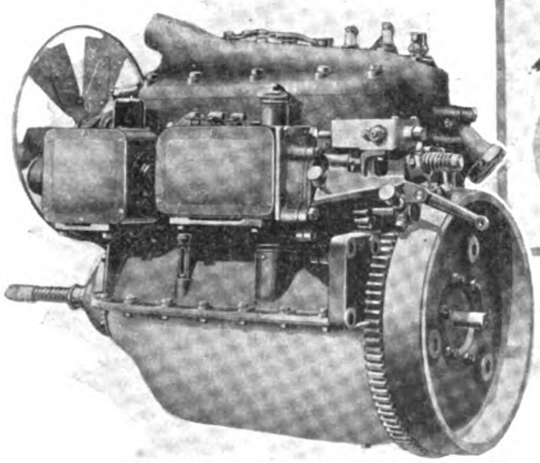
Bodies are exceptionally roomy and of the genuine streamline type, which lines have been fully completed by carrying them out into the rounded, tapering bonnet and rounded, tapering radiator.

Many Minor Refinements

The gasoline tank is placed under the shroud, making for convenience, a more positive feed to the carbureter, and also has allowed for a reserve supply. The upholstering is deep and the seats low so that the occupants sit in the body and not on top. An instrument board, leather covered, conceals the gasoline tank. On this instrument board is mounted the electric light switches, the steering post bracket, flush type speedometer, flush type ignition switch and the gasoline tank filler. The steering wheel is large, having nickel plated spider and nickel plated spark and throttle levers on top. The floorboards and running boards are covered with cork linoleum with aluminum binding. The top is of mohair, equipped with Jiffy curtains and mohair top cover. The windshield is built into the body without the use of stay rods and is of the clear vision, double ventilating type.

1915 Maxwell 25 Price Cut $55

Complete Gray & Davis Electric System $55 Extra



Left—Left side of four-cylinder block motor used in Maxwell 25 for 1915. Note mounting of Gray & Davis cranking motor and generator on brackets on the upper half of the crankcase

Above—Side view of Maxwell 25 five-passenger touring car for 1915 with top up, showing new sloping hood rounding into the cowl in which the gasoline tank is located. The front edge of the radiator is rounded over. The fenders are crowned. This car sells for $695 as compared with $750 for the 1915 model

THE price of the Maxwell 25 for 1915 has been reduced $55 on all models, this reduction notwithstanding the fact that many body improvements have been made and several chassis alterations effected. It includes gas headlights and oil side lamps. If you want the complete Gray & Davis electric cranking and lighting equipment you pay $55 more, or in other words, you get the complete electrical equipment for the same price that the car sold for this year.

The touring car lists at $695. The roadster lists at $670, the town car at $920, and the cabriolet, which is a new body type, at $840. These figures include gas and oil lighting. Add $55 to each for the electrical equipment.

Maxwell Features

Streamline Cowl and Hood
Fuel Tank on the Dash
Two-Piece Windshield
Dash Instrument Board
Crowned Type of Fenders

The Maxwell 25-body style is new in many respects. There is now a sloping hood which rounds into the cowl where the gasoline tank is carried instead of under the front seat as formerly. The front edge of the radiator is rounded over. There is a new two-piece windshield. Crowned fenders are used, and the space between these fenders and the body in front and rear completely inclosed. An instrument board is added, and back of it is located the gasoline tank with filler pipe at the right of the board. The wheelbase remains at 103 inches on all models.

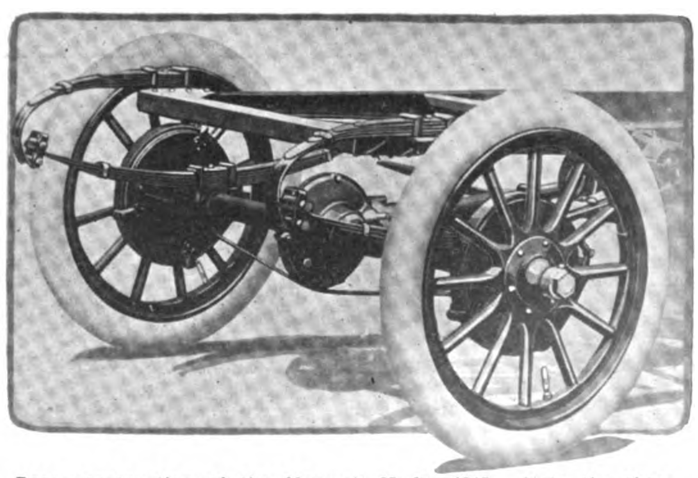
The Starting Equipment

When the Gray and Davis cranking motor and generator are supplied they are carried on brackets on the left side of the upper half of the crankcase. The brackets are cast integrally with the case. The generator is placed ahead of the motor, to be in line with the fan pulley, from which it is driven by belt. Thus the same belt drives the fan and the generator in triangular fashion. The pulley diameters give the generator a speed of 2¼ times that of the crankshaft, and it charges the battery at the full rate when the car is running from 12 to 15 miles an hour.

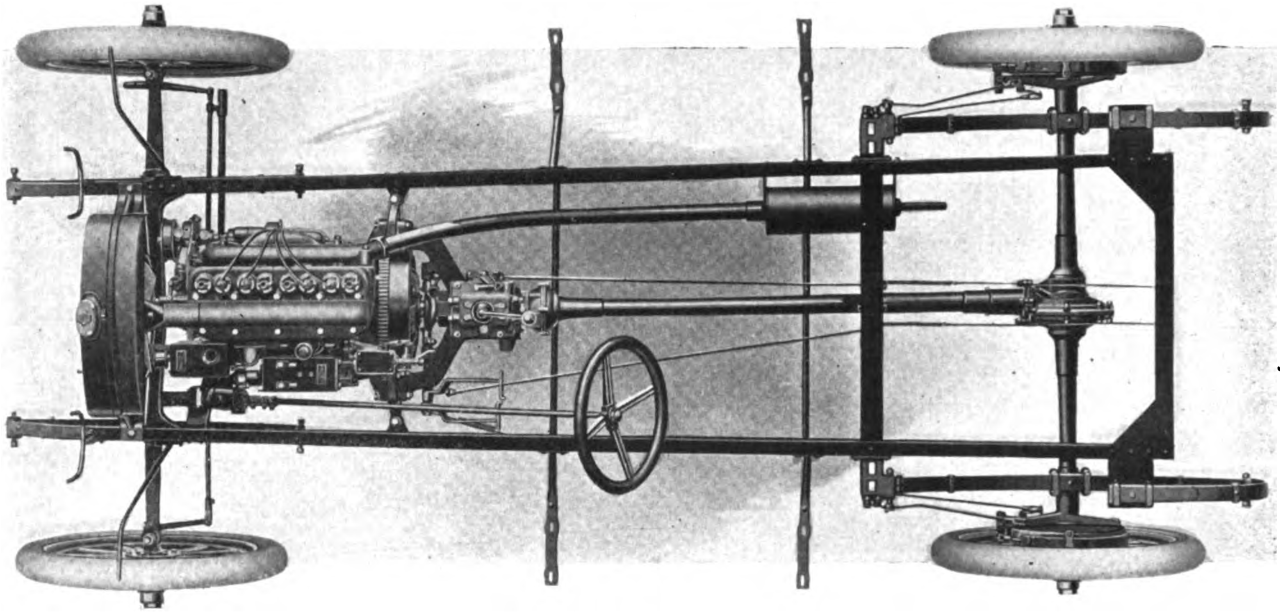
The cranking motor, which has the ability to spin the engine at the rate of 130 r.p.m., is fitted to gear to the teeth of a ring gear fixed to the outer rim of the flywheel. The gear train between the electric motor and the flywheel gives a relative electric motor to engine speed of 30 to 1. The shifting for cranking is of the usual form. Pressure by foot on the plunger pedal starts the electric motor and engages the starter pinion with the flywheel.

In connection with the electric system a Pumpelly storage battery of 80-ampere hours capacity is used. In accordance with general practice these days, there are no side lights with the electrically equipped Maxwell. The 9-inch headlamps are fitted with a dimming coil in the switch which serves to reduce the light for city driving.

Mechanically, the chassis is practically as in 1914, although

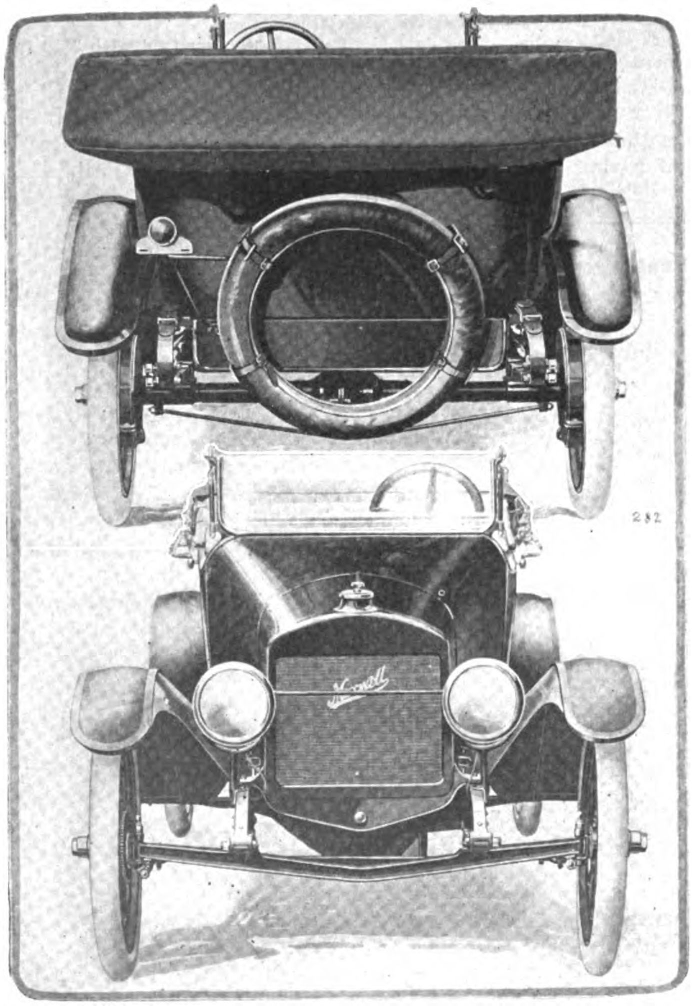


Rear construction of the Maxwell 25 for 1915. Note the three-quarter elliptic rear springs



Plan view of Maxwell 25 chassis for 1915, showing extreme simplicity of construction. Note unit power plant suspended at three points and mounting of compact gearbox for center control

several refinements are included. First is the replacing of the semi-elliptic rear springs which connected to spring horns at their rear ends with three-quarter elliptic rear springs with scroll ends.



Above—Rear view of Maxwell 25, showing tail light and license bracket combination, new crowned fenders and mounting of extra tire

Lower—Front view of Maxwell 25, giving an idea of the new streamline hood and cowl as well as of the rounded front on the radiator

A second change is the shifting of the carbureter from the left of the engine to the right. In the older motor, although the valves were on the right, the fuel went through a passage cored in the cylinder casting. This change was made to make room on the left for the cranking and lighting units, when they are specified, but it has the advantage of making a shorter passage for the gases. In its new location the Kingston atomizer type carbureter is in rear of the magneto and very accessible, being higher up than formerly on account of the higher position of the fuel tank in the cowl as compared with its former position under the seat.

A third new feature is the radiator construction. The radiator shell which is rigidly fastened to the frame is entirely independent of the core which carries the cooling water tubes. Thus the delicate part though securely held in place does not receive all the frame weaving strains which the shell does and the possibilities of springing leaks and damaging the tubes are reduced to the minimum. Replacement of the core is also made cheaper and easier by this construction.

New Control Features

Although drive is still on the left and the control in the center, a new type of steering post which fastens by a bracket to the cowl board for rigidity is used. Instead of the former spark and throttle lever arrangement wherein the two levers were on opposite sides of the steering column, they are both now mounted on a quadrant. It is below the wheel. An added refinement is the placing of the horn button on one end of the quadrant and convenient to the driver's hand.

Motor Is Little Altered

Reviewing the Maxwell chassis constructional features, the motor first commands attention. It is practically as it was in design except for the carbureter shifting and the provision for the mounting of the electrical units. The cylinders are cast in a block with the cylinder head detachable and suspension at three points in unit power plant form. Although the flywheel is unenclosed, the gearbox is made a part of the unit by a yoke circling the flywheel and bolting at either side to the integral crankcase supporting arms.

The cylinders 3 5-8 by 4 1-2 have a piston displacement of 185.8 cubic inches, a stroke-bore ratio of 1.24 and a S. A. E. horsepower rating of 21.1. The maker rates it at 25 horsepower under normal conditions, and it is probable with its long stroke that it will turn up an excess of this amount on the block.

The crankshaft has two main bearings, and it as well as the camshaft and connecting-rods are constructed of manganese steel which is very rigid. Timing gears, housed at the front, are made of nickel steel and all working parts are well designed to be as light as possible and consistent with the work they have to do. Their dimensions should make for efficient operation.

Several motor dimensions follow:

Crankshaft bearing diameter—1⅞ inch.
Front main crankshaft bearing length—2½ inches.
Rear main crankshaft bearing length—3 inches.
Connecting-rod lower bearing length—1½ inch.
Valve diameter—1 9/16 inch.
Camshaft bearing diameter—1 inch.
Front camshaft bearing length—2 inches.
Rear camshaft bearing length—1¾ inch.
Wrist pin bearing—¾ inch diameter; 2¾ inches length.

Troughs for Connecting-Rods

The lower half of the crankcase carries the oil reservoir used for splash lubrication. A plunger pump located in the timing gear case, and operated by an eccentric on the camshaft, lifts the oil from the reservoir to the four splash troughs under the connecting-rods. After the oil has been splashed onto the various bearing surfaces by the rod ends, it finally finds its way back to the reservoir through a drain at the rear of the case and after being filtered is recirculated.

Thermo syphon cooling is used. A Simms dual type high-tension magneto driven by shaft on the right gives the ignition current. It may be locked from the dash.

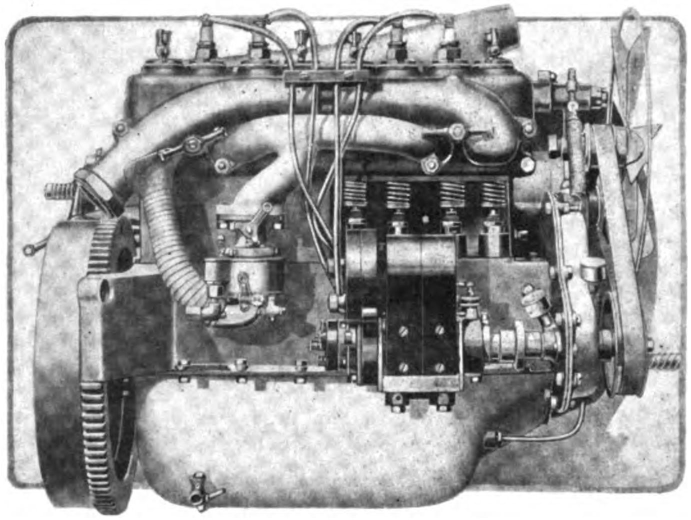
The clutch is a cone type with asbestos lining, the cone being a steel stamping.

The gearset is unaltered and affords the usual three forward speeds. Gears are nickel steel, and Hyatt bearing in connection with a bronze bushing is used at the front end of the main shaft. The rear end is carried on a babbitt-lined bearing. Phosphor bronze bushings are used on the jack-shaft.

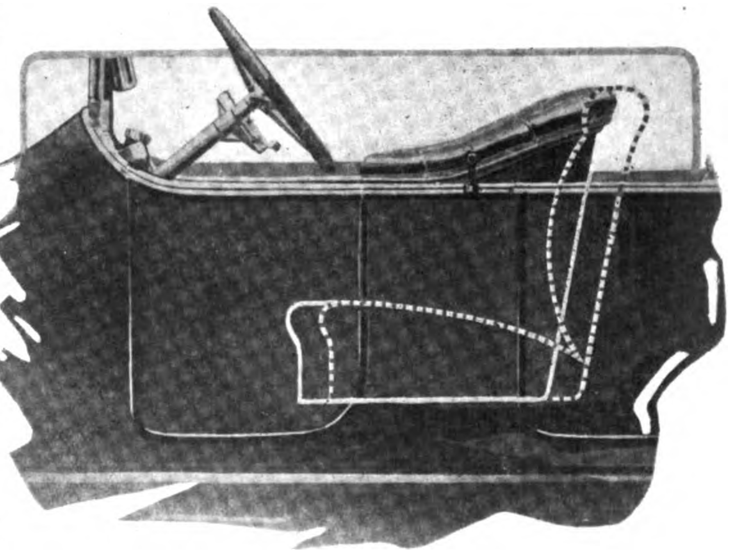
The propeller shaft is inclosed within a torsion tube with one universal joint at the front end. There are no radius rods, the tube taking the drive and torque. Other members are unnecessary with a chassis of this weight.

Three-Quarter Floating Axle

The rear axle is a three-quarter floating type with conventionally constructed bevel gearing and with the springs mounted above it. Brakes are of the usual contracting and expanding type acting on rear wheel drums. The standard wheel equipment calls for wood wheels with 12 spokes front and rear, on which clincher rims are fitted. These carry 30 by 3 1-2-inch tires all around.



Right side of Maxwell 25 motor, showing mounting of magneto and carbureter together with flexible hot air intake for carbureter. Note drain cock at bottom of crankcase



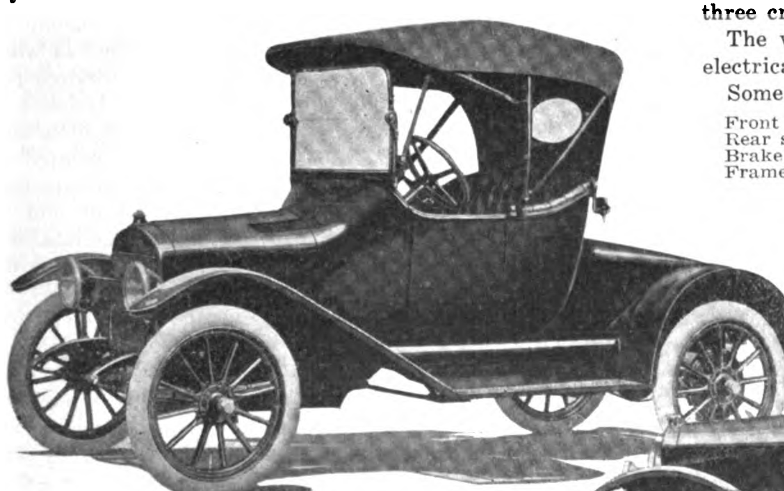
Adjustable front seat on new Maxwell 25. The dotted lines show the two positions which may be obtained by shifting the seats

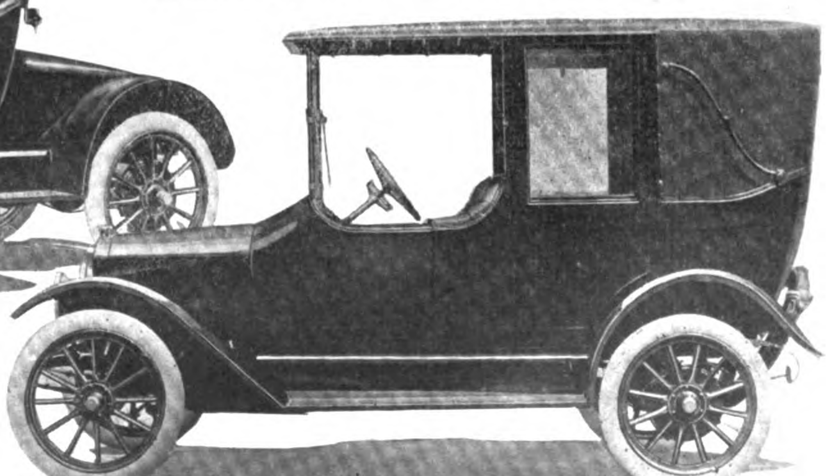
To insure good body support, the frame is tapered from 33 7-16 inches at the rear to 28 inches at the front. There are three cross-members.

The weight of the touring car is 1,850 pounds, this with electrical equipment and ready for the road.

Some chassis dimensions are:

Front springs: 1¾ inch wide; 32 inches long.
Rear springs: 1¾ inch wide; 40 inches long.
Brake drums: 12½ inches diameter.
Frame: 3½ by 1½ inches channel section; 5/32 inch metal.



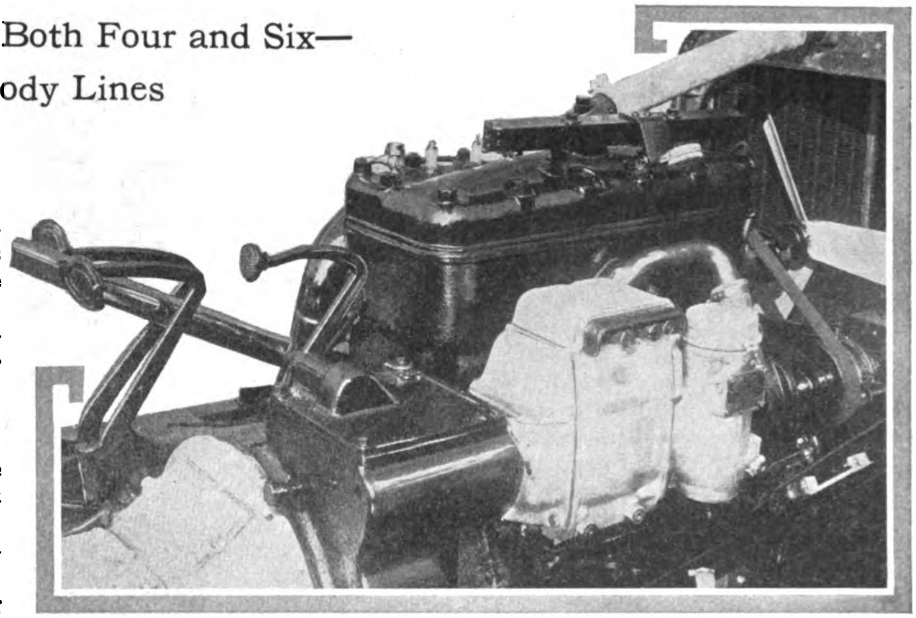


Above—New Maxwell 25 roadster with windshield and top which sells for $670. Note flush sided doors and streamline form of hood and rear deck

Right—Maxwell 25 town car which lists at $925. Note clean running boards, crowned fenders, mounting of extra tire at rear and landaulet type top

Two Oakland Chassis for 1915

Five Body Types Fitted to Both Four and Six—Improved Boat Body Lines



Right side of 1915 Oakland four-cylinder motor, showing mounting of the Delco electrical unit on the right

THE Oakland program for 1915 has been narrowed down to two chassis—a four and a six. On these, five types of bodies are fitted.

The four-cylinder model 37, is a much-altered continuation of model 35, the smaller four of 1914. Its price is still $1,200 and it is difficult to imagine a more refined and attractive light car.

The six-cylinder model, Six-49, is the new edition of this season's model 48. It is reduced in price $100 to $1,685.

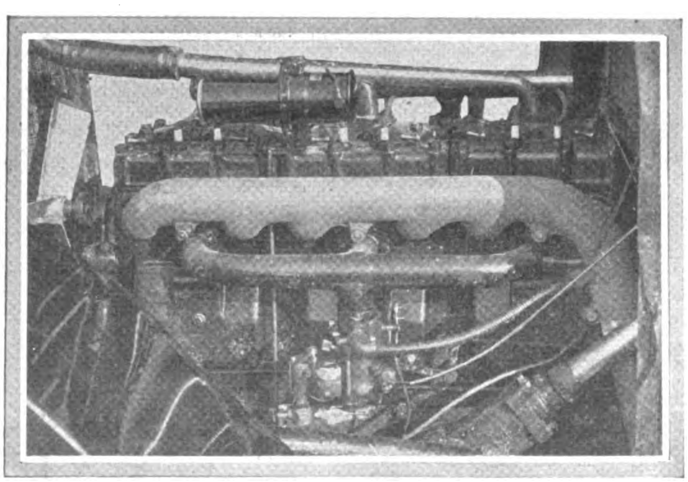
The 1914 model 43, has been discontinued.

Both new models reflect the designing hand of the company's new engineer, Eric Wahlberg. The four is not only mechanically practically a new job throughout, but its body lines are truly European. The six has not come in for much mechanical change, but its body lines have been much modified and hold to practically the same design as the four, on a somewhat larger scale.

Boat Body Lines Improved

The body lines are a modification and improvement of the boat body lines which have appeared in Europe. Beginning at the cowl, the upper edge sweeps in a very flat curve to the rear, while the contour of the cowl itself is scarcely a break from the slope of the hood. The latter is full rounded at the top, and the radiators have been shaped to preserve the general line. They are V-shaped in still better design than heretofore.

Though very similar in outward appearance, the two models are widely different in mechanical construction, and because of this fact, they will be described separately. The four-cylinder model, with its many new features naturally comes first.



Valve side of compactly arranged six-cylinder motor used in model 6-49 Oakland

With its motor refined, and its maximum speed increased; with completely re-designed frame; with a new type of drive and with the elimination of a great many brake rod and lever bearings due to the use of special spring pivot mechanisms, the four-cylinder model 37 has little in common with its predecessor, and with even greater strength and stamina, is several hundred pounds lighter.

The motor comes nearest to corresponding with that of last season's car. It is still 3.5 by 5 inches. It is suspended, as have been all previous Oakland motors, at three points.

A High-Speed Type Motor

Engineer Wahlberg characterizes the motor in its new form as a high-speed type, it operating up to 2,500 or 2,600 revolutions per minute. This is brought about by decreasing the weight of the reciprocating parts; by increasing the valve diameter and lift; and by proper manifolding in which the gas passages are not restricted and the cylinders permitted to draw in a full charge when the throttle is open.

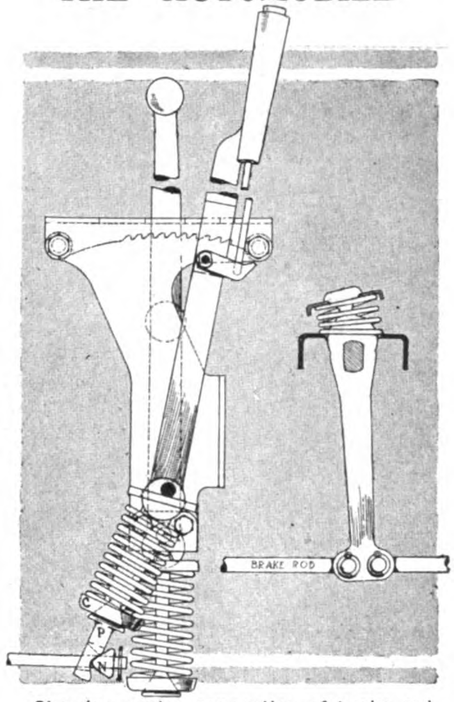
This latter is achieved by arranging the throttle axis parallel with the center line of the motor. It is pointed out that every throttle mounted in the regulation way at right angles to the motor center line acts as a deflector and the flow is not symmetrical with respect to this center line. The throttle arrangement as Oakland now uses it is said to distribute the gases equally either way.

Pistons Have Been Crowned

No alteration has been made in the three-bearing crankshaft, but the pistons have been crowned so as to make them as strong as possible with the lightest weight. In line with the growing tendency, they are fitted with nine thin carbon steel rings, three to each ring slot. These rings have square joints, and will very soon lap themselves into the cylinders due to the small wearing surface. Due to the multi-ring construction, the gas has to leak through nine places instead of three or four as is the case with the old type of rings before any compression is lost.

The L-head cylinders are cast in a block with the head detachable as this year. It is securely held in place by a number of holding bolts arranged in bosses around the edge. This head when removed completely exposes the piston heads and the inside of the cylinders.

Intake and exhaust manifolds are on the left, the former above the latter allowing the carbureter to be conveniently located. Valve springs and stems are completely inclosed on this side, the covers having breather vents in them. The valves are of tungsten alloy steel and have been increased from 1 9-16 inch in the clear to 1 5-8 inch. Timing gears are spirally cut.



Showing wedge connection of brake rod end to lever, eliminating bearings, on model 37 Oakland

Radiator Capacity Increased 20%

The motor is positively cooled by a centrifugal pump located ahead of the Delco electric unit on the right side. It introduces the water into the center of the jacket on the right. The radiator has 20 per cent. larger capacity and is of the fin-and-tube type, made narrow in order to easier take the strains which are put on it when the frame twists on uneven roads. The large tank top has been continued, thus carrying considerably more water than can be contained by a flat type.

Stewart Vacuum Fuel Feed

Although the gasoline tank is still placed at the rear and below the frame level, it does not feed by pressure as formerly but, instead, the Webb Jay, or Stewart, vacuum-gravity system of introducing the fuel into the carbureter is employed. The vacuum tank is mounted on the front of the dash and it is connected to the intake manifold. This latter creates suction enough to draw the gasoline from the rear tank to the vacuum tank on the dash. This has upper and lower portions, the upper filling first, the float in it raising as the amount of gasoline increases. When the level has reached a certain height, this float trips a valve mechanism which shuts the vacuum line off and opens the upper portion to the atmosphere. This will send the gasoline into the lower part of the tank which part is open to the atmosphere always. It connects with the carbureter and in this way gravity feed is obtained with the tank in the rear.

The motor has the latest type of Delco combination electric unit, mounted on the right side and driven from the front gears when operating as a generator and gears to the flywheel through a gear train when performing the cranking function, and has the ignition distributer in unit with it.

Single-Wire Electrical System

The system is of the 6-volt, single-wire type with grounded return circuit, is simple and reduces the wiring to the minimum. The principal improvement in the Delco unit this year is the current control which is connected with the automatic spark advance, another new feature. The latter consists of a centrifugal governor which automatically advances the spark when the speed of the motor increases within a certain range of the position set by the hand spark advance lever on the steering wheel. The current controlling device is purely mechanical, and consists of an arm wiping a brush over a coil wound so as to cause maximum current output at low car speeds. Thus the main advantage is that when the car is being driven at ordinary low speeds of from 10 to 15 miles an hour the battery is being kept charged.

This will be appreciated by those who do much city driving, and whose lights burn considerably, while they also use the starter a great deal. Such drains would soon discharge the battery were it not being charged at nearly any driving speed.

The gear reduction between the Delco unit and the flywheel for starting is the same as this year, namely, about 25 to 1.

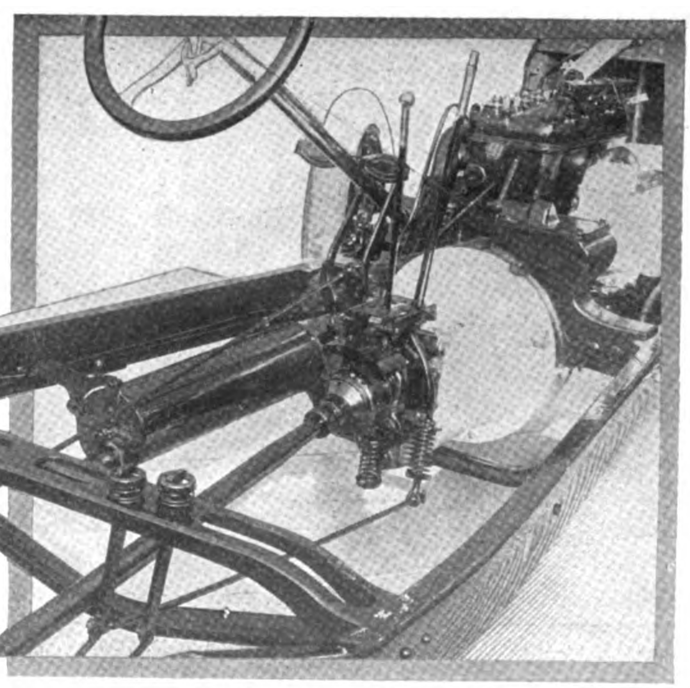
The gear train, which is shifted into mesh with the flywheel face gear by pushing a pedal, is completely housed within a case which is integral with the flywheel housing and the right rear supporting arm. As a generator, the unit is driven at engine speed.

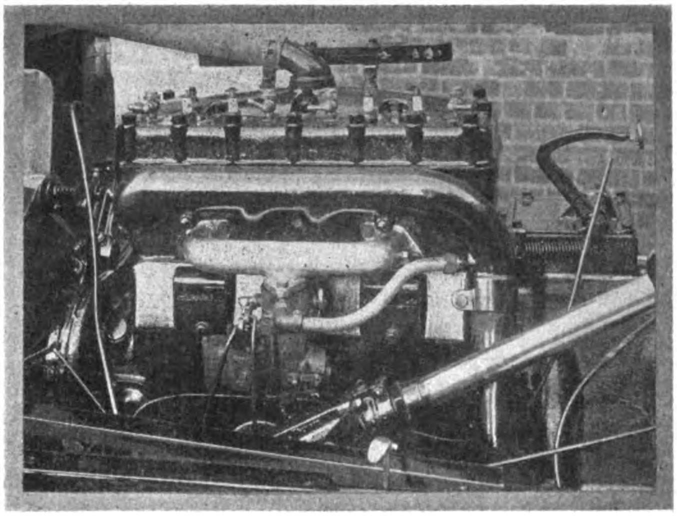
An Exide battery of 80 ampere-hours capacity and carried under the front seat is a part of the electrical equipment.

In connection with the lighting system, the headlights are provided with a dimming attachment, thus eliminating side lamps. The ignition distributer which was separate from the main electrical unit is again made integral with it. Another refinement is the locking of the electric horn button by the ignition switch, that is, when the ignition is off, the horn circuit is also disconnected.

The cone clutch has six spring inserts. An oiling device for the clutch shifting collar has been added. The grease cup mounted on the end of the clutch shifter shaft leads through a hole on the inside of this shaft, through the tube into the box on the clutch shoe, thus lubricating it.

Bolted to the flywheel housing is the three-speed gearbox, which is unchanged in design. The center control is principally the same as it was, although all bearings of both


Brake rod scheme on model 36 four-cylinder Oakland, which eliminates all bearings, springs on rocker shafts and wedges replacing them. These are noiseless and free from rattle due to the springs. They require no lubrication



Valve side of four-cylinder block motor used on model 37 Oakland

emergency brake lever and shifting lever have been eliminated. The sketch on page 217 shows the method of doing this. Springs on the bottoms of these levers hold their small trunnions down against fixed supports and thus allow them to oscillate or rock back and forth within the necessary limits. These springs take up all wear and the constructions eliminate any necessity of lubrication at these points.

Unnecessary Bearings Eliminated

By a similar use of springs and wedges, many bearings of like nature are eliminated, thus reducing the necessary care the owner has to give his car to the minimum. Throughout the brake operating system, there are no bearings to take care of, or places to oil. On the brake rods, on the clutch shifter, on the clutch link, on the emergency brake, on the control lever and on the brake rocker shafts which are under the center cross-member this is true. The brake rocker shaft levers get their oscillatory freedom through the compressibility of the springs which hold them in place by retaining cups. These cups may readily be removed by turning them at right angles to their fastening position so that their larger slots will clear the heads of the rocker levers. This same principle of removal applies to the other spring mountings referred to.

Special wedge connections of the brake rods to their lever ends are also original. These are shown in the sketch on page 217. The threaded end of the rod passes through the end of the lever which has its front side concaved to take the edge of a wedge which screws onto the threaded rod end A cotter pin beyond it and through the rod prevents its coming off, while it is self-locking due to its fitting into the concaved lever end. Adjustment is therefore very easy. The great advantage of these connections is that they may be allowed to rust or get mud-and-water-soaked without interfering with their operation.

Lower Spring Leaves Take Drive

The drive to the rear axle is of the Hotchkiss type, replacing the formerly used design with inclosed propeller shaft. In the new construction, the lower leaves of the rear springs are so constructed as to take the drive and the torque, in that sudden shocks are not transmitted to the chassis mechanism, the springs giving a cushioning effect. This construction is also lighter.

Instead of the solid propeller shaft heretofore used, the model 37 is equipped with a tubular shaft of 1 1-2-inch outer diameter and 1-8-inch wall. It is of medium carbon, seamless tubing, the stub ends of the universal joints being electrically welded on either end. Though 50 per cent. lighter than a solid shaft, it is much stiffer. It will not whip as would a heavier shaft.

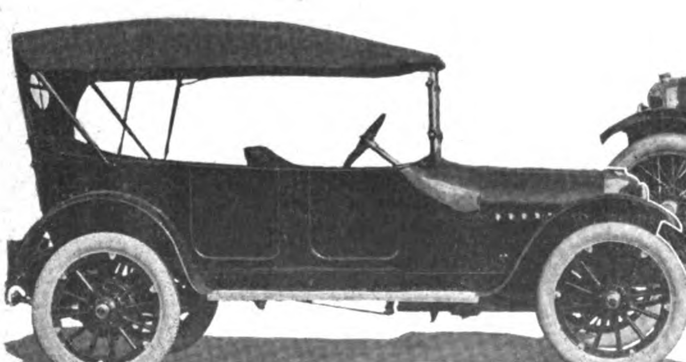
The rear axle is a one-bearing, floating type and replaces the three-quarter floating design of last year. Axle shafts and gears are nickel steel, and Hyatt bearings are used in wheels and differential with New Departures in the third member.

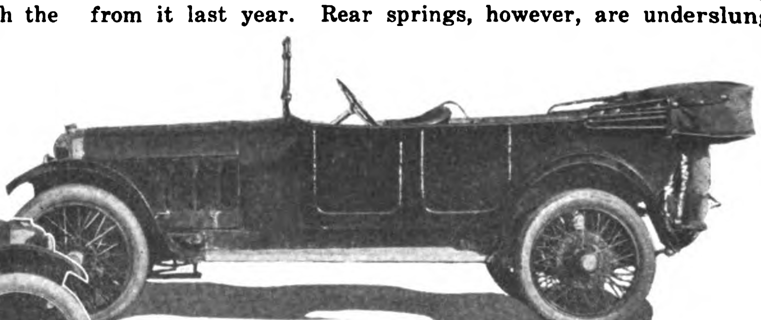
The frame is of entirely new form, and made to be directly under the side panels of the body, all along, giving it proper support, and eliminating the necessity of using side aprons on the car.

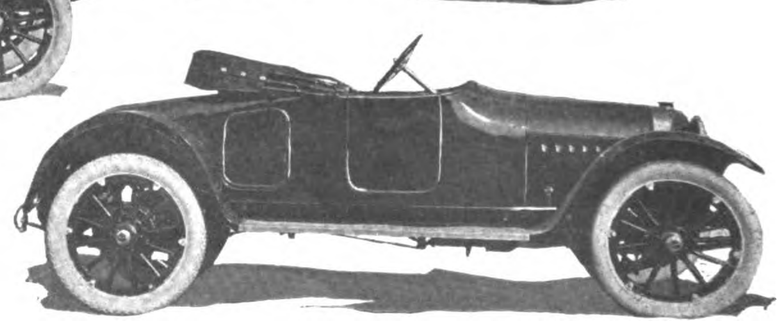
The frame channel is 4 1-4 inches high of 5-32 inch stock. It is 139 inches long over all, has a 4 5-8 inch kick-up at the rear and tapers to the front. The rails are 40 3-4 inches apart and parallel at the rear for 36 inches. Here is located a cross member, and ahead of it the narrowing commences, following the body line forward until at the front the rails are 30 inches apart.

Front Springs Overslung—Rear Underslung

The springs are mounted directly under the frame rails, and not on overhanging brackets, which are heavy and put considerable strain on the cross-members. The scroll at the rear is directly through the gusset plate. The front springs have been placed over the axle again, they being underslung from it last year. Rear springs, however, are underslung



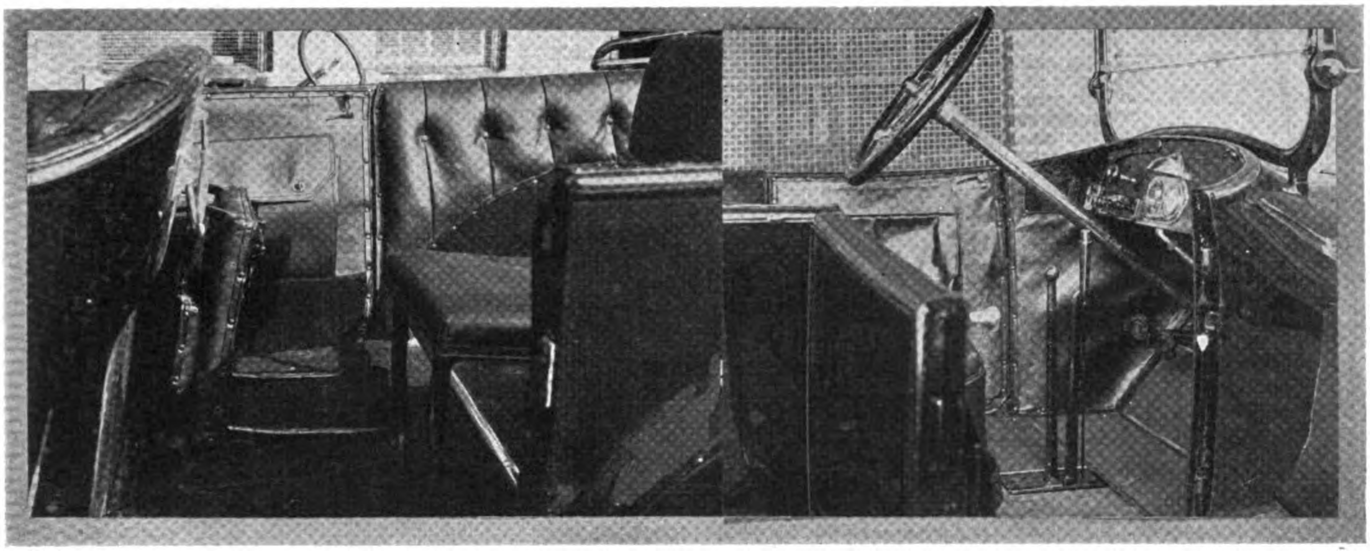




Above—Four-cylinder model 37 Oakland. Note curved line at top of body

Upper right—Oakland 1915 touring car, model 6-49. Note European body lines

Right—Model 37 four-cylinder roadster. Note side door to baggage compartment



Left—Auxiliary tonneau seats of six-cylinder Oakland. Note upholstery on sides. Right—Dash and control of 1915 Model 37 four-cylinder Oakland

as formerly. Fronts are 35 1-4 inches long and rears 48 inches.

The wheelbase is unchanged at 112 inches, and tires are 33 by 4 inches on demountable rims. The equipment includes a one-man top, rain-vision, ventilating windshield, and all other features of the modern car.

Concealed door hinges and a wider rear seat are provided, while the upholstering is new in that the tufted edges do not protrude over the sides of the car as they formerly did. This is in line with a growing tendency in the newer cars. A roadster body is offered as well as the touring car.

Six-Cylinder Model Six-49 Chassis

The six-cylinder Oakland is fitted with either the touring car body, which will carry seven, due to the addition of auxiliary disappearing tonneau seats, or with roadster or speedster body. Its wheelbase is still 123 1-2 inches.

The motor has come in for the same improvements as those enumerated for the four. The bore and stroke are the same, the cylinders are cast in a block with detachable heads, and the crankshaft has four main bearings. The general engine design throughout is the same as that of the four.

Chassis Is Unchanged

Equipped with a three-speed gearset, cone clutch, unin-closed drive shaft and floating rear axle, the car is really a continuation of last year so far as the chassis is concerned. Springs are underslung both front and rear and measure 41 1-4 and 50 7-8 inches in length, respectively.

Tires are 35 by 4 1-2 inches in size on demountable rims, and equipment is complete. Like the smaller car, the vacuum fuel feed is used, and the Delco electrical unit with its new features is also fitted.

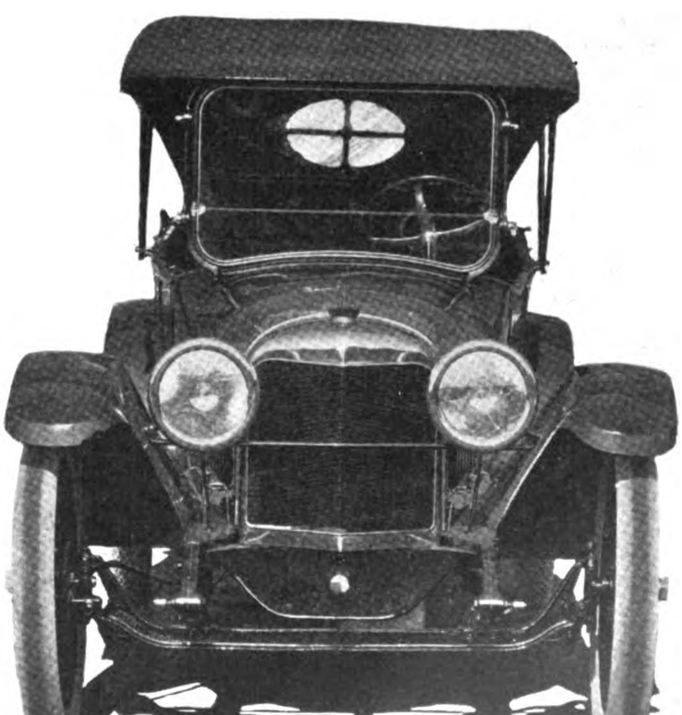
Big Field for Cars in South Africa

DETROIT, MICH., July 26—C. H. Dunlap, export manager of the Hupp Motor Car Co., who has returned to Detroit after an absence of 22 weeks spent in investigating sales conditions of the motor industry in South Africa, states that there is a very good future for the automobile industry in South Africa, and that there is not a foreign country where motor cars can be used to greater advantage. The reason is due to the very poor railroads that there are throughout the Union. The lack of transportation facilities makes it necessary for the South African to use some other means of locomotion than the ox-cart, and right here is where the automobile steps in.

Commercial travelers use motor cars in great quantities. They help develop their territory and enable them to call on small towns surrounding the large cities. Mine operators use motor cars extensively, and even the Boer farmers, who live in the interior and who formerly went to town two or three times a year, now are able to make regular trips to the big cities, and it is uncommon when a week goes by and a farmer does not go to town.

The roads around the large cities of Cape Town, Johannesburg, Port Elizabeth and Pretoria are in very excellent condition. Roads outlying the cities to any great extent are very poor and in many sections there are no roads at all—one has to run right across the "veldts."

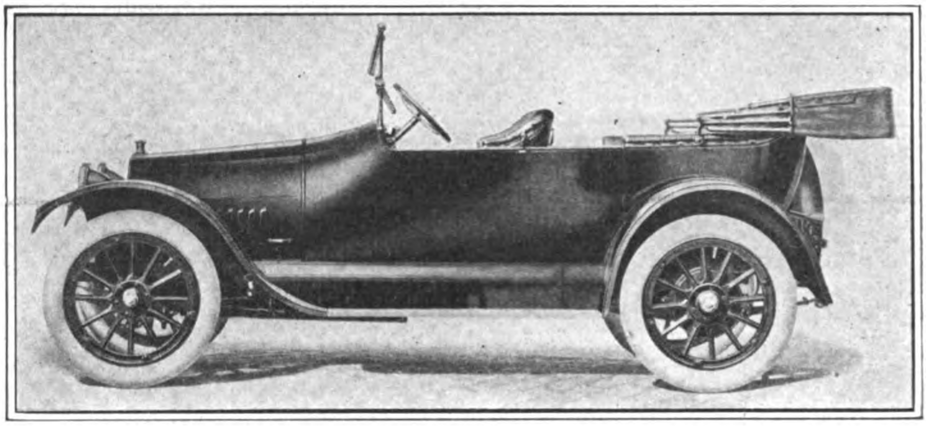
There is a project on foot which has been sanctioned by the Colonial government, to establish good roads and improve roads now through the country, for which five million dollars has been appropriated. This work of road improvement has already been started



Front view of 1915 Oakland, showing streamlines of the hood and body and V radiator

New Mitchell Light Four at $1,250

4 by 5 1-2 Inch Motor of L-Head Type with Cylinders Cast in Pairs—Unusual Equipment



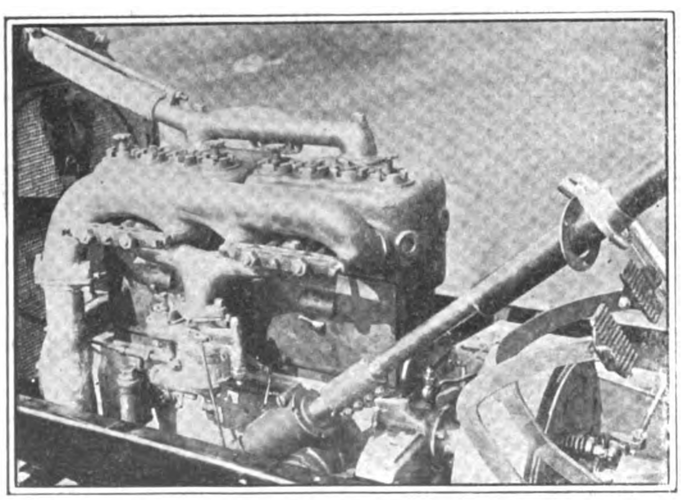
Side view of Mitchell Little Four for 1915 selling at $1,250

A FOUR-CYLINDER, 35-horsepower car at $1,250 with liberal equipment and with constructional features making for easy and inexpensive maintenance is the feature of the Mitchell line for 1915. The more powerful and more expensive chassis models, the Special Four, the Special Six and De Luxe Six upon which two, five, six and seven-passenger bodies and closed bodies are fitted, are continued practically unchanged for 1915.

The Mitchell line is now complete with a line of models ranging from 30 to 60 horsepower and well fitted to cover the greatly broadened selling field in which the company is now prepared to compete. The older models are too well known to require description here. Interest centers in the new Little Four.

Unusually Large Water Jackets

The Little Four has a four-cylinder engine of 4 inches bore and 5 1-2 inches stroke. The cylinders are cast in pairs and are of the L-head type with unusually large waterjackets. The engine has pump cooling, and ignition is obtained from the storage battery and generator of the Mitchell cranking and lighting system. The engine drives through a very accessible cone clutch of new design to a gearset amidships which gives three speeds forward. From here the drive is taken through a shaft in a torque tube and a single universal joint in the floating axle.



Left side of motor of Little Four, showing manifold attachment and collar holding two-piece steering column. Note that exhaust manifold leads to the front of the motor, down and then back

The drive is on the left and the control is center. The wheelbase is 116 inches and tires are 34 by 4 inches. Two-, five- and six-passenger bodies are fitted as stock at present, although coupé, sedan and limousine bodies may be obtained later.

Features of the equipment, in addition to that usually found on a car of this price classification, include a one-man top, ignition lock, headlight dimmer, and magnetic inspection lamp.

Cylinders are light castings. The L-head design of cylinders is a departure from previous Mitchell practice. This permits all the valves to be placed on one side and to be driven by a single camshaft. Pair casting of the cylinders permits neatness of cover placing and accessibility of the valve mechanism.

Pistons are flat-topped, with three eccentric rings. Piston weight has been kept to the lowest possible figure, consistent with strength.

Connecting-rods, like the pistons, are very light and strong, being drop-forged in an I-section from a special analysis steel that is both rigid and tough. The bearings of the piston pins are heavy-duty, dense bronze bushings, which work on hardened steel hollow pins. The bearings are 2 inches long and 1 7-32 inches in diameter. Woodruff keys keep the pins from turning and from shifting endwise by disk-like brass protectors interposed between their ends and the walls of the cylinders. As these are not attached in any way to the pistons, unequal expansion between the cast iron and the steel cannot cause distortion and wear of the pistons. Connecting-rod bearings are 2 1-8 inches in diameter and 2 3-8 inches long.

All Moving Parts Carefully Balanced

Special care is taken in the balancing of the reciprocating parts, so that there will be no vibration at high motor speeds. As each motor is assembled, the various reciprocating parts are paired off and finished to a balance that is exact.

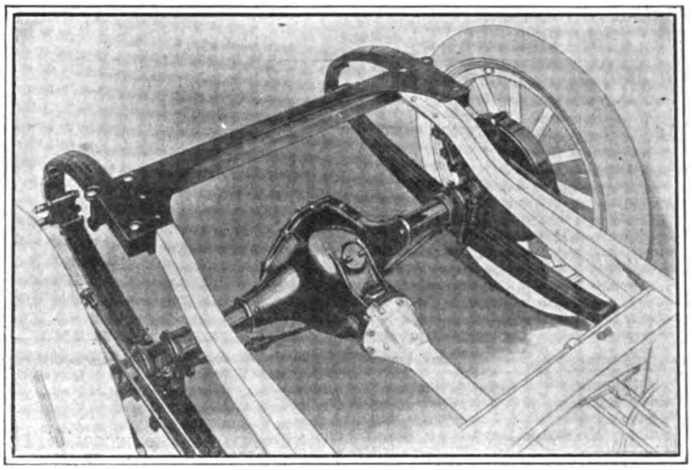
The three bearings of the crankshaft are 2 1-8 inches in diameter. The bearing at the flywheel is 4 inches long, the others being 2 3-8 inches in length. All bearings are wet ground to finish, while permanent alignment and smooth running are insured by the stiffness of the aluminum crankcase which is obtained by special webs. The crankshaft is offset 1 inch from the center line of the cylinders.

Crankcases are of the barrel type without a parting on the bearing line, so that a pressed sheet-steel undercover, in which the oil troughs for the connecting-rods are formed, can be removed for inspection or adjustment of the bearings without disturbing the crankshaft.

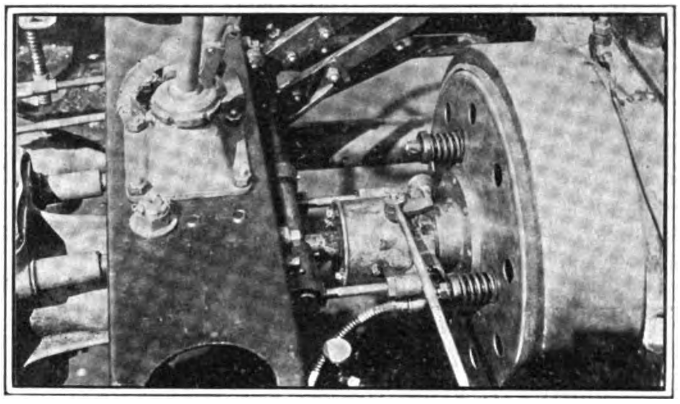
Valves are one-piece alloy steel with hardened and ground stems and are of the non-warping type. They are 1 3-4 inches clear, opening with seats beveled at the angle of 45 degrees. The inlet valve lift is 35-64 inch, and the exhaust 13-32 inch. Valve push rods are single pieces of hardened and ground steel with mushroom heads. The adjustment is effected by simple cap screws with case hardened heads and check-nuts, and the entire valve mechanism is completely inclosed in chambers covered by stamped steel plates, and removable by hand. Valve spring washers are held in place by V-shaped retainers instead of the ordinary key which requires that the valve stems be slotted.

Cams are integral with the camshaft, and the cams and bearing surfaces are deeply carbonized, hardened and ground to form. A pair of steel gears with helical teeth are used for the camshaft drive. These gears have faces 7-8 inch in width.

There are three camshaft bearings, each of which is 1 inch in diameter, the front being 2 9-16 inches long and the others 2 1-4 inches. To permit adjustment for wear and distribution gearing, the front and rear camshaft bearings are supported in eccentric bushings which can be turned to bring the camshaft and this gear closer to the other timing gear.



Rear construction of Mitchell Little Four for 1915



Method of mounting gearshift and emergency levers on crosspiece of frame in Mitchell Little Four. Also adjustment of cone clutch and flexible conduit carrying oil to clutch from motor

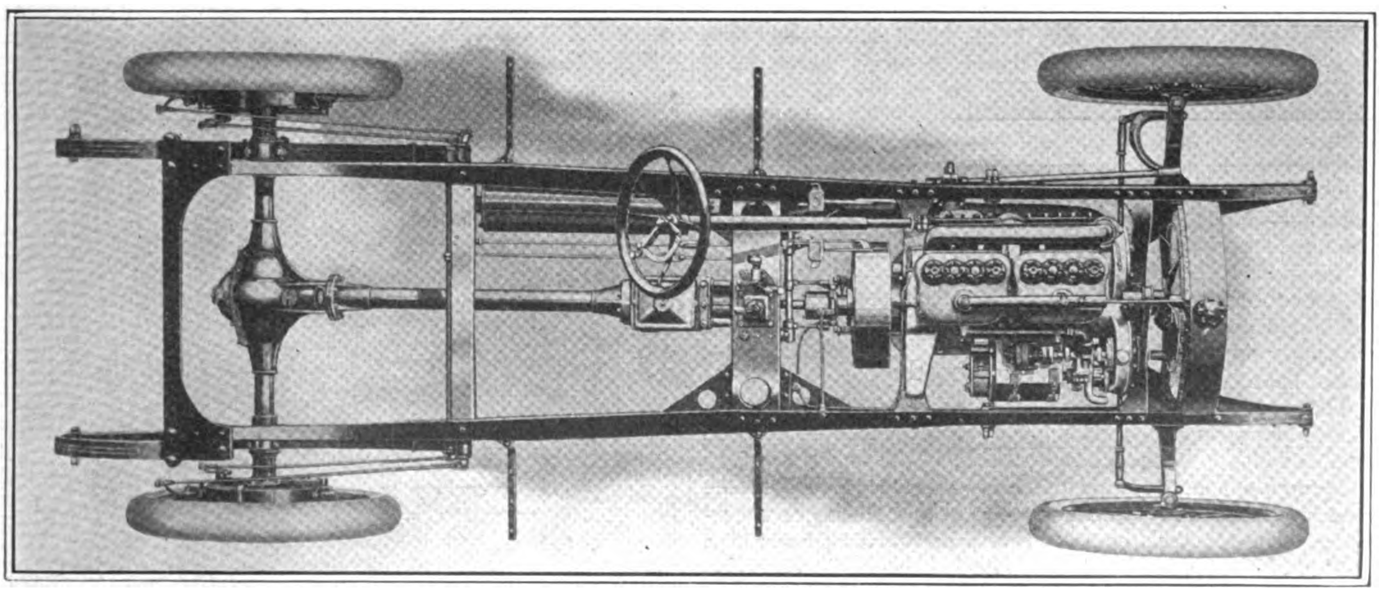
Three-Point Suspension for Motor

Three-point support is employed on the engine, the crankcase resting at the front upon the front cross-member of the frame, while at the rear it is extended into two arms which rest on the side sills of the frame. This three-point suspension avoids distortion of the motor through frame-twisting over rough roads.

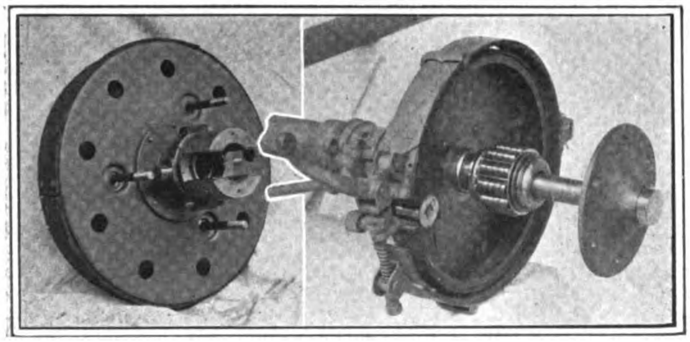
The oil reservoir of the crankcase is formed by the lower cover, which also is used as an inspection plate. The cover is a steel stamping made in two compartments, the lower half is the oil reservoir, and the upper half is fitted with an overflow and troughed for the connecting-rod apron. The system as a whole is a combination circulating splash which has been employed in Mitchell engines for many years.

Starting, lighting and ignition are well taken care of by the Mitchell single electrical system. A single-unit motor generator is carried on the right side of the crankcase and driven by a silent chain completely inclosed in the cast distribution gearcase. The motor generator is hung from trunnions at either end and can be lifted out of its cradle. It is geared at a low driving ratio, only 2.6 turns of the starting motor to one of the crankshaft. The generating function is so arranged that at a car speed of 8 miles per hour the generator is delivering 6 amperes to the storage battery, it is stated. The latter is located on the running board where it does not interfere with getting in or out of the car, but at the same time is handy enough so that the owner will give it the needed attention. Ignition is supplied by battery and generator current through a coil and distributer mounted accessibly upon the engine and driven through a special shaft.

Inlet and exhaust manifolds are both held in the cylinders



Plan view of Mitchell Little Four chassis. Note mounting of Mitchell electrical system at right of motor; also accessible gearbox with hand cover plate



6—Left—Clutch, showing bolts and joint. Right—Interior view of brake drum, showing hub plate of wheel and roller bearing

by a single pair of steel yokes, and to improve the accessibility of the motor the exhaust manifold discharges at the forward end, instead of the rear. This has the additional feature that the objectionable heat under the driver's seat is eliminated, and the hot exhaust is carried directly up to the coolest part of the engine just back of the fan, the air from which cools down the exhaust and assists very much in muffling it without back pressure.

Cooling is by a thin tubular radiator, and the connections to the waterjackets on the cylinders, which are exceptionally ample, are by two outlet tapered manifolds, with heat-proof steam hose between engine and radiator to facilitate this assembly. The radiator is braced by a short rod paralleling the hose to the motor.

Another feature of simplicity is the arrangement of the fan and water pump. The 18-inch, four-bladed fan with a shrouded rim is a one-piece steel stamping. The high-speed centrifugal pump is mounted upon the front end of the fan shaft, where it is accessible close to the radiator and driven without extra mechanism. The fan and pump are driven by a single endless belt with provision for keeping it tight. An important feature of arrangement is the fact that if the pump is permitted to freeze in cold weather nothing worse can happen than momentary slipping of the fan belt.

Propeller Shaft Is Entirely Inclosed

Transmission of power from engine to axle is a continuation of that system employed on older models of Mitchell cars. Its characteristic feature is the division of the power plant into two units, one the motor and its accessories and the clutch, the other the gearset, propeller shaft and rear axle. The important novelty, however, comes in the complete inclosure of the propeller shaft in the torque tube, which is bolted rigidly to the rear axle, while the gearbox is bolted to the front end of the torque tube. The gearbox thus is made a part of the rear axle unit in so far as the perfection of alignment inherent in this construction is concerned, but the addition to the rear axle weight is avoided, and the gearbox merely trunnioned on the frame. Instead of direct trunnion bearings the gearbox is trunnioned by short links so that the thrust of the drive is taken by the springs. A slip joint on the torque tube permits freedom to the twisting action which is inevitable. Suitably placed universal and sliding joints give flexibility between clutch and gearbox.

Final drive is by a bevel pinion and gear, both provided with easy adjustment and with ball thrusts as well as roller radial bearings to carry the loads.

The rear axle is of the floating type, driving shafts are removable without disturbing the wheels which revolve on flexible roller bearings, on the outside of the axle proper.

Springs are half-elliptic in front, 2 inches wide, and the nine levers are 3-16 inch thick. The rear springs are underslung. The construction is of the three-quarter elliptic type and there are ten leaves in the main member 2 1-4 inches in width.

Service and emergency brakes work on pressed-steel wheel-drums, which are 14 inches in diameter with a 2-inch base. The hand brake is internal and the foot brake is external, both faced with non-burnable fabric, and both quickly adjustable without disassembling. The brake adjustment is particularly easy, turnbuckles being provided on the rod and a locked, yet easily operated, adjustment at the drum.

Demountable Rims Are Stock

Demountable rims are stock equipment, and the tires, 34 by 4, are amply large for the weight of the car with its normal load. Either standard or 60-inch tread is optional, and to effect a change from one to the other it is necessary only to interchange the Mitchell patented hub.

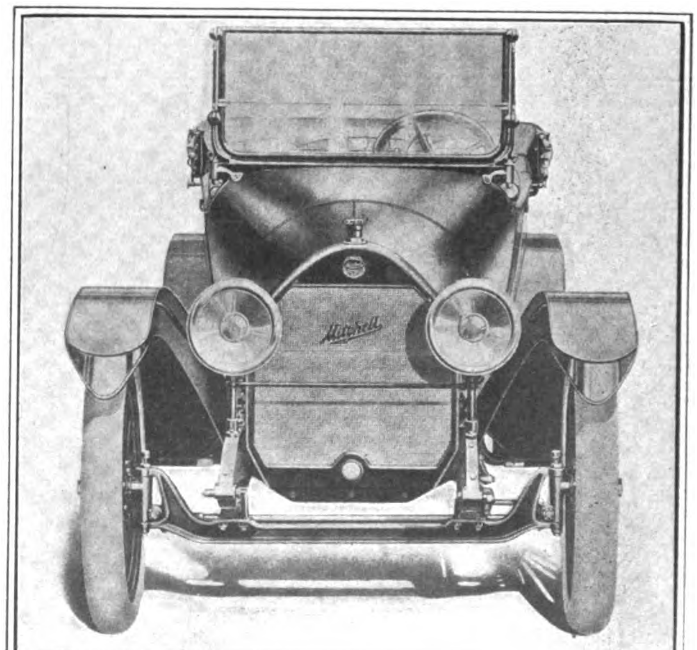
The irreversible steering mechanism is constituted of a worm and a full gear on a squared shaft, combining safety with durability, in that there is no sector to run past the worm and lock, while turning the gear into four positions affords four renewals of the wearing surfaces.

Gear and emergency brake levers are in the center of the car to the driver's right, and far enough forward to allow the occupants of the front seats to leave or enter the car easily from either side. The gear lever is of the rocking type, without a gate.

Fuel Tank in the Cowl

All of the indicating devices and instruments are mounted on the cowlboard, back of which, beneath the deep scuttle dash, is the 18-gallon fuel tank, with its filler opening accessibly placed behind the glass front. Also in the cowlboard are the priming pump for starting the 60-mile speedometer; ignition switch, with Yale lock to prevent theft; gasoline gauge; oil gauge, and switches for the lamps. Over the speedometer is a lamp, which pulls out at the end of a flexible cord, long enough to allow inspection of any part of the car.

A unique feature of the Mitchell Little Four is the arrangement of the button which operates the concealed electric horn. The button is placed on the door at the left side in such a position that it can be operated by either the operator's knee or his hand. The difficulty of wiring attending the installation of a button on the swinging door was overcome by using the hinges as a part of the horn wiring, the hinges being insulated from the ground and from each other so the concealed wires simply are brought to the hinge on either side.



7—Front view of Little Four and Special Six

The Engineering Digest

Compression as a Factor in Motor Economics — Its Terminology Corrected and Defined

RELATIONS TO SELF-IGNITION AND PISTON STROKE

COMPRESSION of the explosive mixture in an automobile motor is an element apparently so simple that all can aspire to understand how it works. It is therefore misunderstood considerably among motorists at those minor points which most easily escape attention; and these become the main points the moment the question is one of special refinements in motor design. Having discovered that this is the situation and that a slipshod understanding of the matter has spread even to builders of motors and is represented in construction and in the printed explanations of construction, Louis Lacoin, whose work on Construction and Regulation of Internal Combustion Motors is recently being quoted widely, gives a clear exposition of the whole subject, and one well suited for setting popular misconceptions aright and making it easier to explain certain features in motors of advanced design. The influence of the valve-timing on the degree of compression, the existing confusion in the terms used for designating compression and the effect of long-stroke motor design, constitute the principal points to which he calls attention. His presentation is rendered in substance in the following:

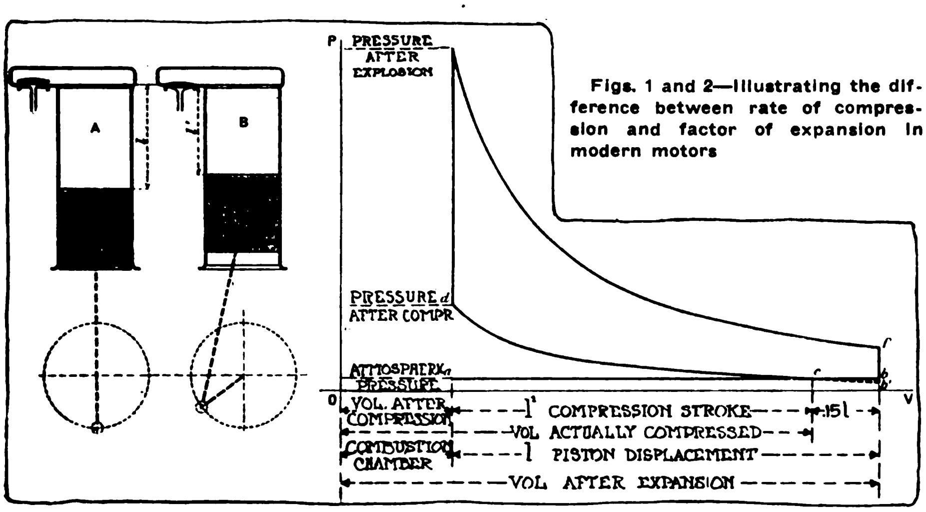
The Troubled Terminology

Strong compression is now looked upon as an indication of high efficiency, and as a rule it is true that the higher the compression is with which a motor can work the better is the motor. It should be added, though, that the real difference between the highest compressions used in practice and the smallest is much more modest than the figures proclaimed by the makers would lead one to suppose. This is due to confusion in terms. When it comes to measuring compression exactly, some makers take the proportion between the volume of the combustion chamber and that of the whole cylinder as a basis while others prefer to designate the compression by the pressure reached in the combustion chamber at the end of the compression stroke. As a matter of fact, though pressure is increased when the volume of the gas is reduced, it is not increased exactly in the same proportion but more rapidly.

In practice both ways of expression are of interest. The proportion in volumes is indispensable for guiding the shop in shaping the combustion chamber to the right volume and capacity, while the pressure determines the forces to which the organs of the motor will be subjected; and the designer must know it for his calculations.

Both expressions are therefore legitimate, and, for that matter, one can be found from the other. But it is necessary to indicate which one is employed, as the difference is great. For an example, suppose the initial volume of gas is 4.25 times larger than the final volume, which is a proportion commonly used. In such a motor the pressure at the end of the compression stroke is 6.56 times its initial value. If then two persons discuss the subject and one claims to compress 6 times and the other admits that he does not exceed 4.25, it may be the second who uses the higher compression, if he speaks of volumes and his friend of pressures.

Merely to specify whether there is question of volumes or pressure is unfortunately not sufficient for disposing of the uncertainty. Each of these terms is subject to certain misundertandings. Continuing to use a motor with a volume proportion of 4.25 as an example, we have, as already mentioned, a pressure at the end of the compression stroke 6.56 times greater than at the beginning. If the latter is taken as the unit, the figure of the compression is consequently just 6.56. But the unit may be considered to be the average pressure of 1 atmosphere, which is equal to the pressure of a column of mercury 760 millimeters high in a barometer and amounts to 1.033 kilogram per square centimeter. On this basis the compression, while still 6.56 times greater than at the beginning of the compression stroke, will be expressed as 6.78, meaning 6.78 kilograms per square centimeter. Finally, by reading the pressure directly by means of a manometer, a figure is obtained which depends upon the actual atmospheric pressure. If the barometer is high—at 785, for example—the initial pressure will be 1.067 kilogram per square centimeter and the final pressure will reach 7 kilograms.



Figs. 1 and 2—Illustrating the difference between rate of compression and factor of expansion in modern motors

Still another mode of expressing the value of the pressure is in common use. It is characterized by leaving out of consideration the initial pressure, on the ground that the compression stroke does not produce it. Accordingly as this initial pressure is now taken as unit, as average atmospheric pressure or as actual atmospheric pressure, three other values must in that case be given as the measurement of the compression; namely, 5.56, 5.75 or 5.93.

At least six different figures may thus be used for indicating the final pressure caused by compressing the same gas mixture in the same motor. For a motor operated with producer-gas six different and higher figures could similarly be employed for measuring exactly the same rate of compression.

When volume is made the basis for the measurement, there is less occasion for confusion. Figs. 1 and 2 show the volumes which enter for consideration. The definition of what is here called the Rate of Compression is absolutely precise. It is the proportion between volume *B*, being the volume existing when all communication between the cylinder and the atmosphere is just cut off, and the smallest volume to which the charge is compressed. If the intake valve were closed at the lower dead center the Rate of Compression would equal the maximum cylinder volume, being the volume of piston displacement plus volume of the combustion chamber, divided by the volume of the combustion chamber, but in all modern motors the volume *B* remaining at the beginning of the compression is in reality smaller than *A* because the inlet valve is not closed till long after the low dead center has been passed. The true Rate of Compression is therefore smaller than the maximum divided by the minimum cylinder contents, though this value is what is frequently taken as the measurement. The proportion of the gross volumes represents on the other hand another important factor in motor economy; namely, the Factor of Expansion for the gases after an explosion.

Prolonged Expansion

Motors in which the Factor of Expansion is greater than the Rate of Compression are known as motors with Prolonged Expansion. To examine the conditions under which such a motor operates, let it be supposed that the inlet valve is closed 45 degrees after the low dead center. The piston has in that case covered about 15 per cent. of its course before the real compression begins. If at this moment the proportion in volumes is still 4.25; that is, if the true Rate of Compression is equal to this figure, the Factor of Expansion is equal to 4.824, which is an appreciably higher figure.

With a delay of the valve opening corresponding tc 25 per cent. of the piston stroke—not yet used in common practice but nowise exaggerated—the Factor of Expansion corresponding to the 4.25 Rate of Compression would even reach the figure 5.333.

The term Volumetric Compression, as used by Letombe, denotes exactly the same that is here understood by Rate of Compression, but the latter term is preferable because it calls for a definition and can therefore not so easily be employed unthinkingly.

Premature Ignition

As has now been seen, the same degree of compression may be denoted by six different figures, when the tension of the gas is made the basis, and by two different figures, if volumes are made the basis; in all eight different modes of telling what a certain compression amounts to are recognized. Of all these only the two denoting the Rate of Compression and the Factor of Expansion are of real interest, as the former represents the element which the chance of premature ignition truly limits and the latter almost exclusively determines the fuel efficiency of the motor. All the pressure figures, on the other hand, may be determined one from the other when the Rate of Compression and the nature of the gas are known.

With the question of terminology settled one can progress to the other question which has so far been discussed rather vaguely; namely, how premature ignition limits the rate of compression.

It is customary to charge premature ignition to the presence in the cylinder of points which have remained at igniting-temperature after the expulsion of the burnt gases. This explanation is only half satisfactory. Especially, such points should certainly be hotter at the beginning of the admission of gas than toward the end of the compression stroke. They should therefore be more liable to ignite the mixture the moment it is introduced than later. They may be the cause of carbureter fires—nothing being more probable—but it is safe to contend that, as a rule, they do not cause premature ignition. If they did, all that would be necessary for making use of very high compressions would be to eliminate them, as shall now be shown.

During the compression the temperature of the gas increases, as well understood. In Diesel motors this increase of their temperature is sufficient to ignite them. Is the condition the same in automobile motors?

Arithmetic of Temperatures

It seems that the reply should be in the negative, as the rates of compression are so different. The Diesel rate exceeds 14; that of automobile motors rarely gets above 4.5. Now, for this rate of compression of 4.5 the proportion in *absolute* temperatures before and after compression is only 1.57. If then, at the end of the admission, the new mixture has the same temperature as the atmosphere, which is a reasonable assumption, and this temperature is 15 degrees centigrade, being 288 (273 plus 15) degrees absolute, the temperature at the end of the compression will be 1.57 times higher than 288, which is 452 degrees absolute or 179 degrees centigrade (452 minus 273).

But the lowest temperature at which a hydrocarbon gas mixture ignites spontaneously is about 450 degrees centigrade. Compression as such is thus far from being sufficient to produce ignition.

The reason for premature ignition must be sought in part in some other factor. There is the actual temperature of the gas mixture at the beginning of compression. It is in reality higher than that of the atmosphere. A certain proportion of burnt gases remains after the previous explosion, still very hot. Its presence raises the average temperature at the end of the induction stroke to 72 degrees centigrade, and the compression carries the total mixture, according to the above manner of calculation, to 269 degrees. This is 90 degrees higher than the figure considered before, but still not sufficient for causing ignition. Suppose, however, that in some quiet and hot corner of the mechanism, in contact with the exhaust valve or its seat, for example, there remains an ever so small portion of explosive mixture which reaches a temperature of 200 degrees centigrade before the compression, then the compression may raise this small portion to the 450 degrees required for spontaneous ignition, whereafter the whole charge will take fire from it. (In fact 200 degrees centigrade equals 473 degrees absolute, which multiplied by 1.57 makes 723 degrees absolute, and this is just the same as 450 degrees centigrade).

It is difficult to prevent the temperature of 200 degrees centigrade from existing at one point or another, and therefore the 4.5 rate of compression is barely practicable.

The Smooth Combustion Chamber

In order to reduce as much as possible the chance for self-ignition it would be necessary to cool the exhaust valves as thoroughly as the rest, which is difficult with the present methods of cooling. It is also needful to shape the combustion chamber so that the gas mixture may continue the course which it follows at its precipitous entrance by way of the admission valve. The whole mass of gas would then take one mean temperature and perhaps a rather high one, but there would be no recess with stagnant air much hotter than the rest. This is the authentic advantage of the semi-spherical combustion chamber.

It has also been established that the free circulation of the incoming mixture and the churning which results from such a movement accelerates the flame propagation started by the spark, producing fuller diagrams, better efficiency.

What Better Cooling Would Do

It is interesting to investigate and see what improvements would follow if some day a more equable cooling of the cylinder were realized. Suppose that the gas mixture at the beginning of the compression were uniformly at a temperature of 122 degrees centigrade. The figure is reasonable, as the unexpelled exhaust gas carries it to 72 degrees and 50 degrees may be added as coming from the heated walls.

These 122 degrees centigrade equal 395 degrees absolute, and the proportion to this of the 723 absolute degrees which stand for the ignition temperature is 1.830 and corresponds, according to the existing tables on the subject, to a permissible rate of compression of 7.5, which is considerably higher than the customary 4.5.

With regard to fuel efficiency the progress would be notable: The theoretical thermic efficiency for the rate of 4.5 is 36.3 per cent.; with a rate of 7.5 it would reach 45.4 per cent., being a gain of 25 per cent.

With regard to power, with the same cylinder dimensions and the same fuel consumption, a motor of 20 horsepower would give 25.

Increased Stroke Taking Place of Compression

All this is still in the realm of speculation. At the present day only very small motors, whose thin cylinder walls admit of a lower interior temperature, can exceed a compression rate of 4.25. But when this rate is adopted and the combustion chamber is established accordingly, there is nothing to hinder an increase of the piston stroke, and thus gaining a large factor of expansion, so long as the inlet valve is forced to remain open long enough. (The author has shown in another article the advantages in fuel economy to be gained by this method.) The efficiency to be obtained in this manner is almost as high as if the compression rate were equal to the factor of expansion. Figures relating to a motor of the dimensions given in Figs. 1 and 2 will show this more plainly.

Without prolonged expansion a compression rate of 4.25 gives only a theoretical thermic efficiency of 35.2 per cent., while a compression rate of 4.824, which would equal the factor of expansion, would carry this efficiency to 37.6 per cent. Knowing that this rate of compression is not practicable we content ourselves with the 4.25 rate and prolong the expansion, as said, giving to this factor instead of to the compression the proportion of 4.824. The efficiency differs very little from what it would be in the other case, reaching 37.5 per cent.

So far as fuel efficiency is concerned, the rate of compression is thus immaterial. It is only the factor of expansion that matters. With regard to the power developed, on the other hand, the influence of the rate of compression is preponderant.

For example—making use of the same figures as before—a motor without prolonged expansion and with a compression of 4.25 gives 20 horsepower with a certain cylinder volume. If the cylinder volume remains unchanged but the rate of compression is increased to 4.824, without prolonging the expansion, the power is raised to 21.35 horsepower. But if the same motor, as it was with the 4.25 compression, is given a factor of expansion of 4.824, the power is reduced, for the same bore and stroke as before, to 18.75 horsepower, because the volume of the explosive mixture has been diminished. It is necessary to lengthen the stroke to get back to the same power, and the motor is then a little heavier, but it consumes less fuel. The increased weight may be offset by the smaller weight of fuel to be carried, at least for long trips, and the economy at all events would be appreciable, as for every 100 francs worth of gasoline used with the shorter stroke to produce a given power, the motor with the longer stroke and the prolonged expansion would require only 93.5 francs worth.

Summarizing: We should aim in our motors at the same time for a high rate of compression, to make them powerful and compact, and for a high factor of expansion, to make them economical, and when we talk about their characteristics we should mention not only their rate of compression but also their factor of expansion, these being data of equal importance and not to be confounded.—From *Omnia*, July 11.

Motors with Steel Cylinders Now Made Economically in Berlin

VERY few steel cylinders are used for automobile motors. Those made in the past have usually been smooth cylinders with welded heads and separate water-jackets. In building up motors with them the cost was high and the production laborious by reason of the many parts to be fitted, and the strength was not always reliable on account of the number of welds used. The Stahl-Motoren Gesellschaft Ernst Jaenisch & Co. of Berlin builds steel motors on a different plan, writes Fritz Klinkenberg, and has done so for some time, developing quite new methods.

The main product is block motors of the approved automobile type, and economy in the production is attained mainly by extensive use of modern factory arrangements and machine tools. The accompanying illustration, Fig. 3, gives views, mainly in section, of one of the types produced, which is a normal four-cylinder block motor, so far as the general design is concerned, with 80-millimeter bore and 130-millimeter stroke, developing 10 German tax-horsepower. The principal dimensions are marked on the cut, representing in some instances the chief point of interest.

(*Continued on page* 241.)

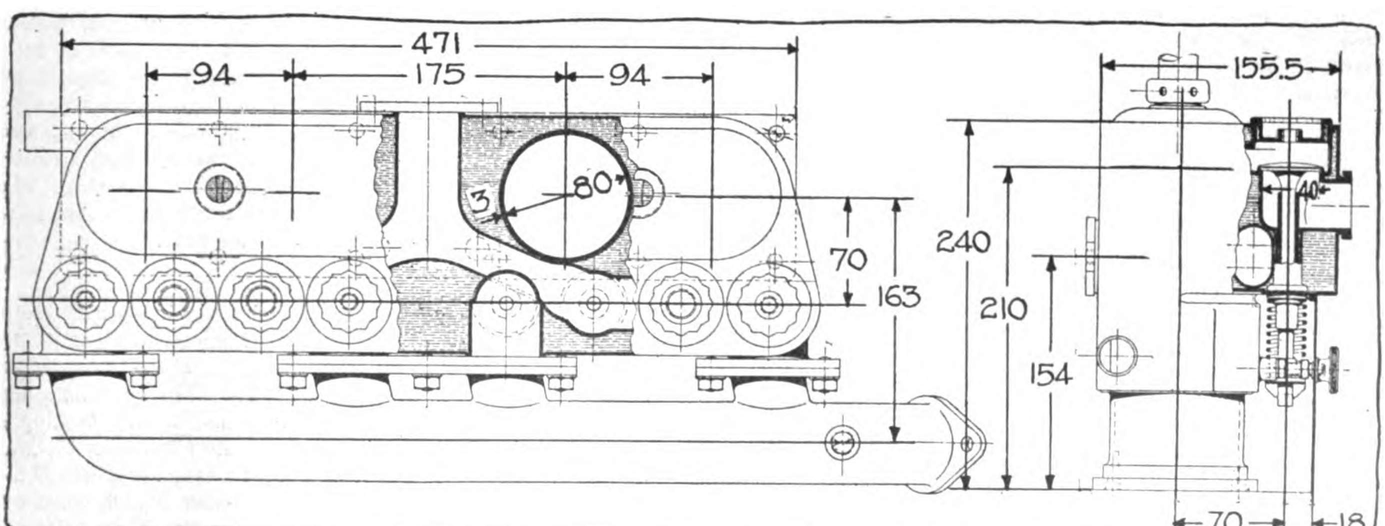


Fig. 3—Views, mostly in section, showing features of Jaenisch steel motors—in this case with cylinders of 80 mm. bore and 130 mm. stroke

Racing Is a Battle of Valve Systems---Knight

The Automobile Engineers' Forum

Inventor of Sleeve-Valve Motor Quotes Performance of Poppet and Non-Poppet Types in Tourist Trophy Race on Isle of Man—Racing Motors Must Reach 3,000 R. P. M. for Modern Racing

COVENTRY, ENG., July 4th—Road racing among automobiles has today resolved itself down largely to a battle of the valving system, namely, the side-poppet valve, the overhead poppet valve and the double-sleeve valve.

The recent 2-day Tourist Trophy race in which three Minerva cars with double-sleeve valves comprised the only team of three to finish in the race, has demonstrated that the sleeve-valve has possibilities in racing which have not been considered to date.

Contrary to the general assumption of would-be motor experts, the double reciprocating sleeves are not the limiting factor for power and speed in a motor, when designed and constructed the same as the high-speed poppet valve motors for speed work alone.

Special Knight Motors for High-Speed Work

The three Minervas which finished the Tourist Trophy race were the first examples of Knight sleeve-valve motors which have been designed especially for high-speed work, these motors having the weight of the reciprocating parts reduced, port area increased, and lubrication methods adequate for racing demands used.

These motors are a slight departure from standard sleeve-valve design in order to increase the port area, and consequently add to the capacity for high speed and power. A bottom exhaust port is added to permit for as much space in the top of the sleeves being used for intake ports.

Further, two eccentric shafts instead of one are employed for reciprocating in the sleeves. There is an eccentric shaft in either side, the shaft on one side operating the four inner sleeves and that on the other side operating the four outer sleeves. The two shafts are used to secure lightness and strength in the sleeves. Steel pistons are used, and pressure lubrication employed.

Smoke Could Have Been Eliminated

The protest against the three Minervas emitting too much smoke during the race emanated from one source only. The majority of the drivers of other cars refused to sign this smoke protest, but signed a remonstrance against it, and the committee, after investgating the matter, rejected the protest. While it is my candid opinion that no high-speed, four-cycle motor can ever be made a commercial success, with a bottom exhaust port because of loss of oil any more than can a four-valve-in-the-head poppet type become practical, yet the objectionable emission of smoke from the three Tourist Trophy Minerva engines could and would have been eliminated for racing purposes had time permitted.

Sixteen 6-Mile Mountain Climbs

The facts remain that in the Isle of Man race are sixteen terrible mountain climbs of over 6 miles each, wherein the motors were turning over at 3,000 revolutions per minute and this required a different adjustment of the lubricating system from that ever contemplated at the Minerva works by the designer. This mountain-climbing work required a maximum of lubricant, and owing to the design of system this maximum could not be varied upon the level and down grades without complete re-designing of the entire mechanism, which, of course, was impossible.

Other cars did not smoke so much at times, nor did they with three exceptions out of nineteen, succeed in surmounting this mountain the necessary sixteen times in succession to a height of over 1,500 feet.

Engine Trouble Put Out Many Cars

Practically all of the poppet valve designs in this race were equipped with four valves per cylinder, and the severity of the race shows how these failed in the early parts of the contest, which was eight laps per day around a circuit of 37.5 miles. In the first lap three cars were eliminated from two teams, namely, two Vauxhalls and one Sunbeam, all with engine trouble. The second lap was just as disastrous, two German Adlers and one of the three Humbers going out with engine trouble. When thirteen laps were over the three Vauxhalls, three Humbers, three Adlers, two Stars, two Sunbeams, one Crossley, one Straker-Squire, and one S. A. V. A. were out, leaving Sunbeam leading, Minervas in second and third, and another Minerva battling for fourth place with a Straker-Squire.

No Adjustment to Two Sleeve Valve Cars

In short, in the field of twenty-two starters, of which nine were of the sixteen-valve-in-the-head construction, but a single one of that new type had withstood the rigors of thirteen successive laps; of the ten side-pocket poppet types, two remained in the race, whereas all three sleeve-valve types remained in the contest. Not a single adjustment of any sort was made to two of the Minerva cars, the bonnets not even being raised before starting on the second day's race. The other Minerva had a broken oil pipe, which compelled it to slow down but not to actually stop in the race.

Fastest Cars Were the Finishers

This Tourist Trophy race contained many interesting facts relative to motor mechanisms. It demonstrated that the fastest cars were not the ones to be eliminated but rather that they were the finishers in the race. The accompanying table shows that Sunbeam I was the fastest car, making a circuit at the average 59.3 miles per hour; Minerva III was second fastest, Minerva I third fastest, etc. In a word, the fastest cars, with the exception of Sunbeam III, finished the race in about the order of their capacity for speed, whereas, many might argue that the fastest cars would suffer more from break-downs or accidents than those which covered the course at a materially lower rate of speed.

Motors Must Make 3,000 R.P.M.

An inspection of the designs of the motors in the recent French Grand Prix race, as well as those in the Tourist Trophy race, will reveal the limits of efficiency of present engine construction. Engines capable only of under 3,000 revolutions per minute stand no chance whatever in first-class competitions today. No motor, with large bore, has any chance of standing up under the severe heat and tremendous piston travel of these high speeds. Ball bearings are being employed generally in crankshafts with as much view to eliminating bearing troubles as reducing friction, but the question of the operation of valves at high speed is coming prominently to the front, and receiving principal attention.

Overhead Valves Mean Lifting Cylinder for Trouble

No designer of a poppet valve motor today would think of bringing forward to compete for speed any motor with other than overhead valve construction, with the accompanying spherical combustion chamber, for the reason that the limit of valve area of the side pocket type has been reached, and that construction is completely abandoned for racing, the same as side chain drive for the road wheels in a passenger car.

But the overhead valve racing design introduces a most disturbing uncertainty and many complications aggravated by the tremendous stresses placed upon it by the enormous speed and pressures met with. The breaking of one of the sixteen valves in the valve-in-the-head construction means the elimination of the car as the cylinder must be lifted in order to replace a valve. The cylinder must be raised to grind any of the sixteen valves, and the best designers can only meet this argument by promising to make the valves unbreakable and so that they will require but little grinding.

Table of the Tourist Trophy Race Held on the Isle of Man, Showing Record of Each Car and Difficult Character of Course

Car	Number of Circuits	Fastest Circuit, Time	Fastest Circuit, m.p.h.	Total Time
		Min. Sec.		Hr. Min. Sec.
Sunbeam I	16	37:55	59:3	10:37:49
Minerva III	16	38:18	58:7	10:57:38 1-5
Minerva I	16	39:10	57:42	11:40:44 3-5
Sunbeam III	12	39:15	57:30	Retired
Straker-Squire I	16	39:50	56:5	11:22:50 1-2
Minerva II	16	40:27	55:58	11:22:20
Straker-Squire II	9	41:12	54:00	Retired
Humber III	13	41:51	53:88	Retired
Star I	6	42:31	52:92	Retired
Vauxhall I	12	43:2	51:96	Retired
Star II	4	43:21	51:72	Retired
Humber I	10	43:24	51:68	Retired
Adler III	10	43:39	51:54	Retired
Crossley	10	44:7	50:94	Retired
S.A.V.A	2	44:48	50:28	Retired
D.F.P.	16	45:2	50:C0	12:24:15
Adler II	1	46:38	49:20	Retired
Humber II	1	46:47	49:00	Retired
Adler I	1	50:22	47:84	Retired

Stirrup Construction Uncertain

The use of the stirrup construction, whereby springs are eliminated, and the poppet valve is mechanically opened and closed by cam action, in order to get speeds of 3,000 revolutions per minute seems to introduce complications and on the surface it looks as if the remedy is worse than the disease.—CHARLES Y. KNIGHT.

Decisions of the Courts—Son Driving Car

By George F. Kaiser

NEW York Appellate Division hands down decision holding that a motor car owner is not liable when an accident occurs while the car is being driven by a person not acting for him.

An automobile, which was being driven by a 24-year-old son of the owner, ran down a man who was waiting for a surface car in a public street. The latter, having been somewhat severely injured, brought suit against the father for damages. It came out on the trial that the son lived with his family and that the automobile was used as a family car by the whole family. The son, however, was the only one who drove it, acting as a chauffeur for his father, or any other member of the family who wished to go out in the car. In addition to this, his father had given him the privilege of using the car on his own account whenever he so desired. At the time of the accident the son, using this privilege, had taken the car out and was driving a party of friends about town.

The Court held that, as the son was neither acting expressly or constructively as his father's agent at the time of the accident, and the car was not engaged in the father's use or service, the injured party's case should be dismissed; this, however, without prejudice to his right to sue the son.—*Heisenbuttel v. Meagher*, 147 *N. Y. Sup.* (*New York*) 1087.

Should Pass on Right

Pennsylvania Court holds that, under ordinary circumstances, a motorist should pass on the right of a vehicle or pedestrian coming in the opposite direction.

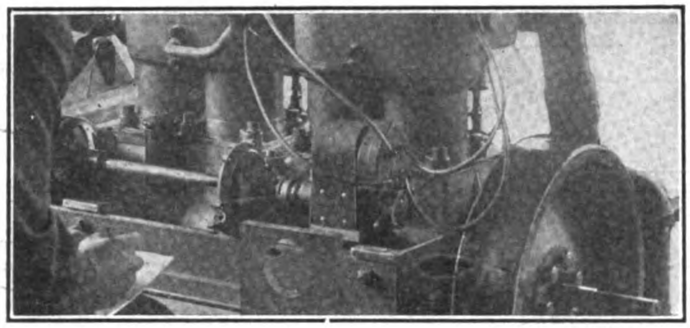
A motorcyclist who was struck and injured in a collision with an automobile while going west on the north side of Walnut street in Philadelphia sued the owner of the car for his injuries and succeeded in recovering judgment against the woman who owned the car, the Court holding that the chauffeur should have passed to the right instead of swerving over to the left of the street.

The chauffeur contended that a team was coming at a "terrible rate"; that he thought it was a runaway and was only trying to avoid a collision when he turned to the left side. The witnesses for the motorcyclist however stated that there was no team present at the time of the accident and the jury, adopting this view, found for him.—*Hazzard vs. Carstairs*, 90 *Atl.* 566.

Automobiles Not Liable to Tax

In a recent case in Idaho it was held that the State Legislature had the right to exempt motor vehicles from taxes by reason of the provision in the State's Constitution which gave them the power to exempt from taxes from time to time in any cases where such a procedure might seem necessary and just.

In this case a resident of Ada County petitioned for a mandate to compel the County Assessor and the Board of County Commissioners of that County to assess all motor vehicles that had escaped the 1913 tax under the Highway Commission Act. The petitioner was beaten, however, for the Court held that it was within the power of the Legislature to exempt automobiles, as there was a provision that registration fees of motor vehicles was to be in lieu of all taxes, general or local, it was only just to so exempt them.—*Achenbach vs. Kinkaid*, 140 *Pac.* (*Idaho*) 529.



The Rostrum

Thinks Two-Cycle Motors Are Passé

EDITOR THE AUTOMOBILE:—For some time I have been reading in the Rostrum the letters of people who are interested in the two-stroke cycle motor. It seems to me about time that some one else took a hand in the discussion.

Why should any one who has the benefit of modern experience and modern engineering progress wish to revert to the early days of the industry when the car was fortunate if it could cover 5 or 10 miles without breaking down?

Of course I don't say that all two-cycle engines are afflicted with this sort of trouble, but when the four-cycle type has attained its present development, with its smooth running qualities and even torque distribution, I cannot see why anyone should want to experience the sensations which I had when I was the fond (?) owner of an old Elmore which with its overlapping explosions, missing fire and ill-smelling exhaust used to haunt my waking hours and, like Macbeth, murder sleep.

Of course the principle of the two-cycle is very attractive, the simplification of parts, the absence of valves and several other factors render it of continued interest of those of an experimental turn of mind, but for the practical automobilist, it seems to me that it is foolish to waste time worrying about this type of construction. There are plenty of other things around an automobile that can be more readily improved upon and which the average car owner would be more likely to stand a chance of improving than this particular department of internal combustion engine construction.

If I am not sensible in putting forward these views on the subject I would like to hear from other motorists and perhaps from some of our engineers who are partial to motors of the two-cycle variety.

New York City. E. R. CRILLEY.

Holding Delicate Parts in a Vise

Editor THE AUTOMOBILE:—A mistake that a great many amateur automobile repairers make when working on a finished automobile part is to clamp the piece directly in a vise without any means of protection.

The sketch, Fig. 2, shows how a piston pin, for instance, should be held in order that the pin will retain its perfect original roundness. Place the pin between two blocks of soft pine, preferably, if wood is available. Any kind of wood is better than no wood at all. In fact almost any soft material may be used such as copper, lead, leather, and even a great many thicknesses of cloth. Remember that the jaws of a vise are hard.

This is about the best way to hold a threaded piece without ruining the threads.

Lead Keys for Light Work

Fig. 1 illustrates a carbureter lever that was originally made without a key or keyway, clamping means being provided by use of a split boss and screw as indicated. However, through carelessness one of the split projections was broken off as shown, rendering the lever useless. The lever was made good again by filing a keyway in the lever boss and chipping and filing a similar one in the shaft. The keyway thus made was a trifle larger than a piece of ordinary soldering wire, the latter being used for making the key. This was done by cutting off short pieces of solder and ramming them into the keyway "cold" by use of the tang of a file.

The lever is solidly fastened and there is little danger of it slipping off. The solder can be rammed in to almost any degree of tightness.

New York City. W. F. SCHAPHORST.

Some Starters for Ford Cars

Editor THE AUTOMOBILE:—Can you put me in communication with the maker of reliable self starter for a Ford car? I am in the market for a starter, electric preferred. Speaking candidly to you, I cannot walk, therefore drive my car with hand levers, and for this reason I am in need of a reliable self-starter. Will you advise if you can get a line on

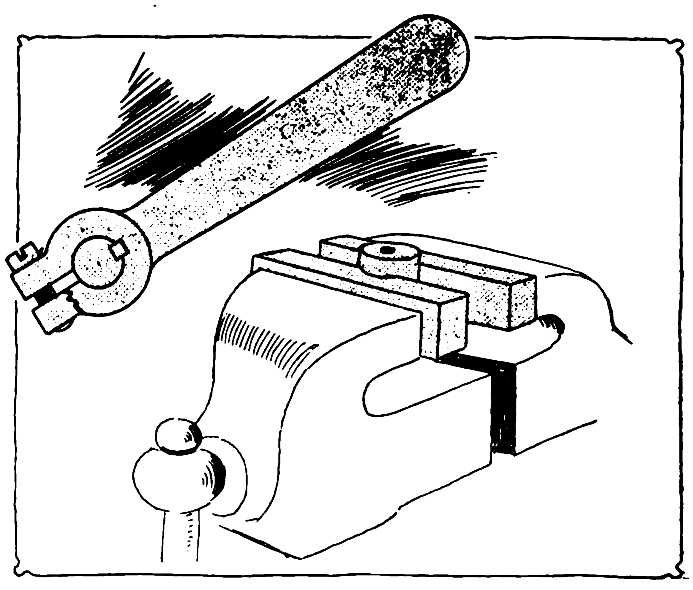


Fig. 1—Upper—Clamping a carbureter lever with a split boss and screw. Fig. 2—Lower—Using wooden blocks for holding delicate parts in a vise

the Detroit Electric Company starter called Deaco, and if said starter is put out by a concern that is reliable?

Warwick, N. Y. E. P. MAIDMENT.

—The Deaco is manufactured by the Detroit Electric Appliance Co., Detroit, Mich. As stated elsewhere in this issue, we cannot pass upon the merits of any given device.

Below is a list of the various types of starters made especially for Ford Cars together with the names and the addresses of the companies. The mechanical types, in which muscular power is required, have been omitted because this kind would be of no use to you.

Electrical starting systems similar to those employed on larger cars offer the advantage that the electric lighting of the car is obtained by the same system. Some of these systems have been produced in a form specially adapted for installation on the Ford.

Another type of engine starter is the compressed-air type in which the motor is made to store air under pressure in a tank, the air then being released into an air motor when it is desired to start. One of the advantages is that the compressed air thus provided always is at hand for tire inflation.

Starters of the spring type differ from those just described in that the engine itself stores up the power by which it subsequently is cranked. The rotation of the crankshaft in ordinary running winds up a spring which when released by the pressure of a foot button whirls the engine over rapidly. Such an one is the Ever Ready, made by the American Ever Ready Co., New York. It is attached in front of the radiator and takes the place of the starting crank. It is about the size of a headlight and looks like a headlight reversed.

A starter of the spring type is the Gardner, made by the Gardner Engine Starter Co., Chicago. This one is inserted in the transmission system, and the only part visible is the foot button which operates it. It is so arranged that after the start connections automatically are established for rewinding the spring.

Another starter designed for the Ford is the Knapp, a compression spring starter operated by a pedal which turns the engine direct on the magneto. The Knapp starter costs $25.00 and weighs less than 50 pounds. It is manufactured and sold by the Fawkes Auto Co., Minneapolis, Minn.

The Boston mechanical starter of the Automatic Appliance Co., Boston, Mass., is of the chain-pull type. It is so arranged that none of the apparatus is visible except the handle on the dash. C. E. Bridges, Chicago, has a pull-type starter which is installed easily. It sells for $12. The Perfection Auto Starter, Denver, Colo., has a pull-type starter operated by a pedal. Attachment is easy and the outfit is listed at $25.

Of the electric systems, one is the Fisher, made by the Fisher Electrical Works, Detroit, Mich. The equipment consists of a motor and generator mounted one above the other in a single housing, a storage battery box, wires, lighting and starting switches, ammeter, chain and sprockets and reflectors for the headlights. The claim is made for this outfit that it can be applied by the owner of the car and that without drilling a hole or altering any part of the engine. With a slight change in the starting crank it may be left in position.

One of the first concerns to market an electric cranking and lighting system for Ford cars is the Northeast Electric Co., Rochester, N. Y. The Ford apparatus consists of a motor-generator driven by silent chain from the crankshaft of the motor, suitable accessories such as brackets and fastenings, and a battery. In operation, pressure on a pedal causes the Ford engine to start, because the battery current flows through the cranking motor. When the engine picks up its cycle the pedal is released and the generator comes into play charging the battery.

A simple starting and lighting system for Ford cars is manufactured by the Detroit Electric Appliance Co., Detroit, Mich., which the owner of the car may himself install. A motor-generator driven by silent chain supplies the current when the car is operating at sufficient speed, but at low speeds, or when the motor is stopped, a battery attached to the running board furnishes the current. Pressure of the heel upon a pedal sends current from the battery to the starting motor, which in turn cranks the engine. All the terminals are marked in some way and the wires cut to exact size, so that the installation is a simple matter.

The Leece-Neville Co., Cleveland, O., has produced an electric starting and lighting system for Fords, designed for quick installation. The Gray & Davis Co. has announced a starting-lighting system for this car, which is very compact and can be installed in a few hours by any garageman. The feature of the system is that the Edison storage battery is used, by which means a lighter and more compact battery is obtained than is possible with the more common lead plates.

The Kellogg Mfg. Co., Rochester, N. Y., has brought out the Kellogg Air-Ford starter, with simplicity, efficiency and moderate cost as the aim. The Kellogg-starter is built under the Durno pattern. A four-cylinder Kellogg air pump is mounted conveniently upon the motor and driven by chain from a gear on the forward end of the crankshaft; this stores air in the storage tank, which upon the pressure of a button on the floor board is released to a starting cylinder which drives backward a piston in that cylinder, pulling a chain over a sprocket on the crankshaft.

The motor is turned so fast that one impulse turns it over several times. A spring returns the drum and prepares the starter for a second application of power. The outfit is supplied ready for attachment on the Ford at $70.

The Gemmer-Detroit Starter Co., Detroit, Mich., has a new air-starter system in which a single instrument performs the function of both the air compressor and the air motor. This combined motor-compressor is in reality a four-cylinder air pump mounted on the engine and driven from the timing gears. When running as a pump it stores up compressed air in a special tank which may be released either for tire inflation or for engine cranking. When air from the storage tank is admitted to the combination unit it runs as an air motor connected to the crankshaft of the engine by gears. Thus it spins the crankshaft at a speed of about 200 revolutions per minute. The total weight of the system is about

Fig. 2—Fireless cooker used as an extra seat

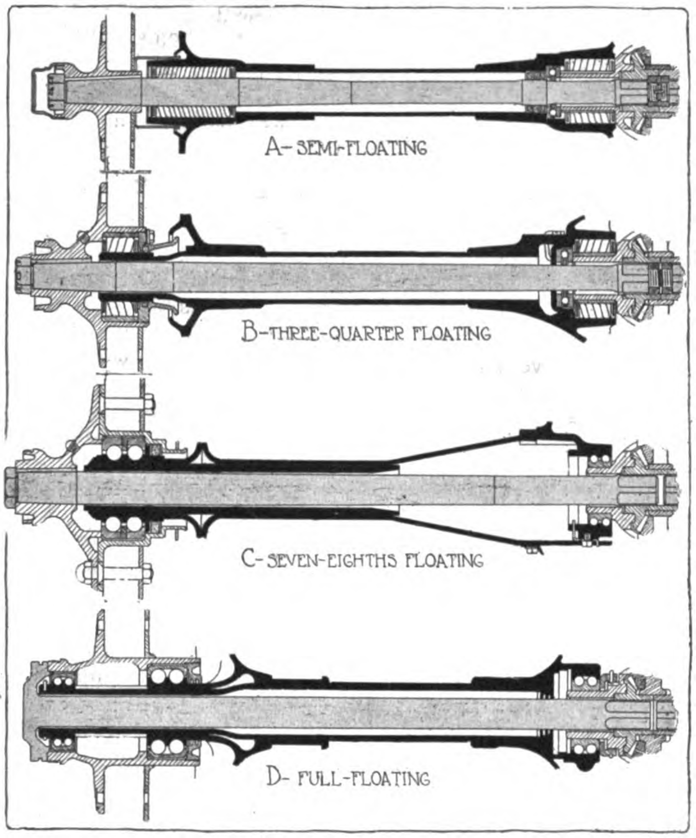


Fig. 3—Weston-Mott rear axle constructions, A is semi-floating, B is three-quarters, C is seven-eighths and D full-floating

35 pounds. A special installation has been developed for Ford cars, designed with a view to quick application.

Fireless Cooker for Seat

Editor THE AUTOMOBILE:—Fig. 2 shows an automobile which is equipped with a fireless cooker, which is used as an emergency seat for carrying extra passengers.

The owner of the car, who resides in Toledo, O., has a summer home at Lakeside, 50 miles distant. At the time of leaving home the cooker is pressed into service and upon arriving at the end of the route, the chicken or roast is ready for serving. To the owner and his family this cooker has been one of the most essential parts of the touring equipment. The cooker, having been made with an upholstered top, can be used as an extra seat.

Port Clinton, O. LOUIS P. WARNER.

Discard Radius Rods for Simplicity

Editor THE AUTOMOBILE:—1—Kindly state in your columns why so many manufacturers are using the rear springs to take the final drive through or why they are doing away with radius rods.

2—Give the pros and cons of the semi-floating and full-floating type axles.

New Matamoras, O. F. N. S.

—1—The principal reason for discarding the radius rods is simplicity. It is obvious that when the drive is taken directly by the springs that the manufacturer has saved on the cost of production and also reduced the number of wearing parts. Many manufacturers believe that the drive can be just as successfully transmitted through the springs as through radius rods, but as both constructions are widely used it is difficult to say which is better.

2—Below are two letters, one from the Weston-Mott Co., and the other from the Packard Motor Car Co., showing the advantages of semi-floating and full-floating axles. Last week the views of the Pierce-Arrow Motor Car Co. on this subject were given in a letter entitled, Pierce Prefers Semi-Floating Axle.

F. A. Bower, Chief Engineer of the Weston-Mott Co., says, "Fig. 3 shows the four types of axles, the semi-floating, three-quarter, seven-eighths and full-floating types, these being designated by the letters A, B, C, D, respectively. While the blueprint is explanatory in itself, we will try to show in detail the advantages of the three-quarter and full-floating types over the semi-floating.

"On semi-floating axles, the entire weight of the car comes directly on the axle shaft, which in time has a tendency to cause this shaft to crystallize and break. This condition is overcome, however, by making the shaft exceptionally strong to withstand crystallization.

"The three-quarter floating type, has all the advantages of the semi-floating on account of fastening the shaft at center of axle, but instead of taking the load on the shaft, it takes load on the axle housing. Therefore, the only strain thrown on the axle shaft on the three-quarter-floating type is the torque required to turn the wheels, and the shaft also assists to steady the wheel. This type is preferable to the semi-floating on this account, as any possibilities of shaft troubles are done away with.

"C shows the Weston-Mott single bearing hub full-floating type. On this type the shaft can be removed without jacking up car and it has all the advantages of the full-floating, shown in D, with the exception that the shaft helps to steady the wheel. The advantages of the type shown at C over the type shown at B is that the construction of C permits removal of the shaft. In B the hub and wheel only can be removed, but not the shaft.

"D shows the standard full-floating type of axle. This means that the only strain taken on the shaft is the torque required to turn the wheel. This shaft can also be removed by simply taking off the hub cap and pulling it out.

"Regarding the advantage of bolting the shaft at center of the axle over the type which slides into an intermediate hub—it may be stated that when a shaft is bolted, it is practically assured of always setting tight, but when the shaft slides into the hub, after continuous wear, it may develop a slight looseness. However, this is not a serious disadvantage, as this type of axle has been made for a considerable number of years and complaints as to wearing of shaft and causing looseness are very few. In fact, they are not enough to cause the slightest worry."

Semi-Floating Axle Lighter—Packard

Russel Huff, consulting engineer of the Packard Motor Car Co., in comparing the semi- and full-floating types states:

"The question of why the Packard company uses the semi-floating rear axle construction instead of the full-floating construction is oftentimes put up to Packard salesmen to explain. The following are some of the more important advantages and reasons why we use the semi-floating type of rear axle construction instead of the full-floating type on our touring cars:

"1—Weight—The full-floating type of rear axle design is heavier than the semi-floating type.

"2—Accessibility—In the Packard construction, the rear wheels can be removed much more easily and quickly than with the full-floating construction. The same thing that makes the wheel in full-floating construction difficult to remove, also makes it difficult to hold grease in this construction.

"3—Structural Points—The full-floating rear axle construction calls for the rear wheels to be mounted directly on the extension of the rear axle housing. In studying the two types, we anticipated serious trouble in cases where a car skidded into curbstones, or met with other similar accidents, where the force was sufficient to break the wheel and bend the supporting member. In recent years we have seen several cases where the tubular extension, which carries the rear wheel in the full-floating type, has been bent by ordinary skidding into curbstones, and which called for an entire new rear axle housing simply because one end of it was slightly bent. Repairs for a slight accident of this kind with this construction might become very expensive; whereas in the semi-floating type of construction, like the Packard, nothing but the straight driving axle would be bent, and this can be replaced without great expense.

"4—Service Expense—We have also seen these tubular extensions in the full-floating construction broken off by crystallization from overload or ordinary fatigue, and here again the expense for a new housing is many times greater than would be the expense for a new axle which might break for the same reason.

"5—Bearings—The rear wheels in the full-floating construction are usually carried on two anti-friction bearings placed rather close together on the tubular housing extension. These bearings are subject to the same wear and tear as the front wheel bearings, and if not kept in close adjustment, produce a serious wobble to the wheels, which in time may cause the breakage of a driving axle. The semi-floating construction has a massive single bearing supporting the wheel near the hub, and a bearing in the differential in the center of the housing for keeping the axle in alignment.

"6—Driving Axles—The average full-floating type of rear axle now on the market does not have proper provision for securing the axle in driving position. We have seen many cases where the hub cap, which is designated to hold the axle in position, has been lost and has allowed the axle to work out of engagement with its driving members. It is no unusual sight to see cases on our streets where the driving axles are held in position by strings and wires because the hub cap has been lost.

"7—Use of Wire Wheels—It is almost impossible to get a good wire wheel installation on a full-floating rear axle. In order to accomplish it at all, it is necessary to have the driving clutches and the rear wheel bearings very small in diameter. If ample diameters, such as are standard on some of the well-known makes of cars using full-floating construction, were used, the wire wheel hub diameter necessary to slide over these would become too large to be practical for interchangeability between the front and rear wheels.

"8—Extra Universal Joints Required—The full-floating driving axle, to be practical and safe, should drive the rear wheel through some form of universal joint. All universal joints in an automobile eventually chafe and wear and produce a serious cluck and jerk in the transmission line, due to the increased lost motion of the worn parts. It has been the Packard idea from the beginning to reduce the number of universal joints in the transmission line to a minimum. This is one reason why we have the rear axle transmission and the semi-floating type of rear axle drive.

"This semi-floating construction is also used by the Pierce in this country, and the Renault and many others abroad."

Wants Information on Beach Records

Editor THE AUTOMOBILE:—To settle a wager will you please publish the records for miles made at Ormond Beach by Marriott in a steam car, and those made later by Burman and Oldfield with a Benz. Also the fastest time officially or unofficially made by Duray with a Fiat at Ostend. I think I have seen somewhere in print that in one of his trials he made a speed of 150 miles per hour.

Gibson, N. C. SUBSCRIBER.

—The fastest time made at Ormond for 2 miles was that of the Blitzen Benz driven by Burman on April 23, 1911. when he covered that distance in 51.28. Oldfield in the same car made that distance in 55.87. The Stanley steamer driven by Marriott made 2 miles in 59 3-5 seconds in 1906.

On December 16, 1914, Arthur Duray, in a 300-horsepower Fiat, attained a speed of 142 miles an hour in an attempt to secure the world's flying kilometer record. The attempt on this record was carried out on the shore road near Ostend.

Road Turns Marked with L or R

Editor THE AUTOMOBILE:—I have noticed several roads around South Bend, Ind., and have also followed their route to Albany, N. Y., and also up into Wisconsin. The turns of the route are marked with a large L or R as the turn may be to the left or right. The route and markings has appealed to me very much and I would like to know who is behind it and also who did the marking.

South Bend, Ind. CHAS. H. FRAZIER.

—The National Trail Blazing Assn. of St. Paul, Minn., is the association behind the marking of these routes.

Water Leaks from Pump Cups

Editor THE AUTOMOBILE:—1—Will you please tell me how to prevent water leaking out of the grease cups at either side of the water pump?

2—The spark lever on my car is very hard to turn, especially when the motor is hot. Where do you think the trouble is and how can I remedy it?

3—What is the best way to keep tires from sticking to the rims?

Albany, N. Y. J. H. H.

—1—You are using too light a grease in these grease cups with the result that when the motor gets warm the grease becomes very fluid and allows the water to leak. In hot weather you should use a heavy grease, probably the hardest that you can buy will be the most satisfactory. However, as soon as cold weather sets in substitute a lighter grease.

2—While this stiffness may be in any of the joints of the linkage operated by the spark lever, it is most likely that the breaker box is too tight a fit, so that when the motor becomes heated the expansion of the part on which it fits causes it to stick.

Disconnect the breaker box from the linkage and note whether it moves freely. If it does not, remove it and rub the interior surface with emery paper until enough material has been removed to allow it to work freely.

3—In order to keep the tires from sticking to the rims it is necessary to prevent the rusting of the rim and this is most satisfactorily accomplished by the use of flake graphite. The graphite is mixed into a creamy paste by adding a small percentage of gasoline. This is then applied to the rims the same as ordinary paint. The gasoline evaporates and leaves the graphite which not only prevents rusting to a large extent but holds the bead of the tire away from the metal of the rim.

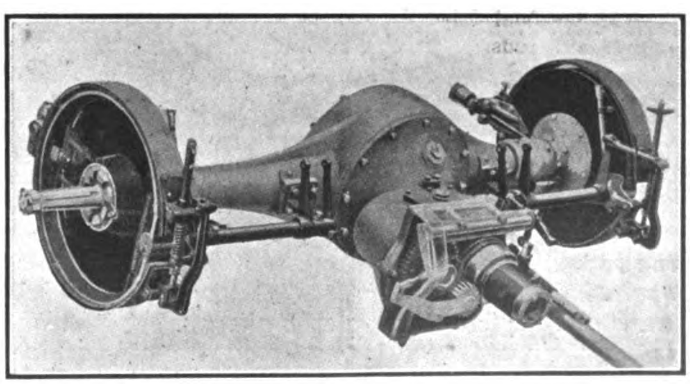


Fig. 3—Packard rear axle, showing semi-floating construction

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Rubber versus Rails

IT is significant that it is the president of one of the largest railway systems in the Middle West who has pointed out the importance which the automobile has attained in Iowa, which is also typical of its status in the other States of the Union.

He states that more than 100,000 automobiles are licensed in Iowa and that the amount of money expended on them by the people annually is in excess of that spent for railroad travel inside the State. The automobile and public roads questions, according to this railroad president, have become more important to the public than the railroad question. People are more concerned with the price of rubber than with that of steel rails, more concerned with the cost of gasoline than with that of coal, more interested in having perfect highways than perfect railways.

But what is more significant, this official looks for an element of consolation in this state of affairs and finds it. He points out that "the man who is concerned with many things is never narrow minded; the citizen who realizes the cost of maintaining and operating an automobile, the cost of perfect highways and their upkeep, also realizes what it means to maintain and operate a railroad; he will not deal broadly with one and narrowly with the other." Thus the development of one will aid the other.

Truck Users in Line

NOW that there is assured a convention of motor truck manufacturers in conjunction with motor truck dealers, why not go one step farther and invite the motor truck users to participate?

The successful operation of a truck depends on the manufacturer, the dealer and the owner. If one is a failure, the others can not reach that degree of success which they should. The interests of the maker and the dealer are very closely allied, but the field of the owner is equally close to them. Successful truck operation interests all three to such an extent that it might be advisable to consider having a day given over to the subject of truck owners' affairs.

There is a precedent for this in our national road organizations, which divide their sessions and give one day to road users, who take up those problems of first interest to them.

Truck Owners' Day would be a red letter one in a motor truck convention. The owner has many questions he would like to ask the truck maker and the truck dealer. There are many problems on so-called service that would be well threshed out if the owner, the dealer and the maker were in the same room at the same time and discussing this all-important subject. The owner could give the maker not a few points of interest and also give some facts of first-class value to the dealer. The owner would benefit because he would receive many criticisms and suggestions where designs could be improved and on the other hand the owner would realise the difficulties encountered by the truck manufacturer, and would not make unreasonable demands.

Then, there are problems in which all three are concerned. A union meeting of these three factors in the truck regime would solve many questions on driver difficulties, tire mileage, overloading, overspeeding, time payments, etc., that are bothering all parties and will continue to bother them until some get-together meeting of this kind takes place.

The truck owners' day could be fathered by some organization outside of the makers and dealers, preferably some club that would faithfully represent their interests. One thing is certain, namely, that if a score or more representatives of truck owners could be gotten to such a convention much good would result. It would be one of the best possible things for the truck interest. It would breed more confidence between owner and maker. Today there is too much doubt and too much uncertainty.

The owner doubts the work of the maker. He distrusts the vehicle, the guarantee and the service assurances. On the other hand the maker imagines the owner is attempting to destroy the truck as rapidly as possible. A little getting together will bring the maker and the owner on common ground. One will see that the other is human, and vice versa. Common interests will be discovered. The net result will be a better understanding, and the engendering of a spirit of unity for the motor truck industry that will be a most valuable asset to it. Let us see if the owner cannot be interested. A dozen owners might represent over 1,000 trucks.

239,902 Cars From 25 Detroit Plants in 6 Months

Output Is 77,902 Without Ford Production—1,258 Commercial Vehicles Built—Fifteen Make Over 1,000 Cars

DETROIT, MICH., July 27—According to information furnished by 25 manufacturers of automobiles in this city they have built during the first 6 months of 1914, that is between January 1 and June 30, a total of 239,902 cars.

Leaving out of these statistics the 162,000 cars made by the Ford Motor Company, there remains an output of 77,902 cars for the other 24 manufacturers.

Of the 25 concerns located in the Michigan automobile metropolis from whom data was obtained, 17 make pleasure vehicles and some of them also commercial vehicles; 5 are exclusive manufacturers of commercial cars and 3 make electric vehicles.

A total of 237,794 pleasure cars were made by the 17 companies. Not including the 162,000 cars made during the first 6 months of this year by the Ford Motor Company, the total number built by the other 16 manufacturers is 75,794.

The 5 commercial vehicle manufacturers built 1,258 delivery wagons and trucks. The three electric vehicle manufacturers reported having constructed 850 vehicles.

Of the 27 concerns having furnished information, one made more than 150,000 during the first 6 months of this year; 3 made more than 7,500 each; 4 made between 5,000 and 7,500 cars; 6 made between 2,000 and 5,000 cars, 3 made between 1,000 and 2,000 cars and 10 made less than 1,000 cars each.

Europe Is Speed Mad—Heaslet

DETROIT, MICH., July 25—Vice-president and chief engineer J. G. Heaslet of the Studebaker Corp. returned a few days ago from an extensive trip through England, France and Germany, during which he made a close investigation of the trend in automobile construction abroad and the requirements of the foreign market in relation to American export business.

In speaking about his trip Mr. Heaslet said:

"Everyone is familiar with the fact that Europe has far better roads than America. There has been time to build them and the various countries over there are intersected with splendid highways. The result is that the European motor car owner drives at a far higher speed than the American motorist and he keeps his car going at a much greater average pace. Rough roads keep the speed low in America; good roads force it to the top notch in Europe.

"Consequently in Europe with the ultimate power of the engine almost constantly in use the driving parts are continuously subjected to the greatest strain and stress and these conditions are much harder on the car. Our rough roads may develop only rattles because of the bumps and jars; in Europe all the driving parts are put to the severest test and the whole car must prove its strength and durability or fail.

"This is a matter that must be seriously considered in manufacturing cars for European consumption and the ultimate car is the automobile that is capable of taking all types of stress—that will meet all requirements for both Europe and America.

"As soon as American roads are improved as they are in Europe, American and European standards will become more nearly identical, and this result will be more to the advantage of American manufacturers than to those of the old World, as American makers will then be able to build a quality car which more nearly comes up to European ideals and at a price with which foreign manufacturers cannot compete."

P. K. Hexter Brings Out Stepless Bus

NEW YORK CITY, July 28—A stepless double-deck bus seating 38 people has been brought out by P. K. Hexter, New York City. The door is at the right side and the floor is so low that passengers can step, without difficulty, directly from the street into the bus. When the bus stops alongside the curb the floor is practically flush with the sidewalk.

Access to the upper deck, which is open, is had through a stairway that runs back from the side door. The conductor sits directly in front of the door and staircase. Accidents to passengers are largely eliminated because it is impossible to jump on or off the bus until the conductor opens the door. It is a very roomy design.

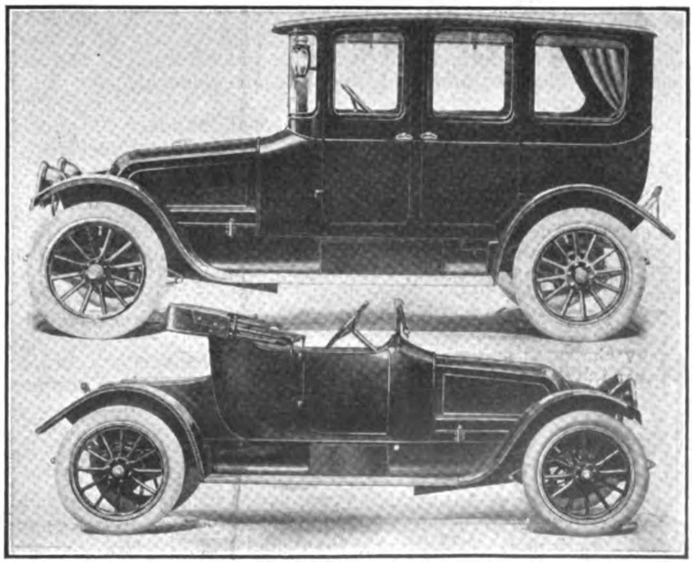
The chassis used is equipped with a 5 by 6-inch motor and the Hexter system of gasoline electric drive which was described in the October 9 issue of THE AUTOMOBILE, page 663. The gasoline motor and generator are mounted at the front while the electric driving motor is at the rear, the drive being transmitted to the axle by a worm gear. With the electrical form of transmission the floor can be placed as low as desired.

New Franklins Lower in Price

SYRACUSE, N. Y., July 27—The most important feature of the announcement of the Series Six-Thirty by the H. H. Franklin Mfg. Co. is a substantial reduction in price. The touring car and roadster are to sell for $150 less, while the reduction on other models has been even more. The prices of the new machines are: Touring car and roadster, $2,150; coupe, $2,600; sedan, $3,000, and Berlin, $3,200.

In the new model the body is larger, the sides of the seats higher and the upholstery is finished off in a roll around the tops of the seats. A shutter effect is used in the front of the hood instead of the old type grill. Goodrich Silvertown cord tires or Goodyear Power Saver tires are now standard equipment. Increased silence has been obtained by using skew bevel gears in the rear axle. The starting and lighting system has been simplified and made lighter and more accessible. The weight, however, remains the same, 2,750 pounds.

NEW YORK CITY, July 28—W. E. Fisk, secretary of the New York State Automobile Assn., and M. Rocomora, manager of the road guide department, have started from Hornell on a pathfinding tour through the state to meet the officers of the local automobile clubs to make final arrangements for the 1914 official tour of the state association, which commences August 31 and continues for over a month. This city is scheduled as one of the stopping points in the official tour of over 3,000 miles.



New Franklin Berlin and roadster models

Chalmers "Light 6" at $1850 —Dealers Vote $50 Raise

Convention of 500 Agents Also Boosts "Master Six" $125 to $2400— Guarantee for Second Hand Cars

DETROIT, MICH., July 25—The most important among the various decisions taken at the recent convention of dealers or representatives of the Chalmers Motor Company, Detroit, was the unanimous approval by the 450 to 500 agents present of the raise in price of the 1915 Chalmers cars, model 26B, the "Light Six" to cost $50 more or $1,850 and model 29, the "Master Six" to cost $125 more than the 1914 models, or $2,400.

This is rather surprising considering that most of the other automobile manufacturers who have announced their 1915 models made a reduction in their prices. "If the men who are to dispose of our output approve of our policy in increasing our prices instead of cutting them, it's a pretty good indication that they believe we are bringing out a car which is fully worth its price," said an official of the Chalmers company. "As we do not sell our cars on a consignment basis, as the dealers buy their supply of cars from us, it is quite natural that they would be the first ones to protest against a raising of the prices if they thought it unjustified. But just the contrary has happened."

Another important decision by the majority of the dealers was that hereafter second hand Chalmers cars will be sold by the dealers with a guarantee, just like new cars. In most cases used cars will be handled entirely separate just as if it were a different business.

The new Chalmers Dealers Service Policy was also adopted by all and will be of the greatest assistance to Chalmers owners and drivers, who will now be able to secure service from any Chalmers dealer in any part of the country, no matter where the owner or driver bought his car. For instance if a motorist bought his Chalmers in New York and is in Des Moines, Ia., requiring special service, he will get it from the local Chalmers agent. The new policy contains the following three clauses, in effect among all Chalmers dealers:

First.—It is our intention to give each and every purchaser of a Chalmers car fair and business-like treatment. Should any customer not receive such treatment, we ask in good faith to be advised.

Second.—We will make all necessary repairs and adjustments, without charge, for one month after delivery of car, provided car has not been tampered with or injured through accident.

Third.—We will install, without charge for labor, any parts that may be replaced as defective by the Chalmers Motor Company, or ourselves, for a period of ninety days after date of delivery of car; after such date, all work will be done in a careful and workmanlike manner and our regular charge made for same.

(Signed) Dealer..............

Many of the officials and dealers at the convention made informal speeches touching upon a great variety of subjects interesting the industry. Here is a list of some of the subjects: "The Automobile Business In General," by Hugh Chalmers, president; "Salesmanship and Advertising Principles," by Lee Owell, assistant general manger; "Manufacturing Methods," by H. H. Pinney, works manager; "Service and Engineering Principles," by Geo. W. Dunham, consulting engineer; "Advertising," by Lee Anderson, manager advertising department; "Selling Cars and Salesmanship," by Lee Counselman, general manager; "The Second Hand Car Problem," by James Levy, Chicago; "Service To Owners," by H. L. Keates, Portland, Oregon; "Following Up Sales Prospects," by Geo. Stove, New York; "Personal Salesmanship," by E. W. Wyckoff, Pittsburgh; "Maintaining Show Rooms," by J. J. Mandary, Rochester, N. Y.; "Educating Salesmen," by C. E. Whittin, Lynn, Mass.; "Covering Territory and Establishing Sub-dealers," by E. C. Anthony, San Francisco; "Service To Owners," by O. L. Weaver, Cleveland.

Haynes Light Six for $1,485

KOKOMO, IND., July 28—The feature of the Haynes line for 1915 will be a light six of 55 horsepower, to sell for $1,485, fully equipped. It will be furnished both in two and five-passenger body styles, will have left hand drive and center control, and will be fitted with the vacuum system of gasoline feed.

In addition to this model the Haynes Automobile Co. is offering a big six rated at 65 brake horsepower and selling for $2,250, and a four developing 48 horsepower and selling for $1,660. The light six is an entirely new model. The electric gearshift will be continued on the big six and the four, but it is not fitted to the light six. Closed bodies are fitted to the big six and the light four.

The weight of the light six, completely equipped, is 2,950 pounds and the wheelbase is 121 inches. A unit power plant with three-point suspension has been adopted and it includes an L-head block motor 3.5 by 5 inches, three-plate clutch and three-speed gearset. A full-floating rear axle is used and the springs are semi-elliptic all around. Artillery wood wheels are found.

New Brasie Co. To Make Cyclecars

MINNEAPOLIS, MINN., July 25—The Brasie Motor Car Co., 2743 Lyndale avenue S., Minneapolis, Minn., is a $100,000 corporation for the manufacture of automobiles and trucks. It takes the place of the former Brasie Motor Truck Co., which manufactured the Twin City truck. In its incorporation the company enlarges its scope and will make a cyclecar pleasure car and cyclecar delivery, as well as a trailer.

J. M. Michaelson, formerly maker of the Minneapolis motorcycle, the Shapiro-Michaelson motorcycle and the Michaelson cyclecar, has associated himself with the Brasies in the new company. As secretary he will have charge of sales and advertising. F. R. Brasie, president and treasurer, will control the purchasing and shop, and Mrs. (E. C.) Brassie is vice-president.

Delivery of trucks has begun, cyclecar deliveries will begin in thirty days and pleasure cars in sixty days. The latter is to be known as the Messenger and the former as the Packet, on the theory that the name should show the purpose of the cars. The car is adapted especially for mercantile men to take orders and collect money in the Messenger and to deliver goods in the Packet. The trailer is a 56-inch tread two-wheel cart on ball bearing wire wheels with pneumatic tires arranged to attach to the springs of a Ford or other light car, instead of the axle. The capacity is 400 pounds and the price $75.

Until its air-cooled engine is perfect the company will make a chassis with a four-cycle, four-cylinder, water-cooled engine, with magneto ignition, friction transmission with belt drive to rear wheel. The wheels are wire, the tread 40 inches and wheel base 90 inches. The engine will develop 16 to 22-horsepower. The gasoline capacity is four gallons. The front springs are full elliptic and the rear semi-elliptic. The delivery car has a panel body 28 1-2 by 51 1-2 inches by 4 feet high and will carry thirty-six single grocery delivery boxes. The capacity is 400 pounds and the price $400. The weight is 900 pounds. The same chassis is used for the pleasure car which has a sociable seat. The cars are electric lighted.

The Twin City truck chassis will be continued at two-ton capacity at $1,350, with body to suit purchaser.

A Record 10 Months for National Company

INDIANAPOLIS, IND., July 25—The annual meeting of the stockholders of the National Motor Vehicle Co. was held this week. According to George M. Dickson, general manager, the season just closed has been an exceptionally good one.

"It has been customary to hold these annual meetings in

Light car made by the Herreshoff Motor Sales Co., Troy, N. Y.

September," said Dickson, "but we closed our fiscal year this season on June 30, which gave us only a 10 months' year. As soon as inventory could be completed our reports were ready and show that the last 10 months have been the most successful the National car has ever enjoyed."

Dickson has been associated with the National company in executive positions for many years. In fact, many of the heads of departments at the National have been there for years, a striking contrast to the changing personnel of other automobile concerns. The National factory is operating full time, and Dickson said that business is maintaining a good average.

When questioned about the properties adjoining the National factory, which have been acquired by that company, Mr. Dickson stated that they were not ready to announce the details of the new National buildings, but this year's successful business meant that there would be no curtailment and that the addition contemplated would go forward as planned.

Illinois Garage Owners for Uniform Prices

DECATUR, ILL., July 28—One hundred garage owners from various points of Illinois assembled this week in Decatur to attend the convention of the Garage Owners' Assn. of Illinois, which was organized last winter in Chicago. William McGinley, president of the Decatur Automobile Club, delivered the address of welcome. He devoted considerable of his talk to the subject of good roads and tendered the association the co-operation of the Decatur club in any legislation that would work for the betterment of road conditions. Mr. McGinley was elected an honorary member of the association. Robert Bland of Chicago, president of the association, delivered one of the principal addresses of the convention. He referred to the drunken driver, the speed maniac and the man with so much money that he did not care how many fines he was assessed, as the three classes of the motorist who are a menace to the automobile industry as well as to society. It is these whom the garage owners association are fighting and they are to be found in all walks of life.

C. B. O'Hara of Chicago, discussed the various qualities of gasoline on the market and furnished some interesting observations on prices and variations in grades.

Sparta reported that the city and county had been completely organized, every garage owner being in line and that the result had been an agreement to establish uniform prices for gasoline and accessories, the combination ensuring better service for the public.

Chalmers Absorbs Boston Distributor

BOSTON, MASS., July 25—On August 1 the Chalmers Motor Car Co. will take over the entire business of the Whitten-Gilmore Co., that has handled the Chalmers cars in Boston and vicinity for several years. The Whitten-Gilmore Co. will go out of business entirely and the partnership of Ernest A. Gilmore and Charles E. Whitten will be dissolved. Mr. Whitten has the agency for a line of cars and trucks at Lynn, Mass., that he will continue. Mr. Gilmore will take a vacation for some weeks before he does anything. Already a number of makers are trying to get him to take over an agency for their cars. The dissolution of the partnership will throw the agencies for the Saxon car and the Federal trucks on the market.

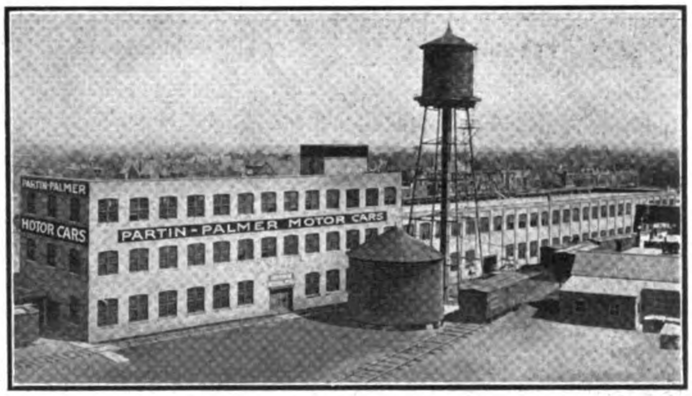
Eastern Jeffery Distribition for Poertner Co.

NEW YORK CITY, July 27—The Poertner Motor Car Co. has been appointed eastern distributer for the Jeffery car, manufactured by the Thomas B. Jeffery Co., Kenosha, Wis. The Poertner company will continue to handle the National and Waverly cars. The salesrooms now located at 1922 Broadway will be removed to 1759 Broadway.

New York Taxicab Competition in Sight

NEW YORK CITY, July 28—The International Cab Co. will on October 1 begin operating taxicabs in this city with charges of $.25 for the first half mile and $.05 for each additional quarter mile, making $.35 for the first mile, and $.25 for additional miles. P. J. Holdsworth, formerly manager of the Yellow Taxicab Co., will be general manager of the new service.

Upon the heels of this announcement is the statement that the Mason-Seaman Transportation Co. will put 200 taxicabs into service at about half the present rates. This would make the tariff $.20 for the first half mile and $.05 each for additional quarter miles. These 200 cabs will be for public hacking only and will not respond to telephone orders. If the experiment is successful more cars will be employed.



New plant of Partin Mfg. Co., Chicago, Ill.

Partin Co. Takes Over Staver Plant

CHICAGO, ILL., July 28—The Partin Mfg. Co., this city, has acquired the large automobile plant formerly operated by the Staver Automobile Co. at Auburn Park Station, Chicago.

Chassis and Body Parts Given Drawback

WASHINGTON, D. C., July 23—A drawback allowance was today granted by the treasury department on the exportation of automobiles and automobile bodies manufactured by J. M. Quinby & Co., Newark, N. J., with the use of imported chassis, aluminum, hardware, metal fittings, plate glass, woolen carriage cloth, various kinds of laces, carpet, waterproofed fabrics for tops, leather, metal chains, rubber tires and other fabrics and materials.

Briggs-Detroiter Dealers in Session

DETROIT, MICH., July 25—Beginning Monday, July 27, the annual convention of dealers handling the Briggs-Detroiter will take place under a big tent specially set up for that purpose on the factory grounds of the Briggs-Detroiter Co. "We expect such a large gathering that we could not take care of them in our offices," said one of the officials of the company. "Anyhow, with this warm weather the men will rather like the idea of being outdoors."

Grossman Pays 100 Cents on the Dollar

NEW YORK CITY, July 27—The creditors' committee, which took charge of the Emil Grossman Mfg. Co., last January, has turned the business back to Emil Grossman unconditionally. At that time it was promised to pay 100 cents on the dollar and this obligation has been fulfilled.

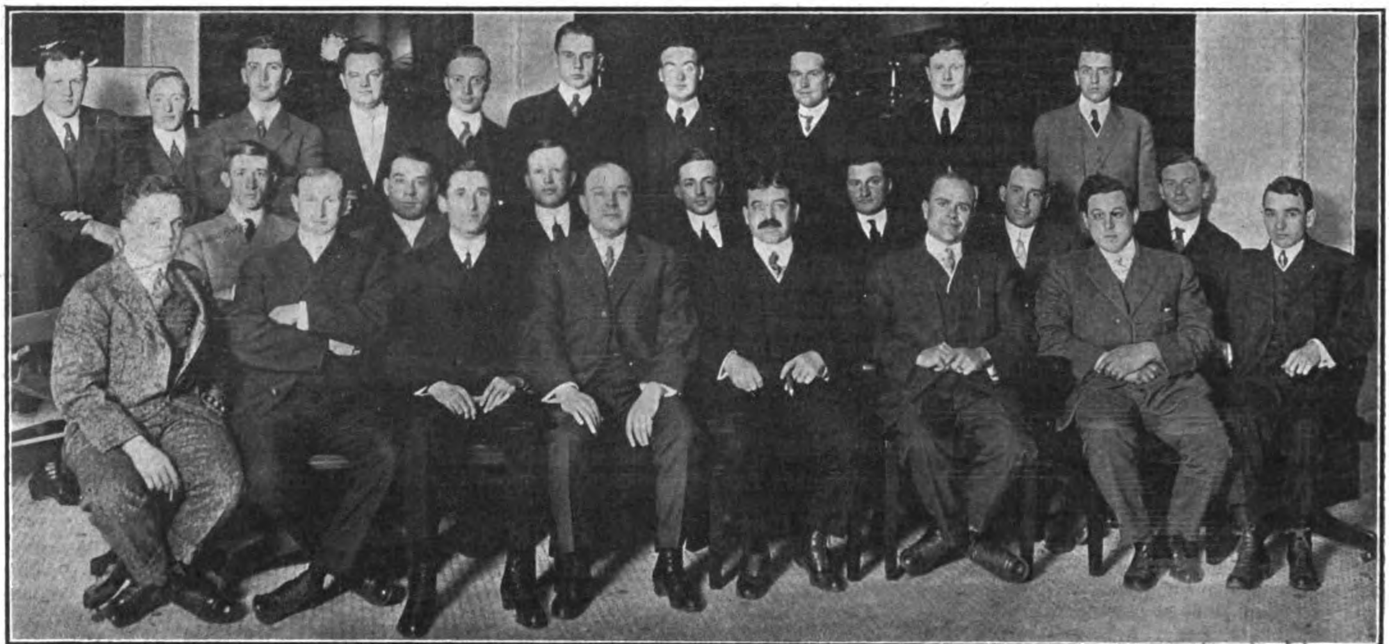
The creditors' committee was appointed for the protection of creditors and customers on Jan. 20, and was due to the facts that the removal of the Grossman factories from New York and Detroit, the installation of additional machinery and equipment, the erection of three new buildings and two kilns at Trenton, N. J., proved a tremendous drain on the cash resources as a result of not producing goods for 2 months.

Notwithstanding the disadvantages under which the Grossman company has been operating it is stated that substantial increases in both business and profits have been made and it is stated that 348 manufacturers have contracted for Red Head spark plugs alone.

Hayden Is Pullman General Manager

YORK, PA., July 24—At a recent meeting of the stockholders of the Pullman Motor Car Co., this city, the following changes were made: H. W. Hayden, general manager; H. W. Conrad, sales manager; J. J. Croghan, auditor, and C. G. Swartz, superintendent.

DETROIT, MICH., July 29—*Special Telegram*—The K. C. B. Co., with a capital of $200,000, has been organized here to bring out a new carbureter for heavy fuel. This company is a reorganization of the Chambray Carbureter Co. The incorporators are: J. H. Chambers, C. H. Bennett and A. A. Leslie, all officers of the Chambray company.



Recent meeting of San Francisco sales force of the Pacific KisselKar branch

A Test of Safety Signals by Life Protective Society

Danger of Rear-End Collisions Obviated by Devices Shown to N. Y. Safety First Society

NEW YORK CITY, July 25—A demonstration of a number of ways in which the driver of a car can make known to those behind him whether he intends turning right or left or stopping was held yesterday under the auspices of the Automobile Technical Sub-Committee on Street Traffic of the Safety First Society, New York. While most of the devices were thoroughly practical and worked well, only one or two have reached the stage where they are offered for sale.

The demonstration was held at 119th Street and Claremont Avenue and was divided into two parts. At 5 o'clock p. m. the daylight test was made and at 8:30 the dark test, in which the illuminating features were brought out. The cars carrying the signals were sent, one at a time, around the block, paced by a motorcycle and followed by the committee car. In all cases the signals did what was required of them. The Automobile Technical Sub-Committee consists of A. B. Cumner, Chairman; David Beecroft, Arthur J. Slade, George H. Robertson, Joseph Tracy and Frederick H. Elliott, Secretary.

The following brief descriptions of the devices shown will serve to give an idea of the many tentative solutions of the problem of eliminating the danger of accidents from rear-end collisions:

Walz Has Three Openings

The Walz Auto Direction Signal, shown by E. A. Walz, Jr., 505 Fifth avenue, consists of a metal casing attached to the rear of the car, having three glazed openings behind which are electric lights. Two of the openings are at right and left of the device, near the top, and are quite large, while the third, below them and in the middle is smaller, is fitted with a red lens and is the regulation tail-light. The larger openings are illuminated by the manipulation of a switch under the driver's control. When the one on the right is lighted up it shows an arrow-head pointing to the right, indicating that the car is about to turn to the right; on the other side the arrow of course points to the left. Illuminating both arrows at the same time indicates "stop."

The device exhibited by James M. Pugh, 1978 Bathgate avenue, Bronx, is of the shutter type, there being a horizontal row of metal slats that can be turned with either of their flat sides outward or edgewise. The flat sides are lettered "Left" and "Right" and the device is operated by magnets controlled by a switch under the driver's hand. An electric light illuminates the letters at night, and a red tail light is part of the device.

What looked like a diminutive railroad signal attached to the right rear fender was the signal devised by Lester D. Mayne, 110 W. 40th street, New York. An arm carrying three lenses in a row is pivoted to swing across the face of an electric light carried on a standard. The side lenses are lettered "L" for left, "R" for right and the middle one "S" for stop and the control, which is through a steel cable operated by a sort of selective lever working in a notched plate, causes the desired lens to be brought in front of the lamp. The lever is worked by pressure of the driver's arm, so that he does not have to take his hand from the steering wheel.

Signatelle—A Semaphore Type

The Signatelle was shown by Dr. Joseph Mandelbaum, 332 W. 145th street, New York, and is of the semaphore type in that when the driver is about to turn to right or left the signal throws up an arrow-shaped arm pointing in the proper direction and at the same time rings an electric bell. When the car is to stop a slide goes up revealing the word "Stop" in illuminated letters on a glass plate. At night the arrows each carry two small electric bulbs.

Auto Signalite Uses Cylinder

The Auto Signalite is of less recent vintage than most of the signals shown, being already on the market. It has a horizontal cylindrical casing with an opening through which the words "Right," "Left" and "Stop" appear when the roller device carrying the lettering is brought around by the driver. The device is made by the Auto Signalite Co., 737 Seventh avenue, New York.

The Grinden Art Metal Co., 427 Marcy avenue, Brooklyn, showed a signal with three glass panels, one on the right, one on the left and the third below the other two, with the necessary lettering for right, left and stop, the latter at the bottom. Lamps inside the casing illuminate the letters.

Gibson Has Two Lenses

William Gibson, 440 E. 156th street, New York, showed a lamp with two lenses one above the other and illuminated by the same lamp. The lower lens, which is green, is covered by a brass shield ordinarily, and the upper lens, which is red, left exposed as a tail light. When the car is to stop the green lens is uncovered automatically, being connected with the brakes so that a red light above a green one shows, railroad style.

The Au-To-C illuminator shown by Harry Searles, 1187 Halsey street, Brooklyn, is an illuminated license number, the figures being formed on glass and thrown into sharp relief by a lamp behind the glass.

Perhaps the most unusual signal in the lot was the Auto-Block, shown by Geo. A. Cole, of Hayes & Diefenderfer, 21 W. 62d street, New York. The signal is on the front of the car. There are two yellow disks, each about 4 inches in diameter, and each with an electric lamp in its center. The disks are on the ends of long spring steel strips which, when levers are moved, shoot out some eighteen inches or so and allow the lamp and disk to wave up and down in a rather startling manner. The signal can be seen from either front or rear because of its projection. Both disks out at once means stop.

Edward Stern, 40 W. 13th street, New York, showed the Nokolyd signal, which is of the illuminated type with lettered glass panels in front of an inclosed electric light. The signal was mounted on the right rear fender.

200 at Hupp Dealers Congress

DETROIT, MICH., July 25—The second annual Hupmobile convention will take place at the plant of the Hupp Motor Car Co., July 20 to August 1, with the presence of about 200 dealers who are expected from all over the country and abroad.

The programme is as follows:

July 30—Registration of dealers and informal reception of the dealers by President J. W. Drake. In the afternoon the dealers will be given a boat ride and supper at Bob-Lo.

July 31—Morning session: Talk on "The Medium-Priced Car Dealer Has a Staple Product," by F. J. Money, sales and advertising manager; "International Selling Methods," by C. H. Dunlap, general export manager; "Territorial Organizations," by A. C. Robbins, Los Angeles distributor; "Spirit of Service," by F. G. Fox; "Direct by Mail Advertising," by Palmer E. Winslow, advertising department; "Newspaper Advertising," by M. G. Ward, of the Dunlap-Ward Advertising Company; "Hupmobile Advertising Plans for 1915," by J. G. Roe, Hupp Motor Car Co., advertising department. Afternoon session: "The New Hupmobile Construction," by F. E. Watts, chief engineer; "Chassis and Electric Construction," by Don T. Hastings, assistant chief engineer. A detailed description will be given of the new car, and disassembled and assembled parts, etc., shown during the course of this lecture. Evening: Theater party at the Temple.

August 1—"Hupmobile Plant Organization and Factory Capacity," by S. H. Humphrey, manufacturing manager. Trip through the plant under Mr. Humphrey's direction. Further discussion on new models and display of new cars in factory sales rooms. Evening: Banquet at Hotel Pontchartrain.

Packard Uses Tungsten Valves

DETROIT, MICH., July 24.—In the July 16 issue of THE AUTOMOBILE it was stated that the valves in the Packard motors are nickel steel. This is an error, as the Packard valves are tungsten steel.

Coupe de l'Auto Course Picked in Auvergne

PARIS, July 15—Piston displacement has been reduced from 183 to 153 cubic inches for this year's *Coupe de l'Auto* race, and in order to make the event unusually difficult a mountainous course has been selected through Auvergne, where brakes will be an important factor. At present only nine entries have been received. These comprise three Mors cars, two Scap, one Pierron, and three Peugeots. These latter will be driven by Boillot, Goux and Rigal. It is announced that one of the Mors racers will be handled by Demogeot.

On the same day, and over the same course, it is intended to run a race for light cars having motors with a piston displacement of 85 cubic inches maximum.

Lindhe Sold Shim Patent Rights?

NEW YORK CITY, July 27—In the case of Eric G. Lindhe against the Laminated Shim Co., a bill of particulars has been filed by the defendant in answer to the motion for same, made July 3 by the plaintiff.

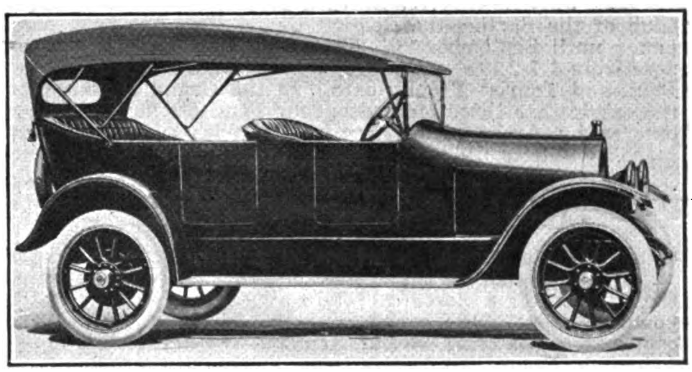
In this bill of particulars the defendant alleges that the contract, pursuant to which patent No. 969,709, covering the shim involved in the suit, was obtained and assigned to the Lindhe Shim Co., was a verbal one between William B. Nisbet, Theodore B. Nisbet and Carlton N. Aborn, who supplied the Lindhe Shim Co. finances, and Eric G. Lindhe, about August, 1910. The defendant further alleges that the said contract was employed to construct a special machine for the making of shims under the patent mentioned. This machine was made, according to the defendant, in April, 1911, before the application of Lindhe for the patent. The "authorization, full knowledge and consent" of the plaintiff to the sale of the patent rights of the Lindhe Shim Co. to Frederick P. Craig is said to be in writing and forms a part of the minutes of the Lindhe Shim Co. It is also alleged that the transfer from Frederick P. Craig to the Laminated Shim Co., Inc., of these rights is in writing and a matter of public record.

Convention of Jeffery Dealers Called

KENOSHA, WIS., July 27—Five hundred dealers representing all sections of the country will be in attendance at the Jeffery Chesterfield convention, to be held at Kenosha, August 4 and 5, at the factory of the Thomas B. Jeffery Co. The announcement of the Jeffery Chesterfield six, illustrated herewith, and which was described in THE AUTOMOBILE for July 23, will undoubtedly result in many changes in Jeffery representation in many sections of the country with new additions to the organization. Two days will be given to the assignment of territory to visiting dealers, the exhibition of the new cars and demonstration of the Jeffery Quad, the truck of Jeffery manufacture which has been adopted by the United States Government.

Chesterfield has 34 by 4 Inch Tires

In the description of the new Chesterfield Jeffery six which appeared in THE AUTOMOBILE for July 23 it was stated that 33 by 4-inch tires are used. This was a typographical error, as 34 by 4 tires are the correct size.



The new Jeffery Chesterfield six selling for $1,650, which is to be introduced to the dealers at the convention to be held at the factory August 4 and 5. The car uses 34 by 4-inch tires

Group of the district representatives of the Thomas B. Jeffery Company, Kenosha, Wis., who were in conference at the factory last week. These men will have charge of Jeffery distribution in the twenty-three districts into which the country has been divided

Dodge Bros. to Employ 10,000 in October

DETROIT, MICH., July 28—*Special Telegram*—Dodge Bros. will put about 10,000 men to work beginning October when a million dollar addition to the plant will be completed. This consists of a four-story assembly room, 1,000 feet long and 70 feet wide, and a press punching building. Machinery worth $300,000 will be installed. The total floor space will be 20 acres and will make it one of the largest factories in the country. A testing track in the shape of a racing circle of a quarter of a mile is being planned.

Col. Pope Can Sell Personal Property of Co.

HARTFORD, CONN., July 28—By agreement of the parties, Judge Marcus H. Holcomb of the superior court passed a substitute order today concerning the sale of a part of the Pope Mfg. Co. assets in Connecticut. The substitute order authorizes Colonel George Pope, the receiver in the Connecticut jurisdiction to sell at his discretion the personal property, not including cash or receivables, at prices not less than 70 per cent. of the inventory value in the smaller sales and no sale over $5,000 shall be less than inventory value without the approval of the superior court or a judge of that court.

The appeal of the Boston creditors' committee from the original order of Judge Holcomb allowing Receiver Pope to sell the property at his discretion as to prices, was withdrawn today and it is understood that about $40,000 worth of the machinery and material can be disposed of immediately. The court order allowing Receiver Pope to conduct the manufacturing business expires August 20 and the factory will close at that time.

Belgian Grand Prix for September 20

PARIS, July 21—By reason of a protest by the Automobile Club of the Sarthe, the Belgian Grand Prix has been postponed until September 20. There will be two races for, respectively 4 1-2 liter machines as built for the French Grand Prix, and Tourist Trophy cars. In the Grand Prix section the entries are three Mercedes, four Peugeots, and a Delage entered by Arthur Duray. The Mercedes entry has been made by Pilette, Belgian agent for this firm.

In the Tourist Trophy section the entries are three Minerva, an Abadal, a Gregoire, and three Sunbeams. The Sunbeam entry appears to have been made by the Belgian agent for this firm, and it is very doubtful if the factory will confirm it.

Market Reports for the Week

There was a general reduction in prices this week in the markets. In the metal markets, tin and copper reduced their prices. Tin closed at $30.75 at a loss of $0.95 per 100 pounds. Electrolytic copper dropped $0.00 2-5 while Lake copper dropped $0.00 3-8 per pound. A further decline is anticipated. Sales thus far are light, as the future of the market depends upon developments in Europe. Lead was dull and unchanged. Pennsylvania petroleum dropped to $1.65 a barrel, a reduction of $0.05. Linseed oil rose $0.04, closing at $0.60, with a strong market. Up-river Para dropped $0.01, closing at $0.72.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¼	.05¼	.05¼	.05¼	.05¼	.05¼	....
Beams & Channels, 100 lbs.	1.26	1.31	1.31	1.31	1.31	1.31	+.05
Bessemer Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	....
Copper, Elec., lb.	.13⅖	.13⅖	.13 3/10	.13¼	.13⅛	.13	—.00⅖
Copper, Lake, lb.	.13½	.13½	.13 9/20	.13½	.13¼	.13⅛	—.00⅜
Cottonseed Oil, bbl.	7.23	7 19	6.86	6.79	6.90	6.90	—.33
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	....
Fish Oil, Menhadden, Brown	.40	.40	.40	.40	.40	.40	....
Gasoline, Auto, bbl.	.14	.14	.13	.13	.13	.13	....
Lard Oil, prime	.93	.93	.93	.93	.93	.95	+.02
Lead, 100 lbs.	3.90	3.90	3.90	3.90	3.87½	3.87½	—.02½
Linseed Oil	.56	.56	.56	.58	.58	.60	+.04
Open-Hearth Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	....
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	....
Petroleum, bbl., Pa., crude	1.70	1.70	1.70	1.70	1.70	1.65	—.05
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	....
Rubber, Fine Up River, Para	.71	.71	.73	.73	.73	.72	—.01
Silk, raw, Ital.	...	4.90	...	...	4.90	4.90	....
Silk, raw, Japan	...	4.35	...	...	4.28	4.28	—.07
Sulphuric Acid, 60 Baume	90	.90	.90	.90	.90	.90	....
Tin, 100 lb.	31.70	31.60	31.15	30.50	30.25	30.75	—.95
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	....

Klaxon Brings Suit Against Newark Dealer

NEWARK, N. J., July 28—The Lovell-McConnell Mfg. Co., this city, maker of the Klaxon horn, has filed suit in the U. S. District Court in this city against the W. C. D. Motor Car Co., Lozier dealer; it is charged that the dealer infringes the original Klaxon patents, Nos. 923,048, 923,049 and 923,122, by using the Sparton horn as standard equipment. This is a different court district from those in which other Klaxon suits have been filed.

Studebaker Liabilities Shrink $2,216,000

NEW YORK CITY, July 29—Net earnings of the Studebaker Corp., for the 6 months ended June 31, after fixed charges, depreciation, etc., and before dividends, amounted to $3,027,844. The net earnings, on the same basis for the full year 1913, before dividends, amounted to $1,904,413.

The liabilities during the period have been reduced by $2,216,000. The cash on hand amounts to $3,228,000.

The net earnings after charges and depreciation of $3,027,844 reported by the Studebaker Corp. for the 6 months ended June 30, 1914 is equal to 9.2 per cent. on the common stock after deducting preferred dividends or at the rate of 18.4 per cent. for the year. This compares with 3.59 per cent. earned on the common stock for the year ended December 31, 1913.

Locomobile Co. Makes Statement of Condition

NEW YORK CITY, July 27—The Locomobile Co. of America, a corporation organized under the laws of West Virginia, reports the following statement of its condition on May 31, 1914:

Assets—	1914	1913
Real estate	$1,992,638	$1,924,092
Merchandise	3,872,342	3,696,751
Mfg. mdse., material and stock in process	911,447	..
Cash and debts receivable	..	1,038,979
Good-will, trade marks, patent rights	*5,305,892	4,986,460
Sundry	217,354	..
Total	$12,299,673	$11,646,291
Liabilities—		
Capital Stock	$6,250,800	$6,250,800
Accounts payable	293,228	512,463
Reserves	323,529	..
Funded indebtedness	2,186,070	1,460,504
Profit and loss surplus	906,046	749,425
Total	$12,299,673	$11,646,291

*Includes cash and debts receivable.

Iowa Spends $20,000,000 on Automobiles

DES MOINES, IA., July 25—Iowa bankers would like to depress the automobile business in Iowa "psychologically" or otherwise, according to leading Des Moines financiers who claim that the automobile industry has taken $20,000,000 out of Iowa this year.

"Whatever this psychological business depression is," says this banker, "I am convinced that the automobile industry is not suffering from it. I am sure that the automobile industry either has no nerves or is not of a skittish temperament.

"The amount of loans which Des Moines banks have outstanding is double what it was at this time last year. The automobile business is largely responsible for this condition. Farmers are buying automobiles faster than they can pay for them. They borrow money from the country banks on the prospects of enormous crops promised for this fall. The country banks borrow in turn from Des Moines banks.

"More than $20,000,000 already has been spent in Iowa for automobiles this year. The number of cars registered at the State House showed an increase of 25,000 over last year for the first six months of the year. The continued demand for money from the country banks indicates that the increase will be as great or greater for the last six months of the year.

"Nearly all this money is absolutely lost to Iowa. Not only does the actual cost of the automobiles go east but also a large share of the cost of maintenance. This is a heavy drain on the resources of the state. It would be well if the automobile business could be depressed for a time."

But Iowa distributors continue to report that they have only one trouble and that is to get cars enough to meet the demands from their territories.

Fuel Competition Brings Further Reductions

NEW YORK CITY, July 28—The Standard Oil Co. of New York has made a further reduction of a cent a gallon in the price of gasoline, largely as a result of competition. Both the Texas Co. and the Standard Oil are now quoting $.13 a gallon to the garages, in this city, Brooklyn and Long Island. The Gulf Refining Co. is still quoting $.14 for gasoline in this territory.

The price of gasoline has been reduced in St. Louis by the Standard Oil Co. to $0.10 2-5 a gallon, half a cent lower than it has been selling since the last previous cut. The gasoline price in East St. Louis, is a fraction of a cent higher than in St. Louis.

In New Jersey the gasoline war has culminated in a bench warrant being issued for the Standard Oil Co. of New Jersey, upon complaint of the Crew-Levick Oil Co., one of the several companies which have been engaged in that controversy. The price has been forced down to $.09 1-2 wholesale, in certain towns. The complaint charges that the Standard company is unreasonably cutting prices in an effort to wipe out smaller competitors.

Considerable surprise is being expressed as to the cause of the low price at which gasoline is being sold by some dealers in Rochester. Prices have been cut there from $.17 to $.12 1-2, $.13 and $.14 a gallon. The recent decline in the price of crude oil at the wells has much to do with the downward trend of prices for petroleum products.

Prices around Boston and Hartford have remained about the same. In Boston, gasoline is sold at $.14 with no indication of change. In Hartford the same price prevails, a reduction having been made last week from $.15.

Goodrich Half Year Profits $2,651,278

NEW YORK CITY, July 28—The following statement is made by the B. F. Goodrich Co., relative to earnings for the first half of 1914:

"The books of the B. F. Goodrich Co. were closed on July 1 for the purpose of determining the results of operations for the first 6 months of 1914. They have not been audited by public accountants, but the company's auditor has just submitted to the directors a statement of earnings for the period.

"After making proper allowances for maintenance, depreciation, bad debts and all known outstanding liabilities, etc., the net profits for the period amounted to approximately $2,651,278. This amount added to the surplus carried over December 31, 1913, shows undivided profits of approximately $2,307,261, after deducting the regular April and July dividends on the preferred stock.

"From this amount the company has appropriated an amount sufficient to retire $900,000 par value of preferred stock. The amount of quick assets over current liabilities shows a gain of approximately $1,628,508 for the period."

Automobile Securities Quotations

NEW YORK CITY, July 29—War indications in Europe affected the stock market considerably this week, and accentuated the weak tone of practically all the listed securities. The unlisted stocks were also affected and although there were a few gains in both listed and unlisted securities there were a greater number of losses while about 1-3 of the automobile and allied securities remained at the same quotations as last week. The tire companies made the strongest showing, Firestone common having gained 10 points while the preferred gained 1-2 point. Kelly-Springfield common gained 2 points and the first preferred 3 points. Goodyear common advanced 6 points while the preferred declined 2 1-2. There was no change in most of the car companies although Reo Motor Car gained 1 point while Reo Motor Truck lost 1-2 and Studebaker common showed a gain of 1-2 point on the common and a loss of 1-2 point on the preferred. Oil stocks were generally weak, Texas Co. losing 15 points while Vacuum lost 9.

	Wednesday		Thursday		Friday		Saturday		Monday		Tuesday		Week's	1913	
Security	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Change	Bid	Asked
Ajax-Grieb Rubber Co. com	220	..	220	..	220	..	220	..	220	..	220	..	..	150	160
Ajax Grieb Rubber Co. pfd	99	..	99	..	99	..	99	..	98	..	98	..	—1	94	100
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	97	100
Case T. M. Co., J. I.	82¼	85¼	82¼	85¼	82¼	85¼	83	85¼	82	85	82	85	— ¼	..	..
Chalmers Motor Co. com	100	103	100	103	100	103	100	103	97	102	97	102	—3	..	112
Chalmers Motor Co. pfd	94	96	94	96	94	96	94	96	94	96	94	96	..	98	102
Electric Storage Battery Co	51	51½	50¾	51½	51½	..	51	51½	50	51	50	51	— ¾	..	..
Firestone Tire & Rubber Co. com	305	310	305	310	305	310	305	310	315	..	315	..	+10	280	282
Firestone Tire & Rubber Co. pfd	108	110	108	110	108	110	108	110	108½	110	108½	110	+ ½	103	104¼
Garford Co. pfd	75	85	75	85	75	85	75	85	75	85	75	85	..	92	96
General Motors Co. com	88	92	88	92	88	89¾	87	90	83	84	83	84	—7	30	32
General Motors Co. pfd	91	93	91	93	91	93	90¼	93	89	91	89	91	—2½	73½	77
B. F. Goodrich Co. com	24½	25	24⅜	24⅝	23¾	25	23¼	24	22½	23½	22½	23½	—1¼	30	31
B. F. Goodrich Co. pfd	88⅜	90	88⅜	90	88⅜	90	86	90	88	89	88	89	— ⅜	90½	92½
Goodyear Tire & Rubber Co. com	174	178	174	178	174	178	174	178	180	185	180	185	+6	298	302
Goodyear Tire & Rubber Co. pfd	97½	99	97½	99	97½	99	97½	99	98	100	95	100	—2½	99½	100¼
Gray & Davis Co. pfd	98	102½	98	102½	98	102½	98	102½	98	102½	98	102½	..	..	..
International Motor Co. com	..	3	..	3	..	3	..	3	..	3	..	3	..	3	5
International Motor Co. pfd	3	9	3	9	3	9	3	9	3	9	3	9	..	18	25
Kelly-Springfield Tire Co. com	51	53	51	53	54	55½	51	55	52	53	52	55	+2	..	..
Kelly-Springfield Tire Co. 1st pfd	70	80	75	80	73	75	74½	75	73	76	73	75½	+3	..	..
Kelly-Springfield Tire Co. 2d pfd	90	100	90	100	90	95	90	95	89	91	90	100	..	..	..
Lozier Motor Co. com	..	14	..	14	..	14	..	14	11	14	11	14	..	15	20
Lozier Motor Co. pfd	..	40	..	40	..	40	..	40	..	40	..	40	..	..	90
Maxwell Motor Co. com	14¼	14¾	14¼	14¾	14	15	13¾	14¼	13½	14½	12½	13½	—1¾	3¼	4
Maxwell Motor Co. 1st pfd	43½	45	44	45	43½	45	43¼	44	41½	43	39	40	—4½	28½	29½
Maxwell Motor Co. 2d pfd	17	19	17	19	18½	19	16	19	15	18	15	16	—2	8½	9¼
Miller Rubber Co	138	140	138	140	138	140	138	140	138	140	138	140	..	138	140
New Departure Mfg. Co. com	124	126	124	126	124	126	124	126	124	127	124	127	..	..	..
New Departure Mfg. Co. pfd	105	108	105	108	105	108	105	108	105	108	105	108	..	..	..
Packard Motor Co. com	103	112	103	112	103	112	103	112	..	112	..	112	..	..	..
Packard Motor Co. pfd	97	100	97	100	97	100	97	100	97	..	97	..	..	95	102
Peerless Motor Co. com	10	17	10	17	10	17	10	17	10	17	10	17	..	30	40
Peerless Motor Co. pfd	..	50	..	50	..	50	..	50	..	50	..	50	..	85	92
Pope Mfg. Co. com	..	1	..	1	..	1	..	1	..	1	..	1	..	10	11
Pope Mfg. Co. pfd	..	3	..	3	..	3	..	3	½	2	½	2	..	28	33
Portage Rubber Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	35	42
Portage Rubber Co. pfd	..	90	..	90	..	90	..	90	..	40	..	40	..	..	90
*Reo Motor Truck Co	11½	12½	11½	12½	11½	12½	11½	12½	12	13	12	13	— ½	9	10
*Reo Motor Car Co	19	20½	19	20½	19	20½	19	20½	20	21½	20	21½	+1	18	19
Rubber Goods Mfg. Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. com	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	51	52	51	52	51	52	51	52	..	48½	..	48½	..	..	..
Stewart Warner Speedometer Corp. pfd	99	101	99	101	99	101	99	101	99	101	99	101	..	..	..
Studebaker Co. com	31½	32	32½	33	32	32¾	32	32¾	30	31	30	31	+ ½	23	24
Studebaker Co. pfd	83	86	82½	86	82½	86	81	85	82	83	82	83	— ½	81	86
Swinehart Tire & Rubber Co	85	87	85	87	85	87	85	87	85	86	85	86	..	82	92
Texas Company	136	136½	135¼	136	134	135	134	135	130	131	120	121	—15	..	..
U. S. Rubber Co. com	57	57¾	56⅝	57⅝	56⅜	56¾	56	56½	56	56½	56	56½	..	60¼	60¾
U. S. Rubber Co. 1st pfd.	101¼	101½	101¼	102	101¼	101¾	100⅞	101¾	100	101	100	101	— ½	104	104½
Vacuum Oil Co	216	219	216	217	210	214	211	215	208	212	207	209	—9	..	..
White Co. pfd	107	110	107	110	107	110	107	110	107	110	107	110	..	104	108
Willys-Overland Co. com	88½	89½	88	88½	87½	88½	86½	87½	85	87	85	85	—4¾	50	60
Willys-Overland Co. pfd	93½	95	93	95	93	95	93	95	92	95	92	94½	—1½	85	90

*The par value of these stocks is $10; all others $100.

No Criminal Responsibility if Car Is Unmanageable

When a Part Becomes Deranged and Affects the Control, Driver Cannot Be Prosecuted for Accidents

WILMINGTON, DEL., July 27—Through the discharge from custody of Nathan H. Hutchins, who was arrested after a motor car he was driving had run down a child on the sidewalk, badly injuring her, the local authorities have made it plain that drivers of motor cars cannot be held criminally responsible for injuries sustained through accidents over which they have no control.

A car Hutchins was driving jumped onto the sidewalk last Friday, knocking down and running over Rosie Sammono, 9 years old, after which the police arrested him, charging reckless driving. It was found that the accident was due to a part on the machine becoming disarranged, causing it to become unmanageable, and when Hutchins was arraigned in the City Court on Saturday, Prosecuting Attorney John F. Lynn entered a nolle prosequi. The child is expected to recover. She is in the Delaware Hospital.

Form Club for New York Motor Tradesmen

NEW YORK CITY, July 27—For the purpose of providing a social organization for the motor tradesmen of New York City, the Motor Club, Inc., has been formed and has taken possession of the rooms at 222 West 59th street, formerly occupied by the now defunct Manhattan Automobile Club. A restaurant, bar, billiard rooms, library and other essential club adjuncts are provided and members are admitted upon payment of an annual fee of $20.

Aside from its social features the organization plans to use its influence in legislative matters. Dances, entertainments and club runs are planned.

F. S. Toback was elected president of the club at a meeting held on July 28. The other officers are: P. J. McShane, vice-president; W. C. Poertner, second vice-president; J. P. Nichols, treasurer and E. F. Korbel, secretary.

U. S. L. Receivers File $100,000 Bond

BUFFALO, N. Y., July 29—J. O. Moore and J. A. Roberts, receivers of the United States Light & Heating Co., have filed a joint bond of $100,000. Judge Hazel appointed Moore and Roberts to the receivership on July 23. On that day, Louis S. Posner, council for the company. filed an answer to the action of the Central Trust Co. of New York, with a $220,000 claim, admitting all the allegations it contained and consenting to the receivership. The company is capitalized at $17,000,000.

The equity action of the trust company will be tried at a later date here in the Federal court.

Judge Hazel ordered the answer of A. H. Ackerman, vice-president of the U. S. Light & Heating Co., in which he admitted fraud and mismanagement on the part of the board of directors of the company and consented to the appointment of a receivership, be stricken out.

Bosch Demonstrates Its New Lighting System

NEW YORK CITY, July 23—A practical demonstration of its new lighting system was conducted by the Bosch Co. last night in the presence of representatives of the technical press. A Marmon car, which make is the first to be equipped with complete Bosch electrification was run over roads in the neighborhood of Fort Lee, under a variety of conditions. One purpose of the demonstration was to show the advantages which the company claims for its new design of head lamp. This lamp differs from the ordinary type in that instead of producing a long pencil ray the light is distributed more evenly about the entire width of the road in front of the car. This effect is obtained partly by the reflector, which is not strictly parabolic, but chiefly by the use of a special lamp, the filament of which is not concentrated in a focal point as is commonly the case but is spread over a comparatively large flat area.

The lamp is interesting from another point. A new standard lamp base has been adopted by the Bosch Co. as in its opinion the old bayonet type is inadequate. Two sizes have been standardized and all lamps and plug connections conform to one or the other. The new socket is also a bayonet design but by the use of flat surfaces instead of pins for holding the base in the socket a much steadier arrangement results.

To show the ample generating power of the dynamo and the adequacy of the Bosch carbon-pile method of regulation the car was run through a large range of speeds with the battery cut out. Above a certain easy running speed the light from the lamps was remarkably steady.

The installation on the Marmon includes the Bosch-Rushmore starting motor which showed itself well able to handle the six-cylinder motor.

FREMONT, OHIO, July 27—At the annual meeting of the stockholders of the Lauth-Juergens Motor Car Co., Fremont, O., the following were elected directors: J. W. Worst, A. E. Culbert, H. H. Weinhart, J. W. Forsythe, W. A. Lucas, Theodore Juergens and L. C. Worst.

Offers $6,500 for Cameron Co. Assets

HARTFORD, CONN., July 28—E. S. Cameron in the bankruptcy court in New Haven has just made an offer of $6,500 for the assets of the Cameron Automobile Co., of West Haven, which recently went into bankruptcy. The purpose of the hearing before Referee Carleton E. Hoadley was also to decide whether or not the referee could re-open the case and authorize J. Birney Tuttle, an attorney who was appointed trustee, to accept an offer of $17,500 for the assets which was made later. Counsel for the interested parties argued the case which was continued until August 4.

Efficiency Survey Discusses Car Units

CHICAGO, ILL., July 23—At a meeting of the board of technical detail of the American Efficiency Survey of Motor Car Units, held at the Chicago Automobile Club last night, eight units were passed upon and many of the present units in test discussed. The meeting was the result of the efforts of President Harry Newman, who, knowing that the members would be in Chicago, arranged a dinner at the Automobile Club, and there discussed and passed upon various units. Of the seventy-three units to be tested the following ten have already been completed: Spark plugs, magnetos, tires, oil, ignition cable, jacks, hand pumps, power pumps, tow line and brake lining.

The American Efficiency Survey of Motor Car Units, using the testing laboratories of Purdue University, is an organization founded for the purpose of testing all the parts which go to make up a motor car and publishing the reports of these tests in the form of a bulletin. The tests continue through day and night for perhaps many months and engineers in the laboratory are said to take readings every 30 seconds throughout the entire testing period. In other words, after a test by the survey, it is expected that the device will have shown all its characteristics and a report can be given out telling its value with relation to similar devices and just how it acted under varied conditions. A report on the units just passed upon will be issued in 2 or 3 weeks, it is stated. At present tests of motors, carbureters and speedometers are being conducted.

The board which considers the passing or rejection of units is composed of the following Purdue men: C. H. Benjamin, dean of the engineering schools; Prof. Louis E. Endsley, G. A. Young, M. J. Golden, C. F. Harding and R. G. Pilkington, resident engineer.

R-C-H and Hupp-Yeats Assets Bring $100,000

DETROIT, MICH., July 25—At the bankruptcy sale of real estate, machinery, equipment, pattern drawings, repair parts of the R-C-H Corporation and of the Hupp-Yeats Electric Car Co., Detroit, a total of about $100,000 was realized.

Walpole Creditors to Receive 4 Per Cent. Dividend

BOSTON, MASS., July 28—Judge Dodge, in the U. S. District Court, ordered another dividend of 4 per cent. to be paid to the creditors of the Walpole Tire & Rubber Co. $50,000 has been set aside for this purpose. This makes $171,000 thus far paid out.

ALPENA, MICH., July 27—The Besser Mfg. Co., a foundry, bid $5,200 for the plant of the bankrupt Alpena Motor Car Co., and it is probable that the sale will be confirmed by the referee in bankruptcy and the other parties interested. All told, the sale amounted to $6,200.

Speed without Negligence Not an Element of Manslaughter

Driver Who Failed to Slow Down to State Limit Not Held for Michigan Killing

LANSING, MICH., July 25—The supreme court of the state of Michigan, in a decision rendered today, held that the accidental killing of a person by an automobile, even when the car is exceeding the state speed limit, is not manslaughter unless culpable negligence has been proven.

The case concerns Wm. J. Barnes of Lansing, who accidentally ran down a girl in May, 1911, the victim dying in consequence of the accident. Barnes was convicted by the Ingham County Circuit Court, Judge Wiest of that court holding that inasmuch as the state law requires automobilists to slow down to ten miles an hour when approaching pedestrians that Barnes had failed to slow down his car, thus causing the accident. It was shown in the testimony that the girl in her excitement jumped in front of the car.

The supreme court held that Barnes could not be held guilty of manslaughter unless culpable negligence was shown.

Injunction in Twitchell Gauge Case

NEW YORK CITY, July 27—In the case of A. Schrader's Son, Inc., against the 35 Per Cent. Automobile Supply Co., alleging infringement of the Twitchell tire gauge, the plaintiff brought a motion for preliminary injunction on July 20 and July 22 the order for a preliminary injunction was issued *pendente lite*. The motion was not contested by the defendant, whose counsel, Lucius E. Varney, states that the company is not infringing the complainant's rights.

Four Missouri Counties Have No Cars

ST. LOUIS, MO., July 3—For the first 6 months of this year 46,143 automobiles were registered with the secretary of state according to figures made public by the official today. Of this number 10,680 are in the city of St. Louis which has 4,883 more cars registered than has Kansas City, whose citizens have placed 5,797 cars on the books. Jasper county led the counties with 1,465 and was followed by Buchannan with 1,331 while St. Louis county—St. Louis city not included—was third with 1,306. Four counties—Carter, Douglas, Ozark and Reynolds—have no registrations while Shannon and Taney counties have but two each.

During the six months licenses were issued to 5,207 chauffeurs and 849 dealers secured permits to do business in Missouri. The motorcycle registry showed 2,920 power bikes.

The money collected from the registration and applied to the good roads fund was $201,866.50.

Two septuagenarians were among the drivers licensed, one being seventy-one years old and the other a year older.

Minnesota Registrations, 56,634

MINNEAPOLIS, MINN., The state automobile directory issued July 1 places the total registration of automobiles in the state at 53,599 cars. Since then the number has gone to 56,634. The book is issued by Roscoe B. Anderson, Security Bank Building, the head of the Automobile Trail Blazing Assn. The book has outline maps to show the routes in the Northwest that are already blazed, fifteen in all. Monthly sheets will be issued to keep the book up to date. The registration for each car is good for 3 years, so the book starts back in 1912 when the new law was passed.

New Jersey Licenses Exceed 1913 by 9,000

TRENTON, N. J., July 17—During the first 6 months of the present year the State Department of Motor Vehicles has collected $668,393, or $6,947 more than the total sum collected during the entire year of 1913.

Comparison between the first 6 months of last year and this year shows that last year there were 40,394 registrations issued, as against 49,567 this year. The increase in registrations is therefore 9,173.

The number of drivers' licenses taken out this year shows an increase of 10,627 over the corresponding period last year. The licenses taken out this year amount to 55,532, while last year, for the same period, they were 44,905. Fines collected up to June 30, 1913, amounted to $4,716, while in 1914 they totaled $9,004.

Motors of Steel Now Made in Berlin

(*Continued from page* 225)

Steel is the material used wherever possible. It is very thin in the cover and the waterjacket. Even the valve chamber covers are made of light steel pieces. The intake conduits are built into the cylinder block and the space gained by the thin material admits of giving them a very uniform sectional area throughout their length. The exhaust pipe is a curved steel tube with walls from 1.5 to 2 millimeters thick. The cylinders are of a special steel and machined inside and outside, while the valve guides are turned from castings and pressed into the respective steel sleeves forming parts of the block. A special process, not disclosed, is followed in producing the joints of cylinders with waterjackets, of the jackets with their upper covers and of the valve boxes with the intake pipes.

A special design feature is that the cooling-water when it enters the cylinders is first led under the exhaust valve chambers before it can rise. For this purpose the apertures are provided which may be seen in the plan view below the section of the induction pipe.

A steel bedplate with bolt holes connects the lower cylinder ends and serves for the securing of the block to the crankcase and to increase the stability of the whole.

With regard to the exterior appearance of these and other steel motors of this manufacture a remarkable smoothness in lines and joints is a striking feature. The block shows no seams but, with its flanges and the exhaust pipe, appears as machined all over.

The weight, as compared with the lightest cast cylinders, is about one-third, but it is considered a greater advantage that the thin walls admit of a very effective water-cooling which in turn admits of increased compression and a much enhanced thermic efficiency of the motor. Another advantage is that almost any requirement of the designer with regard to shapes, the dimensions of conduits and the thickness of walls can be executed with great accuracy in the pressed-steel parts, so that no compromises, possibly affecting the operation, need to be made.

The question of price depends largely on the quantity of production. For small orders it comes relatively high, but in the case of mass production it can be made equal to or even lower than that for ordinary motors. The manufacture is already on a practical basis through its connections with large German automobile builders who will employ the products.—From *Der Motorwagen*, July 10.

Reading Torsion Dynamometers

AN improved method for taking optical readings from torsion dynamometers is described and illustrated by Volkmar Vieweg in *Zeitschrift des Vereines Deutscher Ingenieure* for June 20. It depends upon the use of a system of lenses which revolve with the dynamometer, the axis of the system being parallel with the shaft of rotation, and in whose focal plane are arranged the scale and the index to be observed. The advantages consist in the simplicity of the arrangement and in the sharpness and strong illumination of the images. It was originated at the Physico-Technical Government Institution at Charlottenburg.

Big Economy-Reliability Run for Wisconsin

Four Trophies in 3-Day, 472 Mile Tour — Special Economy Rules — Dealers Bid for Pathfinding

MILWAUKEE, WIS., July 27—Final arrangements just completed for the fourth annual Wisconsin State Automobile Assn. tour indicate that the run will be the most important held in America this year and may surpass in importance the best Glidden ever run. The tour will be an economy-reliability run, conducted under grade 1 rules of the A. A. A., with supplementary rules governing the economy part of it. The dates definitely selected are September 2, 3 and 4, and the route is 472 miles long. The contestants will fight for four trophies, the well-known $1,000 Sentinel cup, which is a sweepstakes trophy; a trophy just offered by *The Milwaukee Free Press*, for best road score; the new cup hung up by the *Wisconsin Motorist* for the winner of the economy division of the test, and the Emil Schandein cup, for private owners, which has been competed for three times in connection with the annual W. S. A. A. tours.

It is expected that there will be a considerable entry list from Milwaukee and Wisconsin dealers for the three trophies, and at least four or five private owners for the Schandein mug. There has been no state tour since 1912, the 1913 tour having been abandoned because of the lack of stock car registrations with the A. A. A. contest board. The 1914 tour was abandoned also, but revived as a combination economy-reliability run upon the demand of dealers for a stimulant to trade, which the runs have always been in the past.

The route will be as follows:

Wednesday, September 2—Milwaukee to Sheboygan, Manitowoc, Kewaunee, Algoma and Green Bay, Wis., 164.8 miles.

Thursday, September 3—Green Bay to Oshkosh, Fond du Lac, Beaver Dam and Madison, Wis., 147.6 miles.

Friday, September 4—Madison to Janesville, Beloit, Burlington, Kenosha, Racine and Milwaukee, 159.9 miles.

The pathfinder will be sent out with M. C. Moore as trail blazer about August 5. Dealers are now bidding for the honor of furnishing the pathfinding car and have until August 1 to quote the best figure.

George A. West, Wisconsin representative on the A. A. A. contest board, and treasurer of the W. S. A. A., who has handled all previous Wisconsin tours, will again act as referee.

31 Cars in Colorado Prize Parade

DENVER, COL., July 24—An evening parade of beautifully decorated and illuminated motor cars was one of the most attractive features of the Grand Lodge Golden Jubilee Session and Reunion of Elks, held in Denver last week. Thirty-one cars from Colorado and one from Utah competed for the $700 cash prizes and the fifteen special prizes of automobile accessories, watches, etc.

Visitors from Los Angeles, New Orleans and other cities making much of motor events of this kind pronounced the decorative and illuminative effects among the most artistic they had ever seen. The parade was in charge of the Denver Motor Club.

Fourteen Entries for Elgin Races

CHICAGO, ILL., July 28—The fourteenth Elgin entry is a specially built car nominated by Frederick Robinson, a theatrical man who has engaged Mort. Roberts to drive it. The car is called the Pahys, a Greek word meaning quick.

Billy Chandler in the Braender Bulldog and F. H. Dearborn in a third Stutz are late declarations for the races of August 21-22. All the cars are in both days, which makes a total of twenty-six nominations for the 2 days.

As the list now stands, the field is made up as follows: E. J. Schroeder's Peugeot, driver not named; Stutz, Oldfield; Stutz, Anderson; Sunbeam, Grant; Sunbeam, Babcock; Marmon, Heinemann; Marmon, driver not named; Mercedes, De Palma; Peugeot, Burman; Braender Bulldog, Chandler; Duesenberg, Rickenbacher; Duesenberg, driver not named.

Babcock, however, will not be found at the wheel of the Sunbeam because of an accident Sunday night at the course. Following a trip around the circuit, Babcock stopped at his camp. Getting ready to start again, his arm was broken in two places by the back kick of his motor. Babcock is in a serious condition and there is some fear of amputation. So far no new driver has been named.

Cy Patschke, who was to have driven Erbstein's Marmon, has been withdrawn because Mrs. Patschke objects to his driving. Erbstein now is trying to get either Howard Wilcox or Ralph Mulford.

Ray Harroun was at the course Saturday and engaged the camp for the Maxwell team which has not been entered as yet but which is surely coming. Harroun states that Moross will enter five cars. In addition to the three Maxwells there will be d'Alene's Marmon and Brock's Wright, which formerly was known as the Ray.

Mercer, Metz and National Star at Springfield

SPRINGFIELD, MASS., July 25—Fully 10,000 persons witnessed the amateur automobile races held this afternoon at Imperial Park.

The National, Metz and Mercer cars were the winners in the twelve events held.

One of the most interesting races of the day was when the small Metz stock runabout, driven by Barrett, competed with a Mercer, driven by Brainard. The Metz was given a handicap of 100 yards, and the little car stuck to it and won the 2-mile race in 3:07 2-5.

The 3-mile race between the National, Mercer and Knox cars started with the Mercer leading, but the National being pushed hard passed it shortly, and holding the pace came in first. The Mercer lost on the curves.

The Mercer driven by Laviolette broke the track record for 1 mile, when it negotiated the distance in 1:24 1-4. The former record was 1:27. This car also won the 3-mile flying start race, beating out Brainard's Mercer. Its time was 4:13 4-5.

Tetzlaff Breaks Washington Mile Record

SEATTLE, WASH., July 18—Tetzlaff, driving a Benz car, broke the state of Washington record for 1 mile at the Meadows track near this city on July 18, his time being 54 1-2 seconds. Cooper in his Stutz succeeded in capturing three of the four principal races of the day, while Klein appropriated the most hotly contested race of the day with his King.

On the second day's racing Tetzlaff succeeded in breaking his record of the day previous when his Benz made the distance in 53 2-5 seconds.

A $500,000 Speedway for Minneapolis

MINNEAPOLIS, MINN., July 27—Capitalists have put underway a plan to build a two-mile brick motor speedway within a short distance of the city limits of Minneapolis to cost $500,000, and to be ready by the fall of 1915. J. D. Hogan and William D. Hogan, land men, and closely associated with other capital, are back of the plan, and Orin Kellogg is connected with the enterprise which will be put on a bond or stock selling basis. After studying four different sections of the surrounding country of the Twin Cities, the Hogans have obtained a half section of land in Anoka county, within reach of the street car lines, not far from railroad lines and on the boulevard system of Hennepin and Ramsey counties, thus bringing both Minneapolis and St. Paul in close touch by automobile roads as well as traction lines. Little excavation work is necessary as the land is level. Large grandstands will be erected.

Car-Nation Covers 3,500 Miles in 8 Days

PHILADELPHIA, PA., July 27—A practical demonstration of the economy and endurance of the small car was concluded yesterday in Atlantic City by the Atlantic States Sales Co., local distributor of the Car-Nation. The Car-Nation selected for the test made six trips daily between the company's headquarters in North Broad street, this city, to Atlantic City, N. J., from July 17 to 26, inclusive.

The total distance covered by the car is approximately 3,500 miles in the 8 days.

Sealed Hupmobile Finishes 6,200 Miles

DETROIT, MICH., July 22—After having previously covered about 4,500 miles with its hood, battery box and starting crank handle sealed, a Hupmobile driven by Fred Perkins arrived in this city from Baton Rouge, La., having made the journey of 1,700 miles in 84 hours 28 minutes at a total operating expense of $29.22, or $0.017 per mile.

Perkins, who came with his wife and little daughter, was the bearer of a letter from the mayor of his home city to Mayor Marx, of Detroit. The executive and a party of city officials found the seals as Mayor A. Grouchy, Jr., of the Louisiana city had appended them.

Mr. Perkins had the hood of his Hupmobile sealed last January as the result of a wager which he made with friends who claimed he could not travel 2,000 miles over the roads of his home state with the car thus sealed. Not only did Perkins win his wager, but he continued the demonstration, and now has covered over 6,000 miles.

SAN FRANCISCO, CAL., July 25—Twenty-five thousand automobiles, the largest number of cars ever brought together at one time in the United States, took part in the fifty-mile parade in San Francisco July 15, which was named Automobile Day.

Two Herff-Brooks Cars for 1915

INDIANAPOLIS, IND., July 28—The Herff-Brooks Corp. line for 1915 will consist of a 50-horsepower, six-cylinder car with a bore of 4 and a stroke of 4 1-2 inches, and a 40-horsepower, four-cylinder car with 4 1-2-inch bore and 5-inch stroke, the cylinders in both motors being of the L-head type cast singly. The six-cylinder, five-passenger touring car, equipped with the Aplco electric system, sells for $1,375 and the four-cylinder, five-passenger car with the same equipment sells for $1,100. The equipment includes, beside the lighting and starting system, a one-man top. Bosch magneto, Stromberg carbureter, disappearing type of steering wheel, which permits of easy access to car from the front, new type of radiator, ventilated engine hood, Turkish upholstery and auxiliary seats in the touring cars. The cars are left drive with center control and are manufactured in both two- and five-passenger types.

Boston To Philadelphia in an Electric

BOSTON, MASS., July 28—A Detroit roadster recently completed a run from this city to Philadelphia, averaging 25.4 miles per hour. The trip was made in an elapsed time of 33 hours and 50 minutes, although the actual running time between the city limits was but 12 hours and 57 minutes.

The trip was undertaken to demonstrate the adaptability of the ordinary electric automobile for touring purposes, when suitable battery and tire equipment are installed; also the feasibility of boosting lead batteries efficiently and expediently. The car was equipped with Goodrich Silvertown Cord tires and was driven by R. L. Heberling, Philadelphia sales manager of the Philadelphia Storage Battery Co. The motive power was furnished by a 44-cell Philadelphia thin plate diamond grid storage battery.

300-Meter Hillclimb Record Is Broken

BOULOGNE-SUR-MER, July 22—Camille Jenatzy's 4-year old record for the 300 meters hill climb was broken in the first day of the Boulogne meeting. With a car having a piston displacement of 1,342 cubic inches, the late Belgian champion climbed the 328-yard hill, having a gradient of 14 per cent., with a standing start, 15 4-5 seconds. One of the Grand Prix Peugeots, built under the 274.6 cubic inch rule, cut this record to 14 3-5 seconds. This is at the rate of a little more than 47 miles an hour. Hispano-Suiza took second and third place in the racing car section with respectively 16 3-5 and 19 4-5 seconds.

In the touring car class a 30 h.p. Panhard-Levassor, Knight motor, made the best performance with 17 seconds. The car carried four passengers. Second place in this division was secured by a Hispano-Suiza in 18 seconds, followed by an Aquila-Italiana in 19 seconds. In the touring car section for cars competing for the Crespelle Cup, which embodies a series of varied tests, a four-cylinder 85 by 130 mm. Darracq made the best performance in 22 2-5 seconds. It was followed home by a Gregoire in 25 seconds, with a Hupmobile third in 27 1-5 seconds.

Wisconsin Registrations Pass 45,000 Mark

MADISON, WIS., July 27—Wisconsin motor car registrations passed the 45,000 mark on June 26. There seems to be no question that the total registry for 1914 will exceed the 50,000 mark. At the close of business on June 26 the figures were: private owners registered, 45,016 and the dealers, 1,160.

The total registration for 1913 was 34,646, and the 1914 list therefore shows a gain of nearly 30 per cent. on June 26, or to be exact, 29.9 per cent. The total revenue from all registrations is in excess of a quarter of a million dollars. At $5 each, 45,016 private owners' licenses amount to $225,080; 1,160 dealers' licenses at $10 make $11,600, and 6,748 motorcycle licenses at $2 figure $13,496, for a total of $250,176.

Lincoln Way Route Not To Be Changed

DETROIT, MICH., July 29—*Special Telegram*—Henry B. Joy, president of the Lincoln Highway Assn. sent the following reply to President Wilson, who some time ago asked the association to have the Lincoln Highway include Washington and Baltimore on its route:

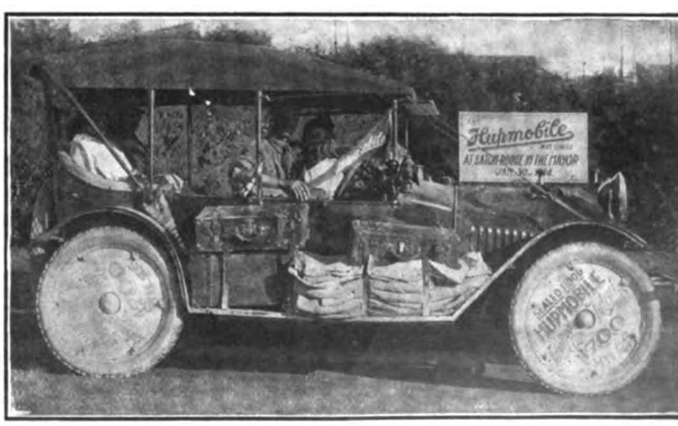
"Your letter addressed to me as president of the Lincoln Highway Association under date of June 19, was duly received and duly acknowledged. In that letter you suggested that the Lincoln Highway Association give its consent to the placing of the official Lincoln Highway markers along a route from Philadelphia to Baltimore, thence to Washington, thence to Frederick, thence to Gettysburg, thus re-routing the Lincoln highway via these cities and increasing the length of route by 17 miles between New York and San Francisco.

"I have delayed replying to your letter for many reasons, among them: First, of course, on account of the seriousness of the request as coming from you, the president, you who have so loyally supported the Lincoln memorial highway project and who sent to our association your check among the very first in support of this great and good enterprise. Second, to ascertain the attitude of the counties and cities lying between Philadelphia and Gettysburg and from which the Lincoln Highway would be diverted by the change in route you suggest. Third, to fully again review and reconsider the purpose and plan so carefuly originally adopted by our association after elaborate investigation and consideration. I am under the necessity of stating to you that the work of the Lincoln Highway Association, no doubt greatly assisted through your recognition of its work in its early stages, has progressed so favorably that there scarcely remains along the entire Lincoln way any section of its route which has not been marked and to a very great extent re-named. Especially is such the case between Philadelphia and Gettysburg, where in the counties traversed, and also in the cites of York, Lancaster, Coatesville, Columbia, Downingtown, etc., the official adoption by the local authorities of the name Lincoln way and the marking thereof and the betterments and beautification in process make the changing of the route in accordance with your suggestion, if for no other reasons, outside of and beyond the control of this association.

"The Lincoln Highway Association has committed and entrusted the Lincoln way to all the people and especially to the states, counties, villages and cities through which its route extends. It is not possible to undo the wonderful work of the communities whose loyal patriotic efforts are making, have indeed made the Lincoln Highway a part of the map of our country and whose plans for its improvement are being effectively carried forward according to the financial means and energies of these communities traversed, and the aid our association is able to extend the Lincoln way is the shortest, most direct and practicable route consistent with the topography of the country from New York on the Atlantic to San Francisco on the Pacific, and to change from that basic principle and extend its length by devious windings from city to city, or from point of interest to point of interest, would insure its failure as a permanent useful memorial way."

Booster Outing for September 17

NEW YORK CITY, July 29—The Village Boosters outing will be held on September 17 down on Fred Wagner's farm. The usual games will be participated in. There will also be a clambake.



Hupmobile, whose bonnet has been sealed since January

Factory Miscellany

MILWAUKEE'S Working Force Increases—Figures compiled by the retail merchants' division of the Merchants and Manufacturers' Assn., Milwaukee, Wis., show that there has been an increase of 5 per cent. in the number of workmen employed by Milwaukee metal-working shops of all kinds in 30 days. The general average of manufacturing plants is 80 per cent. of normal, while machine shops are operating 65 to 70 per cent. of normal. Retail sales show a large increase over the corresponding period of 1913, while cash sales are larger in volume and collections on credit sales are much improved.

Harrold Tool Adds—The H. J. Harrold Tool Co., Salem, O., manufacturer of all kinds of tools, automobile springs a specialty, will enlarge its plant and build an office.

Miller to Build Parts Plant—C. F. Miller, of Defiance, O., will erect a factory in Bryan, O., for the purpose of manufacturing automobile parts in addition to other products.

Will Reorganize Star Rubber—Stockholders of the Star Rubber Co., Akron, O., have decided to reorganize the company for the purpose of freeing the concern from a heavy indebtedness. A new organization will purchase and operate the plant.

Cole Service Bldg. in Plant—Since the completion of a new factory building the Cole Motor Car Co. has moved its service station and general offices from North Capitol avenue to its factory in East Washington street, Indianapolis. The company now has all of its offices and departments at the same place.

Packard and Ford Plants Closed—The plant of the Ford Motor Co., Detroit, is closed since July 22, and will not reopen until August 3, when the work of taking the annual inventory will be completed. The Packard Motor Car Co. will close its plant July 27 and remain closed during one week or less, for the same reason.

Oil Co. Buys Plant—The Winona Oil Co., Winona, Wis., has purchased the branch office, warehouse system, etc., of the Valvoline Oil Co. at Eau Claire, Wis., and will establish a tank wagon service covering Eau Claire, Chippewa Falls and surrounding territory. This is the fourth branch plant established by the Winona company.

Maxwell-Newcastle Plant Working—After a shut-down of 2 weeks, the plant of the Maxwell-Newcastle Mfg. Co., Newcastle, Ind., has resumed operations. About 1,000 men are now employed and the force is to be further increased. The company manufactures parts for cars formerly manufactured by the United Motors Co.

Miller Rubber Increases—The Miller Rubber Co., Akron, O., has planned to expand to a large degree, following the increasing of the capital stock from $1,000,000 to $2,000,000. The buildings, formerly occupied by the Franz Body Works, will be used to increase the capacity at once. Other large additions are contemplated.

Fisher Body Adds—A five-story building located at Forrest and Grandy avenues, Detroit, Mich., has been acquired by the Fisher Closed Body Co. and the Fisher Body Co., which are both under the same management. This will give the concerns about 100,000 square feet of additional floor space and enable them to employ about 600 more men.

Universal Adds More Men—The Universal Mfg. Co., Racine, Wis., which is making a compressed-air cranking device for motor cars, has been obliged to increase its shop facilities and add more men to take care of orders for the appliance. A special device is made for Ford cars and the demand from this source has swamped the concern.

Xenia Rubber Decides on Plant—At a meeting of the officers and stockholders of the Xenia Rubber Co., of Xenia, O., it was decided to locate the company's new plant in Xenia, and the purchase of a site on North Detroit street was authorized. Roy Bickett, manager of the company, states that the directors have decided to construct a two-story building, 50 by 100 feet, concrete and steel, sides constructed of steel and glass.

Dunkirk Plant Sold—L. A. Pease, referee in bankruptcy, July 18 confirmed the sale of the plant of the Motor and Mfg. Works Co., Dunkirk, N. Y., to E. K. Buttolph, of Dunkirk, for $3,500, subject to a judgment lien of $5,200. David Reid, former head of the company, following the sale to Buttolph declared he could secure a buyer at an advanced figure over the one bid by Mr. Buttolph, and Referee Pease postponed his report, but Reid failed to appear as he suggested July 16 at the creditors' meeting, and immediately the sale to Buttolph was confirmed. The company will be reorganized and the operation of the plant continued.

Parish & Bingham Adds—With the preparations for erecting a big power plant to adjoin the main building at Madison avenue and West One Hundred and Sixth street, the Parish & Bingham Co., Cleveland, O., maker of automobile frames, has under way an imposing construction unit. The main building, costing $140,000, and the office building, costing $25,000, will be ready for occupancy in two months. The main building is of the monitor type, 900 feet long. It is a model daylight factory and enclosed in glass. The present location of the Parish & Bingham Co. is on Hamilton avenue, near East Fifty-fifth street. The factory makes frames for Ford cars.

The Automobile Calendar

July-August	French Army Truck Subsidy Trials.
Aug. 1-3	Galveston, Tex., Beach Races.
Aug. 2-9	Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16	Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17	Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupé de l'Auto Race.
Aug. 27	Brooklands Track, England; Annual Automobile Race.
Aug.	Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug.	Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7	Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15	Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2	S. A. E. European Trip.
Oct. 16-26	Paris, France, Automobile Salon.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14	London, England; Olympia Show.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 15	Paris, France, Kerosene Motor Competition.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in  the Industry

Motor Men in New Roles

SILLS Chevrolet Sales Manager—W. C. Sills, who has been in charge of the Boston branch of the Chevrolet Motor Co., New York City, has been appointed general sales manager of that company, with headquarters in that city.

Fisher Off for Europe—Carl G. Fisher, president of the Indianapolis Speedway, sailed for Europe on the *Imperator* on July 25.

Reese Goodyear Manager—Woodson Reese has been appointed manager of the local branch of the Goodyear Tire & Rubber Co., Philadelphia, Pa.

Vogler Maxwell Sales Manager—H. J. Vogler has been made district sales manager for the Philadelphia (Pa.) territory of the Maxwell Motor Co., Detroit, Mich.

Connects With Wagenhals Co.—The former automobile editor of La Presse, a Montreal newspaper, W. Robinson, has become identified with the Wagenhals Motor Car Co., Detroit.

Barnes Joins Federal Truck—L. I. Barnes has joined the sales organization of the Federal Motor Truck Co., Detroit, Mich., and will have charge of the sales development movement in the South.

Hook with Mercer—R. C. Hook has just joined the sales force of the Mercer Automobile Co., Trenton, N. J. Prior to his Mercer connection Mr. Hook was associated with the Motor Shop of Trenton.

Atkinson Resigns—Robert Atkinson, who has been associated with many of the prominent automobile firms in the Northwest, and recently manager of the Hudson agency in Seattle, has severed his connection with that company.

Capt. Gray Resigns—Capt. W. H. Gray, who has been manager of the Northwest Auto Co. in Portland, Ore., for the past 2 years, has resigned. He will take several weeks vacation before entering the automobile business again.

Bloomfield Monarch Representative—The Monarch Motor Car Co., Detroit, Mich., has appointed William Bloomfield as a special representative for the states of Alabama, Louisiana and Mississippi, with headquarters in Birmingham, Ala.

Case Joins Paige-Detroit—Julian Case, formerly manager of the advertising departments of the Regal Motor Car Co., Detroit, Mich., and the Abbott Motor Car Co., is now with the advertising department of the Paige-Detroit Motor Car Co., Detroit.

Jordan Back in Boston—George N. Jordan has returned to Boston, Mass., again to take a position as assistant manager of the wholesale branch of the Studebaker Corp. under Henry Myers. He will travel through New England for the company.

Voorhis Joins Oakland—C. B. Voorhis has resigned his position as assistant general manager of the Kingman Plow Co., of Peoria, Ill., and becomes assistant sales manager of the Oakland Motor Co., Pontiac, Mich., under F. W. Warner, general sales manager.

Changes in Indianapolis—Will H. Brown and Sam Renick have taken over the interests of E. Beveridge Dill in the United Supply and Accessory Co., Indianapolis. Mr. Dill retires as president and general manager, but Grant Newby will retain his interest in the company.

Blossom Sails for Europe—C. W. Blossom, of The Grant-Lees Gear Co., Cleveland, O., sailed on the S. S. *Caronia* from Boston on Tuesday, July 14, to investigate European manufacture of silent chains. He will spend considerable time at the Coventry silent chain factory in Coventry.

Wood Heads Abbott's Detroit Branch—The Abbott Motor Car Co., Detroit, Mich., has opened a new branch in Detroit, at 467 Woodward avenue. L. E. Wood, sales manager of the company, has charge of the branch, while O. A. Schreiber, who has been with the concern for many years, is assistant to Mr. Wood.

Chandler Factory Representative Mondex Absorber—W. R. Chandler has been appointed factory representative of the A. & J. Mfg. Co., Binghamton, N. Y., which has just completed negotiations for the exclusive manufacturing of the new Mondex shock absorbers. He has opened offices in the U. S. Tire Bldg., New York City.

Holton Monarch Sales Manager—Hoover Holton, formerly general sales manager of the Empire Automobile Co., and of the American Motors Co., Indianapolis, Ind., has been appointed general sales manager of the Monarch Motor Car Co., Detroit, which is making a four-cylinder car listed at $1,000 and a six-cylinder car costing $1,400.

Kaufman Sailing for Europe—Carl Kaufman, general manager and treasurer of The Motor Car Equipment Co., New York City, accompanied by his wife and daughter, will sail for England the first week in August. Mr. Kaufman will look into the development of the motor accessory line abroad and attend the automobile shows in Berlin and Paris.

Moore Gets Boost—E. A. Moore, production manager of the Fairbanks-Morse Mfg. Co., Beloit, Wis., has been appointed general manager of the gas engine department to succeed F. E. Greene, who resigned recently. Mr. Moore is an internal combustion engineer and has been associated with the Fairbanks-Morse and other engine builders for many years.

Baker Heads Franklin Service Dept.—E. L. Baker has been appointed head of the service department of the H. H. Franklin Mfg. Co., Syracuse, N. Y., to succeed Ralph Murphy, who is now chief engineer. Mr. Baker has been connected with the Franklin engineering department several years and for the past year and a half has been resident engineer on the Pacific Coast.

Daniels May Build Light Car—It is reported in Detroit, Mich., that a new concern to manufacture a light car is now being formed by George E. Daniels, formerly vice-president and general manager of the Oakland Motor Car Co., Pontiac, Mich.; Howard Bauer, former assistant sales manager of this company, and J. H. Newmark, former advertising manager of the same concern.

Roberts Joins Oakland—R. K. Roberts, of San Francisco, Cal., has been named assistant general sales manager of the Oakland Motor Car Co., and will be given entire charge of the Oakland business on the Pacific Coast, embracing California, Oregon, Washington, Idaho, Nevada, Utah, British Columbia and the Hawaiian Islands. Mr. Roberts was formerly identified with the management of the Howard Automobile Co. in California.

Bowen Heads New S. G. V. Agency—The agency for S. G. V. cars for the Metropolitan district was transferred last week to the Whitefield Motor Car Co., New York City. This new concern will succeed the Gotham Motor Car Co. The Whitefield company will be located at 242 West Fifty-ninth street. F. H. Bowen is general manager. The directors of the new company are A. L. Corey, M. J. O'Brien, Jr., D. W. Wilworth, Seth B. French, H. W. Carhart and F. H. Bowen.

Garage and Dealers' Field

Michel Advertising Co. Moves—A. Eugene Michel, advertising agent, New York City, has changed his address in Chicago, Ill., from the Rookery to 225 East Twenty-second street.

Will Handle Timken Axle Parts—Jos. C. Gorey & Co., 354 West Fiftieth street, New York City, will handle a complete line of parts for Timken front and rear axles from 1907-1915 types on and after August 1, 1914.

Adopt Westinghouse System—The Westinghouse Electric & Mfg. Co., of East Pittsburgh, Pa., announces that the Singer Motor Co., Inc., Long Island City, N. Y., has adopted the Westinghouse electric starting and lighting system for its 1915 cars. This equipment consists of starting motor and lighting generator with the complete equipment of switches, fuse blocks and voltmeters. This company also announces the adoption by the American La France Fire Engine Co., Elmira, N. Y., of the Westinghouse electric automobile equipment for fire trucks manufactured by this company.

Buick Dealer Uses Tent—H. E. Pence, of the Pence Automobile Co., Minneapolis, Minn., distributor of Buick cars in the Northwest, last week started out a tent exhibit of the new Buick models to make all the state and county fairs of importance in the territory. The tent is 40 by 80 feet. Except at Huron, S. D., and Helena, Mont., where Mr. Pence will be personally, local dealers will handle the big exhibit. The first stop was at Grand Forks, N. D., July 28. The Pence company contracted for 390 Buick 1915 models with dealers the first day the exhibit was made in the Pence showrooms, Hennepin avenue and Eighth street.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

Indiana

INDIANAPOLIS—Metal Auto Parts Co.; capital, $50,000; to manufacture metal parts of automobiles, etc. Incorporators: B. E. Thompson, W. B. Austed, G. H. Scott.

MUNCIE—M. C. M. Motor Co.; capital, $10,000; to manufacture automobiles. Incorporators: W. M. Mathews, Luther Cobb, E. L. Morris.

Kentucky

COVINGTON—United States Motor Truck Co.; capital, $250,000. Incorporators: R. C. Stewart, B. Bramlage, M. H. McLean.

New York

NEW YORK CITY—Remington Motor Sales Co.; capital, $150,000; to deal in automobiles. Incorporators: Philo E. Remington, 30 Church St.; Carl W. Bliss, E. M. Kolstad.

NEW YORK CITY—Universal Advertising Autocar Co.; capital, $25,000. Incorporators: Antonio DeGiorgio, 107 Broad St.; Giulio J. Lusardi, Guiseppe Manara.

ROCHESTER—Pritchard-Lyon Motor Co.; capital, $25,000; to manufacture automobiles. Incorporators: Curtis B. Lyon, 47 Flower City Park; Paulina Pritchard, Albert R. Pritchard.

Ohio

CLEVELAND—Kelley Sales Co.; capital, $10,000; to deal in automobiles and parts. Incorporators: E. R. Cross, L. W. Kelley, F. T. Beaumont, D. V. Fisher, L. H. Luff.

CLEVELAND—Patterson Auto Carriage Co.; capital, $10,000; to deal in automobiles and accessories. Incorporators: Edna May Patterson, L. M. Westropp, R. J. Mariarity, C. C. McMobon, H. C. Patterson.

TOLEDO—Paige-Toledo Co.; capital, $20,000; to deal in all kinds of motor vehicles. Incorporators: C. L. Sturtevant, J. G. Eppens, H. D. Davis, F. Hofer, Jr.; C. L. Clapp.

PAINESVILLE—Vulcan Carriage Co.; capital, $1,000,000; to manufacture and deal in automobiles and other vehicles.

Pennsylvania

PITTSBURG—Pittsburg Motor Car Co.; capital, $100,000; to manufacture automobiles and all kinds of motors. Incorporators: J. M. Frere, H. J. Davis, G. Shearer.

GARAGES AND ACCESSORIES

Connecticut

STAMFORD—Enterprise Tire Shop; capital, $5,000; Incorporators: Claude L. Frost, Rupert C. King, John M. Carl, Harry J. Bond.

Indiana

SOUTH BEND—League Tire Co.; capital, $250,000; to deal in tires. Incorporators: W. P. Furey, R. J. Miller, M. Brung.

Kentucky

LOUISVILLE—Electric Garage Co.; capital, $25,000. Incorporators: George Bader, Frank S. Ouerbacker, J. Woodford Button.

Michigan

ADRIAN—Adrian Carburetor Co.; capital, $50,000; to deal in carburetors.

DETROIT—Wallace Shock Absorber Co.; capital, $5,000; to deal in shock absorbers. Incorporators: John E. Wallace, William J. Wallace, George C. McDonald.

New York

BROOKLYN—Rutledge Garage; capital, $10,000. Incorporators: Blanche V. Foulks, James E. Foulks, Jr., 1324 Dean St.; Oliver N. Sarvant.

NEW YORK CITY—Vehicle-Safeguard Instrument Co.; capital, $25,000; to manufacture safety devices for automobiles, etc. Incorporators: Junius A. Howe, 1269 Broadway; Frieda G. Howe, Junius J. Howe.

Ohio

CLEVELAND—Cuyahoga Tire & Supply Co.; capital, $10,000; to deal in tires and other automobile supplies. Incorporators: Louis Abrams, M. M. Gleichman, M. B. Abrams, M. Eckstein, N. B. Gordon.

CLEVELAND—General Rubber Goods Co.; capital, $50,000; to deal in all kinds of rubber goods. Incorporators: Griswold Wilson, L. H. Wallace, W. L. Hassenmueller, William G. Stuber, G. C. Sheidler.

TOLEDO—Wight Mfg. Co.; capital, $20,000; to manufacture automobile supplies. Incorporators: A. V. Wight, A. C. Faulkner, George Sace, Edward Scanlon, F. E. Calkins.

Oklahoma

CUSHING—New State Refining Co.; capital, $25,000; to deal in gasoline. Incorporators: T. J. Hughes, R. C. Jones, J. R. Travis, all of Cushing, and C. H. Travis, Coffeyville, Okla.

OKLAHOMA CITY—Emma Gasoline Co.; capital, $6,000; to deal in gasoline. Incorporators: W. A. Ledbetter, C. E. Franke, J. H. Gauthier, all of Oklahoma City.

Canada

TORONTO—Canadian Storage Battery Co.; capital, $40,000; to manufacture storage batteries.

CHANGE OF NAME AND CAPITAL

Ohio

AKRON—Miller Rubber Co.; capital increased from $1,000,000 to $2,000,000.

Automobile Agencies Recently Established

PASSENGER CARS

Alabama

Florence	Maxwell	McRae Motor Car Co.
Russellville	Maxwell	Chas. R. Wilson

Arizona

Phoenix	Jeffery	McArthur Bros.

California

Sisson	Maxwell	P. H. Miller

Connecticut

Hartford	Regal	D. I. Strong

Georgia

Vidalia	Maxwell	C. C. Thaxton

Iowa

Clarinda	Maxwell	Night & Day Garage
Sac City	Franklin	D. E. Hallett

Idaho

Hailey	Maxwell	Hailey Garage Co.
Shoshone	Maxwell	Helman & Helman

Illinois

Cerro Gordo	Maxwell	C. W. Adams & Co.
Robinson	Westcott	O. H. Wheeler

Indiana

Bowling Green	Maxwell	K. X. Frump
Centerville	Maxwell	Jos. M. Zea
Indianapolis	Westcott	Sears Auto Repair Shop
New Albany	Saxon	W. W. Humbert

Kansas

Aulne	Maxwell	Aulne Auto Co.

Kentucky

Ashland	Saxon	Wright Motor Car Co.
Beaver Dam	Saxon	M. D. Hudson Automobile Co.
Brandenburg	Ford	McIntire & Applegate
Carrollton	Saxon	J. G. Howe
Central City	Ford	Barnes Automobile Co.
Cynthfield	Saxon	Bryant McMurtry
Frankfort	Saxon	Nicols Bros.
Harrodsburg	Saxon	Ingram's Garage
Henderson	Saxon	J. V. Gasser
Hitchins	Saxon	Clayton S. Hitchins
Leitchfield	Saxon	Paul Meridith
Lexington	McFarland	McFarland Six Sales Co.
Lexington	Overland	S. E. Drake
Lexington	Paige	Bluegrass Auto Co.
Lexington	Saxon	A. W. T Davis
Louisville	Partin-Palmer	Louisville Automobile Exchange
Louisville	Vulcan	J. A. Viglini
Owensboro	Saxon	J. R. Beck
Paducah	Saxon	C. N. Baker
Poole	Saxon	Crowley & Nelson

Massachusetts

Boston	Partin-Palmer	Hudson-Dolan
Collins	Franklin	J. C. Penn

Michigan

Grand Rapids	Briscoe	Wealthy Heights Gar.

Missouri

Greenfield	Maxwell	M. L. Young
Kansas City	Howard	Young Motor Co.
Kansas City	Lexington	Young Motor Co.
Kansas City	Partin-Palmer	Standard Motor & Mfg Co.
Kansas City	Vulcan	Vulcan Motor Co.
Ozark	Maxwell	J. H. Gardner & P. R. Waggoner

Nebraska

Danbury	Maxwell	J. W. Nutt

New Jersey

Mendham	Westcott	Freeman Bros.
Red Bank	Westcott	Fred Van Doren
West Hoboken	Westcott	Decker & Keynton

New York

Brooklyn	Westcott	Remson Auto Co.
Nyack	Westcott	D. D. Kessler
Ogdensburg	Franklin	Lytle & Murton

Ohio

Circleville	Allen	G. L. Schiear
Circleville	Cadillac	G. L. Schiear
Circleville	Hupmobile	G. L. Schiear
Columbus	Patterson	Gean DeWitt
Waterford	Ford	Pickering & Roberts

Ontario

London	Franklin	London Engine Sup. Co. Ltd.
Port Arthur	Franklin	D. Boureau

Oregon

Heppner	Maxwell	N. E. Winnard
Portland	Briscoe	Francis & Kadderly
Portland	Jeffery	F. C. Riggs Co.

Pennsylvania

Bethlehem	Westcott	O. C. Snyder

Quebec

Montreal	Crow	Sevigny & Lalonde
Montreal	Moon	Sevigny & Lalonde

Tennessee

Nashville	Chandler	Capital Garage
Nashville	Saxon	Dixie Motor Car Co.
Nashville	Stutz	Stutz Motor Car Co.

Texas

Burton	Maxwell	Chas. Kasten

Washington

South Bend	Maxwell	Soule & Round

Wisconsin

Hurley	Franklin	Twin City Iron Wks.
Iola	Franklin	Swanson Bros.

COMMERCIAL VEHICLES

Maine

Bangor	Koehler	S. L. Crosberry

Missouri

Kansas City	Republic	Republic Motor Sales Co.

New Jersey

Hightstown	Koehler	Thos. Peppler & Son
Whitehouse	Koehler	Burdette Bros.
Athens	Koehler	F. E. Goldsberry

Pennsylvania

West Newton	Koehler	McKennery & Britton

UNIVERSAL Annular Ball Bearings—The Schatz Mfg. Co., Poughkeepsie, N. Y., is offering a new type of annular ball bearing, Fig. 1, designed to meet the demands of the manufacturer of cyclecars and small automobiles, also for the needs of the accessory manufacturer. This bearing is known in the trade as the Universal.

The bearing is made with a solid steel cone, pressed steel cup rings and a soft steel outer jacket, which grips and holds the cup rings rigidly in place. The ends of the soft steel jacket are turned in in an angular position, as shown, against the cup rings, thereby reinforcing the cup rings and also giving a finish to the completed bearing.

These bearings are made from high-grade materials throughout. The cone and cup rings are carefully hardened and tempered and are guaranteed to carry the same load as standard bearings. Particular attention is called to the fact that although this bearing has all the advantages of an annular ball bearing, its construction is such that 70 per cent. radial thrust is obtained. Furthermore, it is claimed in this construction there is a three-point contact, making it practically impossible to break a ball under the most severe conditions. Owing to the fact that the universal is an annular bearing and positively non-adjustable, the assembling is less expensive than in other types. The manufacturer claims that this one feature alone makes the bearing particularly desirous in wheel construction. In this design the ball race in the cone and the O. D. dimensions only are ground, but the bore and other dimensions are kept within commercial limits. The bearings are made in standard sizes.

K-W Road Smoother—Several changes from the model announced at the first of the year are noted in the helical spring shock absorber which is manufactured by the K-W Ignition Co., Cleveland, O., and which is known as the K-W Road Smoother.

These shock absorbers, Fig. 2, are designed to be attached to the spring ends, replacing the shackles, both front and rear. There are several interesting features in the new model. First of which is an anti-rebound air chamber at the top which, it is said, effectually prevents the rebound of the spring. Then the anti-side motion links prevent side rocking and swaying when turning corners. The air piston is provided with an automatic lubricating pad and there is a dust shield enclosing the bottom of the mechanism. The springs are manufactured from electric-smelted chrome vanadium steel and phosphor bronze bushings are used throughout.

Bigger Rubber Preservative—A process by which it is stated that new rubber can be made to last for many years and by which the old rubber may be rejuvenated is offered by the Bigger Rubber Preservative Co., Inc., Buffalo, N. Y.

It is well known that rubber loses its life comparatively quickly because the chemicals needed to put it into the various forms for commercial uses, in time, cause it to disintegrate. But it is claimed that by proper chemical treatment that this chemical action can be prevented.

S. V. Truck Tire—A new pressed-on type of solid truck tire known as the improved S. V. has just been announced by the Goodyear Tire & Rubber Co. The feature of this tire is that there are no accessories needed, such as bands, keys, side flanges or bolts and there is no left or right side. The tread is flat, the base of corrugated channel section and more rubber is now used than previously. The weight of the tire now is less than the weight of the ordinary type with accessories, it is claimed.

Canvas Tread Tires—A rubberized canvas tire which is claimed to be exceedingly strong and immune to punctures, blowouts, etc., has been brought out by the Canvas Tread Tire Co., New York. The tire consists of 13 layers of rubberized canvas vulcanized together with an extra ply of rubber between each ply of canvas. The bead is of fiber. The maker claims unusual wearing qualities for this construction and adds that it shows excellent non-skid qualities. The prices range from $24.95 for the 30 by 3½-inch size to $60.60 for the 37 by 5-inch.

Polo Tire Alarm—A new model tire alarm, known as No. 14, has been introduced by the Polo Tire Alarm Co., Great Northern Bldg., Chicago, Ill. This alarm is intended to be screwed into place on the valve, replaces the ordinary cap and is so adjusted that should the pressure drop below the required amount a shrill and continuous alarm gives warning that the tire needs attention. A set of four costs $6, complete.

National Bar Spring—An unusual form of front spring is that shown in Fig. 3, in which a solid bar takes the place of the usual half-elliptic. This bar is pivoted to the frame at the front, and is supported at the rear by a scroll spring fastened to the frame. The axle is attached near the front of the bar so that the long end of the bar is supported by the spring and thus a lighter spring can be used.

It is stated that the shock or jolt occasioned by the wheels passing over uneven surfaces is transmitted in a line indicated by the arrow, and is automatically cushioned. When obstacles are encountered, the wheel momentarily stops, due to the fact that the operation of the bar swinging from its pivotal connection performs its function of receiving and transmitting shocks to the springs in a quicker time, thus permitting the wheel to pass over the obstruction without that sudden shock or jolt. After the car has passed over the obstruction, the action of the spring forces the bars into the normal position and prevents the vibration which always accompanies a shock when the car body is suspended upon the spring supports of the ordinary type.

Staon Tire Gauges—The Advance Specialty Co., Shinola Bldg., Rochester, N. Y., has recently brought out an im-

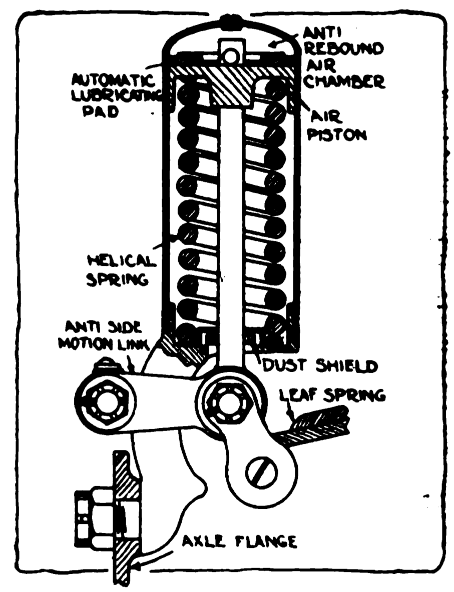


Fig. 2—New K-W Road Smoother with features plainly indicated

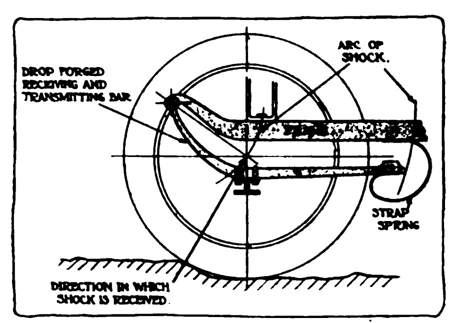


Fig. 3—National bar spring, in which a solid bar with a scroll spring at one end is used

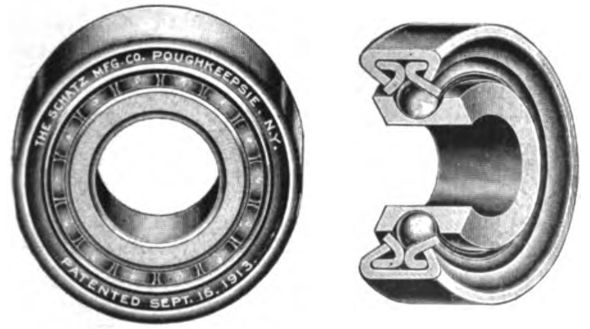


Fig. 1—Two views of the Universal annular ball bearings

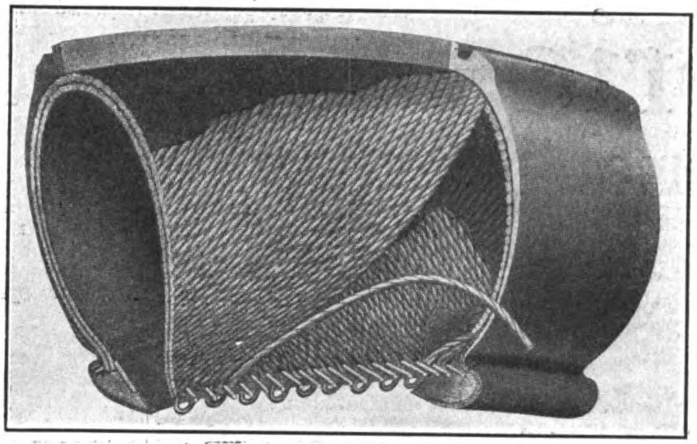


Fig. 4—Phantom view of Goodrich Silvertown Cord tire

proved form of tire gauge. A shut-off valve which is operated by the cover hinge pin in such a way that air enters the gauge tube only when the cover is open. When it is closed there is no pressure in the gauge tube and the pointer stands at zero. Because of this feature the gauge mechanism is relieved of continuous strain. The cost of a set of four gauges is $6, and the gauges are intended to remain in position except when the tires are being changed.

Goodrich Silvertown Cord Tire—There are many interesting features in the Cord tread tire recently brought out by the B. F. Goodrich Co., Akron, O. It is claimed that with the use of these tires that the 15 per cent. more horsepower is available for the propulsion of the car. In other words, this much more of the engine power is available because these tires offer less road resistance. This saving is due to the increased flexibility and resiliency of the cord construction. Looking at this feature from another angle—with the same gasoline consumption greater loads can be carried. It is said, that on a car that developed 15 horsepower at a certain speed, 800 pounds extra were carried without increasing the consumption of fuel. Also with the same load, the fuel consumption is reduced about 25 per cent. on the average, it is stated.

The increased resilience gives additional speed and makes the work of guiding the car much easier. Owing to the equality of tension in the cable cords, cars equipped with Silvertowns will coast much farther than cars with ordinary tires, it is stated.

Fifty per cent. reserve strength is claimed for these tires and also that the tires are immune from stone bruises. The cord construction and even tension make the Silvertowns extremely resilient. On hitting a stone the casing flexes easily and the shock is not felt on the inner body as in the old types.

It will be noted in Fig. 4, the cord tire, as its name implies, has a fabric made up of cotton cords or cables instead of a canvas cloth. The carcass of the tire is made up of a number of individual, long fiber cotton threads thoroughly impregnated with rubber under high pressure; these threads are then woven into a cord which is also impregnated with rubber. The finished cord is then woven over a form, in two layers, each layer of cord being separated by a layer of rubber. Every part of the cord is made and wound into the tire under an equal tension by specially designed automatic machinery in such a manner that all the internal strains are conveyed throughout, with no slack threads or overworked parts. Every part of the tire carries its share of the load and all parts work together as a unit it is stated.

An interesting test to show the relative merits of the two types of tires was recently made by the Goodrich company on a hill on South Main street, Akron, O. The car, a six-cylinder Peerless, was allowed to coast down this hill, equipped, first with ordinary canvas fabric tires, and then with Cord tires. The average grade was about 2 per cent. and the hill was 2,297 feet in length. Beginning with a standing start, no power being used, at the first .1-mile the speed of the car with fabric tires was 9 miles per hour and with Cord tires was 14; at the .2-mile these respective figures were 11.5 and 17; at the .3-mile, 11 and 17; at the .4-mile 8.5 and 16.5; and about 200 feet beyond this mark the car when fitted with ordinary tires stopped. At this same point the car, when equipped with Cord tires was running 13.5 miles per hour, and continued for 546 feet when it stopped on a slight up grade.

Double Spark Plug—In order to produce two sparks in the same cylinder at the same time the Power & Efficiency Co., Trenton, N. J., has brought out a double spark plug, shown in Fig. 5. This plug when connected with an ordinary plug causes the current to go to the gaps of both plugs and thus two sparks occur, thereby increasing flame propagation and hence power. The insulator is shaped to form a double V, the sides of the larger V being slightly concave and the smaller V being in the center and ending in a sharp point. This construction is said to cause the points to be cleaned by the gas. The insulator is carried to a point very near the spark gap in order to prevent any short circuit to the shell of the plug. The keeper B may be used to carry the current to ground after it has jumped the gap, and in this way the action is the same as an ordinary plug. By removing the keeper and attaching a wire in its place, the other end of the wire connecting with an ordinary plug, each plug will fire. The plug sells for $1.

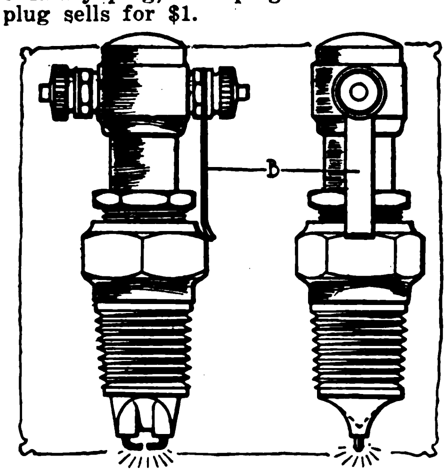


Fig. 5—Two views of Double spark plug

Ideal Gas Lighter—A simple device, Fig. 6, for lighting and controlling the acetylene lights from the dash has been brought out by the Ideal Brass Works, Indianapolis, Ind. It is easily installed, consisting merely of a gas regulating and controlling valve on the dash and some simple electric wiring to produce sparks at the burners when the gas is turned on.

An ordinary gas tank is used, a high-pressure gas tube running from the tank to the control valve on the dash. From here the gas passes to the regulating valve to the lamps, the same as in any system. Along side of the control handle is a small push button that is operated when the sparks are to be produced. Connected into the back of this switch is a lead running from the high-tension circuit. Closing the switch causes the current to flow between the spark gaps at the burners, and thus the lamps are lighted.

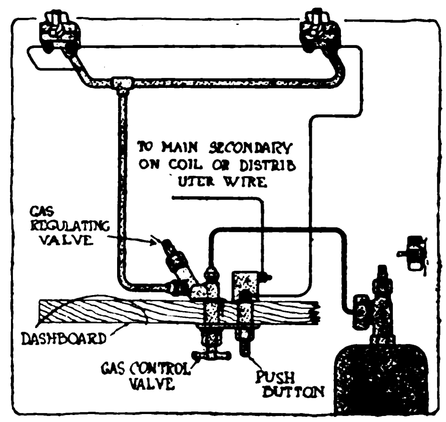


Fig. 6—Ideal gas lighter for acetylene systems

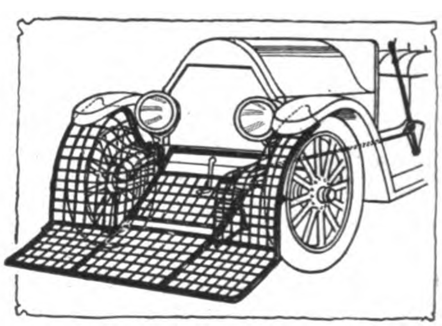


Fig. 7—The Standard fender, which may be raised or lowered from seat, depending on road conditions

The Standard Fender—An interesting invention that has recently been put upon the market is the Standard fender, Fig. 7. It is designed to protect pedestrians from being run over, by motor vehicles, and trucks especially, and yet not interfere with maneuvering of the machine or its progress under varying road conditions.

The Standard fender is easily manipulated by the driver by a lever which allows him to raise the fender slightly when traveling over rough roads, or a full movement of the lever folds the fender up. The fender when lowered in position is 2.5 inches from the ground.

Standard fenders are constructed for all sizes and styles of machines and are built from channel and angle steel, which is latticed and securely riveted. Every bolt is fastened with a lock washer.

Vol. XXX New York—Thursday, August 6, 1914—Chicago No. 6

The Automobile

Bird's-eye view of an industrial city where the facilities for manufacturing, shipping and storing are combined—the buildings, yards and docks of the Bush Terminal Co.

Terminal City—A Triangle of Efficiency

Combines Facilities for Manufacturing, Storing and Shipping in One Huge Industrial Settlement

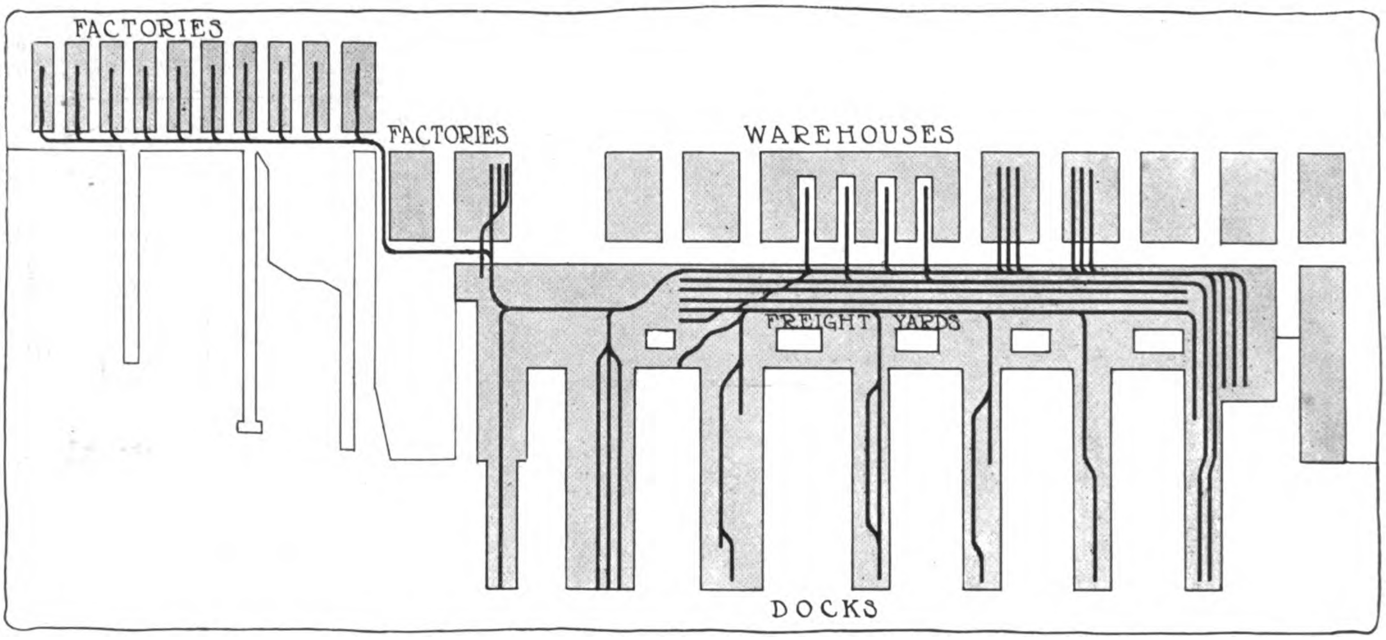
By J. Edward Schipper

THE operation of a manufacturing city along the lines of an office building is accomplished. It is not a looked-for desire but an actual business reality. True, such an industrial city occupies more than a city block—it is not one building but a dozen—yet the entire plant is governed through one administration. Renting space in such a city is much the same as renting a flat. You get heat, water and a dozen other service features thrown in. Your rent pays for floor space, heat, the use of the shipping facilities, fire protection, storage, etc.

As a manufacturer in such an industrial city you are relieved of factory cares, you are provided with power at a lower rate and a hundred and one other advantages are yours at a minimum cost.

Universal service for every manufacturer; one set of elevators arranged for the convenience of all the occupants of the huge buildings; a complete freight yard solely devoted to the use of the manufacturers; one set of motor trucks to convey the goods of all companies; one general shipping department to relieve the occupants of the bothers of routing their goods—all this is accomplished in the industrial city which is operated along the lines of a New York skyscraper.

Once the manufacturer has placed his goods in a packing case his responsibilities cease in the same manner as if he had placed a letter in a mail chute. He knows that the machinery of the city will place the goods upon an elevator, carry them to a loading platform and even place them on the car of a line which enters the territory to which he is ship-



Layout of the buildings, freight yards and docks of the terminal city designed to render quick shipping service to the occupants

ping. If he is shipping to a foreign country, the steamships which dock at the desired port also dock at the piers of this industrial city. His goods will find their way into the proper hold and across the seas to their destination.

Elasticity of Space

Should he be using 5,000 feet of manufacturing space and then suddenly through the securing of a large order desire to double or treble that amount, the space is there. His manufacturing elasticity is unbounded. He need not worry over the building of additions to his factory.

He need not bother about the space for the dead storage of his product, it is supplied. Enormous warehouses for the use of the city's manufacturers provide the space for the storage of his goods. It is not necessary to pay the same rent or the interest on the same invested capital for storage space as for manufacturing area. Overhead is cut to the bone, for the manufacturer need only pay for the space that he uses. He need only employ the number of men that he needs and he need not ship his goods through the traffic-laden streets of a metropolis.

The factory is at the terminal. The connecting link is removed and the chain connecting factory to purchaser is shortened. Attention is not distracted by the harrowing details of tracing freight shipments because the terminal city employs its own tracers and sees the cars safely on their way. Efficiency in handling manufactured products has now passed beyond the point where it merely applies while the material is passing through the plant. After an article has been made it is really not complete until it has been put into the hands of the user. If it costs too much in money or time to put the article into the users' hands, then the saving which has been effected by the use of efficient production methods is lost.

Three great problems beset the manufacturer. He must have space in which to manufacture, he must have efficient shipping facilities and he must have the space to store his goods whenever necessary. The highest degree of efficiency in the handling of the manufactured product is not attained until there is no lost time, money or motion.

Manufacturing

The most efficient manufacturing plant is that in which the floor space held by the manufacturer is just sufficient to meet his needs. He must be neither crowded nor must he have an excessive amount of room. But the quantity turned out by a factory varies from time to time in order to meet the demand. Therefore, in order to take care of the maximum condition and at the same time not to have too much dead space on the minimum, the factory space should be elastic. The efficiency factor in the manufacturing plant as far as space is concerned is in its elasticity.

Shipping

In shipping the utmost economy is obtained when the number of steps between the maker of the article and its user are a minimum. When the factory is at the railroad terminal this desired condition is obtained. When the manufacturer of an article is located in a large city, he has to depend on sending his goods through the city streets before he places them in the hands of the accredited agents of a railroad. He is subject to the delays of traffic, loading and unloading. The difference between first putting the goods on a truck and putting them directly on the freight car means thousands of dollars annually to a large manufacturer and for this reason many are obliged to forego the advantages of being near a good source of labor supply in order to be in a position to secure a railroad siding.

Storing

For a manufacturer to store his goods economically the warehouse must be near the factory. This will reduce the carrying charges between the factory and the warehouse. The storage place must also, for maximum economy, be at the shipping terminal because it must be possible to ship directly from the storing place without intermediate handling.

The only way in which these conditions can be met is in the concentration of the factory, warehouse and shipping terminal at one point. This proposition has been met in New York in this manner and has been taken advantage of by 200 manufacturers who have centered in a terminal city in which there is unlimited space for manufacturing and storing and which is at the same time a terminal shipping point for every railroad line that enters the city and for vessels which reach every country in the world.

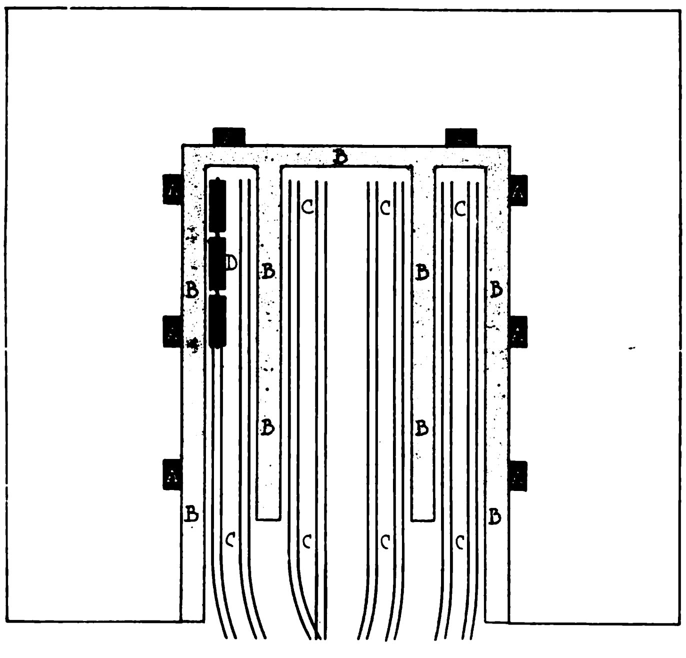
Short cuts in routing goods through factories have resulted in the saving of thousands of dollars. The only reason that short cuts in the balance of the handling of goods have not been made is because they require an undertaking so vast that it is out of the power of any but the largest concerns. The idea of a terminal city in which a manufacturer can vary the amount of floor space he requires and at the same time be in close touch with storing and terminal facilities has solved the problem of cutting down overhead for these two hundred manufacturers and the same idea could be adopted in other cities.

By the construction of huge manufacturing buildings the greatest elasticity is given the manufacturer. He can quickly secure the space to meet his largest demands should they come suddenly. He can secure any amount of light and power at a cost that would be much lower than were he to secure it outside or were he to attempt to generate it himself. When the storage warehouses are close at hand no dead space has to be carried for the storing of goods and yet he can store as much or as little as he likes. There is at his disposal a flexible three-unit plant which responds to the touch of the throttle of demand in the same manner that a high-powered car leaps forward to meet the needs of the moment.

Overhead Expenses Cut

When selecting the location for an industrial plant broad consideration must be given to the problems of machinery, power, labor and all the factors that enter into the manufacture and marketing of the output. With the exception of high rents and difficulties in reaching good shipping facilities a large city offers big advantages in all of these. With the removal of these two objections an enormous cut in the overhead expenses of a city plant can be effected.

It is not surprising that the banding together for a number of manufacturers would result in the cutting of expenses for the individual. The same principle has been used in the purchase of other commodities than factory requirements. Housewives have found that where several came together and purchased in quantities much more advantageous prices have resulted. And in this instance where the plan was limited because of the few necessities required by every one involved in the plan it would not be limited in the instance of manufacturers bcause they all require space, light, heat, power, labor and shipping facilities. They all need room for future requirements and quick postal and telegraph service.



Plan view of the mammoth U-shaped factory buildings, showing how the elevators A communicate with the loading platforms B. The freight trains D can enter the enclosure and reach all parts of the building by means of the tracks C. There are frequent switchings and sidings to facilitate rapid handling of the cars

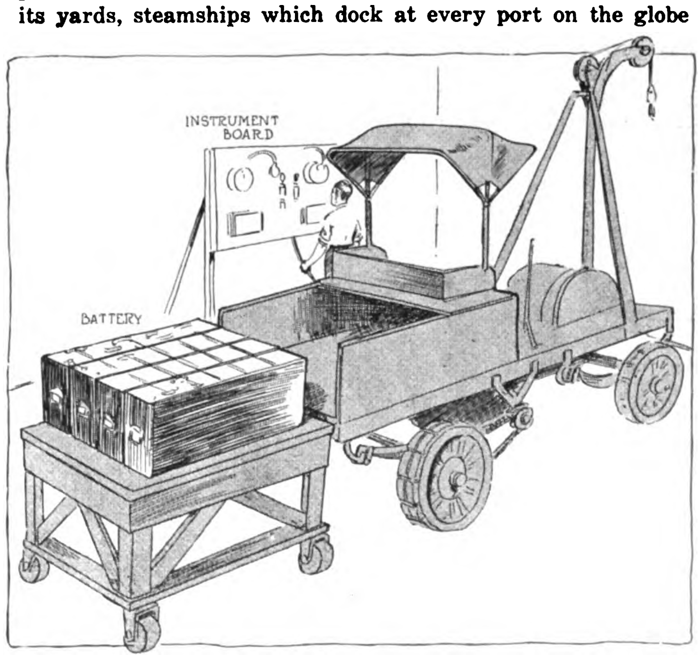
There is not one of these requirements which is not secured more cheaply if bought in large quantities and then distributed to the individual according to his needs. In the specific case of labor, the location of such a concentrated industrial plant within the limits of a large city puts every manufacturer in touch with an abundant supply of labor that will be much better trained to his particular class of work than that which he would find in the country.

New York is not alone however in the requirements of terminal service. About a year and a half ago, the Philadelphia Team Owners' Assn. brought an action before the Pennsylvania Railroad Commission looking to get improved conditions at the different freight terminals in that city. At the Convention of the National Team Owners' Assn. held in Minneapolis last June, the matter was brought up and it was decided to make the subject of congestion at terminals a national issue, and since that time the local associations in several of the large cities throughout the United States have petitioned the Interstate Commerce Commission to grant them relief.

Package freight moves through the New York terminals in quantity and variety greater than through any other terminals in the United States. This bears a direct relation to the population which aggregates more than 5,000,000 and to the extensive manufacturing and other industries which are only to be found in the first city of America. The physical handling of this freight presents a task so stupendous, that but for the doing of it men would say it were impossible. To cope with this situation, the freight terminals must be spread over a wide area, or else these terminals must be conducted with an efficiency of the highest order. The answer to this is a terminal such as the Bush Terminal in New York.

Community in Industry

Covering 250 acres of ground and embracing within this wide area the most modern facilities to meet each of these three great problems this gigantic terminal city stands as concrete evidence that the community principle can be carried to the heart of industrial questions. The enterprise stands alone and independent. The outside city streets need not carry so much as an ounce of the products of the 200 factories which are already represented within its broad expanse. The freight cars of every line in the country are in its yards, steamships which dock at every port on the globe



One of the utility battery crane trucks made use of at the terminal city, showing how it is relieved of its battery by means of a rolling table of the proper height. These battery crane trucks not only lift heavy loads but carry trains and trailers about the city yards

Specimen of steel reinforced concrete factory building at Bush Terminal. Tenant may have 140,000 square feet of space on one floor of this building

are moored to its huge piers. The employees and their families now supported by terminal represent a population of 50,000. The plant was organized in 1902 by Irving T. Bush to remove manufacturing from the crowded streets of Manhattan.

In meeting the three requirements of providing manufacturing space, shipping facilities and storage warehouses, the Bush Terminal Co. has planned for the future. Everything is done on so vast a scale that for some years it is impossible to foresee the present and proposed facilities outgrown. There are 5,000,000 square feet of floor space which can be utilized for manufacturing purposes. This space is contained in ten concrete and steel buildings and there is plenty of room for thirty more of these buildings of the same size. These will be built as they are needed. Eight of the buildings which now stand are six stories in height and the other two are eight stories.

The plant occupies a long rectangular space extending along the waters of the upper bay. It extends from 29th street South Brooklyn to 52nd street, a distance of 23 blocks in length and, neglecting the seven 1,400-foot piers which project from the rectangle like the prongs of a rake, it has a depth of two city blocks. It is located on the eastern shore of New York bay. A general idea of the shape of the plant and its relation to New York City is given on page 255.

One of the covered docks at Bush Terminal. Ships on one side deliver the freight, cars on other side move it to its destination without the use of the city streets

The fundamentals of success for a factory site are that it must be near the source of labor supply, it must be handy to the market for raw material and it must be able to reach the consumer at the lowest possible price and in the least possible time.

Labor Supply Unlimited

Within the 5-cent fare zone of the Bush Terminal there are 5,000,000 people. The supply of labor is unlimited. Ferries, elevated roads, subway and surface cars are handy and radiate in all directions from terminal plant like the veins of a leaf. Thus the home accommodations of those who labor at the terminal are practically without bound. Restaurants abound in the neighborhood and in one of the buildings one is provided at which good food can be secured at reasonable prices. There are five mail deliveries a day and there is a post office located in the plant.

A manufacturer can secure as much space as he needs. Subdivisions as low as 5,000 square feet can be arranged for and the rental is 30 cents per square foot for any but the top and ground floors on which the rental runs 35 cents a square foot. This rental price does not only mean that space is provided but in addition all the facilities of the terminal for heat, fire protection, elevator service, transportation service and watchmen are included.

In daytime there is no possibility of a want of light. The U-shaped buildings permit of light on every side as well as in the center and at night the electric current for lighting is supplied by the dynamos of the Bush company at little more than cost. The hot-water heat supplied by the plant in winter is sufficient to keep any room in any f the buildings at the desired temperature.

The fire protection is a big factor in the economy of the plant because it means reduced insurance. The rates are approximately 10 cents per $100 in the New England and Mutual companies and 20 cents per $100 in the line companies. It cost the terminal company $1,000,000 to install the fire protection system. There are 220 miles of piping leading to 225,000 sprinkler heads. The electric wiring totals a length of 175 miles. A force is maintained to inspect the fire alarm apparatus and maintain it at its highest efficiency at all times. When a fire breaks out the high temperature starts the water from the sprinkler head and at the same time automatically turns in an alarm which is responded to by the trained fire force. In a recent fire which occurred on one of the lower floors of a building, a number of girls located at the windows of the upper floors amused themselves by observing the crowd which had gathered below. This in spite of the fact that smoke was pouring from the windows of the rooms in which the fire was burning.

Eight Automobile Firms

Eight manufacturers of automobile supplies and accessories have already made their headquarters in these buildings and scores of other industries which are here represented are closely allied to the automobile industry. The Eisemann magneto company has its plant here as have also the Emil Grossman Mfg. Co.; the Jones speedometer; New York and New Jersey Lubricant Co.; Oil Products Co.; Tagliabue Mfg. Co. maker of the well-known viscosity meters; Sears-Cross, manufacturer of speedometers, and the Wagner Electric Mfg. Co. Besides these there are manufacturers of all kinds of engineers' supplies, bolts, nuts, measuring instruments, etc.

Freight sidings and loading platforms surrounded by Bush factory

Shipping Arrangements

The moment a packing case leaves the door of the factory it is taken under the care of the Bush Terminal and the owner need have no further fears for its safe and speedy transmission. A Bush employee places the packing case on a Bush handtruck, wheels it to the elevator and loads it thereon. It is taken to the ground floor and carried to the loading platform by Bush men. The goods are then placed on a car of the line over which they are to be shipped. The car is then hauled by a Bush electric locomotive to the car floats and there the car is loaded on a Bush barge and carried to the proper railroad terminal and sent on its way. All this is without charge, being included in the rent.

Congestion of the city streets is absolutely avoided for the area of the Bush plant is so great that nothing like a jam of the streets occurs. There are eighty elevators at the disposal of the tenants, each is capable of 6,000 pounds and each has an area of 88 square feet, giving a total carrying capacity of 480,000 pounds per trip.

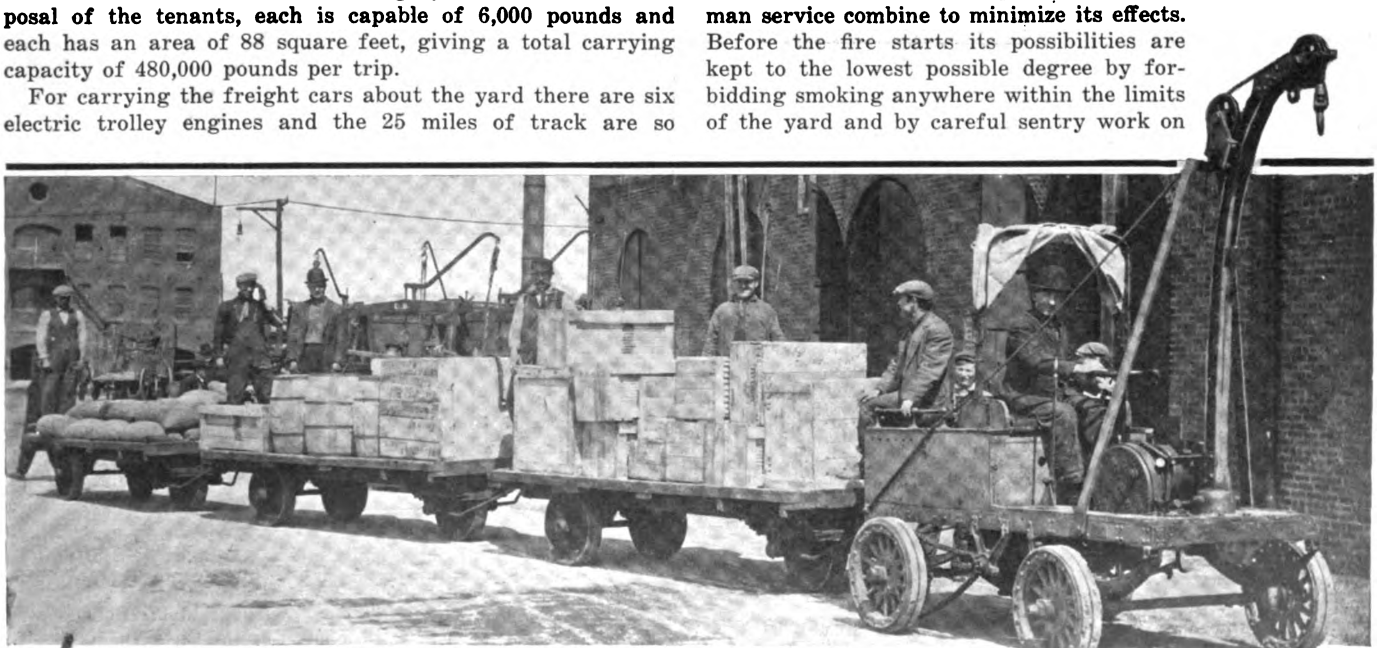
For carrying the freight cars about the yard there are six electric trolley engines and the 25 miles of track are so placed that there is not a point in the yard that cannot be easily reached. Frequent switches and sidings also help in the efficient handling of the transportation. Another factor in the efficiency of the handling of goods is in the use of four electric battery crane trucks. These tow trains of trailers and are not only useful for this work but in the actual lifting which is accomplished by the small crane attached to the front end of the truck. These trucks are inspected every noon and are ready for the men who operate them at the close of the lunch hour.

When the trucks are brought into the inspection and charging station at the noon hour they are lined up in the garage and a reading is taken on the ammeter to determine if the batteries still have a sufficient charge to last during the afternoon. By this system of two inspections a day these little units are maintained in a state of constant efficiency and perform a valuable work in the handling of goods about the yard.

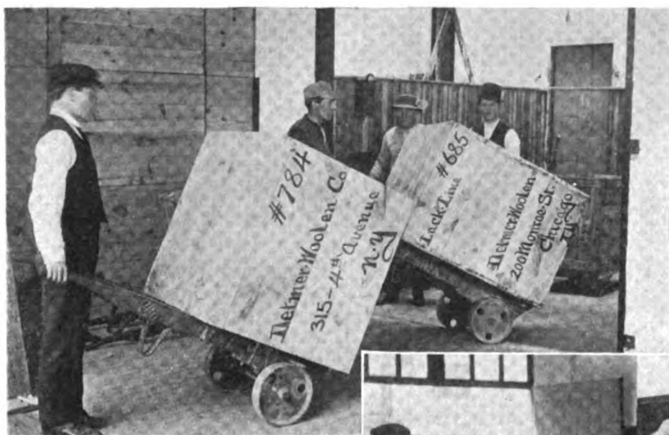
Storage in 130 Warehouses

The cost of storage in the warehouses of the Bush terminal is a minimum on account of the small amount of handling required to get the goods in and out of the storage warehouses and on account of the vast space provided. There are 130 warehouses of various sizes. In these, goods of any nature can be taken care of and the cost will depend on the bulk and on the nature of the risk the company assumes in taking charge of them.

The warehouses are also of concrete and steel construction and in addition to the inherent fire-proof qualities of this type of building, the sprinkler system taps every nook and corner. The fire protection accorded the goods is complete in both curative and preventive measures. After a fire has broken out the automatic sprinkler and alarm and the watchman service combine to minimize its effects. Before the fire starts its possibilities are kept to the lowest possible degree by forbidding smoking anywhere within the limits of the yard and by careful sentry work on



Battery crane truck for handling light freight at Bush Terminal. Giant warehouse in background



the part of the department in charge of the policing of the terminal.

Organization Is Complete

The internal arrangements of a plant of this size are as complete as those of a well-governed municipality. The wheels of industrial efficiency must not be clogged and at the present time the Bush company employs 2,000 men to see that they are not. The police and fire departments are trained to the minute and the adminstration organization made up of the heads of the various departments and the company officers eliminates the lost motion in the handling of the goods through the facilities of the yard by frequent meetings in which the interlocking duties of the departments are discussed.

The tenants of the Bush Terminal Co. are not the only ones who make use of the facilities for shipping which are found at its plant. Although the company operates its own railroad, primarily to facilitate the handling of freight about the terminal, there are still a number of other manufacturers who make use of it. There is a track delivery yard with a capacity of 200 cars for this business.

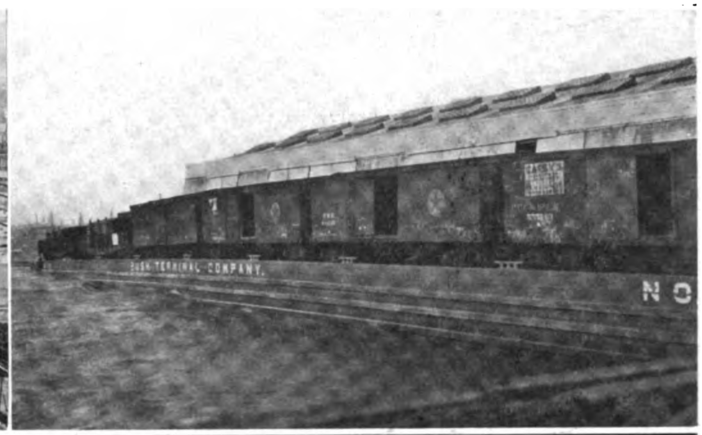
There are twenty steamship lines which now use the Bush terminal for berthing their vessels and besides being the accredited agents of these lines, the offices at the terminal are the American headquarters for many of the freight lines. Steamships are now docking at the piers at the rate of 750 a year and the large new double-decked pier, 1,400 feet long by 270 feet wide and 50 feet high, is the largest in the United States. It is to reach these facilities that outside concerns who are not tenants of the terminal make use of the yard service.

The social welfare side of this giant organization is not neglected. There is a garden for the children of the employees which is carefully inclosed by a high barbed wire fence to protect it from harm. In this the children are instructed in gardening. There is a loan organization from which employees can borrow at the rate of 6 per cent. annually for the purpose of meeting old debts, to purchase furniture, for illness, rent or vacation. In the last 3 years $3,000 has been loaned to 140 employees. The average loan is $20 and the maximum except in cases of extreme misfortune, is twice the weekly pay of the borrower.

Ten Departmental Heads

The administration consists of a president, four vice-presidents, secretary, treasurer and board of directors constituting the administration board. The departments of the plant are: finance, docks, warehouses, factory buildings, railroad yard, freight, floating equipment, legal, educational and social service. All are under specially qualified superintendents who are supreme in their respective spheres, subject only to orders from the administrative council. The legal department embraces a number of lawyers, one of them resident who looks after leases, claims, etc. The educational and social service are under directors. The former edits and publishes the plant's magazine, lectures before business bodies, handles advertising publicity, etc., and the latter department looks after welfare of employees and their children. The Bush Terminal Aid Society, with rooms in the Terminal Building, No. 19, is another feature of interest. There is a well-equipped meeting room, billiard and pool room and bowling alleys. The administrative board or council passes on everything of a business

From factory to destination—This series of illustrations shows how the packing case is taken in charge by the Bush Terminal Co., placed on one of the elevators, thence to a loading platform and into the freight train which finally carries it to the desired point, relieving the shipper of all anxiety



Railroad yard at Bush Terminal, which accommodates 2,000 freight cars. Freight cars on float to be carried to proper railroad terminal

character. The police and fire departments come under jurisdiction of the plant superintendents.

Justifies Community Principle

The terminal is only another adaptation of the community principle which has been advocated by students of political and social economy for decades. But it is a more sensible use of the principle than any of the so-called communities which have been founded on the principle of joint work. Here, there is no intermingling of those whose interests are not in common and each concern represented gives no more than a fair return for what it receives.

There is no support of the idle members of the community by those who labor more diligently, but there is a blending of interests in the cause of common efficiency which would not be possible with the detached scheme which this terminal replaces. The triangle is complete. It is an equilateral triangle, too, in every sense of the word, the requisites for each of the three branches, manufacturing, shipping and storing, being given their required amount of space without one overlapping the other. For, to what end would it be if the floor space and power for manufacturing were provided, and if, on the other hand, sufficient freight cars could not be accommodated to take away the products turned out?

The same applies to storing. With the 130 warehouses there is never a question of their being overtaxed. Goods can be kept at the temperature which they require to await the arrival of the steamship to bear them away or they can be kept at the warehouses indefinitely and there is plenty of room to accommodate the needs of the outside customers who make use of the facilities of the Bush terminal.

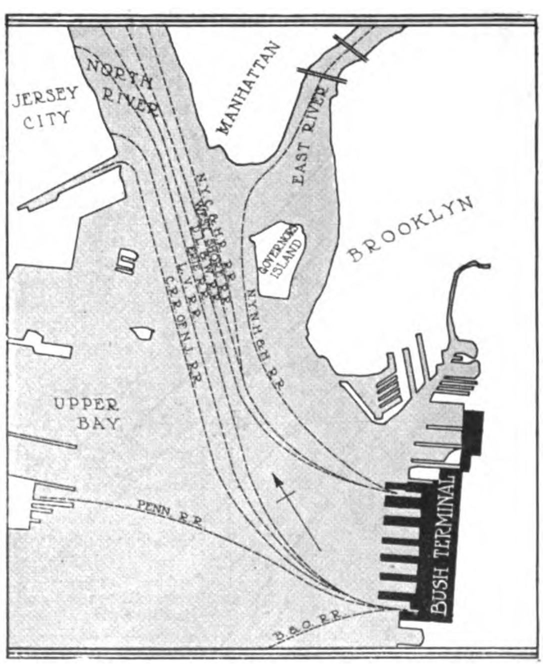
Bush Facts

¶ The Bush Terminal Co. is 14 years old.
It extends over an area of 250 acres.
It is located in South Brooklyn, N. Y.
There are now ten factory buildings.
Its industries support 50,000 people.
There will eventually be forty buildings.

¶ It has 5,000,000 square feet of factory space.
The buildings are all of concrete and steel.
There are seven 1400-foot piers now completed.
Within a 5-cent fare are 5,000,000 people.
In the yards there are 25 miles of track.

¶ It has a capacity of 2,000 standard freight cars.
It is protected by 220 miles of sprinkler pipe.
There are 225,000 sprinkler heads in the plant.
Electric automatic alarm wire totals 175 miles.
Steamships from its docks reach every port.

¶ There are 130 storage warehouses of all sizes.



Map showing the location of the Bush Terminal in relation to Manhattan and Brooklyn. The huge piers extend 1,400 feet into the waters of the upper bay, docking vessels from all ports

Hay Started Terminal

The history of the terminal is unique. Realizing the advantages of South Brooklyn for a terminal point because of its great natural marine advantages and because through its use the traffic congestion in the city streets would be avoided, the founder, Irving T. Bush, organized the terminal and then went out West and bought hay, ordering it to be sent to the Bush Terminal.

The railroads had never heard of this and refused to take the freight shipments for a while, but the orders to have hay shipped to the Bush Terminal continued, and finally the shipments were accepted. It is stated that Mr. Bush sold his hay at a profit.

After the shipments continued for a while the Bush company arranged with the railroad companies to operate its own barges, bringing to the railroad terminals freight consignments to be shipped over their lines.

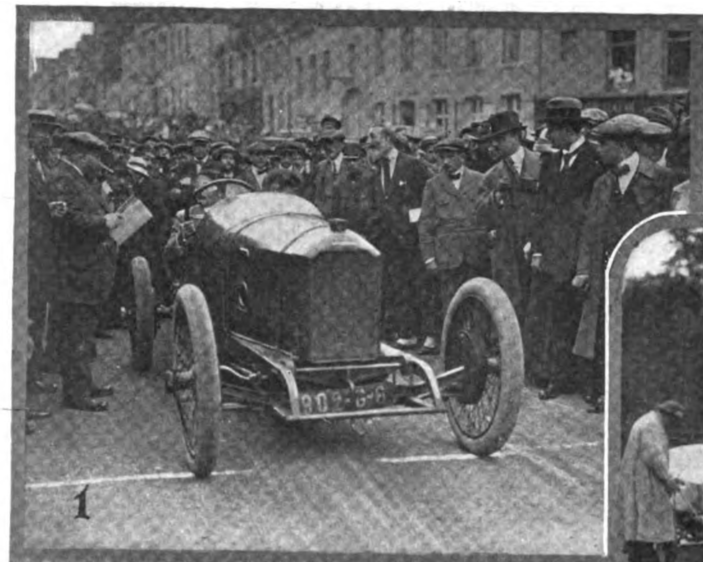
It was then but a step toward the promotion of the manufacturing and storing end of the business. These have kept pace with the shipping and the result has been a well-balanced plant.

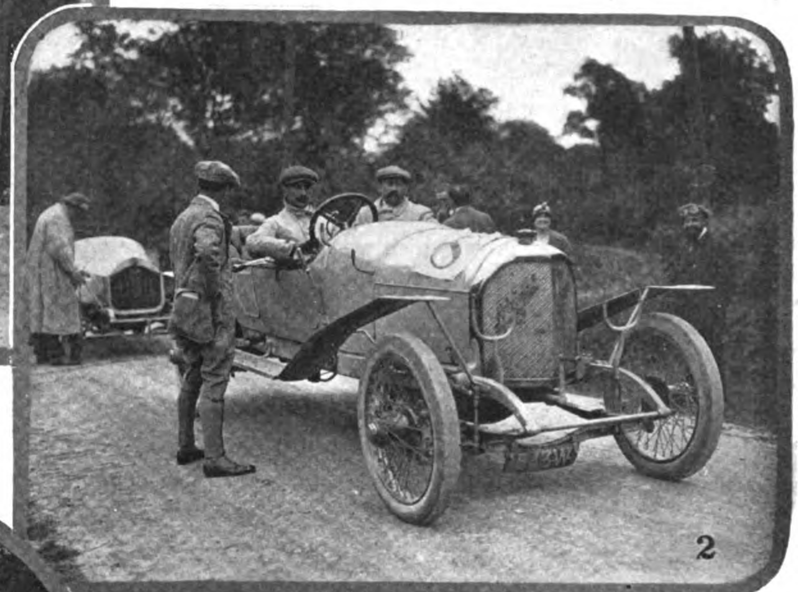
Room for Future Growth

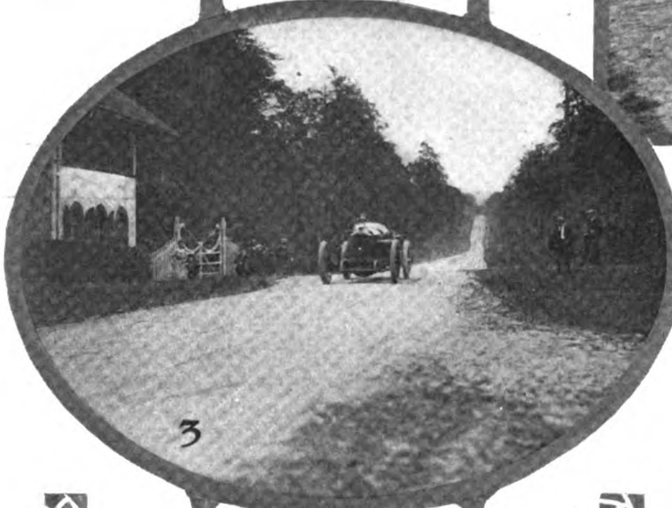
In laying out the plant the future has been considered as well as the present. There is enough property owned by the enterprise to erect many times the buildings which are now standing and the docking and storing facilities will grow with the increase in factory space. The railroad yards, which are a complete system in themselves, can expand beyond the limits of the present plant to such an extent that no fears for the future are held by the terminal officers.

Grand Prix Peugeot

Attains This Average Sp







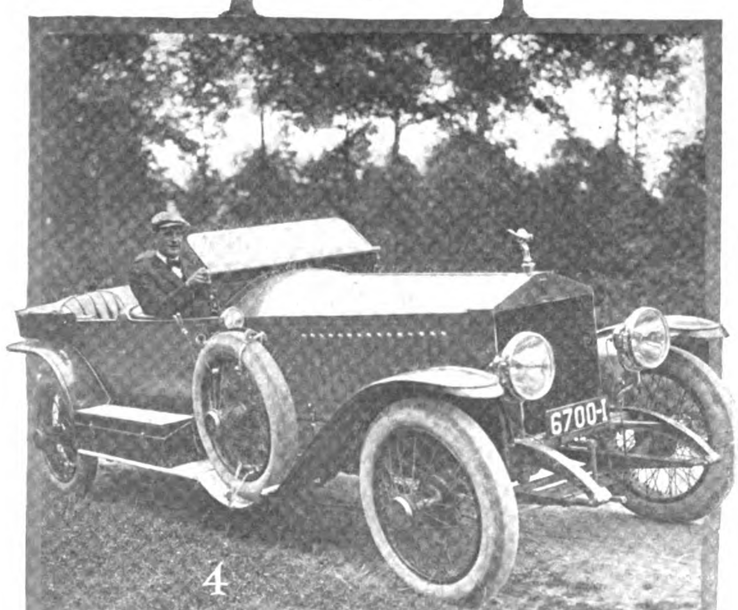
1—Grand Prix Peugeot starting the hillclimb at Boulogne
2—Vier in the Abadal, one of the fastest of the touring cars
3—Grand Prix Peugeot averaging 107½ miles per hour

BOULOGNE-SUR-MER, July 25—With a piston displacement of only 274.6 cubic inches, it has been possible to attain an average speed of 107 1-2 miles an hour over a 4.3 miles straightaway, the latter portion of this distance being covered at 112 miles an hour, to cover 3 kilometers standing at an average of 90.4 miles an hour, and to climb a mile hill, standing start, with several bends, in 1 minute 1-5 second. These performances were put up by one of the 274.6 cubic inch Grand Prix Peugeots which took part in the race at Lyons. It was the only car of its class in the meeting and naturally defeated all comers. In addition, it broke four year-old records held by the late Camille Jenatzy with a racing machine of 1,342 cubic inches piston displacement.

Knight-Motored Panhard Does Well

In the touring car section wonderfully good work was done by Panhard-Levassor, with Knight motor, which defeated all comers and bettered the racing car times with the exception of the Grand Prix Peugeot. Over the 1.86 mile course the average speed was 72.7 miles an hour, attained with a standing start. On the 4.34-mile course, flying start, the average was 82.5 miles an hour. The car is the Panhard-Levassor 35-horsepower model with a four cylinder Knight motor of 125 by 150 millimeters bore and stroke.

America was represented in this meeting by Johnny Aitkins, who drove a Rolls Royce touring car belonging to Charles Faroux. He finished fourth in the 4.34-mile trial.



4—Johnny Aitkins on Rolls Royce owned by Charles Faroux, which won first prize in the elegance competition

1.86 MILES STRAIGHTAWAY, STANDING START

Racing Machines

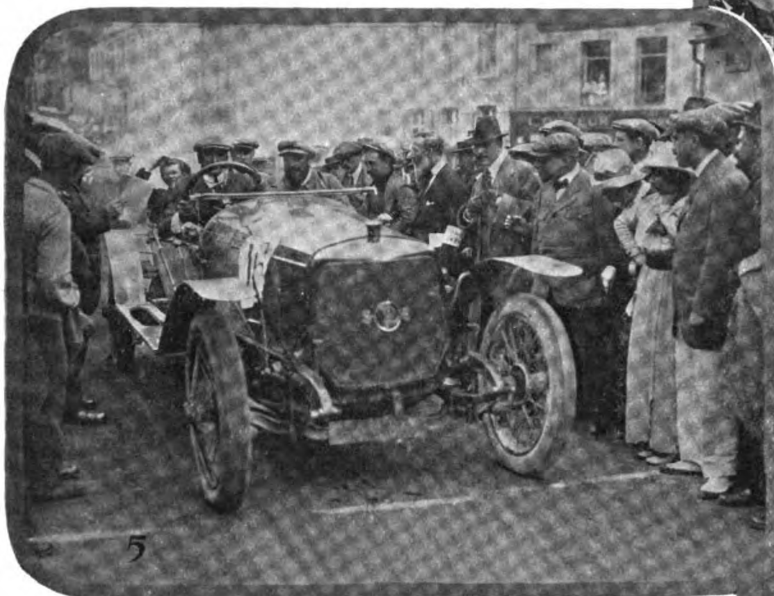
NO.	CAR	DRIVER	TIME
1	Peugeot	Boillot	1:14
2	Hispano-Suiza	Bertin	1:36 2-5
3	Hispano-Suiza	Cordier	1:47 4-5
4	Spa	Leduc	1:48
5	Gregoire	Stenne	2:04
6	Scar	Martin	2:06 3-5

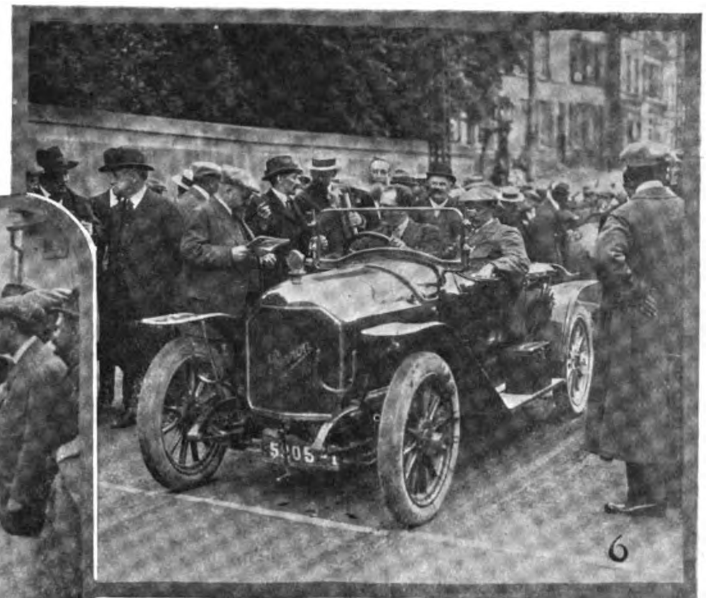
Touring Cars

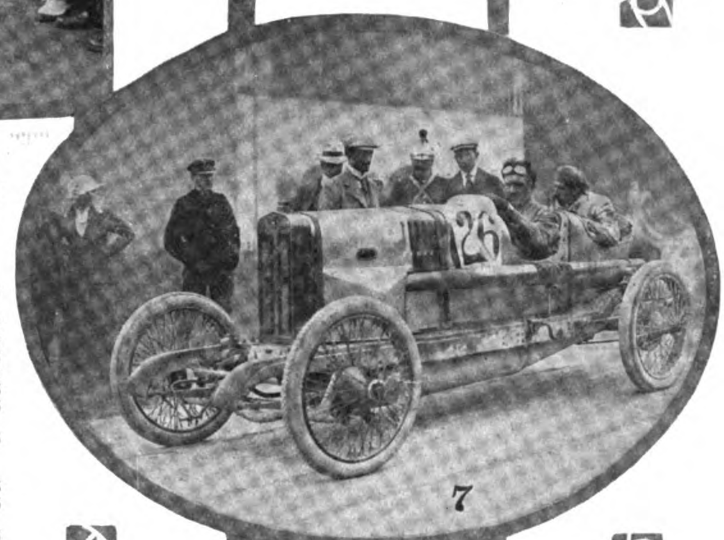
NO.	CAR	DRIVER	TIME
1	Panhard-Levassor	Artault	1:32
2	Panhard-Levassor	Thibault	1:53
3	Hispano-Suiza	Bara	1:40 3-5
4	Aquila-Italiana		1:48 2-5
5	Abadal	Vier	1:57 4-5
6	Hispano-Suiza	Delpierre	1:59 3-5
7	Rolls & Royce	Johnny Aitkins	2:00
8	Nagant	Wery	2:04
9	Darracq	Retif	2:12
10	Gregoire	Sauvage	2:13
11	Pierron	D'Avaray	2:28
12	Hupmobile	Deli	2:33

Makes 107½ M. P. H.

eed at Boulogne Races







5—Artault on Panhard-Levassor, the fastest of the touring cars
6—The small Pierron driven by D'Avaray starting in the hillclimb
7—Tandem seater Hispano Suiza, second fastest in racing section

4.34 MILES STRAIGHTAWAY, FLYING START

Racing Machines

1	Peugeot	Boillot	2:25 1-5
2	Spa	Leduc	3:42
3	Hispano-Suiza	Cordier	3:54 2-5
4	Hispano-Suiza	Bertin	4:00 4-5
5	D'Aoust	Hanriot	4:02 2-5
6	Aquila Italiana	Mollet	4:03 1-5
7	Zenia	Delattre	4:05 2-5
8	Gregoire	Stenne	4:48 4-5
9	Scat	Martin	4:50
10	Bugatti	Givelet	4:57 2-5

Touring Cars

1	Panhard-Levassor	Artault	3:09 4-5
2	Hispano-Suiza	Bara	3:28 4-5
3	Aquila-Italiana		3:48
4	Rolls & Royce	Johnny Aitkins	4:00 2-5
5	Hispano-Suiza	Delpierre	4:17
6	Panhard-Levassor	Thibault	4:22
7	Abadal	Vier	4:28 1-5
8	Nagant	Wery	4:29 1-5
9	Pierron	D'Avaray	5:33 1-5
10	Scat	Boutmy	5:48 3-5
11	Scat	Williame	6:35 1-5

MILE HILLCLIMB, STANDING START

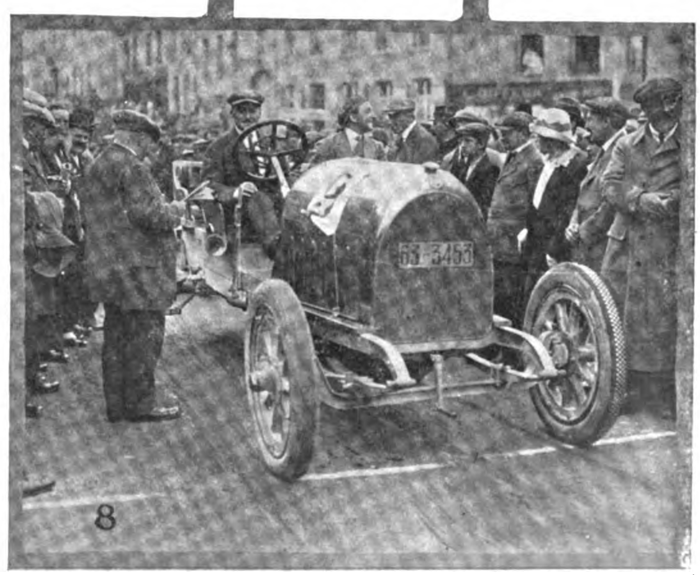
Racing Machines

1	Peugeot	Boillot	1:09 1-5
2	Hispano-Suiza	Bertin	1:18 2 5
3	Hispano-Suiza	Cordier	1:29 2-5
4	Spa	Leduc	1:31
5	D'Aoust	Hanriot	1:33
6	Aquila Italiana	Moliet	1:33 1-5
7	Zenia	Delattre	1:36 2-5
8	Bugatti	Givelet	1:38 3-5
9	Gregoire	Sienne	1:40 2-5
10	Scar	Martin	2:01 3-5

Touring Cars

1	Panhard-Levassor	Artault	1:16 1-5
2	Hispano-Suiza	Bara	1:20 2-5
3	Aquila-Italiana		1:29 3-5
4	Hispano-Suiza	Delpierre	1:35
5	Nagant	Wery	1:48
6	Darracq	Retif	1:50 3-5
7	Abadal	Vier	1:53 2-5
8	Gregoire	Stenne	2:02 2-5
9	Hupmobile	Dely	2:17 4-5
10	Scat	Boutmy	2:36 1-5
11	Pierron	D'Avaray	2:40
12	Sigma		2:44 3-5
13	Zedel	Bournigeaud	2:49 4-5
14	Scat	Williame	2:53 3-5

The French Grand Prix at Lyons did not allow the public to appreciate the speed possibilities of these new 274.6 cubic inch creations. **The average of 65.5 miles an hour was alone looked at, the fact being lost sight of that the course was of such a winding nature as to make speed impossible.**



8—Leduc on the Spa, one of the fastest of the racing cars in the competitions held at Boulogne-sur-Mer

Rapid Flame Propagation the Aim in Plug Location

The Automobile Engineers' Forum

F. E. Moskovics Takes Exception to Statements in "The Autocar"—Not a Matter of Number or Location of Plugs but of Raising Effective Pressure of the Cylinders as Rapidly as Possible

INDIANAPOLIS, IND.—Editor THE AUTOMOBILE:—In THE AUTOMOBILE for July 16, page 123, you give considerable prominence to a line of experiments and resultant curves by C. F. Dendy Marshall on the subject of location of spark plugs and the effect on power development; as reported in *The Autocar*. I read the report very carefully and was absolutely astounded at the results obtained until I reached practically the last part of the article in the paragraph headed Two Plugs are Unnecessary, where I find the little joker, which lies in the paragraph—"The engine I experimented with was of the fashionable type with all the valves on one side."

Flame Propagation Rapidity the Problem

Now, is it possible that a writer capable of attracting the technical attention of *The Autocar* should have to even experiment on a proposition of this sort. The matter is not one of spark plug location nor number of spark plugs, but the old, old problem of rapidity of flame propagation. It is so childlike in its simplicity, the principles involved are so elementary, that it hardly seems possible that they are not perfectly manifest to everyone in the profession.

Shape of Motor an Important Factor

Of course, locating two spark plugs over the valves of an L-head motor will make no appreciable difference, but placing them over the valves of a T-head motor would certainly make a great difference. Also, had Mr. Marshall made his experiments by placing his plug or plugs in the center of his cylinders rather than over the valves, he might have found some results which would have surprised him.

Center of Flame Area for Plug Location

We might refer him to the Sunbeam factory in England, which locates the single spark plug in the passage between the valve ports and the cylinder bore to get it as near as possible to the center of the flame area, or he might inquire of the various designers of the Knight motored cars, who locate their spark plugs directly in the center of their combustion chambers for the same reason and all of them have the single purpose of getting as rapid flame propagation as possible.

Raising Effective Pressure of Cylinders

The problem is so clear that it would seem at this late date it was unnecessary to again point out that it is not a matter of where the plug is located nor how many plugs are used so much as the fact that the result to be attained is that of raising the effective pressure of the cylinders as rapidly as possible and this certainly is accompanied by rapidity of flame propagation, and rapidity of flame propagation is accelerated by simultaneous ignition of the charge at points widely separated.

This also answers the last paragraph of the writer in which he says that "it seems that the double plug arrangement has much more effect when the valves are on opposite sides than when they are on the same." Then again he draws an erroneous conclusion when he says "owing probably to the two points of ignition being farther apart." I beg to say that there is no probability or question as to the reasons involved. It has been proven too often on the dynamometer, and the manograph clearly shows the increased pressure of the two-point ignition when the plugs are located as far apart as possible.

Symmetry of Firing Does Not Affect Power

The closing paragraph states he credits the advantage of two-point ignition on T-head motors "partly to the fact that the charge is symmetrically fired." I believe it is safe to say that the symmetry of the firing of the charge has absolutely nothing whatever to do with the increased pressure and the resultant increased power.—F. E. MOSKOVICS, Commercial Manager, Nordyke & Marmon Co.

Car of the Future Will Be Greatly Simplified

DETROIT, MICH.—Editor THE AUTOMOBILE:—The whole construction of the present day automobile (excepting perhaps the body and wheels), is rotten. I know I am stacking up against some pretty clever designers but tell me what has been done in the automobile as we now have it, outside of the perfection of details that was not in the little $650 Olds of the early 90s, or the big single-cylinder Winton of the same period. I will say there has been not one radical improvement or change.

Look back in the early stage of industry, when steam wore the crown and when Charles Duryea would argue with everyone that would argue with him that the internal combustion engine was the coming motor power. In those days Duryea, Olds and Alexander Winton were, you might say, the Master Minds. They are the ones who built the present automobile when it started.

Addition, Complication and Results

Since then we have added improvements, of course. We have also added cylinders, added gears, added magnetos, added expense, added complication, until it compares favorably with the first-class battleship, but always the same old machine. True, we get somewhat better results, but why wouldn't we? Haven't we been working on the same old thing long enough? And, haven't we added enough to get something?

The Car of the Future

Now let me tell you what the motor vehicle will be not 50 years hence but 25 years from now. You can call it imagination if you wish, a dream or a nightmare, but before forming an opinion, think of the Atlantic cable, the telephone and wireless. The future truck will have for its foundation a chassis of standard design and measurement for the different sizes, say, 1,000, 2,000, 4,000, 6,000 and 10,000 pounds capacity. It will have standard springs and fittings. And will provide standard lugs and braces for the motor power. The power plant, I believe, will be operated by alcohol and perhaps it might be well here to give my reasons for such belief. It being a manufactured product, the quantity of which is unlimited, could be regulated to suit the demand. It is safer, cleaner and more agreeable to handle than either gasoline or kerosene and produces a more flexible explosion than either. And I might suggest that if the government would take up this matter of producing alcohol, instead of spending money in useless investigations, we would then get a price much less than that of gasoline at the present time.

The Real Self-Starter

The power plant, as I said, will have standard bosses or projections to fit lugs and braces of the chassis with but three or four bolt holes to fasten it to the same. It will be completely self-contained. The motor will be self-starting, in fact, not the so-called self-starter of today, where we depend on acetylene gas, electricity, compressed air, spring movements or some other form of power. This term, like many more on the automobile, is used for the want of something better. There are no self-starters today. They are auxiliary starters. Our future machine will have auxiliary powers but they will be reduced to two, compressed air and electricity. The acetylene gas generator and tank will have passed away and the only place you will find the water-circulating pump or a carbureter will be in a museum and referred to as Ancient Motor Group. I know there will be a general smile of criticism all along the line when I say that you will find the magneto and that spider-web piece of construction called a radiator in the same group. The motor of the future may be a modification of the Knight, but will not be as expensive in construction and will be much simpler. It will have no timing gears or camshafts.

Now let us see what we have under the hood. A plain symmetrically designed motor (and it won't be a two-cycle either) with no poppet valves or springs, no timing gears or chains, no cam or connecting link shafts, no circulating pump, no magneto, no wiring and no radiator. In addition to this, the motor being self-contained, can be removed for repair or replaced for a new one in less than 1 hour by the driver or an ordinary mechanic.

The Things We Won't Need

Listen, did I hear someone say, this fellow has forgotten about his drive shaft connections, and universal joints? No, but you forget that we are 25 years older and have learned that we don't need any. Not even a clutch, and about that box, filled with chrome nickel steel with more or less grease and trouble mixed in, well you'll probably find that in the same museum with the motor group, but indexed as Ancient Transmission Group. When we have gone this far, we can naturally disregard the gearshifting mechanism, including levers, etc.

Independent Drive for Each Wheel

Now let's get back to the thing that won't drive when one wheel slips, commonly called the differential. We will have to get something here that will give us the results we require and the only way is to drive each wheel independently.

But how? Now we have three methods, bevel or worm gear, chain and internal gear. By the time we have the rest of this car worked out, I guess we will have decided that the internal gear is the thing. And then we shall have a standard size gear bolted to the wheel, with standard size pinions suitable for each chassis of given capacity. Somebody else said I've forgotten the steering gear. No, I haven't. That answers pretty well now, so we will continue to use it.

The Results Will Follow

Now, in going over the above, it will be noticed that I have not attempted to suggest how any of the results are accomplished. But I do wish to say that I have my own ideas and know they are more possible than I would have believed the phonograph was, 30 years ago, or wireless telegraphy, 20 years ago.

Just as soon as the present automobile momentum dies out, someone will have made enough money to spend some of it in giving us what we really want.—WILLIS A. SWAN.

High-Grade, Costly Cars Will Always Have a Field

DESPITE persistent reports of psychological depression in business, the automobile industry continues at a steady pace along the high road of prosperity. To accentuate the contradiction, it is pointed out that conspicuous examples of increased business are found in the field of high-priced cars, possession of which might be regarded as a luxury.

$7,000,000 Sales in 6 Months

During the first 6 months of the calendar year 1914, the Packard company, for example, has established one of the biggest sales records in the annals of that successful concern. During this period, the company's net sales totaled, in round numbers, $7,000,000 and the output of cars was utterly inadequate to supply the demand.

In explanation of these conditions, Alvan Macauley, vice-president and general manager of the Packard company, made the following statement:

"The manufacture and sales of automobiles is perhaps the only specialty business in which every man, woman and child in the United States feels a deep and personal interest. Everyone who hasn't an automobile hopes some day to have one. Those who fortunately own a car are looking forward to the time when they can have a new and better machine.

"The automobile business has been described as the greatest self-advertising business the world has ever known. The entire people are interested, not only in having an automobile, but in having the most up-to-date one their purse will allow. I have been greatly impressed by the eagerness with which the school-boy studies the features of the various cars and promptly forms his own opinion of the various new models as they appear.

"The American tendency is to buy what is most desirable, with the cost as a secondary consideration. Also, there is a noticeable tendency toward keener appreciation of style and luxury in automobiles. Every car manufacturer appreciates the force of this awakening, and is catering to it in so far as the selling price of his product will permit.

Always a Class Putting Quality First

"The field for cars presenting the happy combination of beauty in line, luxurious riding quality, and extraordinary service quality is a distinctive one. There always will be that class which demands the last word in workmanship and design, putting quality first and then seeking the best value to be found in that particular field."

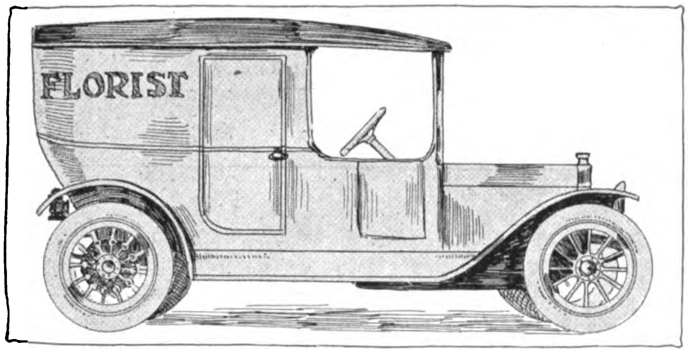


Fig. 1—Limousine converted into delivery wagon

The Rostrum

Suggests Making Old Limousines Into Delivery Wagons

EDITOR THE AUTOMOBILE:—A partial solution of the second hand car problem, is to use the closed cars that have fallen into the discard as delivery wagons. The change is easily and inexpensively made and the result is very pleasing. The delivery wagon-limousine as shown by Fig. 1, is well adapted to many lines of work. It makes an excellent vehicle for florists, dry goods merchants, confectioners and the like.

In making the change, it is merely necessary to remove the rear seat and arrange suitable shelves around the interior. Then, the windows are replaced by mirrors or these spaces are closed up entirely. In either case the cost is not great.

Watertown, N. Y. J. S. S.

Information on Regrinding Cylinders

Editor THE AUTOMOBILE:—1—I am contemplating having the cylinders of my Metz 1913 motor reground and new pistons with Leak-Proof rings fitted. Will you kindly advise me as to how much clearance I should allow between piston and cylinders? Should the pistons be the same size, the whole of their length, or smaller at the top end to allow for greater expansion?

2—Will it be necessary to get oversized rings if Leak-Proof rings are used?

Worcester, Mass. W. C. WHITTUM.

—1—With a motor of this size and speed, the clearance at the lower end should be .006-inch and should taper so that at the upper end the clearance is .012. For a high speed motor of this size the clearance should vary from .009 at the bottom to .015 at the top. In general .00125 inches clearance should be added for each inch of bore.

Whether oversize rings should be used depends on how much larger the cylinders are made. It would be best to determine what size the cylinders are to be and order the rings accordingly.

2—In reboring the cylinders it would be best to follow the S. A. E. standard as you can then probably get pistons to fit the cylinders exactly without any machining. It is recommended that the cylinders be ground .01, .02, .03 or .04 inches large.

How to Adjust Steering Gear

Editor THE AUTOMOBILE:—I have a Staver car, Model 35F in its fourth year:

1—Where are the various adjustments for the steering gear? Will you please designate each one's purpose?

2—Is there any method of preventing screeching of brakes? The leather is very little worn.

3—What is the bore and stroke of this engine?

4—Upon the opening of a petcock in a four-cycle engine for the purpose of determining the number of revolutions, does each report indicate two revolutions?

Minneapolis, Minn. E. F. BORUSKE.

—1—We are unable to give you exact information on this point because we have no photograph or drawing of the steering gear on this particular model and as the Staver is no longer manufactured there is no ready means of obtaining this information.

However, general instructions on the adjustment of the steering mechanism should be sufficient for you to remedy any fault. The steering mechanism is shown in principle in Fig. 2.

Jack up the front wheels, so that all parts of the steering mechanism may be moved freely. Turn the wheel back and forth and note whether there is any play in the gears. The adjustment of these gears varies on different cars but a careful inspection of the steering gear and a little experiment housing should reveal how to take up the play. As a rule the adjustment takes the form of a nut located at the base of the steering column, just at the point where it goes into the housing. By turning this nut the wear is compensated for. There is generally some sort of a locking device for this nut, which must be loosened up before the nut is turned. Be careful not to adjust the gear so tightly that it binds, but just enough to remove all play.

If the gears are so badly worn that the play cannot be fully removed it will be necessary to replace them unless the steering gear is a worm and gear type in which case the steering connections can be loosened and the wheel rotated until the worm meshes with a new segment of the wheel.

Next, examine the steering rod, and if there is any play in the ball joints at the ends this should be removed by adjusting them. By referring to the figure it will be seen that the outer end of each socket consists of a cap threaded into the steering rod and by turning up on this member the play between the ball and the socket is removed.

Note whether the pins or bushings holding the tie-rod are worn and if they are they should be replaced. Also see that the wheel bearings are in adjustment and that the king pins on which the wheels pivot are not worn.

2—Screeching of the brakes can be prevented by putting a few drops of oil on the brake drums. Be careful not to apply too much.

3—This is unobtainable.

4—Yes, because there are four strokes to every explosion in a four-cycle motor and two strokes every revolution.

Gasoline Consumption Is High

Editor THE AUTOMOBILE:—I have an E. M. F. 30 horsepower, 1910 five-passenger car and it has been making about 18 miles per gallon of gasoline. This year it is not making over 8 miles. I have had the cylinders cleaned, new spark plugs put in magneto and carbureter examined. The car runs and does about as well as ever, until after climbing hills or after the engine gets heated. It will begin to miss until after speed gets up to 10 or 12 miles per hour, then it will run all right. After the engine becomes heated the spark lever works very bad.

Parkersburg, W. Va. A. B. Preston.

—We do not believe that the magneto is at fault or that the stiffness of the spark lever is causing the trouble. A method for limbering up the movement of the spark lever was given in the Rostrum for July 30, page 231.

Since your car only misses at speeds below 12 miles per hour and then only when warmed up, it seems likely that the heat causes a slight leakage, either by warping a valve or by expanding a valve stem. Test the compression when the motor is warm and if any cylinder is weak see whether it is not due to lack of clearance between valves and push rods or to a warped valve. These defects would cause enough leakage to make the motor misfire when the throttle is nearly closed but yet not enough to make it miss at wider throttle openings.

Faulty carburetion may also be the cause of the misfiring. Reduce the richness of the mixture when running slowly and see if this makes any difference. It is possible that the reduction in charge weight caused by the heating of the air is sufficient to decrease the ratio of air to gasoline enough to prevent combustion, although when the motor is cold enough air is taken in so that the motor will run all right.

Another possibility is that there is a leak in the intake manifold due to it warping out of shape when heated. Tighten up the bolts holding the manifold and if necessary put in new gaskets.

See that the brakes are not dragging and that the spark advance has not slipped so that you are running with it retarded.

Motor Gets Too Much Oil

Editor The Automobile:—I have an E. M. F. 30, 1910 car. This car, as you know, has an oil reservoir with a gauge. I have been bothered with the engine getting too much oil. I can fill the reservoir full of oil and it will remain in the gauge and tank all right, but as soon as I screw the nut on the oil tank it will go to the crankcase giving the engine too much oil and causing it to smoke.

I have looked everywhere and can find no place where the oil gets air and the oil pump does not leak as long as the nut is left off of the oil tank. If you can give me any advice as to how to remedy the trouble I will be greatly obliged.

Shannon City, Ia. W. A. Hofmann.

—The oiling system, Fig. 3, on this car is so simple that there are very few places that it can cause trouble. It con-

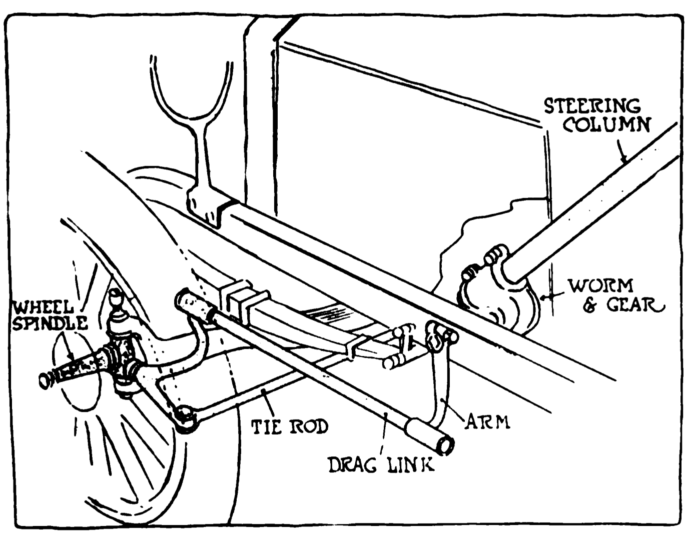


Fig. 2—Sketch of steering gear showing where wear may occur

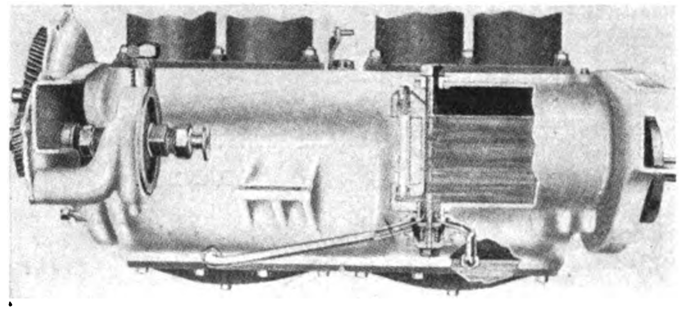


Fig. 3—Vacuum oiling system used on 1910 E. M. F.

sists merely of a reservoir, integral with the crankcase, which has two oil pipes running to the front and rear compartments of the crankcase. A constant level is maintained in the crankcase automatically. When the level drops below the holes air makes its way up into the reservoir and allows oil to flow down until the level is brought up to normal.

An excess of oil can only occur when there is a leakage of air. The leakage may be caused by a worn rubber gasket on the filler cap, a cracked gauge glass or due to small holes in the casting. Inspection should reveal where this trouble is.

Excessive smoking, however, may be the result of using too light an oil, loose pistons or worn rings.

There is no pump in the system.

Marmon 48 Weighs 4880

Editor The Automobile:—What are the weights of the 1915 seven-passenger 48 Marmon with tanks empty and fully equipped?

2—What is the gearing of the Marmon on each of the speeds?

3—What system of lubrication does the new Locomobile use?

4—Which makes the best and most powerful six-cylinder motor, a 4.5 by 5.5 inches or 4.125 by 6 inches?

5—What is the piston displacement of an engine and how may it be found?

Beaver Falls, Pa. A Subscriber.

—1—The weight of the Marmon six 48 is 4,880.

2—The gearbox reductions on the Marmon are: Third—direct; second, 1.63 to 1; first, 3.36 to 1, and reverse, 4.33 to 1. There are four standard rear axle reductions, 3 1-18 to 1; 3.50 to 1; 3.77 to 1, and 4.08 to 1. With the 3.50 reduction the overall ratio between the rotation of the motor and the rear wheels is: Third, 3.50 to 1; second, 5.7 to 1; first, 11.75 to 1; reverse, 15.15 to 1.

3—The Locomobile system is a combination splash and pressure feed, the lubricant being supplied under pressure to the main bearings and the pressure being sufficient to overcome the centrifugal force due to the rotation of the crankshaft. The rest of the motor is lubricated by the splash created by the dipping of the connecting-rods in the troughs. The oil is supplied to the main bearings through a pipe running the length of the motor, a branch outlet going to each bearing, of which there are seven. Oil to the troughs is furnished by another pipe that squirts oil out of individual openings opposite each trough.

4—The 4.5 by 5.5-inch motor will develop more power providing that the design of the two is identical and that the maximum speed of both motors is the same. This is obvious because the 4.5 by 5.5-inch motor has a displacement of 349.9 cubic inches, while the 4.125 by 6-inch motor has a displacement of only 320.7 cubic inches.

5—The piston displacement means the actual volume of air in cubic inches that each piston displaces when moving the full length of the stroke multiplied by the number of

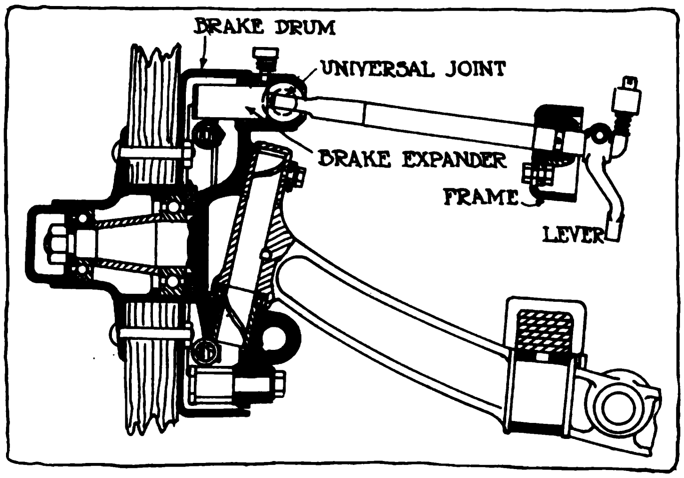


Fig. 4—Argyll front wheel brake construction

cylinders. It is calculated by multiplying the bore by itself, multiplying the result by the stroke and the number of cylinders and then by the constant .7854.

Expressed as a formula, this becomes,

Piston displacement = Bore^2 $\times$ Stroke $\times$ No. of cyls. $\times$ .7854.

The Construction of Front Wheel Brakes

Editor THE AUTOMOBILE:—Please explain by aid of a diagram the construction of the front wheel brake; and if it is possible to install them on a model 19 Buick.

Cincinnati, Ohio. A SUBSCRIBER.

—The construction of front wheel brakes is the same as that of any other brakes except that some special means must be employed for attaching the brake rods so that the wheels may be turned without affecting the brakes.

A typical brake is the Argyll, Fig. 4, in which expanding shoes are used. The movement of the wheel in steering is taken account of by fitting a combination slip and universal joint to the brake rod at the point where it enters the brake drum. The brake rod is also supported in the frame of the car by means of a ball joint so that the flexibility of this member is complete.

It is not advisable to fit front wheel brakes to your car although it is possible to do so. The objections are two in number, the first being the cost, and the second, the fact that the axles and springs are not designed to take this added strain.

Front wheel brakes are less liable to make the car skid when suddenly applied, and when used simultaneously with a rear set, the car can be stopped in about half the time.

Storage Battery Gives Trouble

Editor THE AUTOMOBILE:—1—Could one use 18-candle-power lamps throughout the Chalmers motor and the lights draw from all nine cells? Would not this eliminate this battery trouble that is now present? I have a Chalmers car and about every 3 weeks I have to take the battery to a garage to have it discharged and recharged.

2—What is the weight of the 1913 Pierce-Arrow 38?

3—I have been told that an automobile should have 1 horsepower to every 80 pounds of weight. Is this correct? If not give some formulæ.

4—How many miles per gallon should a 2-38 Packard touring car make in country driving? We only get 7 miles per gallon.

5—Were the electric starters tried out before 1910 and discovered that it required too much power from the motor?

Sudbury, Vt. G. E. S.

—1—You should have your battery and lighting system examined by a competent man as it should not give this trouble if it is in proper condition.

2—4,280 pounds.

3—The proportion of weight to horsepower is a matter of individual taste and also depends upon conditions under which the car is built, however, 80 pounds per horsepower should be satisfactory. If an extremely good hill-climber or a speed car is wanted this ratio might be reduced. On the other hand, the ratio might be exceeded if fuel economy alone were considered.

4—This car should make 13 miles to the gallon according to tests that were conducted by the A. C. A., on Long Island last winter. In these tests the car averaged 13.1 miles per gallon when running at an average speed of 20.8 miles per hour. At a speed of 40.6 miles the mileage dropped to 11. This was with all lamps lighted.

Assuming that you are getting full measure, your car is not as economical as it should be. Readjust the carbureter and see if it does not improve the economy. Drive with the spark as far advanced at all times as is possible without causing the motor to knock. See that the compression is good and that power is not being used by excessive friction at any point.

5—Electric starters were not used to any extent until 1911. They were not tested at some previous time and found that too much power was required as you suggest. At that time the problem was to make a reliable starter and it is doubtful if the question of economy was every raised.

How To Adjust High-Speed Clutch

Editor THE AUTOMOBILE:—1—On a model 40 Overland car, please describe the method of clutch adjustment. The high-speed clutch on this car will drop out occasionally. How can this trouble be overcome?

2—What is the bore and stroke of the engine?

3—The intake manifold on this car is quite long. If the manifold were cut off say 3 or 4 inches this would shorten the gas travel and perhaps avoid manifold condensation. What is your opinion of this proposition?

Haskell, N. J. C. H. BENTON.

—1—The slipping out of the high-speed clutch is probably due to wear in the clutch mechanism or the rod is out of adjustment. If the former is true then the play should be removed, while if the latter is the case the rod should be made the correct length.

2—The bore and stroke are 4 1-4 and 4 1-2 inches, respectively.

3—This would not be advisable for the reason that the difference in the level between the fuel in the tank and the float chamber would be considerably reduced, so much so that the gasoline would not flow on steep hills.

If you are troubled with condensation and are sure that the cause is not poor carbureter adjustment, bad ignition or lack of compression or some other cause, you had better fit a hot-air connection to the carbureter.

List of A. C. Rectifier Makers

Editor THE AUTOMOBILE:—My car carries a 40-ampere-hour storage battery. Will you please tell me through your Rostrum the best kind of apparatus to use in charging it. I have alternating current but no direct current. The A. C. voltage is 110.

Please advise me through the magazine as to the apparatus, its cost, connections, and where I can obtain it.

Steelton, Pa. JOHN B. DOWNS.

—Below is a list of concerns, taken from the Automobile Trade Directory, that make alternating current rectifiers suitable for charging storage batteries. The simpler of these systems can be attached indirectly to any lamp circuit by screwing in a plug. The prices of these devices vary from about $30 up.

American Battery Co., 1132-34 Fulton street, Chicago, Ill.

J. F. Ashbrook, 2639 Emmet street, Chicago, Ill.
Thomas A. Edison, 114 Lakeside avenue, Orange, N. J.
Efficiency Sales Co., 42 Broadway, New York City.
Electric Economy Co., Hyde Park, Mass.
Electric Products Co., Cleveland, Ohio.
Electric Storage Battery & Mfg. Co., Cincinnati, Ohio.
General Electric Co., Schenectady, New York.
Thomas Hickley, Belmar, N. J.
Murphy Electricity Rectifier Co., 187 N. Water St., Rochester, N. Y.
Service Battery Co., 2325-27 Wabash avenue, Chicago, Ill.
Sirch Electrical & Testing Co., 126 West Third St., Los Angeles, Cal.
Standard Metal Mfg. Co., Newark, N. J.
Wagner Electric & Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wilson Supply Co., 1191 Gladys Ave., Cleveland, Ohio.

Why Maxwell Gear Slips Out

Editor THE AUTOMOBILE:—How can I adjust the direct drive of a two-cylinder Maxwell model A. B.? Every time I put the lever on the direct it slips for about a block before it takes hold and drive the car. This transmission is a two-speed planetary.

Larchmont, N. Y. G. L.

—This trouble is probably due to lack of adjustment of the planetary bands. On the outside of the transmission case there are two adjusting screws, one for the low speed band and the other for the reverse. Tighten up on these screws and your trouble should disappear.

It is also possible that there is not enough oil, or it may be that the high speed disk is worn, in which case it must be replaced. Should the trouble be caused by a worn finger, however, it may be eliminated by adjusting it.

American Co. Entered One Race

Editor THE AUTOMOBILE:—1—Did the old American Motors Co. ever enter automobile races? If so, did they win or take prizes in any important races?

2—Could you show me a cross-sectional view of the starting motor and generator used in the Electro system.

3—How many American cars were manufactured when the American Motors Co. went out of business?

San Diego, Cal. MARK JUNGK.

—1—According to the A. A. A. the American Motors Co. entered its own racing car in only one big event and that was at Atlanta, Ga., May 5, 6 and 7, 1910. The reason for the firm not entering any more races after that was because of a protest that its car at that race was not a stock model.

At the Atlanta meet, the car distinguished itself by finishing first in the 50-mile free-for-all, with Herbert Lytle driving. The time was 40:20:02. It came second in the 10-mile free-for-all, its time being 7:43:46. In the 200-mile stock chassis, 451-600 cubic inches race, it came in second; time 3 hours and 5 minutes. The car had a 4-cylinder engine with a 5.75-inch bore and a 5.5-inch stroke, giving a total piston displacement of 571.3 cubic inches. The weight of the car was 2,880 pounds. The car made a mile in 43.19.

2—The Electro system, which is manufactured by the Electro Light & Starter Co., Indianapolis, Ind., is a single unit type in which the starting motor, lighting generator and ignition system are combined. A section through the machine is shown in Fig. 5. The breaker and distributer mechanism are located at the right. The instrument is driven through this end and the commutator is at the opposite end.

The Electro system is a slow speed design in which the armature is driven at crankshaft speed. When operating as a generator it gives maximum current at 350 revolutions per minute, insuring a maximum recharge of the storage battery at about 7 miles per hour.

The gear reduction is automatic and operates only when the engine is being started. It gives a ratio of 25 to 1 and since the instrument when operating as a motor develops 3.5 horsepower, it is capable of turning over any engine at 55 revolutions per minute.

The shock due to the back firing of the motor is taken care of by a friction clutch at A. This cone is fiber faced and the cone ring B has springs C adjusted so as to give the proper friction for turning over the gasoline motor. If the engine backfires, the cone slips and the armature immediately carries it over until the engine starts. This does not affect the timing of the ignition as the distributer is keyed to the driving cone. The advance and retard of spark is accomplished the same as in the ordinary magneto.

3—When the American Motors Co. went out of business there were 3,285 American cars in use, according to the receiver of the company.

Gear Ratios of Racers

Editor THE AUTOMOBILE:—1—What was the gear ratio of the Marmon, Maxwell, Peugeot, Dusenberg, and Delage that competed at Indianapolis, May 30, 1914?

2—What is the horsepower and how many cubic inches of piston displacement has the motor in the Woods Mobilette?

3—What company bought the assets of the U. S. Motors Company when it went into the hands of the receivers?

4—What make of motor does the Saxon car use; rear axle; who designed the car; is not the Ford company putting out this car?

Cooper, N. C. S. B. TEW.

—1—Marmon, 2.33 to 1; Maxwell, 2 to 1; Peugeot, 3 to 1; Duesenberg, 2 to 1; Delage, 3 to 1.

2—The Woods Mobilette is rated at 12 horsepower and has a piston displacement of 69 cubic inches.

3—The purchaser was the Maxwell Motor Co., with W. E. Flanders at its head.

4—A Continental motor is used, and the rear axle is made by the Detroit Metal Products Co. The car was designed by G. W. Dunham. The concern making this car is in no way connected with the Ford company.

No Data on Life of High-Speed Motor

Editor THE AUTOMOBILE:—Please give me all data possible in these columns or refer me to a paper discussing the life and efficiency of high-speed motors (2,500 revolutions per minute or over) compared with the average motor having a maximum speed of 1,700 revolutions per minute.

Elmhurst, L. I. GEORGE W. GAY.

—We know of no paper on this subject.

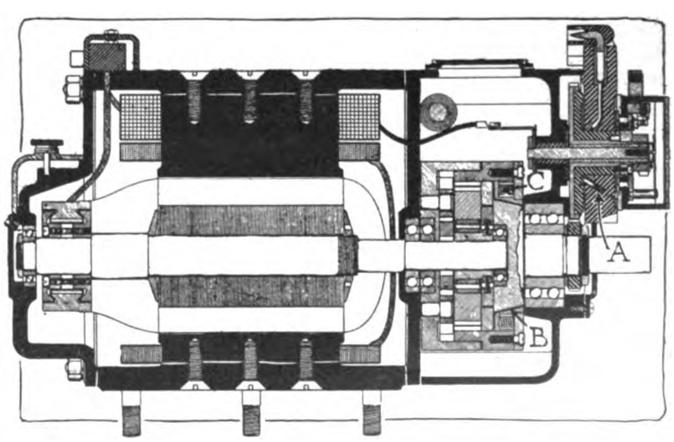


Fig. 5—Single unit electro system

The Engineering Digest

Two-Wheeled Schilowsky Automobile Balanced with a Gyroscope Weighing 750 Pounds

AN EXPERIMENT MAINLY OF SCIENTIFIC INTEREST

SINCE Brennan of England, Scherl of Germany and Schilowsky of Russia some years ago showed the wonders of monorail transportation, with gyroscopes to steady and balance the vehicles—the two former inventors using two gyroscopes spinning in opposite directions but Schilowsky only one—the question of the application of the gyroscopic principle to automobiles has aroused more or less interest, partly as a matter of scientific curiosity and partly with a view to the sport possibilities which seem to arise the moment a vehicle may be expected to turn corners at full speed without being upset. The theory of gyroscopes has in the meanwhile become better and more widely understood, though still remaining very difficult and obscure in some of its applications to practice, and it has been found necessary to move very slowly in attempting to make use of the principle for common carriers on wheels.

Very recently, however, Schilowsky has had built at the Wolseley Tool and Motor Car company's works a gyroscopically balanced automobile which runs on two wheels and has seats for six, and this car has been shown in operation in London, again bringing the subject to public attention.

The construction of this vehicle serves at least to show that, at the present stage, the mechanical complications and the increase in weight which the addition of a gyroscope equipment render necessary are very serious, apart from the encumbrance which the apparatus represents and the danger of unexpected effects which for some time yet must be associated with its use.

Worked by Heavy Pendulums

The precession or rocking of the gyroscope which tends to take place when it is forced out of its plane of action by movements of the vehicle, and which in turn can be utilized to right the vehicle, is controlled by means of two pendulums, one on each side of the vehicle. The pendulums weigh about 50 kilograms each and do not act on the gyroscope until they have swung to the limit of their lateral motion in the direction away from the vehicle. They are therefore independent of each other, and one of them obviates upsetting to one side and the other to the other side.

Figs. 1 and 2 show the mechanical arrangements of the vehicle in side view and plan, and Figs. 3 and 4 show side view and plan of the mechanical parts by which the gyroscope acts upon the vehicle frame. Fig. 5 shows the same in two transverse sections.

The Wolseley motor develops 25 horsepowers at 1,200 revolutions, and the power is transmitted through a four-speed gearbox to a drive shaft which is set off to one side because the rear wheel is occupying the middle plane. The offset is accomplished by a silent chain from the gearbox. The shaft drives a worm gear on the wheel axle between the wheel and one of the springs. The gears give vehicle speeds of 14, 27, 40 and 55 kilometers per hour.

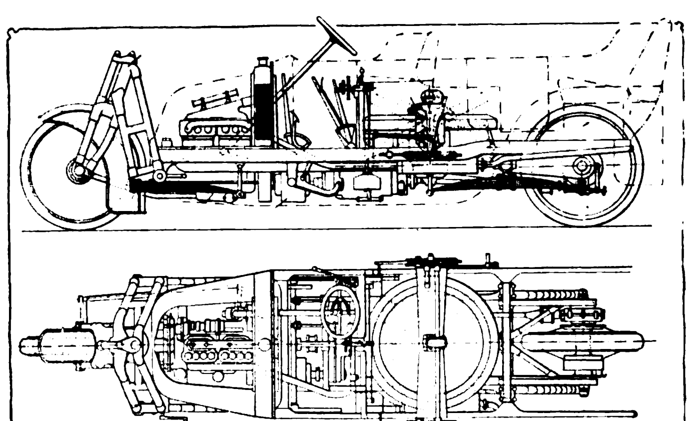
The gyroscope A is actuated electrically and comprises a forged steel disk slightly more than 1 meter in diameter and provided with a rim which weighs 254 kilograms and turns in a horizontal plane at speeds from 1,200 to 1,550 revolutions per minute. The electric motor B is secured to the frame F which carries the vertical axle C of the gyroscope, the armature being keyed directly to the latter. The axle C is guided in the interior of frame F by three roller bearings while heavy ball bearings support the weight of the gyroscope. All the bearings are lubricated from a special oil-circulating system for the gyroscope and its motor. The frame F is a stout casting and is mounted by means of the two stub shafts G in roller bearings secured to the main frame reaches of the vehicle.

The electrical energy used in motor B is furnished by a generator shown in Figs. 1 and 2, which is controlled by means of a coupling-sleeve and a chain taking their movement from the primary gearshaft. The normal speed of this generator is 2,000 revolutions per minute, but it can function at 3,500 revolutions for 15 minutes without heating unduly. If the generator exceeds 3,000 revolutions the gyroscope reaches its maximum speed of 1,550 revolutions and a commutator automatically cuts down the output of the generator so as to prevent further acceleration.

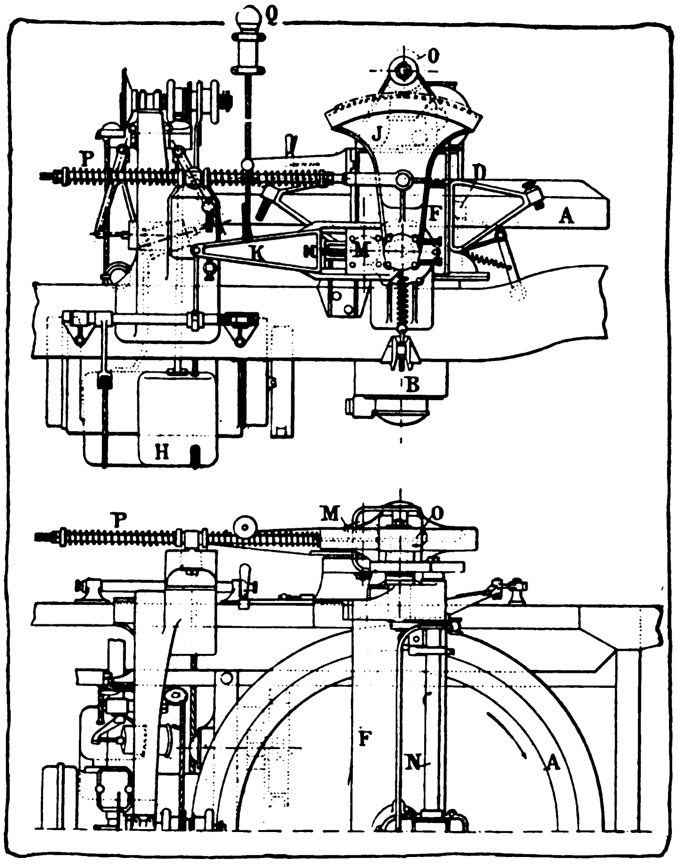
Reducing-Gears Force the Precession

Each of the two pendulums H is connected by a cable and various levers to an arm K at the opposite side of the vehicle, which arm is arranged to be lowered when the corresponding pendulum swings away from the vehicle. It is connected at a right angle with sector J the periphery of which, L, is toothed. At any given position of the shaft M of the arm K every oscillation outwardly of the corresponding pendulum raises the toothed sector J a certain amount.

To co-act with these elements, the movable frame F which supports the gyroscope carries in its upper portion a transverse shaft N to which is transmitted, through a worm, the movement of the shaft C of the gyroscope with a speed reduction of 66 to 1. It may be noted incidentally that shaft N rings a bell at every turn, and this in connection with a simple clockwork indicates at any moment the speed of the gyroscope. Shaft N actuates by suitable gears two spurwheels O which are located at the two sides of the vehicle and turn in opposite directions. Each of these spurwheels can



Figs. 1 and 2—Side and plan views of Schilowsky car, showing general arrangements



Figs. 3 and 4—Side and plan views of gyroscope and mechanism for operating it by automatic action of pendulums

mesh with the corresponding toothed sector L when the latter is raised through the action of the pendulum connected with it. It tends then to displace itself along the sector and exerts a pressure against the upper end of the shaft of the gyroscope, either forwardly or rearwardly—according to which of the two spurwheels is engaged—thereby throwing the precession movement in the direction adapted for re-establishing the equilibrium of the vehicle.

To prevent a violent effect from the sudden engagement of the toothed wheels with the sectors, the latter are braced in their vertical position by the spring struts P. The use of one instead of two gyroscopic disks renders necessary certain precautions when the vehicle is to make a turn in the same direction as that of the rotation of the gyroscope. By means of one of the levers Q, which normally serve to release or immobilize the gyroscopic mechanism, a special pressure is in that case put on the arm K to increase the precession movement in the required direction, the handle of Q being operated directly by the driver.

Takes 10 Minutes to Start

Two safety sprags are let down automatically, to give stable support for the vehicle, if for any reason the speed of the gyroscope becomes too small and allows the oscillating frame of the gyroscope to tip too far forward or backward. These sprags are provided with little rubber wheels and admit of maneuvering with the vehicle when the gyroscope is not running, as in the garage, for example.

For starting, certain precautions must be observed. The vehicle motor is started by hand at a speed of about 500 revolutions per minute which produces a current of 90 volts in the generator. The electric motor is thereafter set going gradually by means of a lever on the dashboard. The acceleration of the gyroscope absorbs 5 horsepowers. After about 5 minutes the velocity of the gyroscope reaches 1,000 revolutions which makes the automatic balancing of the vehicle possible. In order to find at the beginning the properly

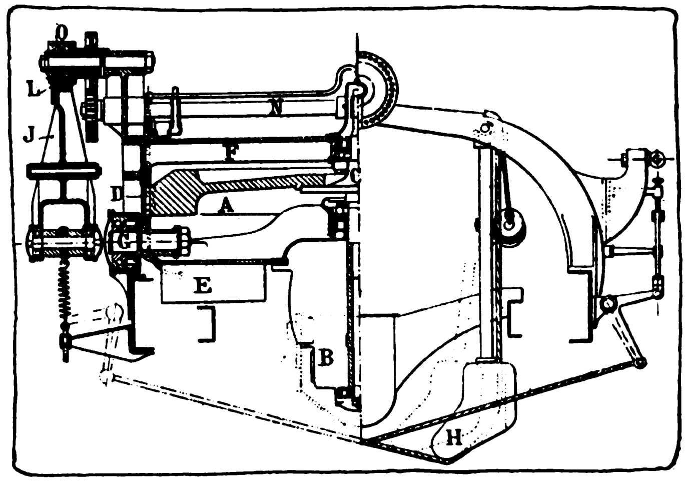


Fig. 5—Transverse sections in two planes through Figs. 3 or 4

balanced position of the vehicle, it is first placed in a position departing about 5 degrees from the vertical and then the two control levers Q are released, thereby releasing also the arms K, so that the gyroscope can begin to act. The toothed sectors J are now alternately engaged with the corresponding toothed wheels under the influence of the pendulums which control them, and the gyroscope thus gradually brings the vehicle into the position which represents unstable equilibrium.

When the gyroscope has attained its maximum speed of 1,550 revolutions, the gasoline motor can be throttled down to still-running, as only from 1 to 1.3 horsepower is then required for maintaining the speed of the apparatus. If the power is cut off completely, the gyroscope will continue to run for 10 to 15 minutes before dropping to the minimum speed at which it ceases to be effective for the balancing of the vehicle.—From *Le Génie Civil*, July 4.

Experienced Driver Formulates a Wish for Improved Motor Control

MR. LEPEUX has driven cars for a number of years and owns one which easily runs at a rate of 80 kilometers per hour, but he considers that the greatest comfort is obtained by keeping up an almost uniform speed of about 50 kilometers per hour, on hills as well as on the level, whenever prudence does not command a slower gait. He has equipped his car with a speed indicator to enable him to know how fast he travels and aims to keep the hand steadily at the figure 50. But at this point he experiences a difficulty. His car needs very little gas to go at 50 kilometers and it is a rather delicate foot action with the accelerator pedal which is required to keep the speed from varying considerably on both sides of the desired mean. A moment of inattention or a light road shock throws the indicator hand to either side. In other words, he has to keep his foot half in the air, in a position which becomes very fatiguing on a long tour. He desires a remedy for this condition.

There is however, the gas lever which does the same as the accelerator, it is objected. Why not use it? Yes, but this lever cannot be operated rapidly. It consists of a screw which must be given several turns to effect the total acceleration that may be wanted. And then, even if the gas lever were handy to use, it would not solve the problem, for the following reasons:

At the start, when the motor is cold, the gas lever is placed at an adjustment which is the best for starting and which the driver soon knows by heart. When the motor has become hot, the driver adjusts the gas lever to the position for still running, so that the motor will not stop when there is occasion for unclutching. This is common and well-known driving practice, mentioned only to make the rest clear.

Now on the road. To drive with the accelerator is fatiguing, as said, and gives an irregular gait. One can then try to drive with the gas lever. To this end, the gas is opened till the indicator shows the desired speed of 50 kilometers per hour on a nice level road. There is a hill ahead, say. A push of the accelerator, and we climb the hill without touching the gas lever, since the latter limits only the backward but not the forward stroke of the accelerator pedal. For the same reason, when the hill is passed, it suffices to release the pedal to make the vehicle resume its normal gait automatically. So far, all would thus be perfect—but: After the level road there follows a descent or a village or an unexpected obstacle demanding immediate checking of the car. Unclutching and braking are instinctive, but with these actions there comes the furious speeding-up of the motor; for the gas lever prevents the accelerator from closing. No less instinctively than before we rapidly push the gas lever back, but in doing so in a hurry we are almost sure to push it beyond the adjustment for still-running, and then the motor stops. Even if it does not stop it is necessary to find again the adjustment corresponding to our desired mean speed of 50 kilometers per hour. And this every time we unclutch!

If others have had the same experience, the modern car would seem to stand in need of a little improvement with regard to its motor control, Mr. Lepeux suggests.

To be sure, automatic governors have been used which never allowed the motor to run wild, but builders will probably not easily conclude to re-adopt this feature despite its advantages. The little problem which seems to present itself may therefore be formulated in the following combination of requirements:

(1) The accelerator should function in the ordinary manner.

(2) The gas lever should limit the backstroke of the accelerator pedal.

(3) When the clutch is withdrawn, the motor should come to its still-running adjustment without need of touching the gas lever. (For greater convenience this adjustment might be secured by a permanent regulation of the carbureter, independently of the gas lever.)

Is it impossible, asks Mr. Lepeux, to contrive this kind of control which would secure for all cars most of the advantages that an automatic governor offers. Such an improvement would not involve great expense. It might consist in applying, concurrently with the accelerator, a retarder device actuated by the brake pedal on the first one-third of its stroke, as has been done on certain vehicles. The control maneuver would then be very simple, as it would be sufficient at every unclutching to push the brake pedal also, to bring the motor to still-running.—From *Omnia*, July 15.

International Trade in Automobiles 123 Million Dollars

OBTAINING his figures from the customs statistics for 1913 in the different countries, a French actuarian, Max Dutray, has compiled the table appended herewith which shows the value of the automobiles sold by one country to another. The figures are of course much smaller than they would be if the sales of each country in its home market were included, still it is noticeable—when a comparison is made with other statistics giving the registration of cars in use and the increase from year to year—that of all the manufacturing countries the United States is probably the only one where the exports do not exceed the home sales. In England the sales to the British public are much larger than the exports only if the very large importations are included, while the importations in the United States have now dwindled to an insignificant figure.

In many instances the customs statistics are incomplete or misleading, as exports are not always listed with reference to the country of ultimate destination, the purchase being credited to the country where trans-shipment takes place. The compiler has corrected this error where it could be traced, as where Belgium was credited with most of the South American purchases from France, because these were shipped from Antwerp, but in many more cases it has not been possible to make this correction. This and other errors find their expression in the large purchases—amounting to 40 per cent. of the total sales—which are found under the heading "Diverse." From intrinsic evidence it is plain that "Diverse" includes many or all of the countries listed as purchasers besides many which are not listed. Assuming that the total of 50 million dollars worth of purchases is evenly divided between listed and unlisted countries, a 20 per cent. factor of inaccuracy in the purchase figures for the different countries listed should therefore be allowed, while the lack of

(*Continued on page* 267)

THE INTERNATIONAL AUTOMOBILE TRADE FOR 1913

BUYING COUNTRIES	SELLING COUNTRIES							Total
	Germany	England	Belgium	France	United States	Italy	Diverse	Purchases
Germany	....	$383,408	$778,224	$1,465,184	$1,547,768	$126,480	$439,704	$4,740,768
England	$1,668,048	....	761,395	10,355,340	3,566,600	1,670,142	302,877	18,324,402
Austria-Hungary	2,374,104	....	....	244,080	....	204,019	....	2,822,203
Algeria	....	....	....	4,562,880	....	....	....	4,562,880
Belgium	156,442	92,062	....	269,163	....	....	93,020	610,687
Brazil	1,317,872	....	258,662	1,740,660	....	421,949	....	3,739,143
Canada	....	....	....	....	8,177,256	....	....	8,177,256
Chile	248,496	....	....	....	....	....	....	248,496
Denmark	1,076,568	....	....	....	....	....	....	1,076,568
Spain	467,728	....	85,892	1,364,700	....	....	....	1,918,320
United States	214,701	161,667	....	467,167	....	153,039	158,299	1,154,873
France	547,440	1,267,080	123,916	....	1,136,700	335,700	569,144	3,979,980
Japan	80,848	....	....	....	....	....	....	80,848
Italy	694,705	65,116	....	880,744	388,595	....	516,064	2,545,224
Mexico	....	....	....	....	408,148	....	....	408,148
Russia	5,740,456	....	....	1,309,680	....	....	....	7,050,136
Argentine Republic	1,851,320	....	787,940	3,444,180	....	874,037	....	6,957,477
Switzerland	506,168	....	....	954,300	....	185,385	....	1,645,853
Turkey	....	....	....	192,960	....	....	....	192,960
Uruguay	263,376	....	....	....	....	....	....	263,376
Sundry Amer. States	....	....	....	....	3,008,005	....	....	3,008,005
Diverse	6,883,936	12,483,685	1,054,640	18,234,721	8,796,380	2,393,502	....	49,846,864
Total sales	**$24,092,208**	**$14,453,018**	**$3,850,669**	**$45,485,759**	**$27,029,452**	**$6,364,253**	**$2,079,108**	**$123,354,467**

Exhaust Jacket on New Kerosene Carbureter

Float Chamber and Venturi Tube Surrounded by Exhaust Heat—No Spring Controlled Valves

IN the kerosene carbureter announced by the Senrab Carbureter Co., Sea Cliff, L. I., the vaporization of the fuel is aided by passing part of the exhaust gas into a jacket completely surrounding the float chamber and venturi tube. This heat acts on the thin film of fuel between the wall of the float chamber and the float so that the fuel is adequately heated.

Suitable means for starting with gasoline are provided for by a connection to the side of the carbureter body. Only a few seconds' running on gasoline will be required and the engine can then be allowed to run continuously on kerosene.

An ingenious method has been devised for regulation of the fuel and air supplies, whereby the proportionate quantities of fuel, as well as the main and auxiliary air supplies, may be furnished in proper quantities to suit varying cylinder requirements. In other words, the Senrab carbureter is so arranged that the adjustment of a single moving part effects in proper ratio the fuel supply, the main air supply, and the auxiliary air supply; and under different degrees of running the user can depend upon the admission into the cylinder of a correctly proportioned mixture of fuel and air without the necessity of separately adjusting the several supplies.

Venturi Increases Velocity

The Senrab has taken advantage of the known characteristics of the venturi tube as a passage for the main air supply, because of the increased velocity through a passage having a constricted throat, and because the tube lends itself to the convenient regulation of air by means of a central moving member C, having an annular shoulder directed towards the constricted portion of the tube. This moving member is placed in axial relation to the venturi and carries a tubular fuel supply with radial orifices slightly above the annular shoulder, through which the heated fuel is allowed to pass under the control of a long taper needle and mix with a proportionate amount of air passing through the venturi at high velocity.

In order to provide for atmospheric conditions, the auxiliary valve may be adjusted by revolving the center stem. The needle may also be independently adjusted for varying qualities of fuel.

A method has been provided for control by a lever on top of the carbureter. This lever may be set on the right or left side, or turned in an upward or downward position as desired.

Adjustment Is Simple

The adjustment of the carbureter is simple and permanent. To decrease the quantity of fuel the needle valve A is screwed down after releasing its locknut, while to increase the volume of mixture the collar B is placed higher on its stem. The adjustment of the auxiliary valve is accomplished by revolving the stem after loosening the set screw holding it. After these initial adjustments have been made it is claimed that the carbureter will deliver a proper mixture at all speeds and loads. The throttling function changes the capacity of the carbureter and the mixture does not change owing to the various demands on the motor, it is stated.

If when making these adjustments it is found that the carbureter precipitates moisture on the screen E, it indicates that the velocity is not sufficient for proper vaporization and the stem D should be lowered until the exhaust shows good combustion.

The intake F is for gasoline which is used in starting. After running a few seconds on gasoline sufficient heat is generated in the float-chamber jacket to allow engine to run on kerosene. The kerosene connection is at G, and a portion of the exhaust is by-passed into the inlet H and discharged at J.

On carbureters above the 1-inch size a sight glass is provided at K for inspecting the fuel level. If the fuel is flowing properly the level will be little above the center of the glass.

The prices vary from $15 for the 3-4-inch model to $36 for the 2 1-2-inch.

International Trade in Automobiles

(*Continued from page* 266)

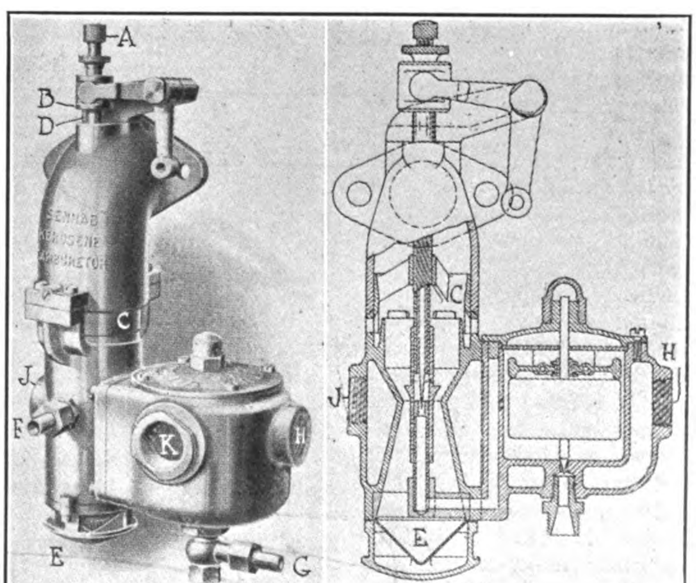
specifications under "Diverse" may also conceal the omission of some important purchasing countries, such as Australia, British India, the Dutch Indies, South Africa and others.

The sales column naturally comes closer to the true figures, the "Diverse" heading in this case representing only 1.6 per cent. of the total sales.

With allowance for the inaccuracies, it is noticed that the principal purchasing countries, among those listed, rank as follows: England $18,000,000; Canada $8,000,000; Russia $7,000,000; Argentine Republic $7,000,000; Germany $4,600,000; Algeria $4,400,000; France $4,000,000; Brazil $3,600,000; Italy $2,400,000.—From *Omnia*, July 4.

Tests for Cars with Two-Cycle Motors

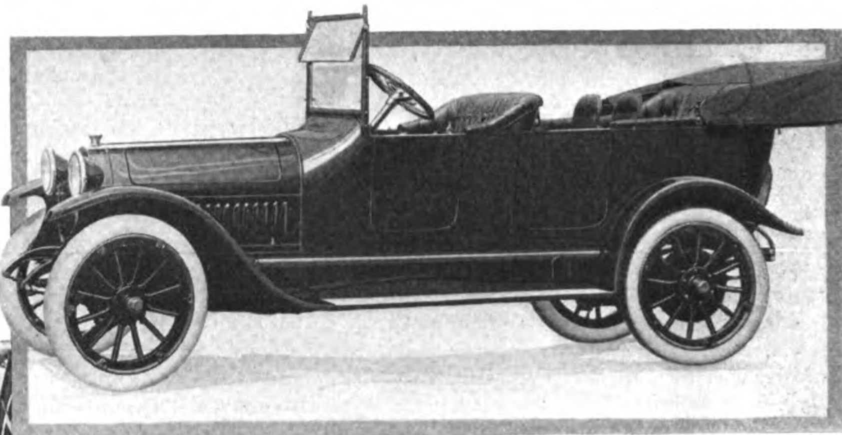
ACCORDING to *The Automobile Engineer* the Royal Automobile Club of Great Britain has issued preliminary regulations for contemplated open-competition tests of two-cycle motors fitted to cars. The tests will include a run of 1,000 miles on the road, with records taken at intervals of the temperature of the cooling-water; tests of car speed on the level without misfires of motor and with records of acceleration on top gear from minimum speed; hill-climbing tests; fuel and oil consumption tests and tests relating to the facility for starting the motor from cold with a given fuel. Noise and vibration will be considered in the awards.

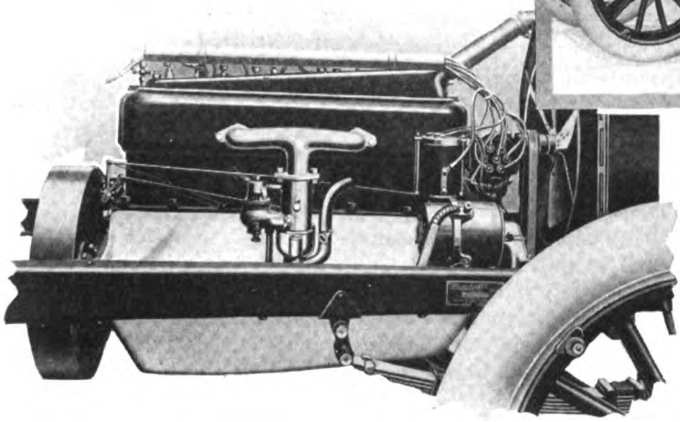


Senrab kerosene carbureter. Right—Elevation of carbureter. Left—Sectional view

15 Per Cent. More Power in Studebakers

Four Now Sells for $985 —Five Passenger Six, $1,385— Seven Passenger Six, $1,450



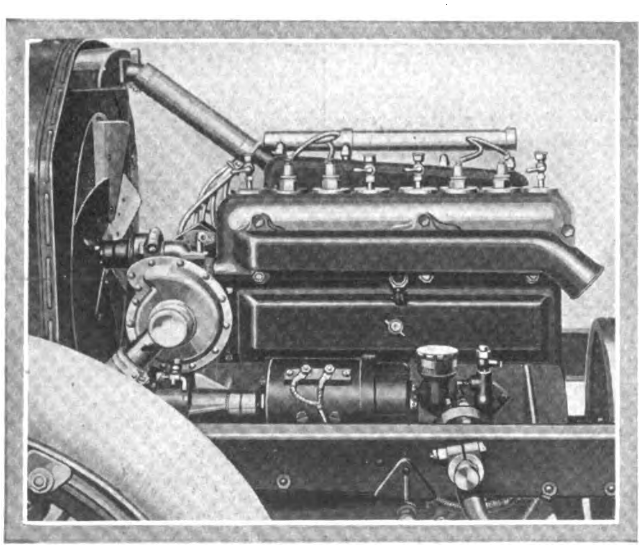


Above—Studebaker seven passenger six touring car for 1915 which with complete equipment sells for $1,450
Left—Intake side of six cylinder motor used in 1915 Studebaker showing Wagner starting motor and Remy distributor as well as Schebler hot jacketed carbureter

STUDEBAKER will continue for 1915 the two chassis, a four and a six, that made up the 1914 line. While the cars are the same as last year in all the elemental features of design, improvements have been made throughout the chassis, body and equipment with the result that the cars are lighter, stronger, roomier and more powerful, although selling for $65 less than last year in the case of the four and $190 less in the six. The price of the four is now $985 and for the six $1,385, with a five-passenger body, and $1,450 with a seven-passenger.

In the motors the maximum power has been increased 15 per cent., according to the Studebaker engineers, by reducing the weights of the reciprocating parts and altering the manifold design. Four ounces has been cut from the piston assembly by using lighter pistons with three rings. The valve sizes remain the same, but the valve ports have been made larger, thereby increasing the efficiency of the motor both as regards intake and exhaust. The splash scoop has been changed in shape and the splash troughs altered to give greater oil economy. While the model R Schebler carbureter is still used it is fitted this year with a waterjacket and also has a means for pre-heating the intake gases from the heat of the exhaust. In the four the carbureter is bolted against the integral cylinder casting without any exterior intake manifold.

The same clutch has been kept for the 1915 car, but the leverage on the operating members on the six has been changed to give an easier throw. The design of the rear axle has been altered and instead of the exterior flange connection with the wheel it now has a tapered-fitting connection with the driving flange and carries a hub cap.



Valve side of four cylinder Studebaker motor showing mounting of electric generator and water pump

Bodies 100 Pounds Lighter

The improvements in the body work and equipment are marked and through them 100 pounds has been cut from the weight of each model. In the body much of the woodwork has been replaced by pressed steel. This has resulted in a roomier design of much less weight. The top now used is a one-man design. The curtains can be put up from the inside of the car and clip to the windshield which is also a new design for 1915.

The instrument board is now a stamping and is so arranged that the instruments project through it but are not supported by it. It is possible by this construction to remove the instrument board and still leave all the instruments in place. The running-board pads have been made of corrugated rolled aluminum which extend the entire length of the running boards. Dome-shaped fenders and improved splash guards add to the appearance of the car.

The interior arrangements permit of more leg room in both the front compartment and the tonneau. There is more clearance between the steering wheel and the cushion, secured by decreasing the steering wheel rake slightly. There is also more clearance between the control levers and the seat. The starting switch for the Wagner system has been moved forward.

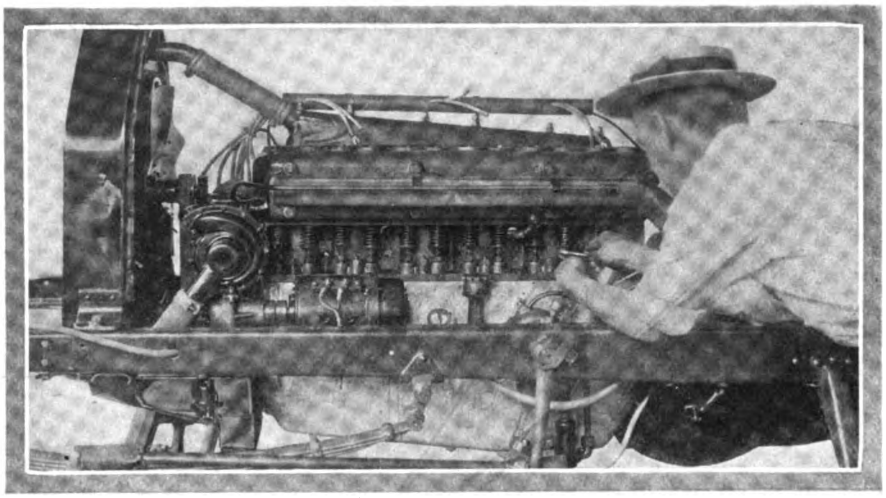
Features of Design Similar

In many details of design the six and four are exactly alike.

Both have their cylinders cast in block, both are L-heads and in bore and stroke, 3.5 by 5, are also similar. This method of duplication of design fits in with the Studebaker policy of standardization for quantity production which is carried throughout both chassis. The pistons, connecting-rods, wristpins and valve assembly are exactly the same in both cars.

The pistons carry but two compression rings this year, as against three in previous designs. An oil-wiper ring is carried at the bottom of the piston in addition. The rings this year are concentric and in manufacture are lapped in the cylinders. The wristpins have bronze bushings.

The 1 13-16-inch valves are carried on the left side of the motor and the adjusting nuts and exterior mechanism are covered by means of light dust-proof plates held in postion by thumb nuts.



Valve side of Studebaker six motor, showing accessibility of valve adjustment

The crankshaft of the four-cylinder motor is carried on three main bearings and that of the six on four. In both instances the front bearings are 1 5-8 inches in diameter and 2 15-16 inches in length, the center 1 11-16 by 2.5 and the rear 1 3-4 by 3 1-2. The bearings are babbitt lined, the babbitt being run in at the factory.

The motor lubrication system is accomplished by a combination force-feed and splash. The supply of oil passing to the motor is visible through a sight feed mounted on the dash. The oil supply is carried in the lower part of the crankcase and from this reservoir the oil is lifted to the sight feed by means of a steel plunger pump. The motor bearings and the cylinders are taken care of by the splash, while the timing gears and connecting-rod bearings are oiled by direct circulation. The splash scoops and troughs are new designs for 1915.

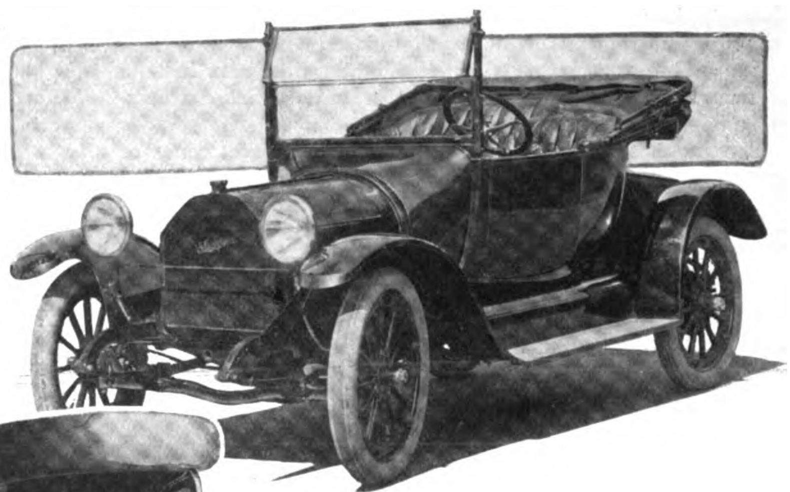
Cooling is accomplished in the six by means of a honeycomb radiator. In the four a vertical tube radiator with an auxiliary tank is used. Both cars use the centrifugal water pump. The cooling problem in the four has been greatly simplified by the use of a larger exhaust pipe than for 1914.

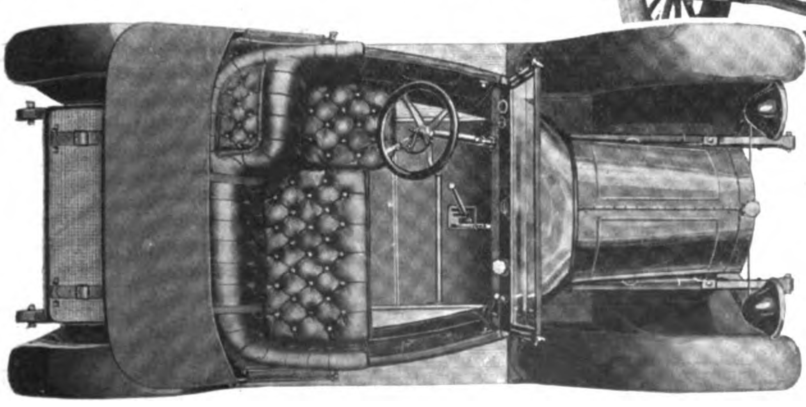
Practically no change has been made in the electrical equipment of the car for this year. Starting, lighting and ignition are still handled by the two-unit Wagner-Studebaker system. One step toward compactness, however, has been accomplished in the motor. This is fully an inch shorter in overall length now than it was in the 1914 line.

The two electrical units are the generator and the cranking motor. The electric motor for starting is connected to the engine crankshaft by means of a roller chain. By means of this chain and a pinion gear reduction the relation of the cranking motor speed to the crankshaft is 20 to 1. The gear reduction is 5 to 1 and the chain multiplies this by four. Owing to decreased internal friction of the motor and the lighter parts the speed of cranking the motor is higher this year than in the previous cars. The actual speed, of course, varies under different motor conditions, but the average amperage draw on starting is 100. The cranking motor is operated by a pedal on the toe board. Connection is broken between the engine and the starting motor as soon as the engine takes up its work by means of a roller clutch. The roller clutch is placed on the crankshaft and therefore when it is out of engagement the entire chain-drive mechanism is silenced as it comes to rest.

The generator which furnishes all the current for lighting and ignition is driven at the ratio of 1.5 crankshaft speed by means of a gear on the camshaft. The generator starts to charge the battery at a car speed of 10 miles per hour and reaches its maximum output at 20 miles per hour.

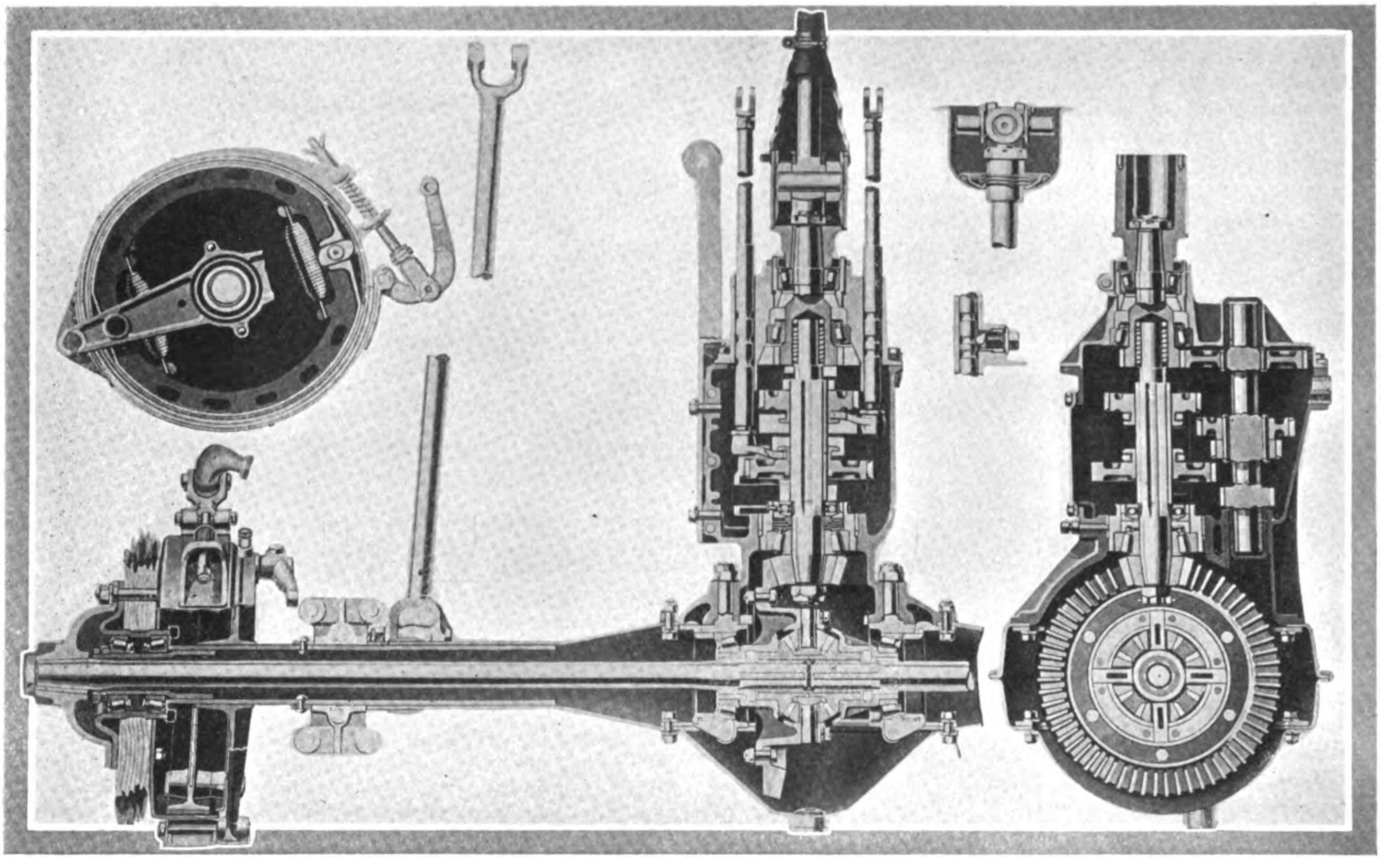
For ignition the current is taken from the storage battery and, after passing through an induction coil, is led to the Remy distributer on the end of the transverse shaft at the front end of the motor. From this point the leads are taken





Above—Three-quarter of Studebaker four-cylinder, three-passenger roadster for 1915. Two of the passengers sit at the driver's right, the driver's seat being slightly in advance of the seat for the other two. Note the broad doors and ample storage space in the rear

Left—Plan view of three-passenger, four-cylinder roadster, showing the seating arrangement with the compartment in the back of the driver's seat which is slightly in advance of the seat for the other two persons



Cross section through the Studebaker rear axle, together with a side view through the gearbox and through the differential. At upper left is interior of brake drum

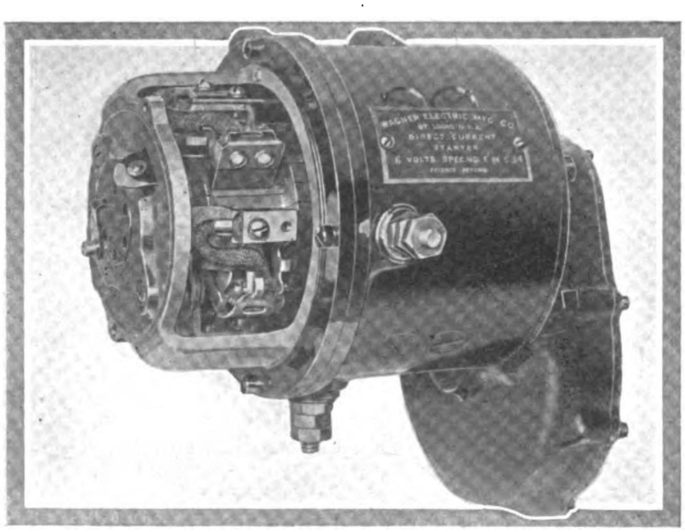
to the spark plugs. Dry cells are furnished for emergency use. The ignition switch is at the driver's right.

Cams in Steering Mechanism

The control mechanism of the spark and throttle has been modified somewhat this year. In place of the ordinary bell crank levers at the ends of the control shafts which project through the bottom of the steering column there are cams which act as guides for L-shaped followers.

The carbureter is turned longitudinally this year instead of transversely, and the result is a neater and more accessible job.

The clutches used on the six and four are direct cones of pressed steel faced with leather, beneath which are placed flat engagement springs. A single clutch spring of heat-treated alloy steel is used. The clutch fork arm on the six is shorter this year than last, while the pedal arm remains the same length, thereby giving an increased leverage on the clutch.



Wagner direct current starter used on 1915 Studebaker

The gearboxes are another point of exact similarity between the two chassis. They are three-speed selective and are the same as have been used in Studebaker cars for three seasons.

The rear axles are floating designs and the same as for 1914 in every particular up to the construction at the wheels. Here the change mentioned has been made and the exterior of the wheels are ornamented by a hub cap. The most material result in the new construction is the elimination of grease leakage from the differential housing to the brakes through the axle tube. The brake diameter has been increased 3 inches and now both brakes are lined with asbestos fabric, whereas on the previous model one set was metal-to-metal.

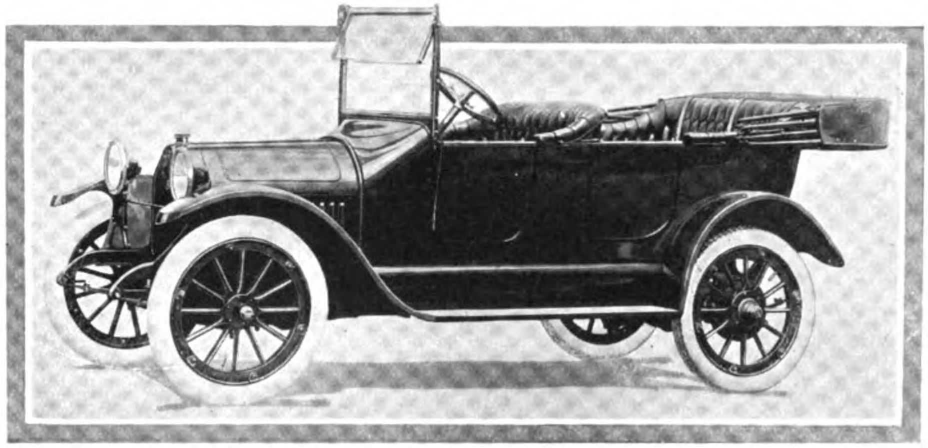
The rear springs are a point of difference between the four and six. On the four, scroll elliptic springs underslung under the rear axle housing are used, while on the six a deep three-quarter elliptic design is employed.

The wheels on both cars are of second-growth hickory artillery design. On the four they are fitted with 33 by 4-inch tires, an oversize for the 32 by 3.5-inch size which was used in the previous model. On the six the 34 by 4-inch size are used. This gives both cars an ample tire size, as the four weighs 2,500 pounds and the six 3,000 fitted with the standard bodies.

On the six there are two bodies fitted, a five and a seven-passenger touring design. On the four there is a five-passenger touring car and a three-passenger roadster. This gives a complete line of four bodies.

Everything is made as tight as possible. This year a strip of anti-squeak fabric is placed between the body and the frame for the sake of silence, and the windshield is lined with rubber for waterproof qualities.

The fenders are crowned and, with the body, undergo twenty-four operations in the paintshop before finishing. The hood, fenders and running gear are black with a narrow white stripe, while the bodies are a dark blue striped with white. The bright parts are heavily nickel-plated. The wheelbase of the four is 108 inches, and of the six 121 inches.



Four-cylinder five-passenger touring car selling for $985 completely equipped

The equipment of the cars is complete. There are no dash lamps, but instead a series-multiple switch on the dash enables the driver to dim the headlights. On the dash there is the Stewart-Warner magnetic speedometer, gasoline filler cap for the undercowl tank, Triumph gasoline gauge, sight feed, etc., while the additional equipment includes an electric horn under the hood, extra rim on rear tire irons and a full set of tools.

Empire Continues One Chassis and Three Bodies—$50 Less

INCREASED production, continuation of the one chassis policy, $50 reduction in price and introduction of a new type in an electrically started and lighted streamline touring car, selling for less than $1,000, are features of the 1915 program of the Empire Automobile Co., Indianapolis, Ind. This gives the company a line of three cars, a roadster being carried with the two touring cars.

The new touring car at $975 has a streamline body and many points of Continental design as well as electric starting and lighting. Seats are set low, allowing seat backs of more than ordinary height. Upholstering throughout is Turkish type of selected leather. All door hinges are concealed, and with the body tapering back from cowl, gives a most pleasing flush side effect, completed by the limousine back. Roll crown fenders add to the general attractive appearance.

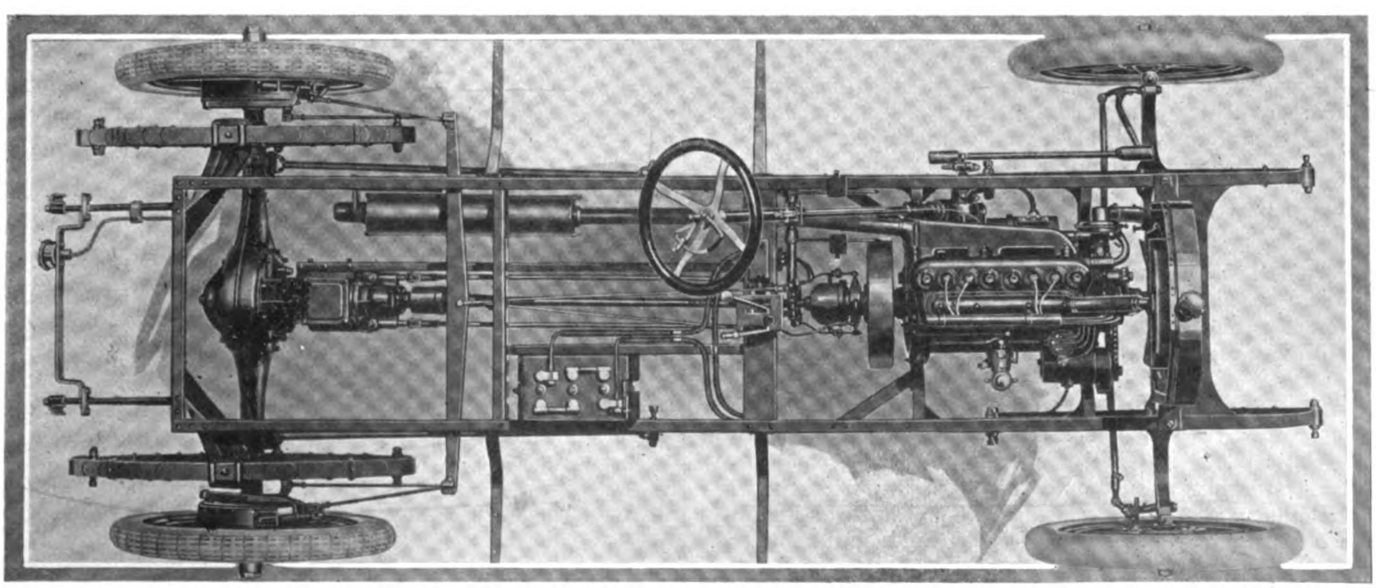
Starter button is of plunger type on dash, while all other instruments, such as speedometers, carbureter adjustment, dash light, ignition switch, battery indicator, light controls, etc., are assembled on an instrument board sheltered by the cowl. Remy one-unit electric system, with starting, generating and ignition of magneto type with spark advance, is fitted. Not only the car itself but also the entire electric equipment, including Willard oversize storage battery, is covered by a 1 year guarantee. Non-skid tires are furnished on rear.

The Empire Standard Model 31 non-electric car, with complete equipment, including mohair top, top boot, curtains, Stewart speedometer, Prest-O-Lite tank, oil side and tail lamps, quick detachable demountable rims, etc., lists at $850. This is in its fourth season, newly improved and refined in many points of detail. Thus, option of either electric or standard car is offered the purchaser. In addition to the touring models the line includes a roadster model furnished either with standard equipment at $875 or with electric starting and lighting at $975.

The chassis has been continued for four seasons without a change in any basic principle of construction. It has a unit power plant with a four-cylinder L-head motor of 3 3-4-inch bore and 4 1-2-inch stroke. Cooling is of the thermo-syphon system with fan, while the lubrication is constant level with force feed by motor pump and three sight feeds on the dash. The motor is fitted with Holley model H carbureter, with dash adjustment. The clutch is a disk type running in oil, while the transmission is selective sliding, with three speeds forward and reverse. Weston-Mott axles are used for both front and rear.

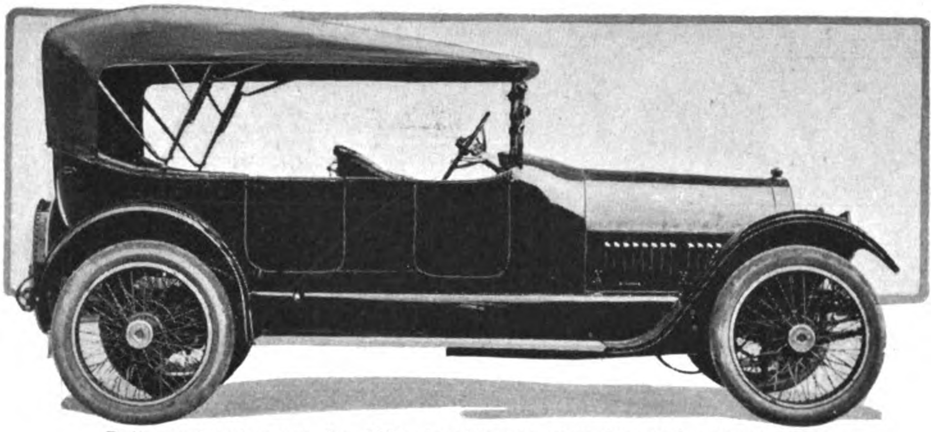
Warner steering gear with 17-inch wheel is also incorporated. Brakes are external contracting and internal expanding, operating on 12-inch drums on each rear wheel.

On these cars, the company will double production over the last season to meet the demands of its dealers.



Plan view of Studebaker four-cylinder chassis, showing mounting of storage battery at right of frame, rear axle gearbox and elliptic rear springs

1915 Pullman Built on Light Six Lines



Pullman touring car for 1915 showing one-man top and new radiator

Minor Refinements on Model 6-48—Wheelbase 134 Inches—Body More Roomy—Lighter and Larger Radiator

THE Pullman Motor Car Co., of York, Pa., will continue the model 6-48 in practically the same form as was introduced at the last New York Show. There have been some refinements, however, the wheelbase having been lengthened 4 inches, making it 134, and this of course has necessitated a larger body and a strengthening of the spring suspension although the car has been lightened throughout. The body has 2 more inches room in the driver's compartment and 6 inches in the tonneau. The seats have been widened and deepened, the rear doors brought back and a leatherette top is used in place of mohair. The dash is now covered with leather and a 12-volt electric system used for starting, lighting and gearshifting. A lighter radiator with larger cooling capacity. The price remains the same at $2,350. Fitted with the Vulcan electric gearshift an additional charge of $150 is made.

The equipment includes a full set of tools, extra wire wheel, motor-driven tire pump, speedometer, and one-man top, held down at the front end by a special attachment on the windshield, thus eliminating straps.

This car is built generally along the light six lines which have come into vogue in the past year. It embodies advanced design straight through from the small six engine to the electric gearshift and streamline type of body.

The motor weighs 600 pounds, including the flywheel and regular equipment. It is of the L-head type and forms a unit power plant with inclosed valve mechanism and three-point suspension. The bore is 3.75 inches and the stroke is 5.25 inches, giving a horsepower rating of 34 according to the S. A. E. formula. On block tests the motor has developed 38 horsepower at approximately 1,500 revolutions per minute.

Cylinders Cast in Threes

The six-cylinders are cast in threes from close grained gray iron which has been aged after the rough boring process to eliminate casting distortions. The cylinder base flange is broad and forms the bases of the guides for the valve lifters. This construction allows for the cover plates which inclose the valves.

The valves are mounted on the right side of the motor and are operated by a single camshaft having the cams integral. The inlet and exhaust valves are interchangeable and have nickel steel heads mounted on carbon steel stems.

The oiling system is a combination force feed and splash with a constant level. The oil is circulated by pumping it through a gear pump with a gallon a minute capacity directly to the main bearings. The overflow from these bearings goes into the splash troughs and also into oil pockets which are designed to feed the lubricant to the timing gears and the silent chain which provides the generator drive.

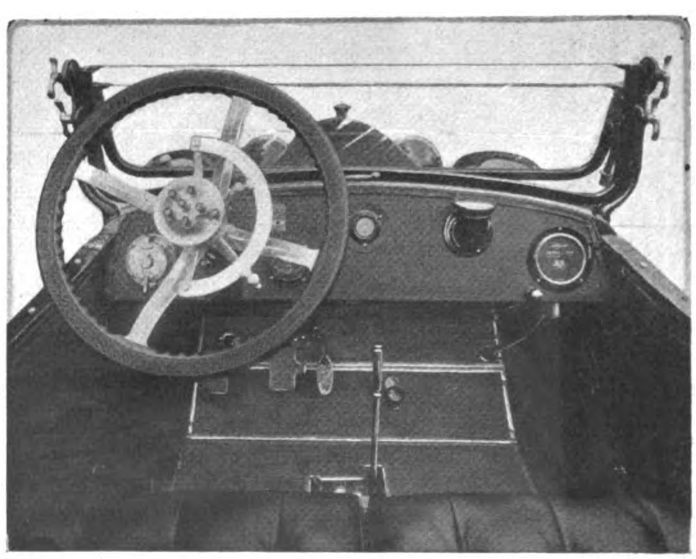
A multiple disk clutch is used on this car. It is composed of twenty-one disks alternate faces being covered with Raybestos. The tension is provided by two independent clutch springs. This clutch is housed directly with the flywheel and the housing is carried back to include the gearbox, thus providing the unit power plant.

The electrical equipment of the car divides itself into four separate and independent systems for lighting, starting, ignition and gearshifting.

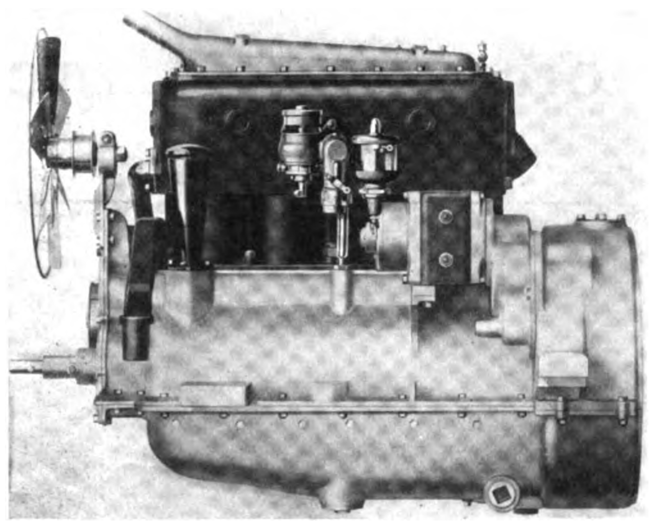
Lighting is taken care of by a Westinghouse six-volt generator connected with a storage battery. The headlights can be dimmed for city driving.

Gearshifting is accomplished by the Vulcan electric device which operates with current taken from the battery. The gearshifting is controlled by a series of buttons located on the end of the steering column which are so arranged that they do not turn with the wheel but are always in the same position.

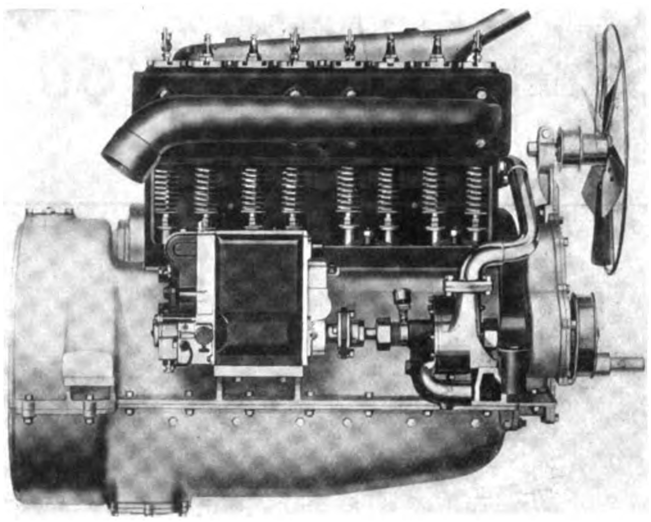
The control features are all on the left side of the car and the emergency brake lever is mounted to the right of the driver's seat or in the center of the car. The dash equipment is carried on a cowl board and the gasoline tank of 20 gallons capacity is mounted in the cowl.



View of front seat in 1915 Pullman, showing leather-covered dash and Vulcan electric gearshift buttons on steering column



Intake side of new Kissel four motor. Note high mounting of carbureter



Valve side of motor, showing mounting of electrical system on pump shaft

Detachable Sedan Top New Kissel Feature

Four-Cylinder Touring Car Price Cut to $1,450—Sedan $350 Extra

THE new KisselKar 36 has a lower price than any previous model, and also introduces an innovation in the shape of a detachable sedan top for winter use. The price of the 36 with the touring body only, is $1,450, and the detachable top can be had for $350 additional.

To convert the touring car it is necessary to remove only the windshield, summer top and moulding, and then to screw a metal plate over the door latches. Removal of the detachable top reveals the two-door touring body with individual forward seats. The four-door body can be had for the same price as the two-door, and for $100 more, two disappearing seats and extra tires are included.

The motor is new. It is of an L-head block type cast in the Kissel foundries. Its bore is 4 1-4 inches and its stroke is 5 1-2. It has 2 3-16-inch valves with nickel steel heads. Both valves and lifters are completely housed. The aluminum crankcase is very rigidly constructed with parting line 2 inches below the large diameter crankshaft.

The oil basin, which is of aluminum alloy, has troughs into which connecting-rods dip, and these are filled by means of a positive gear pump which furnishes a uniform stream of lubricating fluid. The oil is drained back into the reservoir in the lower part of the oil basin, through a fine screen before entering the pump for re-distribution.

Carbureter Mounted Directly on Cylinders

Three helical timing gears are used to drive the camshaft, circulating pump and the magneto. The camshaft is of special alloy steel and supported on large white brass bearings. A 16-inch safety blade fan that can under no circumstances cut the radiator is used. The Mercedes honeycomb type of radiator is used. A Stromberg carbureter is used. This is connected directly to the cylinders, doing away with intake pipes.

The power plant is a unit with four speeds, three forward and one reverse. The large leather-faced cone clutch is integral with transmission, and is accessible for adjustment by removing a manhole cover located amidships. Adjustable spring inserts are placed under the leather to insure a smooth and easy engagement. All gears and shafts are of nickel steel, heat-treated.

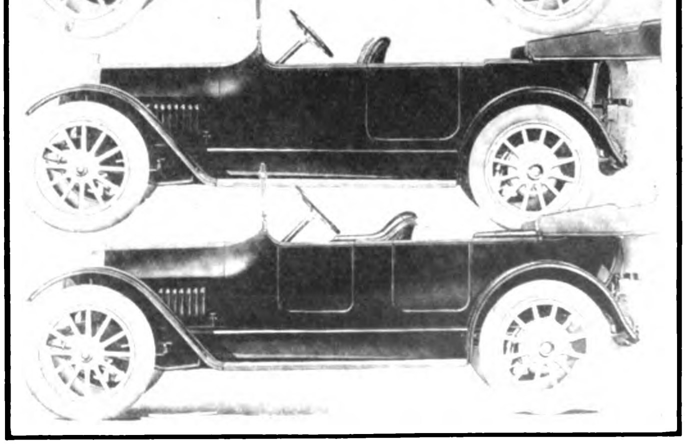
Starting, lighting and ignition are in two units, the Kissel starting system being retained. The Westinghouse system is used for ignition and lighting.

All electric wires on the 36-Four are centralized on a panel attached to the front of the dash. This feature permits the instant location of trouble, and in addition makes it possible to remove the body without cutting a wire.

The wheelbase is 121 inches and the tires are 34 by 4. The frame is of pressed steel with a tapering front to allow short turning. The control levers are at the driver's right in the center of the car. The driver's seat is on the left.

Differential is mounted on taper roller bearings, as are the front and rear wheels. F. & S. annular ball bearings are used in the transmission.

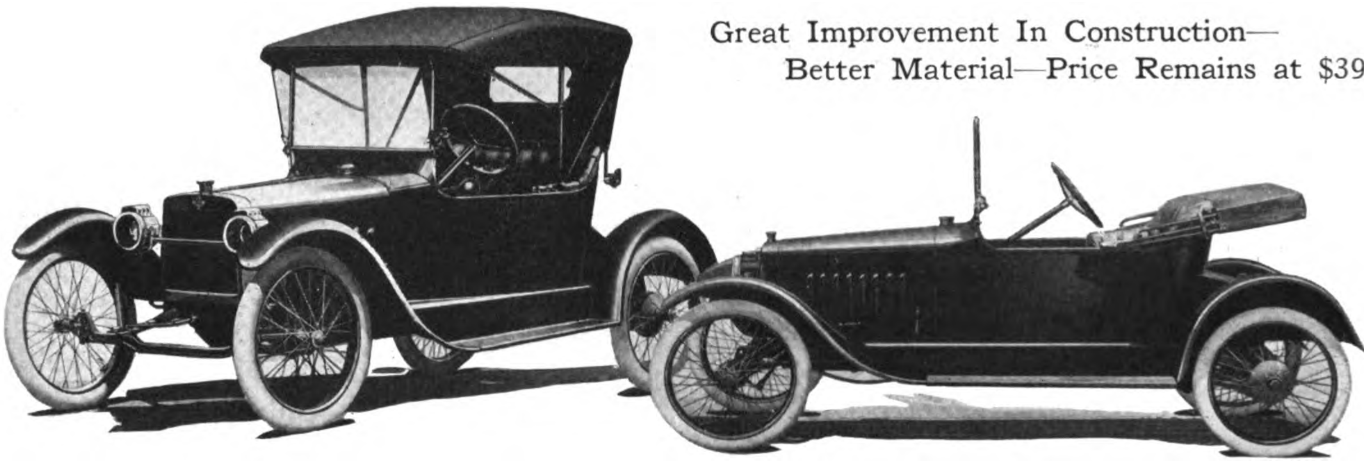
The Stewart vacuum gasoline system has been added to this car. The 18-gallon main tank is in the rear.



Top—Kissel four two-door touring car with detachable sedan top. Middle—Same car with ordinary top. Bottom—Four-door touring

Streamline Body on 1915 Saxons

Great Improvement In Construction—
Better Material—Price Remains at $395



Left—Three-quarter front view of 1915 Saxon with top up and showing new streamline body. Right—Side view of new Saxon. Note running board and tank filler in cowl.

REPLETE with refinements in finish and mechanical construction, the new Saxon for 1915 continues to be sold at $395. This concern, which was organized last year under the name of the Saxon Motor Co., Detroit, Mich., by a number of men connected with the Chalmers Motor Co., has passed a successful year, showing clearly the field of the light car selling at less than $400.

In bringing the Saxon car up to date its external appearance has been altered to a large extent by the fitting of a larger body of streamline form, complete running boards and superior upholstery. In fact, throughout the car, better material will be found than in the previous model. There is now a three-hinged bonnet in place of the one-piece design, rendering it easier to open and making a more rigid job on account of the rod which fits across the top of the bonnet from the radiator to the cowl. The gasoline tank filler cap is now on the cowl, making it unnecessary to remove the bonnet to fill the tank. The starting handle is now polished steel, and the bonnet locks have concealed hinges. In outfitting the body a rubber floor mat is now supplied. The cushions are softer, the seat backs deeper and the springs in the cushions are a tied type, making for greater comfort.

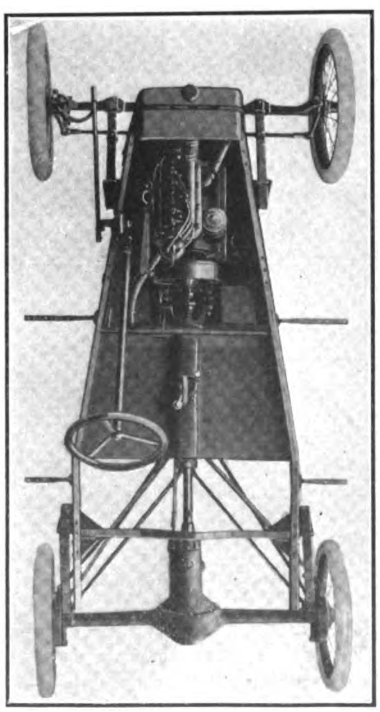
Throughout the entire body-work better finishing has been accomplished. The door locks have been improved and are now a fully concealed design. There is a trim strip on the top of the door and a strap on the right side which prevents it from striking the generator and scratching the door.

Headlights Now in Front

The enamel on the radiator is now baked on, which makes a more durable job. The car has an entirely new color scheme, having a dark blue body with black running gear. The headlights are now in front, in place of on the side, and the leg room in front of the seat has been increased to 18 inches at the bottom and 30 inches at the top of the toe board.

In the detailed mechanical changes the gasoline nozzle on the carbureter is improved, and there is a dash throttle which proves a great convenience as far as ease of starting and guarding against stalling are concerned. The brake straps are now provided with two supporting strings which prevent the straps from rattling against the step brace rod. The battery is now carried in a well, which holds the cells vertically instead of horizontally.

In the new model car the axle has been improved in three details. Two felt washers are now inserted in the ends of the rear axle, which prevent the lubricant from leaking out and covering the braking surface. There is now an oil filler in the differential, which carries the oil directly to the bearings and insures that they are at all times properly lubricated. There is also a through pin for locking the differential pinion carrier, in place of a set screw. Vibration cannot loosen this pin and cause it to fall out. Another feature of the lubrication of the differential and gearbox, which are bolted together in one housing, is the use of an automatic grease level which prevents the grease from collecting in one chamber, thus starving the other of oil.

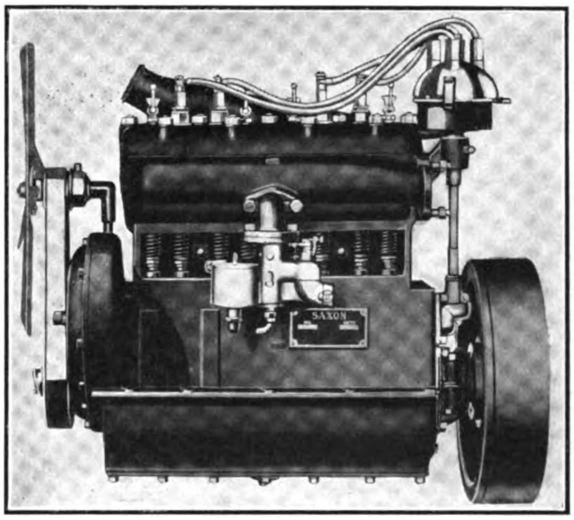


Plan view of Saxon chassis, showing the dust and oil pan, the rear axle gearbox, etc.

Better Material Used Throughout

The steering gear has been improved by the use of better material. The gear pinion shaft is now hardened to make a more lasting job, there is a larger hardened key in the steering gear segment and special carbon steel has been substituted in all of the steering connections in place of the softer material heretofore used. In fact, throughout the entire car there will be found a considerable improvement in the quality of material. In the clutch yoke there was formerly a malleable casting, while now it is a forging with hardened points. On the starting crank there is a collar in place of a pin, and instead of washers under the motor, steel shims are now used. The blades on the fan are now reinforced and there is a jamb nut on the fan support locking screw, which prevents the fan from working loose. The screw on the timer for locking it in place has now a hexagonal head in place of the filister head previously employed. There are now reinforcements at the rear end of the engine pan to prevent sagging or cracking. The handles on the gearshift and brake levers are other improvements.

The power plant of the Saxon is a four-cylinder motor of L-head design with the cylinders cast in a block and carrying the crankcase integral. The bore is 2.625 and the stroke 4 inches. The valves have steel stems and cast-iron heads, and the crankshaft is a drop forging carried on two bronze bearings lined with babbitt. The camshaft is also a drop forging, having a diameter of 1 inch and carrying the cams integrally. It is operated by helical timing gears from the front.



Valve side of Saxon motor for 1915. Note thermo-syphon cooling

The motor is oiled by a vacuum-feed system which provides a constant level in the crankcase by always keeping the oil at the same height as the feed standpipe. In order to eliminate any chance for air leaks in the oil tank there is a new oil tank filling plug which contains a leather washer recessed into it, which acts as an effective packing, making the tank airtight and preventing too rapid flow of the oil.

Atwater Kent Ignition System

Ignition is accomplished by a six dry cell battery system, using the Atwater Kent distributer. Cooling is by thermo-syphon, the radiator being tubular and aided by a belt-driven fan. The carbureter is the latest Mayer, having adjustments for air and gas on the dash. The fuel feed is by gravity from a 6-gallon tank located under the cowl and having its filler cap projecting through the cowl, an improvement over the arrangement in the original car.

The gearset is carried on the rear axle and provides two selective speeds, forward and reverse. It is mounted on Hyatt roller bearings in the case of the main driveshaft, and in the other bearings hardened steel or cast iron is used. One universal is used on the driveshaft, and the torque tube is carried concentric. The torque tube terminates in a forked yoke at the forward end. The steering gear is a bevel gear design with a sector and pinion. The steering post is a steel tube 1.25 inches in diameter, and the wheel has a diameter of 16 inches.

The rear axle is semi-floating and has a pressed-steel housing. The outer end of the driveshaft is carried on Hyatt roller bearings, and the differential is a two-pinion type with plain bearings. The front axle is a single-piece drop forging I-beam section, heat-treated, carrying ball bearings in the hub. The brakes are 8 inches in diameter, lined with Thermoid for service purposes, and the emergency set is steel on steel, 7 11-16 inches in diameter. Both brakes are carried on the rear wheels and both have a 1.25-inch face width. The springs are cantilever design, both front and rear, with the main leaves vanadium steel. Both are 1.5 inches in width, the front 22 inches long and the rear 23 inches long. The wheelbase is 96 inches. The wheels are wire and carry 28 by 3-inch clincher tires. The equipment includes a top, windshield, two acetylene headlights, oil tail light, generator and horn.

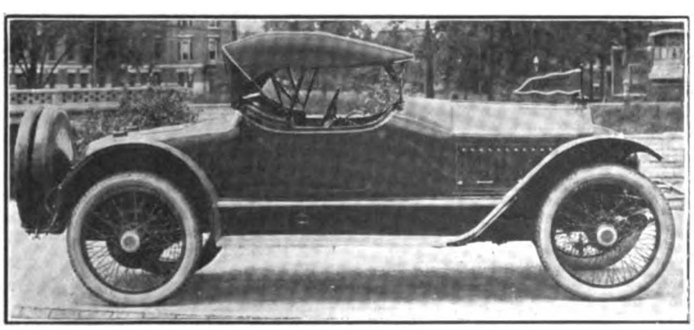
The new battery mounting is a feature of improvement, the placing of the cells in a well rendering a vertical position possible. The cells are held more rigidly, their life is increased and the connections cannot come off.

Makes National Runabout a Sleeping Car

Dr. LeGear, of El Paso, Tex., who owns extensive properties in southwestern Texas, found it inconvenient to travel among them because of the distance and poor train service.

In order that he might travel in comfort he had constructed by the National Motor Vehicle Co. an automobile sleeping and camping car. This roadster has every requisite for camping, being so constructed that a regular pullman bed can be made in the car. Wash basins, cooking arrangements and everything needed by the camper have been provided.

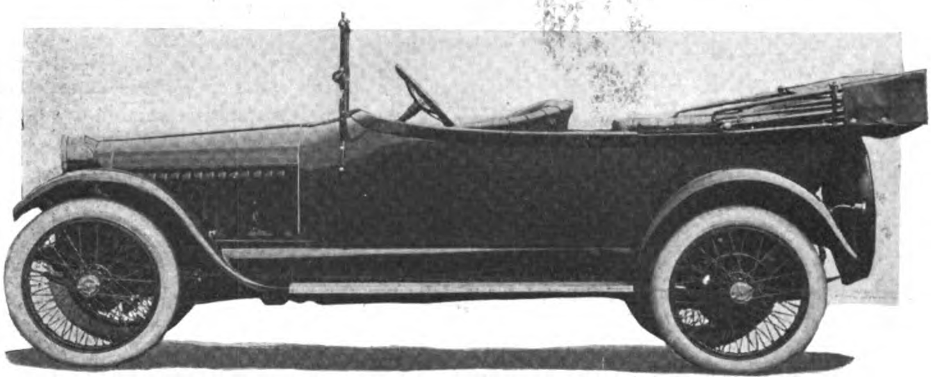
The special body has been constructed on a powerful National car. Special reserve tanks placed under the frame carry a total of 65 gallons of gasoline and 12 gallons of oil. This makes it possible for the National to travel more than 600 miles without taking on any additional fuel supply. The car is finished in light green, with gold trimmings and a large gold star, which is the insignia of Texas.



National Roadster fitted with special sleeping body

View showing the method of converting roadster into sleeping car

Chalmers Master Six Has Boat Body



Chalmers Master six phaeton for 1915. Note new boat-type streamline body

Light Six Also Continued for 1915—Pressure and Gravity Fuel Feed—More Complete Equipment

CHALMERS will continue the two sixes which made up the 1914 line for the coming season. The two cars have been refined at a number of detail points and on the larger chassis a touring body of entirely new design has been fitted. The larger of the two sixes, known as the Master six, was introduced last September, and the light six at the time of the New York show in January. The two present designs are refinements of these two models.

Mechanically the cars are fundamentally the same as in the previous models. The cylinder castings have exactly the same interior dimensions, but the core work has been altered to give better waterjacket space on both models. The gasoline feed system has been altered to a combination pressure and gravity feed. The gasoline is forced by pressure to a small tank on the dash of the car and it then flows by gravity to the carbureter. This arrangement has permitted a slight elevation of the carbureter with better accessibility than last year.

New Rayfield Carbureter

The carbureter itself is different and is now the latest model G Rayfield. Carburetion has also been assisted by increasing the waterjacket space around the intake manifold and also by the better waterjacketing arrangements provided by the new carbureter.

The same type of clutch is used on the new cars, that is a multiple disk with cork inserts, but now the disks alternate bronze and steel, whereas in the previous cars all the disks were steel. The gearbox remains the same, except that second gear on the light six now has a greater reduction. On the light six another change has been made in the fitting of Timken bearings on the front axle. The axles on the Master six have not been changed as to general design, but have been weighted up somewhat to follow the lesson learned on the racing track of making the unsprung weight as much but no more than necessary to have the car hold the road. The speedometer drive on both cars is now the inclosed Empico.

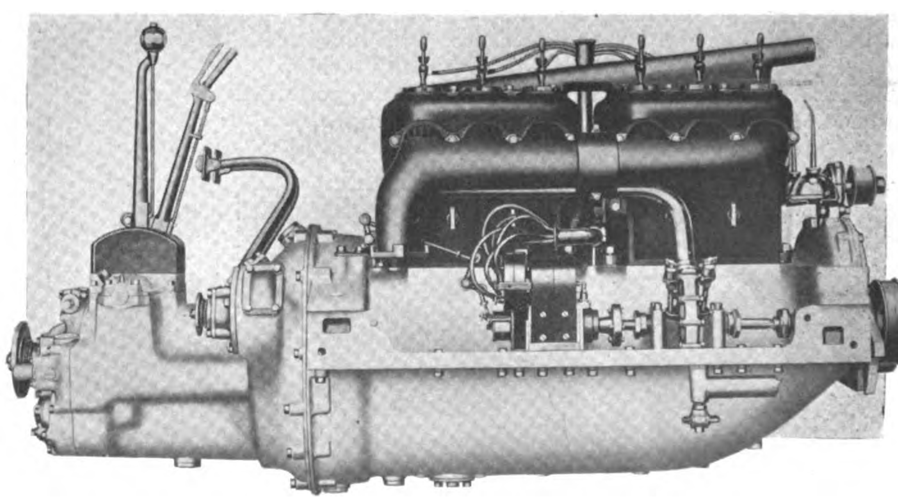
Better equipment will be found on both sixes than on their predecessors. A new design of top which has been worked out in the Chalmers shops is fitted. The storage battery is an improved design having more sealing compound and better separators, which are designed to eliminate buckling of the plates.

A volt-ammeter has been added to the equipment of the dash. The electric switches are also changed in design and a Yale lock is fitted. The appearance of the instrument board has been improved by a rearrangement of the instruments. The tires are larger on the light six. They are now 34 by 4.5 inches, whereas in the preceding cars they were 34 by 4.

Boat Line Body on Master Six

In the body work the cars have been brought up to date in every particular. On the light six there are five bodies listed; these are a five-passenger touring, six-passenger touring, limousine, coupelet and sedan. On the Master six chassis there are two bodies, a seven-passenger touring and a phaeton.

The seven-passenger touring body on the Master six is an innovation for the Chalmers company. It is built on boat lines, carrying the streamline form idea throughout. It has two doors and a passageway between the driver's seat and the seat of the passenger who sits next to him. The driver's seat is adjustable and taken into consideration with the adjustable pedals that are now fitted on all models, a perfect fit can be secured for the driver. There is a ventilating arrangement on the cowl which can be raised and lowered from the driver's seat. This deflects the draught so that it freely circulates about the front compartment of



Exhaust side of Chalmers Master six unit power plant for 1915 the car instead of only reaching the feet of the occupants. This model sells for $2,400. The five-passenger little six is $1,850. This is a raise in price of $125 on the big six and $50 on the light six.

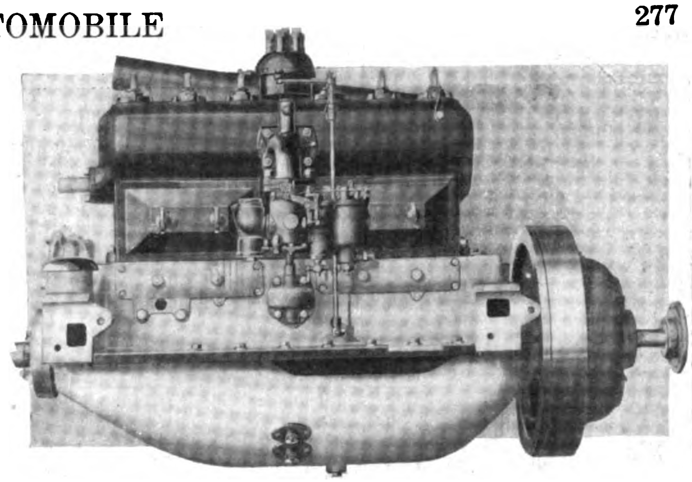
Cars of Similar Design

Both sixes follow along similar lines of design in many particulars. Chalmers made its début into the ranks of the T-head manufacturers last September and now builds nothing but that type. Both chassis have six-cylinder T-head power plants, but the larger car has the cylinders cast in blocks of three, while the smaller one has all the cylinders cast together. The cylinder castings now provide an exceptional amount of cooling space over the heads of the cylinders and around the valves. The intake valves are on the left side and the exhaust on the right.

The cylinder dimensions of the larger six are 4 by 5.5. The smaller six has 3.5 by 5.5-inch cylinders. The S. A. E. ratings of the two models are respectively 38.4 and 29.4. The makers claim dynamometer outputs of 74.3 and 53.4 horsepower for these motors. Last year the Chalmers reciprocating parts were lightened to a large degree and this year the light parts are continued. There is a standing offer in the engineering department of the Chalmers company of a dollar a pound for the reduction of weight anywhere throughout the car. Very close attention has been paid to this feature, but nothing further has been cut in the new cars. The connecting-rods are I-beam drop forgings of open-hearth steel.

Four section-type piston rings are carried. These rings are made up of two parts, the outer ring is complete and inside this there are a number of arc-shaped pieces which form a complete inner ring. Each of the small segments is forced outward by a small leaf spring giving an equal compression all around the cylinder. The crankshafts are drop forgings from .40 carbon steel. They have the crank throws curved so as to bring the center of gravity of the shaft directly on the axis, thereby making for a perfect running balance.

The crankshaft bearings are the same as in the 1914 models, being composed of bronze with babbitt bushings. The bearings are three in number. On the Master six the bearings are 2.125 inches in diameter. The main bearing dimensions for the light six are as follows: Front bearing, 2 3-16 by 2 1-4 inches; center bearing, 2 1-4 by 2 3-8; rear bearing, 2 5-16 by 3 1-2; valve size, 1 15-16 inches.

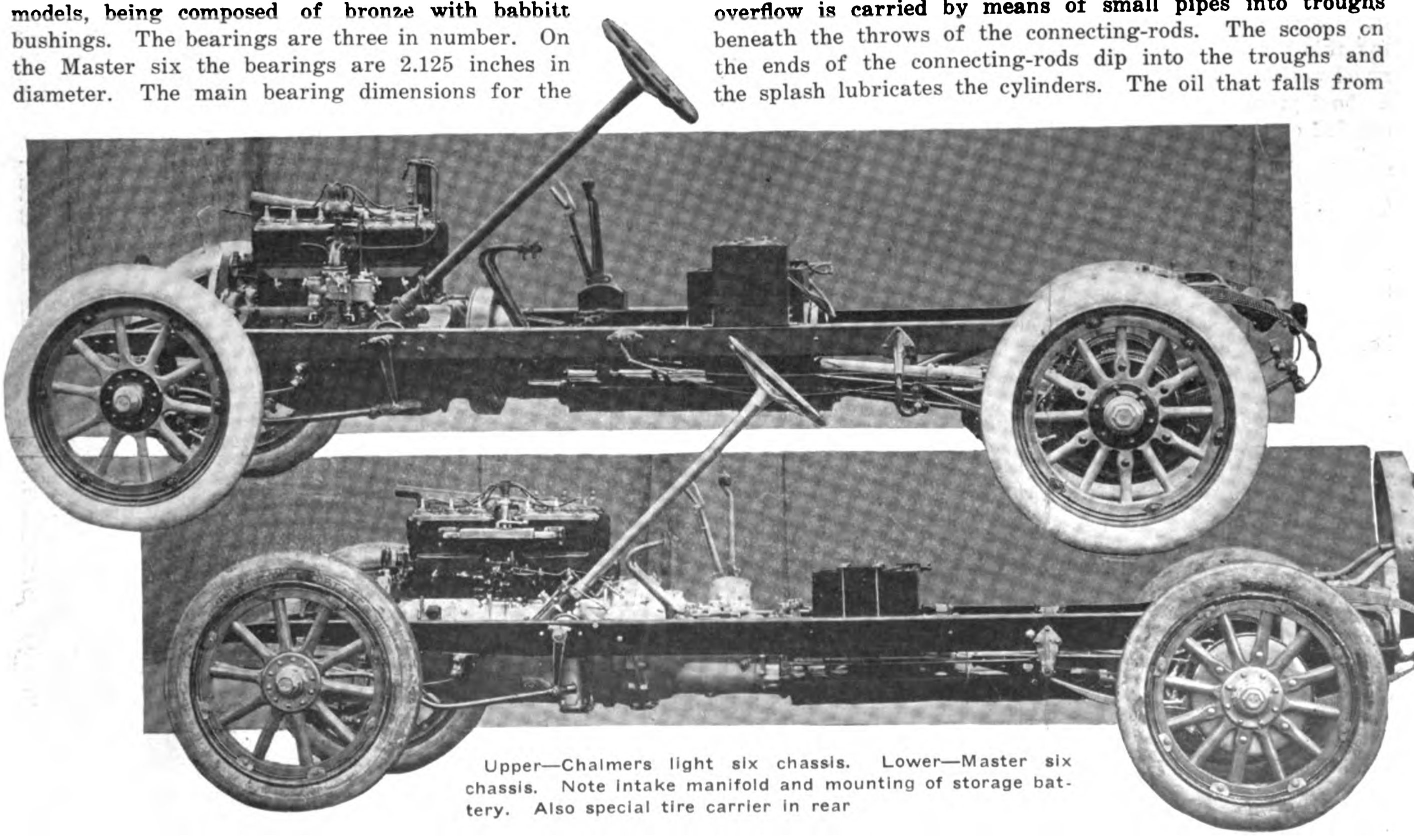


Motor used on 1915 Chalmers light six. Note new carbureter

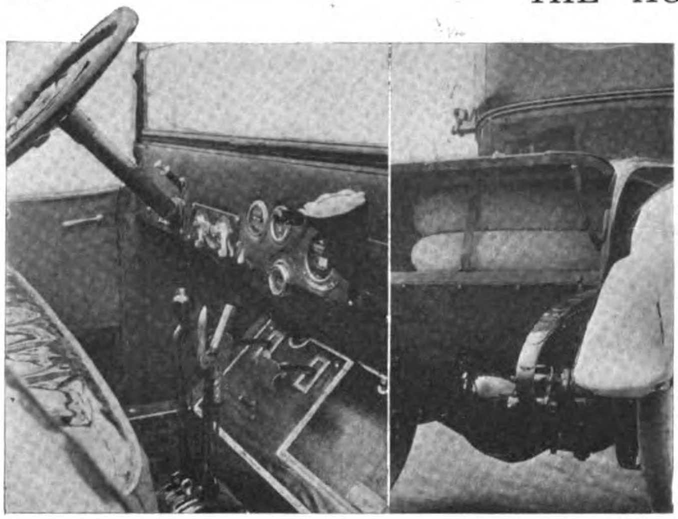
Valves Are of Tungsten Steel

Both the intake and exhaust valves on both models are of tungsten steel. They are driven by separate camshafts, which carry the cams integrally. On the Master six valves are 2.125 inches in diameter and on the light six they are 1 15-16 inches. This gives a very liberal space for the passage of the gases and is one of the features which makes for a high power output on the dynamometer.

The oiling system is essentially the same as that introduced into the Chalmers line in the 1914 design, the only change being in the increase of the size of the oil stream to each of the main bearings from .25 inch to .375 inch. In this oiling system there is a gear pump in the crankcase which takes the oil from the reservoir and forces it through a lead that runs the entire length of the crankcase. From this lead the oil is tapped off at each of the main bearings. The amount of oil that passes to the main bearings is far in excess of what is necessary for their lubrication and the overflow is carried by means of small pipes into troughs beneath the throws of the connecting-rods. The scoops on the ends of the connecting-rods dip into the troughs and the splash lubricates the cylinders. The oil that falls from



Upper—Chalmers light six chassis. Lower—Master six chassis. Note intake manifold and mounting of storage battery. Also special tire carrier in rear



Left—Instrument board and control features of light six Chalmers. Right—Tire compartment in rear

the troughs and the excess from the splash returns to the sump in the bottom of the crankcase, from which point it is again circulated.

An additional oil strainer has been added to the lubrication system. It is mounted on the side of the crankcase and is so arranged that all the oil that is re-circulated passes through it.

Series-Parallel Dimming Switch

Outside of detail features such as a new series-parallel dimming switch the fitting of a volt-ammeter on the dash and the improved battery, the electrical equipment of the cars for the 1915 season is the same as that on the 1914 models. The Chalmers-Entz system is used for starting and lighting on both the Master six and the light six. For ignition there is a Bosch magneto on the larger car and on the smaller the ignition is a battery system with the Atwater Kent distributer.

The Chalmers-Entz motor-generator which met with a great amount of favor last year is continued without change for this season. The motor-generator is still placed in its novel position beneath the right front seat and is driven by a short propeller shaft which extends to the flywheel. It is carried on a bearing at the forward end, and on the front extremity of the shaft there is a small sprocket wheel which is connected by a silent chain to a sprocket on the flywheel. The reduction between these two sprockets is 2.6 to 1.

When acting as a motor the motor-generator is capable of spinning the engine at 100 revolutions per minute under average conditions. When acting as a generator it starts charging the storage battery at a car speed of 8 miles an hour. The generator attains its maximum charging rate at 18 miles an hour. At that time the rate of charge is 15 amperes. The voltage at which the entire system operates is 18. The electrical equipment is largely made in the Chalmers factory. The motor-generator is a product of the Chalmers shops; it is suspended in a very substantial manner by means of a pressed-steel bracket hung from the frame side member. The battery is supported in a similar manner.

New Two-Jet Rayfield Carbureter

The new Rayfield carbureter used on the Chalmers models was described in THE AUTOMOBILE for July 23. It is a two-jet design having three air openings, one of which is fixed and the other two governed by the requirements of the motor. The primary jet supplies all the gasoline while the motor is idling. As soon as it picks up sufficient speed to open the auxiliary air valve a metering pin which is inter-connected with this air valve comes into operation and the secondary jet is opened.

Although the disks have been changed and now alternate bronze and steel, the design of the clutch has not been changed in any other particular. The clutch is operated in oil and has cork inserts. It is a pure multiple disk design.

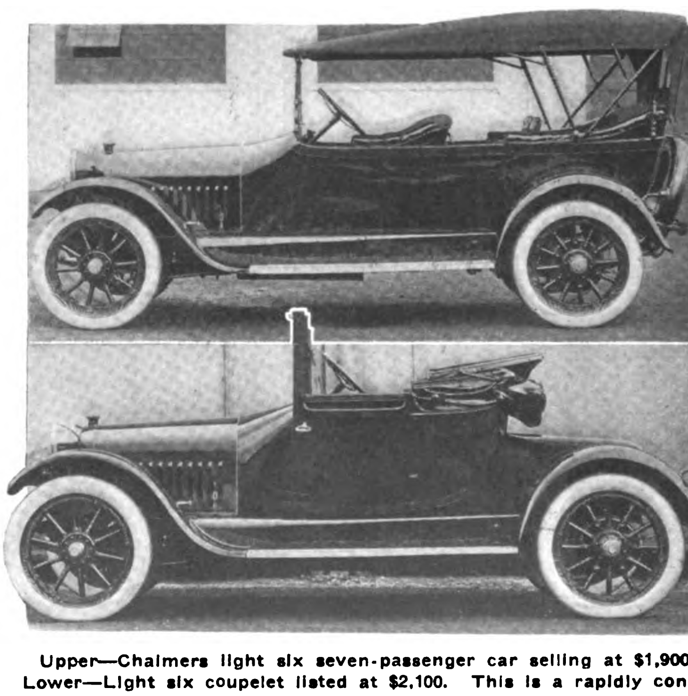
On the Master six the clutch and gearbox housing is bolted to the rear end of the crankcase as a unit. The gearbox provides four forward speeds. Both the clutch and gearbox can be reached by means of hand-holes which are fitted by cover plates in the housings of the clutch and gearbox. On the light six the multiple disk clutch is used also. The gearbox provides three speeds forward.

The rear axles are floating with a single-piece pressed steel housing. Heat-treated nickel steel is used for the axle shafts and for the driving pinion and large differential bevel gear, 3.5 per cent. nickel steel is also employed. The bearings in the rear axles are Timken rollers.

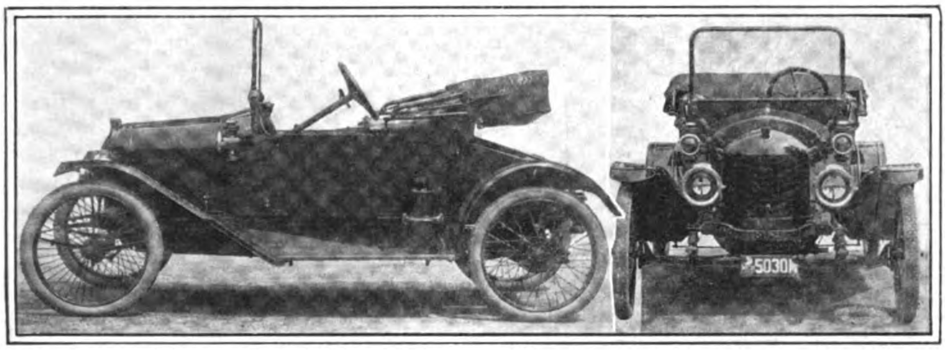
Equipment a Special Feature

The spring suspension remains as it was; the rear springs are three-quarter elliptics. The improved method of suspension adopted on the larger six when it was first introduced has been continued. Instead of the usual spring hanger the springs are bolted directly to the rear of the frame members. The rear springs are underslung and the design has been worked out to permit of the maximum spring action without bumping. Vanadium steel is used in the main leaves of the springs.

The equipment of the cars has been given careful consideration. The speedometer drive is now the Empico inclosed type, the top is easily handled and makes a tight fit against the vertical windshield. The latter is also changed in design, and on the limousine body there is a double glass that provides an extra shield for rain vision. With this shield the designers claim that the heaviest snow will not interfere with vision. The Master six has 132 inches wheelbase, while the light six has 126 inches. The wheels on the larger car carry 36 by 4.5-inch tires, while on the lighter car they carry 34 by 4-inch tires. Wide doors, with concealed hinges, are a feature of the line of bodies on both. The inclosed cars are particularly luxurious, with attention to the smallest of details, such as cigar lighters, etc. The coupelet, which is a rapidly convertible type, is continued. Tires are carried on the rear of the car in the touring designs and under the rear deck in the roadster.



Upper—Chalmers light six seven-passenger car selling at $1,900. Lower—Light six coupelet listed at $2,100. This is a rapidly convertible car. Tires are carried under the rear deck



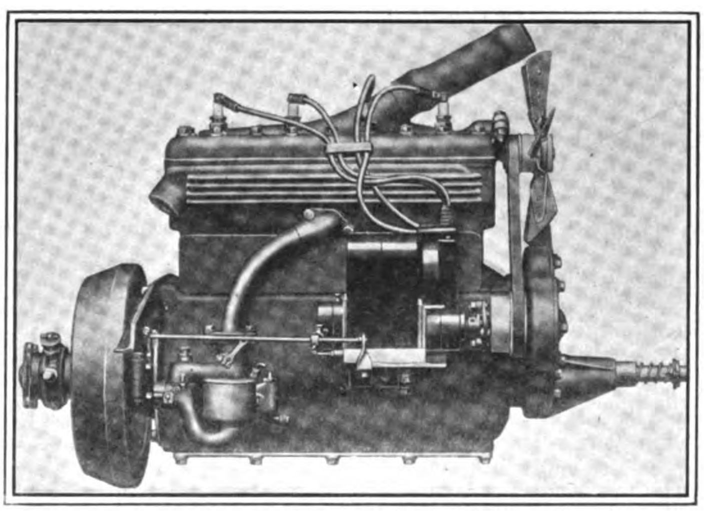
Left—Side view of Grant. Right—Front view showing modified streamline design

Grant Cuts Price $70 for 1915 —Modified Streamline Body

All Important Features Continued as in 1914—Electric System Fitted at Extra Cost

PRACTICALLY a continuation of the same model as brought out last season, the Grant Motor Co., Findlay, O., has cut the price of this little car from $495 to $425. This price cut is due to increased production and is in line with the statement made last January that when the production passed a given amount the price would be cut.

The Grant car is a typical light car design. It has a four-cylinder power plant with the cylinders and crankcase cast together. The inlet and exhaust passages are also included in the cylinder casting and, together with the inclosed valve action, give a very clean appearance to the exterior of the motor. The Grant company claims an output of 21 horsepower with the 2.75 by 4-inch cylinders. While completely inclosed the motor has been made accessible by the use of a large removable plate at the top of the cylinders, for cleaning cylinders and pistons without removing them. A removable plate is also placed on the base of the motor to permit of adjustment of the main and connecting-rod bearings.



Side elevation of Grant four cylinder motor for 1915

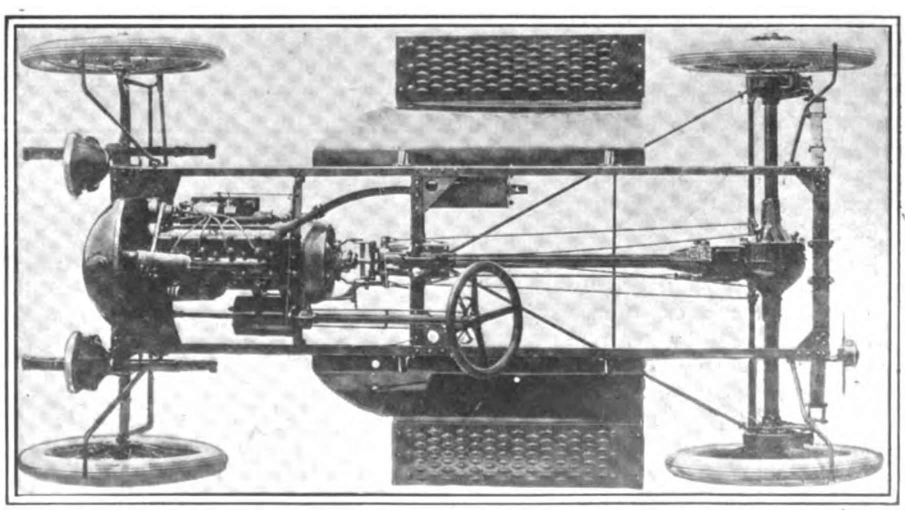
Both the crankshaft and camshaft are drop forgings from alloy steel. The bearings of these shafts are lubricated by constant level splash, oil being fed to the crankcase supply by an automatic drop feed. The carburetor is hung at the rear right end of the motor and is kept low to insure a positive gravity feed. The heat radiated from the crankcase assists in the vaporization of the fuel as it passes up the intake pipe. Ignition is accomplished by single magneto system, the magneto being carried on a shelf at the forward right side of the motor. Cooling is by thermo-syphon and the water pipes are large to permit of a good flow of water through the radiator. under all conditions.

Power is transmitted through a leather-faced cone clutch to a two-speed sliding selective gearset. All the gears and shafts are of alloy steel, hardened and ground and are carried on roller and ball bearings. The drive is by propeller shaft with a ball joint torque tube and the rear axle a three-quarter floating design mounted on roller bearings. The entire load of the car is carried on the axle housing, only the driving stresses being transmitted through the axle shafts. The gear ratio of the rear axle is 4.521.

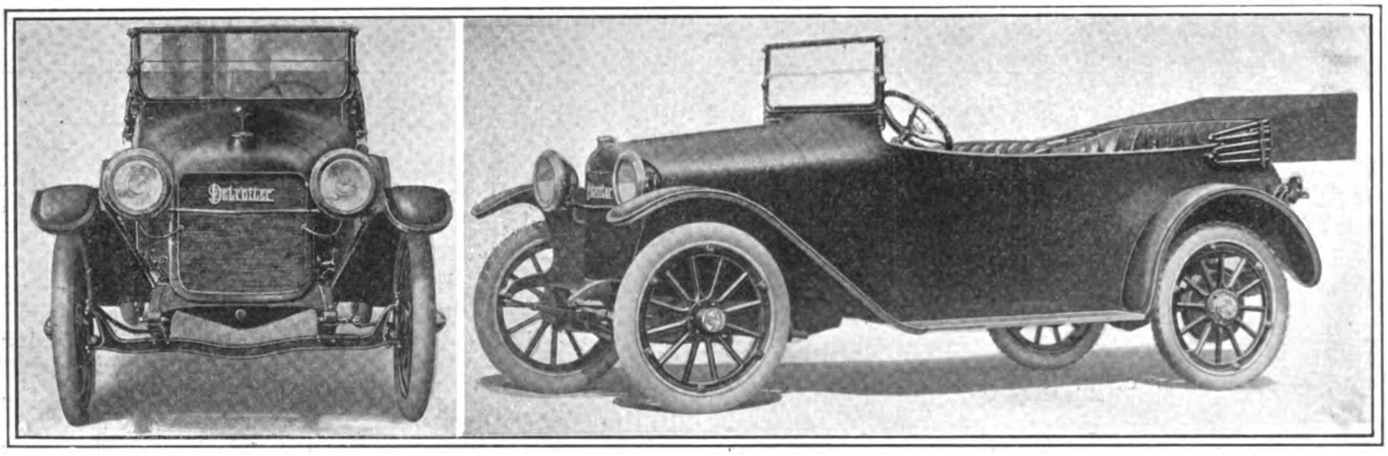
The front axle is a drop forging, having an I-beam section. It is heat-treated and the steering knuckle pins are hardened and ground. The front wheels are carried on ball bearings. Wire wheels are used as standard on the Grant car. They are 28 by 3 and carry Bailey tread tires of this size. Both sets of brakes operate on drums carried by the rear wheels, the foot brake being external contracting and the hand emergency brake internal expanding. The brakes are lined with asbestos babbitt.

Two elliptic front springs are used and one semi-elliptic cross spring on the rear. The road clearance of the car under normal load is 10 inches. Steering is by pinion and gear.

The body fitted to the car is a two-passenger roadster of foredoor design. It has a modified streamline effect, which is accentuated by the round radiator and the cowl dash. The color of the body is black and the chassis and running gear red. The 5-gallon gasoline tank, which the makers claim is sufficient to carry the car for 150 miles, is mounted in the cowl. The weight of the car complete is 1,075 pounds. Standard equipment includes a full set of lights one-piece windshield, top and full set of tools.



Plan view of Grant chassis showing simplicity of design



Left—Front view of 1915 Detroiter, showing streamline design. Right—Side view. Note crowned fenders and boat body lines

Body Improvements Feature Detroiter

Wheelbase Increased from 104 to 112 Inches

WITH a large number of detail chassis refinements and an entirely new body the Detroiter, made by the Briggs-Detroiter Co., Detroit, Mich., will be continued for 1915 fundamentally the same as for 1914. The motor and all the important dimensions of the chassis except the wheelbase remain the same, but the general appearance of the car is greatly altered. The price continues to be $1,050.

The story of the more important changes in the car is told by the fact that the wheelbase has been increased from 104 inches to 112 and the weight still remains the same at less than 2,300 pounds. This has been accomplished by an entirely new design of body, the use of drop forgings in place of castings for the levers, etc., and a light one-man top.

Carbureter Is 4 Inches Higher

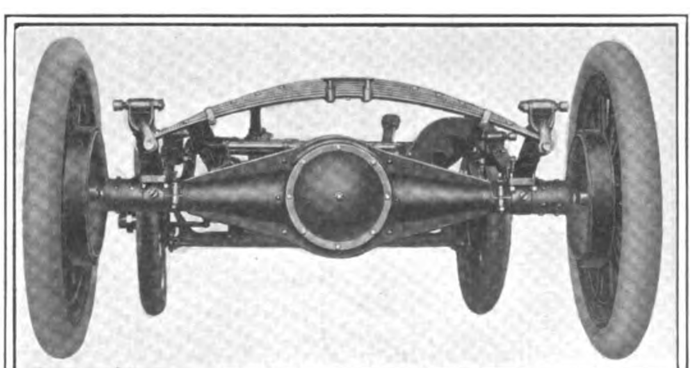
On the motor the carbureter has been raised 4 inches. This is rendered possible by placing the gasoline tank under the cowl. The motor support has been changed and, while it remains a three-point suspension, it now has a full cross member to take the rear supports and a new type of front support which permits the motor to be lifted out directly instead of having to be moved back 2 inches before being removed. The starting motor now bolts directly against the front of the motor whereas last year it was held on a separate shelf. This year the starting and lighting outfit has been changed and while operating at the same voltage and with practically the same connections it is a Westinghouse.

The appearance of the front of the car has been improved by a round radiator which moulds continuously into the body lines. A mud shield has been added to the bottom of the radiator. The rear appearance of the chassis is changed by removing the bracket for the rear platform spring perch and in its place the spring is supported directly by the rear frame cross member. The springs have had an extra leaf added to them. The front now have seven leaves, the rear side, seven and the rear platform eight. Step hangers are supported directly by the body.

Oil Level Warning Light

The brake and clutch pedals are now adjustable for length. The steering gear is a Gemmer ball bearing design and is fully adjustable for wear. In the 1915 car the Detroiter will be fitted with a muffler cutout and accelerator pedals. The instruments, including the bank of electric switches, gasoline gauge, voltmeter, speedometer, instrument light and oil-level warning light are all on an aluminum plate fitted to the cowl board. The oil level warning light is an innovation this year. When the level in the crankcase reservoir drops to a dangerous degree, a metal float makes an electric contact and the red lamp on the dash lights up telling the driver that it is necessary to replenish his supply.

It is in the body work that the most marked change is made. The car has a very distinctive streamline boat-like form. The body is 1.5 inches lower than before and follows the line of the car, starting from the new rounded radiator to the rounded-off stern. The running boards are kept free, the battery box having been removed and underslung from the frame. In the finishing of the body there are now twenty steps as compared to sixteen last year. The doors have been widened to 24 inches. For 1914 they were 16.5. The rear seats are now 45 inches wide in the clear whereas last year they were 41 inches. The body is much more roomy all around with a greater amount of leg space in the front compartment than previously. The windshield is a new attractive rain vision design and fits well with the new one-man American top. The fenders are crowned.



Rear axle construction of 1915 Detroiter. Note platform spring

The four 3.5 by 5-inch cylinders are cast in a block. Motor is an L-head design suspended from the frame at three points. The clutch and gearset housings are integral with the crankcase. The pistons are 4.75 inches in length and are fitted with three eccentric compression rings all fitted above the piston pin. The connecting-rods are I-beams with crankpin bearings which are 1.875 inches square.

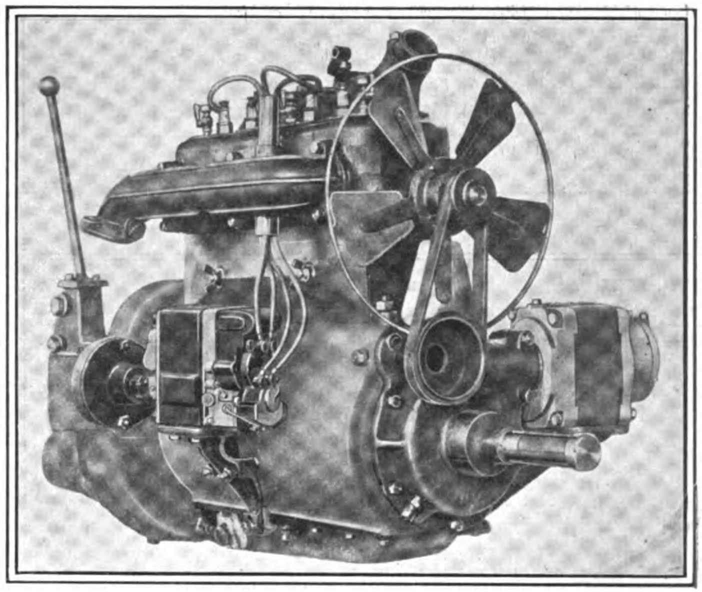
The crankshaft is a drop-forging from high carbon steel and is carried on two annular ball bearings. The camshaft is also a drop forging with the cams integral. These are ground to a limit of 0.001 inch. The bearings for the shaft are 0.937 inch in diameter. The end bearings are 2.5 inches long and the center 1.25 inches. The valves have cast iron heads welded to carbon steel stems. Dust-proof cover plates are fitted over the valve mechanism.

Two per Cent. More Cooling Space

The curved radiator of this season gives about 2 per cent. more cooling space than that used for 1914. The cooling is accomplished by thermo-syphon through large waterjackets, the water intake and outlet pipes having a diameter of 2 inches. Lubrication is accomplished by splash.

Power is transmitted through a twenty-three disk clutch. There are twelve internal and eleven external crucible steel disks which furnish the frictional surface under the pressure of three helical clutch springs. Three forward speeds are provided by the gearbox. The gears used are of high carbon steel and have face widths of 0.75 inch.

The differential and the drive gear assembly form a complete unit and may be removed from the rear axle without disarranging any other parts. A difference in the 1915 model is that the drive pinion is adjustable as well as the large bevel gear of the differential. In the 1914 car only the large bevel gear was adjustable. The differential assembly is carried on two double-row annular ball bearings. The drive ratio at the rear axle is 4 to 1. For 1915 there will be an option offered in this particular. Dealers in hilly territory will be furnished with cars having a gear ratio of 4.33 to 1 if they desire. The axle construction is floating.



Four cylinder 3.5 by 5-inch block Detroit motor

The service brake is 14 inches in diameter and the emergency brake is 10 inches. The wheels are of the artillery type and carry the brake drums. They have twelve 1.5-inch spokes and carry 32 by 3.5-inch tires.

Jeffery Quad Climbs 49 Per Cent. Grade

KENOSHA, WIS., July 29—More than thirty representatives of trade papers gathered at the plant of the Thomas B. Jeffery Co. here today to witness a demonstration of the Jeffery Quad, a four-wheel drive, steer and brake, truck.

The first spectacle was that of running the truck flush against some wooden planks piled 16 inches high and then mounting the planks, running over them and reversing to the original position. All this was accomplished with a load of approximately 3,000 pounds. Besides demonstrating the truck's ability to mount a 16-inch obstruction it demonstrated that either set of brakes could stop the vehicle in almost any position.

Another test was that of climbing a pile of lumber 16 feet high, in which heavy planks were arranged to provide steps respectively 4, 8 and 12 inches in height. The angle of the slope was 49 per cent., or 44.1 degrees.

After the obstacle-mounting demonstration the truck was driven to a very bad piece of land, one which was full of deep holes and bad ruts. This field was preceded by a ditch about 4 feet deep. The truck went through the ditch easily and then through the field, turning around, reversing and doing innumerable stunts suggested by the spectators. After the list of suggestions had been exhausted the quad was driven into the ditch with the frame of the car touching the opposite side. It pulled out by pushing aside some of the dirt.

Another vehicle of similar construction and carrying a load of 3,000 pounds in the form of steel ingots, showed what could be done with a trailer similarly loaded. The trailer was taken in and out of the ditch, through the field, and in short followed the wheels of the tractor around the same torn-up land as did the other car. A braking test was next staged. The car came around the testing track which is used by the company for testing its chassis at approximately 15 miles per hour and the brakes suddenly set. The car stopped within 8 feet. The Jeffery Quad was then backed against a wall of one of the buildings. The motor was started and the gears thrown into mesh, but the wheels could do no more than spin around.

The Jeffery Quad which made this remarkable showing is of the four-wheel-drive type, with all wheels braking, steering and driving alike. A small high-speed motor, 3 3-4 by 5 1-4 inches, the same engine as is used in the four-cylinder Jeffery passenger car, furnishes the motive power. This motor is mounted under a hood in front of the driver but centered in the floorboards. An exceptionally large radiator is used, which makes the motor bonnet invisible from the front. This engine drives by shaft to a large gearbox from which two shafts extend, one operating the front driveshaft and the other the rear. The driveshafts are parallel to the dead axles. The drive is by internal spur gearing. All four wheels are exactly alike.

Jeffery Quad climbing 49 per cent. grade in factory test

The AUTOMOBILE

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SPECIAL NOTICE—Mr. W. I. Ralph, vice-president of The Class Journal Co., assisted by Mr. Henry Knott, will have temporary charge of the Detroit territory in place of Mr. L. G. Vogel, whose resignation has been accepted to take effect August 6, 1914.

New Merchandizing Methods

THE announcement in this issue of THE AUTOMOBILE by two different concerns that a refund of a substantial portion of the purchase price would be made providing more than a certain number of cars were sold during the coming year, is one of the most interesting statements made for a long time. It should do a great deal to further popularize the automobile, and will bring it within the reach of more people. Further, it will undoubtedly inspire greater confidence in these concerns, as it is conclusive evidence that they are honestly trying to retail their products at the lowest price.

One of these concerns is a manufacturer and promises to make a refund of 10 to 15 per cent., while the other is a dealer and states that a rebate of $50 per car will be given.

From the viewpoint of the manufacturer this move marks a great advance, and solves in a degree the question of price reduction. No risk is taken on the manufacturer's part. In either case his profit is assured, but if the stipulated production figure is reached the purchasers get the benefit of reduced cost of manufacture.

The dealer's case is similar, his overhead charges are distributed over a greater number of cars and hence the conditional reduction.

This new method of merchandizing should prove a success, and its progress will be watched with interest, because the principle involved is applicable to many other lines of business and its extension might make an appreciable reduction in the cost of many articles.

A Time for Study

WAR, the greatest evil that can befall commerce of every kind, has already had a perceptible effect upon our export trade. Many of our largest and most active companies have received cablegrams from Europe to the effect that it is no longer safe to ship cars, parts and accessories to Great Britain, our leading customer for these goods, or to the other European countries.

Just when the majority of American manufacturers were beginning to pay serious attention to the great possibilities of foreign markets and in return the foreign markets were beginning to look to American manufacturers as never before in the history of the automobile industry, the precipitation of hostilities gives this growing trade a severe setback. And one of the most unfortunate aspects of the entire situation is that it is not only our trade with European countries which is affected but also that with countries in the East, in South America and other quarters, owing to the fact that the merchant marine of the world is largely owned and controlled by Great Britain and therefore of little service in carrying our exports abroad. Such cars, parts and accessories as we will be able to ship must be carried by either American vessels or those of other countries which are not involved in the European war.

Thus a study of the situation shows that, temporarily at least, our export trade will be terribly handicapped, but the makers must not allow this to make them despair of further developing their market in foreign countries. True, they must concentrate for the present on the domestic market which, owing to the splendid crop conditions reported throughout the ocuntry, is apparently ready to take more cars than ever before. But, while doing this, they must also keep closely in touch with their foreign interests if possible and utilize the interval in active foreign trade by more closely studying its requirements and preparing for an aggressive campaign upon the return to normal conditions.

This is also an opportunity for our makers to secure the business in South America and the Far East, which European makers formerly controlled.

This is a time for study, not only of the foreign market that was, but of the foreign market that is to be upon the close of the war. Conditions will probably vary and requirements may change. The companies which take these things into consideration and study and plan accordingly will be those whose export business will profit in the end.

War Shatters Motor Exports Boom

Detroit Has Two Hopes: That Britain Will Not Be Drawn into the European Battle Royal and That United States Government Will Establish a Merchant Marine to Facilitate Shipments to Neutral Ports

DETROIT, MICH., August 3—The general European war will have a far-reaching effect upon the whole American automobile export business, and no one can at the present time estimate how many millions of dollars will be lost by the Detroit manufacturers, as the local motor-car makers have been providing about 50 per cent. of all the cars exported by this country.

If the war is confined to the continent of Europe and the United Kingdom is not drawn in, the loss will not be so far-reaching, but inasmuch as over 50 per cent. of the exported cars to Europe have been shipped to Great Britain alone, it can be readily seen how great the difference is with England also fighting.

An idea of how the automobile business will be affected can be better gained by showing the United States Government statistics for the 11 months of the fiscal year ending in May. Up to that time a total of 27,018 automobiles had been exported to all countries of the world by the American automobile manufacturers, and the value of these cars was $24,583,435. Out of these 27,018 automobiles 12,521, or 46.3 per cent., having a total value of $9,733,600, or about 40 per cent. of the total value of all cars exported, were shipped to Europe.

From the information gathered at the Detroit automobile plants it is safe to say that fully 65 per cent. of the automobiles exported by this country are coming from the local manufacturers and one or two other Michigan concerns, and the general opinion among these manufacturers is that the war is a hard blow to their foreign business, not only with Europe but with all other countries.

Effect of War Doubtful

"Nobody can predict what the effect of the war will be upon the American export trade in motor cars and parts," said the general manager of one of the big concerns doing a large foreign business. "If the war would be confined to one or two countries, and not include England, the situation would be less gloomy, but with all the big powers engaged in war it will be a long time before there will be any chance of resuming anything like natural business relations with Europe. Even if we had the chance of sending cars over we would not take the risks as the general financial conditions will become such that the people won't have any money to spare except for their immediate requirements and these will not include automobiles. The best thing for the American manufacturers to do now is to develop his home trade and that with Canada and then prepare to supply Europe when Europe will be ready to buy."

One of the officials of the Hupp Motor Car Co., which has one of the biggest foreign automobile businesses in the country said: "There is no question that if the war lasts any length of time the American automobile export trade all over the world will be greatly affected. For a short time South America, Australia and Asia may not be strongly affected but there will be a lack of shipping facilities and the financial conditions will also render the export business much more difficult to handle."

"There will be such a big falling off in the American automobile export business that it will make one think of the time when the first export shipments of American cars were made," said the foreign manager of one of the Detroit manufacturers. "Canada can hardly be called a foreign country and thus the number of cars to be shipped will be very small. If we had a merchant marine it would be different, but now we ship practically 85 per cent. of that which goes to foreign countries on ships flying a foreign flag and about 70 per cent. is divided among British and German ships."

"Most discouraging is this war," said the foreign sales manager of another big local plant. "The American automobile business in Europe had just started to become really important and we had an exceedingly good year abroad with splendid prospects. Now this is only a dream and who can predict when the time will come when the American trade will again be as prosperous over there as it has been during the last 18 months? If Great Britain could have been kept out of the muddle it would be different, but now it is a situation which could not be worse, as far as European trade is concerned, as Great Britain has been the biggest customer this country has had. No doubt can exist that within a comparatively short period the business in motor cars with the rest of the world will also be reduced so much that it will barely amount to anything. The reason will be the lack of transportation facilities, as we have no ships, and the inability of foreign bankers to make settlements."

An official of the Studebaker Corp. said: "The British people control practically all the shipping facilities of the world and with Great Britain drawn into the war the whole shipping system of the world will be reduced to such a small scale that there will be no way of taking care of export trade. But even if we could effect shipments to Europe now we would not take the chances as the risk is much greater that the cars would not reach their destination and be unloaded at the port of arrival and taken to some warehouse or some other place at our risk."

"Last week we had orders for cars from South Africa and from England," said one of the officers of the King Motor Car Co., "but the orders were subject to the shipments being made per American steamers. As we have such a small number of ships flying our flag the situation is a very difficult one. This should be a warning to our government and ought to open the eyes of every American and make him realize what it means when a great, or rather, the greatest of all nations, has no merchant marine of its own.

"One of the principal reasons why the war will greatly affect the whole American automobile export trade," said the spokesman of one local manufacturing concern, "is the fact that in many countries all settlements are made through drafts negotiated through London. This is specially the case with some of the South American countries, Japan and Australia. Many bankers do practically all of their business with London banking houses and with Great Britain at war you can readily see what chances these foreign banks have to transact business with London. Of course there are concerns which have no recourse to London and do their business through New York bankers, but the number is not large and they would be hampered in other ways so that the export business might be considered non-existent for some time."

English Engineers Conclude Belgian Visit

ANTWERP, BELGIUM, July 30—The visit of the Institution of Automobile Engineers to Belgium, which came to a conclusion last week, was probably the most successful of any of the visits hitherto held by the institution. The Minerva Motor Co.'s factory was visited in this city. One of the most striking things noticed in these works was the use which is still made of machinery which might by some be considered somewhat out of date. But any disadvantage there might be, it would appear, is to be fully compensated for by the very low rate of wages which is paid to machinists in Belgium, about $.10 an hour. Other large plants were also visited.

Rates for Charging Electrics Less

NEW YORK CITY, July 30—The reductions in the rates charged for electricity by the New York Edison Co. during the past three years may be taken as conclusive testimony of the increasing use of electric vehicles. Prior to July 1, 1911, the rate averaged approximately 3.5 cents per K.W. hour. Between July 1, 1911, and May 1, 1914, the rate was reduced to less than 3.25 cents, and on May 1, 1914, the minimum rate, based upon the consumption of 50,000 K.W. hours monthly, was lowered to 2 cents a K.W. hour. The new rates which are now in force are as follows, these being dependent upon a minimum monthly bill of $25:

The first 2,500 kilowatt hours monthly at 5 cents; next 2,500 kilowatt hours monthly at 4 cents; next 5,000 kilowatt hours monthly at 3 cents; next 20,000 kilowatt hours monthly at 2½ cents; next 20,000 kilowatt hours monthly at 2¼ cents; excess over 50,000 kilowatt hours monthly at 2 cents.

Lower Ford Prices $60 to $120 a Car

Revised Profit-Sharing Plan Includes Fixed $60 Reduction and Other Tentative Benefits

DETROIT, MICH., Aug. 1—Prices of Ford cars have been reduced. A plan announced for the coming year will include a sharing of the company's profits by customers. This is said to complete the triangular profit-sharing plan which the company had in mind when the employees were given a portion of the earnings of the company.

Each car has been reduced $60 and is sold with the understanding that if 300,000 cars are disposed of between August 1, 1914, and August 1, 1915, each person who buys a car between those dates will receive an additional discount of from $40 to $60, making a total reduction of $100 to $120 on each car.

Thus the touring car, which has been sold for $550, will sell for $490, and under the conditional plan the price will amount to $450 or $430; the roadster is cut from $500 to $440, with a possible added $40 or $60 discount, and the town car drops from $750 to $690, with the possible added reduction.

The 300,000-car output represents, it is stated, a condition of maximum efficiency in the Ford plants and will make the profit sharing possible. The distribution of about $18,000,000 is entailed.

The reductions in the Ford prices concern only the American Ford company, and the output of 300,000 cars is to be produced by the Detroit plant.

N. Y. Overland Agent Has Profit-Sharing Plan

NEW YORK CITY, Aug. 4—The C. T. Silver Motor Co. has inaugurated a conditional price reduction plan in connection with its 1915 sale of Overlands. If the sales by August 1, 1915, total 2,500 cars, $50 will be rebated to each buyer and a further rebate will be made if the sales reach 3,000. This will entail a disbursement of about $125,000. Silver believes his sales for the year will exceed 3,000.

Government Has Devised Glare Antidote

WASHINGTON, D. C., Aug. 1—The problem of eliminating the glare of motor car headlights, against which municipal ordinances and police regulations in many cities have been placed in force, is to be taken up by the federal government. In compliance with a request of the Automobile Club of America the bureau of standards, department of commerce, has devised a method of accomplishing this result and this method now is being tested. Director S. W. Stratton, of the bureau, has recommended that a patent dedicated to the public be taken on this method.

Director Stratton will not discuss the details of the new method. He believes that more definite announcement should wait the patenting of the method. The bureau is now awaiting the arrival of apparatus needed to complete the tests before taking steps toward obtaining a patent.

Sterling Co. To Build Light Cars

BROCKTON, MASS., Aug. 3—The Sterling Motor Car Co., of Brockton, Mass., successor to the Sterling Motor Co. announces that it will begin at once the construction of 1,000 motor cars to retail, fully equipped, at $650. The company has a plant on Centre street, near Quincy, and states that 500 men will be put to work immediately. Its output for the 1915 season will be at least 5,000 cars, according to the officials of the company.

S. A. E. Council To Meet August 24-25

NEW YORK CITY, Aug. 4—The next Council meeting of the Society of Automobile Engineers is to be held August 24 and 25 at which the question of the European trip will be decided and other important matters considered. It is the idea of the officers of the society to await developments in Europe before deciding as to whether or not the European trip will be held. On August 15 the ballots will be counted in the voting as to the amendment of the constitution.

Several division meetings are in prospect, one of which will be the Electric Vehicle division. The Standards Exchange division will also meet to take up matters with the engine builders. Two respects in which standardization will be sought are in bell housings for attaching gearboxes to unit power plants and housings for attaching gearboxes to rear axles. In both these particulars there is a woeful lack of uniformity at present.

E. V. A. A. Membership Is Doubled

NEW YORK CITY, July 30—The Membership of the Electric Vehicle Assn. of America has increased about 100 per cent. since last October. Last October the membership was 437, while it is now approximately 850. The sectional representation has expanded until it now includes New England, Chicago, Philadelphia, Washington, Cincinnati, San Francisco, Los Angeles, Pittsburgh, New York City, Detroit, Cleveland and Toronto with expectations of having local sections in the immediate future in Buffalo, St. Louis and three or four other cities.

Service Bureau for Motor Truck Club

NEW YORK CITY, Aug. 3—The Motor Truck Club of America plans to operate a Legal Aid Bureau during the coming year. It will distribute copies of laws to club members, establish a school of instruction for drivers, appear in court for traffic offenders, act as legal adviser, recommend support or condemnation of proposed legislation, prepare proposed laws, gather statistics and act generally in behalf of club members.

To Build Trucks and "Cykes" in Orange, Mass.

ORANGE, MASS., Aug. 3—The old plant at Orange, Mass., used for many years by the Grout Automobile Co. for manufacturing Grout cars, has just been leased by the Orange National Bank, its owners, to a syndicate that proposes to form a corporation that will build light trucks and cyclecars. The factory has been leased for a term of years with an option to purchase the place at the expiration of this period. The new company plans to use the entire factory and it expects to begin operations in September when an announcement will be made.

Monroe Co. To Make $450 Two-Seat Light Car

FLINT, MICH., Aug. 1—A two-passenger light car to sell at $450 will be made by the Monroe Motor Co., which has been organized and incorporated with a capital stock of $250,000. The plant formerly occupied by the Imperial Wheel Co., in this city has been secured and manufacturing operations will start at once so as to begin deliveries beginning September. The first year's output is expected to be of about 5,000 cars.

The board of directors consists of R. F. Monroe, for the last three years with the Chevrolet Motor Co.; W. C. Durant, of the General Motors Co.; Arthur G. Bishop, president of the Genesee County Savings Bank; A. B. C. Hardy, general manager of the Chevrolet Motor Co.; R. T. Armstrong, of the Armstrong Mfg. Co.; Curtis R. Hathaway, of New York. Mr. Monroe is president and general manager of the new concern.

Wagenhals Experimenting with Small Car

DETROIT, MICH., Aug. 2—The Wagenhals Motor Car Co. is carrying on extensive tests with an experimental car about half the size of the machine it is manufacturing. The little machine resembles the larger one in that it has three-wheels, one in the rear. Its carrying capacity is between 400 and 500 pounds and the price will be about half of the present model. It carries a four-cylinder motor 2.75 by 4 inches.

Stepless Electric Bus Test in New York

NEW YORK CITY, Aug. 3—Regular 125-mile-a-day trips are being made in New York city by the Field stepless electric bus, with a view of proving its practicability. The New York Omnibus Co. has applied to the board of estimate for a franchise to operate Field buses on regular lines.

In its demonstrations the bus has been climbing hills of 10 per cent. grade.

In the run of 125 miles daily the bus is said to use up 220 kilowatts. The vehicle is charged for 5 hours at night and is given a 10 minute boost at the end of each 15-mile round trip.

Knox Motors Company Is Active

NEW YORK CITY, Aug. 4—In THE AUTOMOBILE for July 16, among companies which were mentioned as being out of business were the Knox Automobile Co. and the Knox Truck. These concerns have nothing to do with the present Knox Motors Co., which is actively engaged in the manufacture of passenger cars, tractors and motor fire apparatus at Springfield, Mass.

Paige Cuts Car Prices $50 and $80

DETROIT, MICH., Aug. 5—*Special Telegram*—The price of the 1915 Paige-Detroit has been reduced to $925 on model 25 and $1,195 on model 36, or, respectively, $50 and $80 less than 1914 prices.

Powers Want Federal Trucks

Federal Motor Truck Co. has been asked per cable by several European countries now at war how soon a large number of trucks could be furnished. The company has taken up the matter with the U. S. Government to find out if the declaration of neutrality will prevent such shipments.

New Denby Truck on Overland Test

DETROIT, MICH., Aug. 1—The first of the new trucks made by the Denby Motor Truck Co., of this city, started on an extensive test and advertising trip yesterday en route to Philadelphia over the Michigan and Ohio roads. Sales Director R. P. Spencer and C. D. Chenever of the export department of the Denby company are making the trip on the truck.

Signal Flags at Crossings, New Traffic Plan

NEW YORK CITY, Aug. 3—Regulation of traffic by means of flags has been tried out in New York city on Fifth avenue at Forty-second street. By raising a flag a traffic officer indicated the direction of traffic, and the same signals were given on other corners within view of the man with the flag, thus causing traffic to flow north and south at the same time and east and west at the same time on streets within the signalling area.

Market Reports for the Week

By far the most important event of the week as far as the prices of materials are concerned was the $0.27 rise in the price of tin, due to the rumor that Great Britain had barred exports of metal from the British Isles. The price is now 58 cents and will probably go higher as it seems only a question of supply and not of price. There has been practically no change noted in the other materials.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony	.05¼	.05¼	.05¼	.05¼	.05¼	.06	+¼
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	....
Bessemer Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	....
Copper, Elec., lb.	.12⅞	.12¾	.12⅝	.12⅝	.12½	.12⅜	—½
Copper, Lake, lb.	.13	.12⅞	.12¾	.12¾	.12⅝	.12½	—½

Quotations on cottonseed oil closed on Friday. Wednesday it sold for $6.92 and Thursday for $7.05.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	....
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	....
Lard Oil, prime	.93	.93	.93	.93	.93	.93	....
Lead, 100 lbs.	3.87½	3.87½	3.87½	3.87½	3.87½	3.87½	....
Linseed Oil	.60	.60	.60	.60	.60	.60	....
Open-Hearth Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	....
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	....
Petroleum, bbl., Pa., crude	1.65	1.65	1.65	1.65	1.65	1.65	....
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	....
Rubber, Fine Up-River, Para	.72	.72	.70	.70	.70	.70	....

Raw Italian silk quotations closed on Monday. The selling price on the preceding Thursday was $4.90.

Quotations on raw Japan silk stopped last Monday. The price for the preceding Thursday was $4.22½.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	....
Tin, 100 lb.	31.00	30.75	48.00	48.00	48.00	58.00	+27.00
Tire Scrap	.04¼	.04¾	.04¾	.04¾	.04¼	.04¾	....

Detroit Ships 44,500 Carloads in 6 Months

Nearly 67 Per Cent. as Many Cars Shipped as in Twelve Months of 1913

DETROIT, MICH., August 4—During the first 6 months of 1914 a total of 44,500 carloads of automobiles have been shipped out of Detroit, the total number of automobiles being estimated at 189,125. During the 12 months of 1913 the total number of carloads of automobiles shipped by Detroit manufacturers totaled 66,450, the number of automobiles shipped in them being estimated at 282,412. Thus in 6 months of this year the number of carloads of automobiles handled by the railroads running into Detroit amounts to nearly 67 per cent. of the total they handled all last year.

The 5 per cent. increases in freight rates accorded the railroads by the Interstate Commerce Commission for the territory between Buffalo and Pittsburgh and the Mississippi river, affects especially the Detroit automobile manufacturers, according to traffic expert A. T. Waterfall, of the Detroit Board of Commerce, who stated that about 60 per cent. of the total tonnage of the railroads running in and out of Detroit concerns coal and coke, which are among the commodities upon which no increase of freight has been allowed, while of the remaining 40 per cent. of tonnage the automobiles come in for the larger proportion.

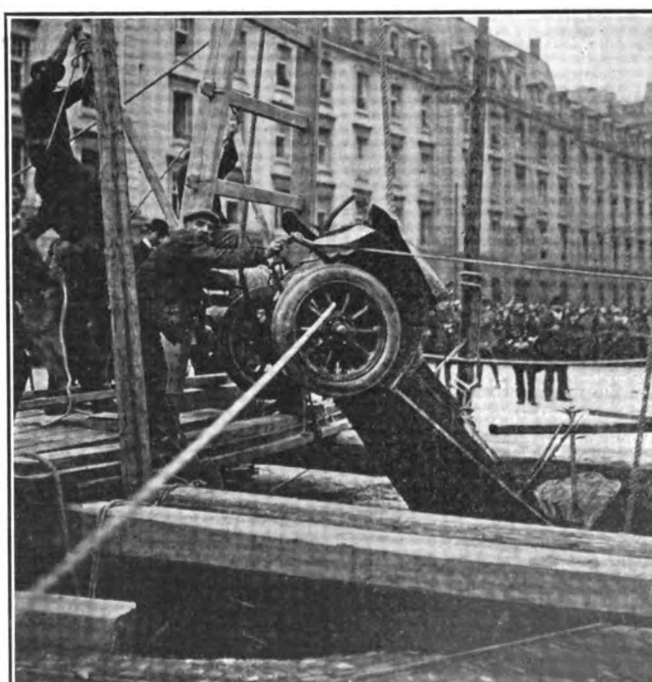
Many Concerns Hold Up Foreign Shipments

Information obtained by the Detroit Board of Commerce shows that among the forty big local manufacturing concerns which have received cable instructions to withhold all further shipments to Europe, are the manufacturers of the Chalmers, Ford, Hudson, Hupmobile, Krit, Lozier, Packard, Saxon and Studebaker cars and of the Continental motors.

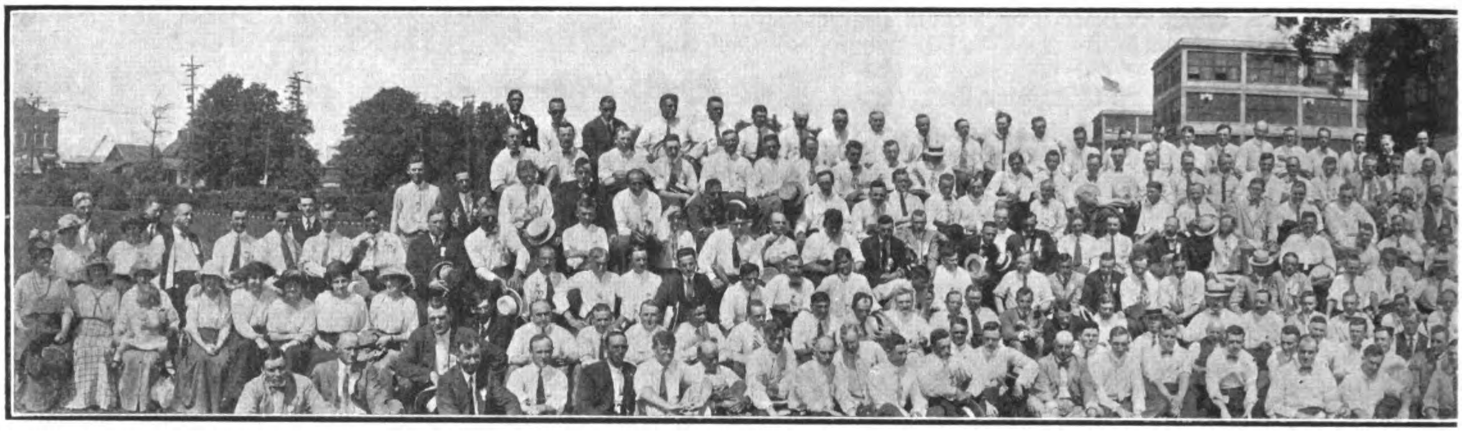
BOSTON, MASS., Aug. 1—The Leghorn Sales Co., of which George R. Leghorn is president, has been formed to act as distributors for the Lozier cars in New England. Salesrooms will be opened on Boylston street.

No Securities Quotations This Week

NEW YORK CITY, Aug. 4—Owing to the war conditions existing in Europe the New York Stock Exchange has been closed and there is no trading in securities.



In a recent cave-in of a street in Paris a taxicab was carried into the hole. The illustration shows the removal of the wreck



Gathering of nearly 500 Chalmers dealers at the factory of the company in Detroit. The meeting was very enthusiastic and a material increase

"All 1914 Cars Sold"—"Many 1915 Orders," Say New York Dealers

Branches and Agencies Find No Depression, Reporting Record Business—Buick's Extraordinary Sales—Trade Has General Gain of 50 Per Cent. Over Same Period Last Year

NEW YORK CITY, July 27—Dealers in this city report a very successful year for the sale of their 1914 model cars. A majority of the agencies are far ahead of the 1913 sales—on an average, approximately 50 per cent. The much discussed business depression does not appear to have affected them.

Many of the firms are sold out and are still having many calls for the 1914 product, which they cannot satisfy, as the factories are also all sold out and are about to announce their 1915 models.

The dealers look forward to a good business for 1915 models, one agency having already delivered 100 cars, with a standing order of 100 more. One firm sold eighteen cars retail on July 23, the largest day's sale in its history. The same firm reports the biggest year and the best outlook.

Most of the dealers have large territories, including most of New Jersey, Long Island, part of Connecticut, several counties in this state, also Staten Island, the Metropolitan district and Pike County in Pennsylvania.

Just what each dealer did last year is shown in the following extracts, giving in some cases the total sales and also the percentage of increase for the first 6 months of this year in comparison with the same period during 1913:

Buick—Biggest year it ever had, with a splendid outlook for 1915. Was sold out on May 1, 2 months earlier than last year. Sold 360 of the 1914 cars. Has sold 100 of the 1915 cars and has a standing order for 100 more. On July 23 sold eighteen cars, the largest day's sale in its history.

Cadillac—All sold out, with sales better than ever. Sixty per cent. ahead of last year. Customers calling for 1914 cars just as the 1915 model is to be announced. Is having much difficulty in supplying needs of customers. Has had to call on distributors in surrounding territories to be able to make immediate deliveries on some of the orders.

Car-Nation—Started selling on May 15. Up to date sixty-four cars have been sold. Reports very good outlook for future sales.

Chalmers—Best year it ever had, with a 50 per cent. increase. Fine outlook for 1915 models.

Chandler—June was the largest month it had. Up to July 24 sales have exceeded June. The agency has handled 10 per cent. of the factory output, amounting to 250 cars. The agency has only been going about 11 months.

Ford—Long Island plant reports a 50 per cent. increase.

Hudson—Sold twice as many cars up to July 12, this year, as sold 4 months later in 1913. During 1914 this agency sold 868 cars wholesale, and 146 retail. Increase in sales attributed to the reduction in price on its light six. The agency contracted during 1914 for 298 cars and for the 1915 season, 868 cars.

Hupmobile—During June the local agency has sold and delivered 300 cars to its sub-agents in the surrounding districts, with an increase of about 200 per cent.

Locomobile—Splendid retail sales. One of the best years in the company's history.

Marmon—Has sold fifty-seven cars since March 1, 1914, with prospects good for next season's models. Agency all sold out.

Mercer—Mercer sales are a little above those of last year. This year the agency has made less sales in cars where it has had to take second-hand cars in the trade, than in 1913.

Mitchell—The Mitchell agency reports a 150 per cent. increase. During 1914 300 cars were sold as against 125 in 1913. These 300 were sold during the first half of this year, more than the whole of last year. Predicts good sales for the latter part of 1914.

Moon—From January to June of this year, this agency has sold 182 cars, an increase of 41 per cent. over last year's sales for the same period.

Oldsmobile—Gain approximately 15 per cent. in its sales. Sold 185 cars in 1913 and 215 in 1914. Has sixty orders on the 1915 model. Has contracted for 850 cars of the 4-cylinder type for the coming year and 250 of the sixes. Predicts big year on the fours.

Overland, Peerless, Willys-Knight—Sales 33 1-3 per cent. ahead of 1913. Has ordered 3,500 cars for next year. Last of 1914 Overlands sold.

Packard—Sold out in May on 1914 models. Same sales as made in 1913. Ahead on truck orders. Sales on trucks up to July, 1914, more than any other year.

Premier, Briscoe, Lexington, Pathfinder, Ford—This agency reports good business. Though only in business for a few months sales have been very satisfactory.

Pullman—Sold seventy-five cars first 6 months of this year a 25 per cent. increase. Good sales on 1915 model.

Simplex—Same as last year. Sales on new models very good.

Stevens-Duryea—Up to May 12, 1914, sold as many as up to August 1, 1913. Better this year than ever. Especially good sales in closed cars.

S. G. V.—Increase of 10 1-2 per cent. on 1914 cars. Good 1915 prospects.

Studebaker—Good sales for 1914. Fine prospects for 1915.

Stutz—1914 sales were much better than 1913.

Velie—From August 1 to July, 100 per cent. ahead of 1913. Sold 150 cars in 1914 and seventy-five in 1913. The truck end of business very good.

White—Sales show a very satisfactory increase over last year.

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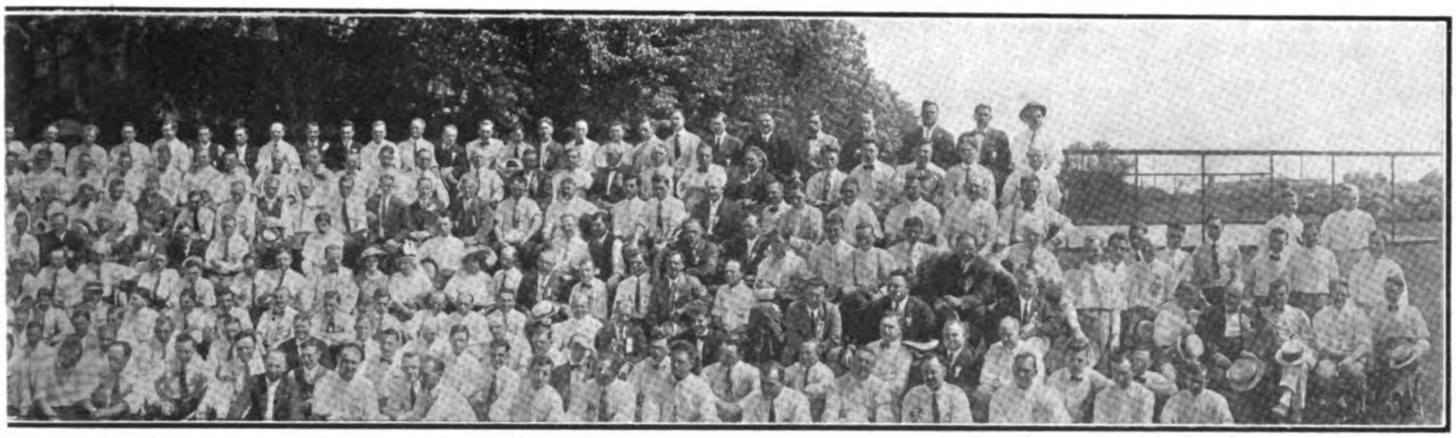
PONTIAC, MICH., Aug. 1—C. E. Voorhis has resigned as assistant general manager of the Kingman Plow Co., Peoria, Ill., to become assistant sales manager of the Oakland Motor Car Co., Pontiac, Mich.



in business is in prospect for 1915. Many important decisions were reached at the conference, among which was the increase in the car prices

Ohio Trade Gets Cut Rates for Compensation Insurance

Premium of 65 Cents Per $100 for Factory Workers Reduced to 60 Cents—For Chauffeurs, from $1.65 to $1.49

COLUMBUS, OHIO, Aug. 3—The Ohio Board of Awards, which has charge of the administration of the workmen's compensation law, made a number of reductions in the premium rates to be charged employers July 1. In this list, which was on the average of 5 per cent., the automobile industry benefited to a large degree. As a result thousands of dollars will be saved employers of men in garages, repair shops, taxicab companies and plants and branches.

The old rate of $1.65 per $100 of the payroll for chauffeurs has been reduced to $1.49. The old rate of 75 cents for all garage employees has been changed to 65 cents, and the old rate of 65 cents for employees of automobile plants and branches has been reduced to 60 cents.

With the law in force for a little more than two years the great benefits to be derived, not only by the employees but also the employer, are plainly seen. While there are a number of things to be adjusted the administration of the law on the whole has been very successful.

The law makes it compulsory for all employers, if firm, individual or corporation which employs five or more persons, to contribute to the state fund. Concerns employing less than five persons can come in if they wish. Those who do not want to come in are compelled to file a bond with the Ohio State Board of Awards and to make all settlements for deaths and injuries on the basis followed by the board.

Packard Dealers in Session This Week

DETROIT, MICH., Aug. 1—The Packard Motor Car Co. will hold a special "Sales Session," August 5 to 7, when over 100 dealers and sales managers from 60 cities will come to the Detroit plant. Assistant sales-manager A. E. Corbin, will speak about the changes made in the new model "3-38"; the heads of the different departments will give instructive talks and there will be a general discussion of sales problems and Packard methods of manufacture. Finally each dealer will receive his "3-38" demonstrator and will return to his home town in the car, some already having advised the Packard company that they will make a non-stop return trip.

Briggs-Detroiter Convention Optimistic

DETROIT, MICH., Aug. 1—The annual distributors' convention of the Briggs-Detroiter Co., which was held this week was attended by its principal distributors in the United States, Canada and foreign countries. All seemed very optimistic about the future outlook of the automobile business and greatly pleased with the 1915 Detroiter.

President C. S. Briggs, who presided over the out-door convention which was held under a big tent on the factory's testing grounds, announced that the output for 1915 will be at least double that of this year, the price remaining the same.

There were informal talks about all matters partaining to the Briggs selling, advertising, service and factory policies and an interchange of ideas and suggestions by the distributors.

One of the features of the convention was the presenting by the Briggs-Detroiter company to "Bob" Overstreet, of Ft. Worth, Tex., of the silver bowl and $500 in gold coins which had been put up as prizes to the distributors who disposed of the largest number of cars between May 1 and July 27. Minneapolis and Omaha were respectively second and third in the competition.

The convention ended with a banquet tendered by President C. S. Briggs to the distributors at the Detroit Boat Club.

Walpole Creditors Get 4 Per Cent. More

BOSTON, MASS., Aug. 3—An additional dividend of four per cent. has been ordered by the United States District Court in Boston for the creditors of the Walpole Tire & Rubber Co. Fifty thousand dollars has been set aside for this purpose. This makes $171,000 thus far paid.

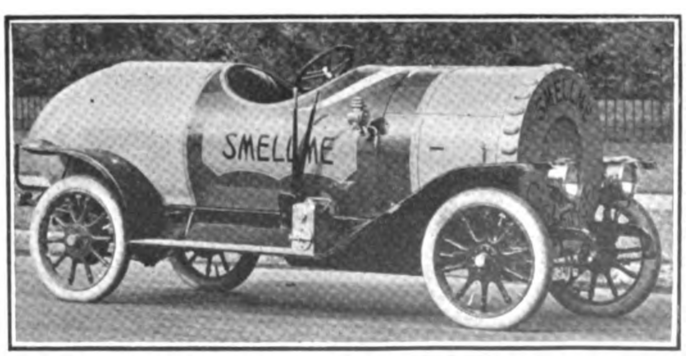
Willman, Studebaker Advertising Chief

DETROIT, MICH., Aug. 1—George L. Willman, who was assistant advertising manager when William S. Pettit was in charge of the advertising department of the Studebaker Corp., has been appointed manager of this department, while Paul Hale Bruske, who had charge of it after Mr. Pettit's departure, will devote all his time to his work as manager of the publicity department and editor of the Studebaker News. Mr. Willman was most recently connected with the Detroit Board of Commerce as its business manager.

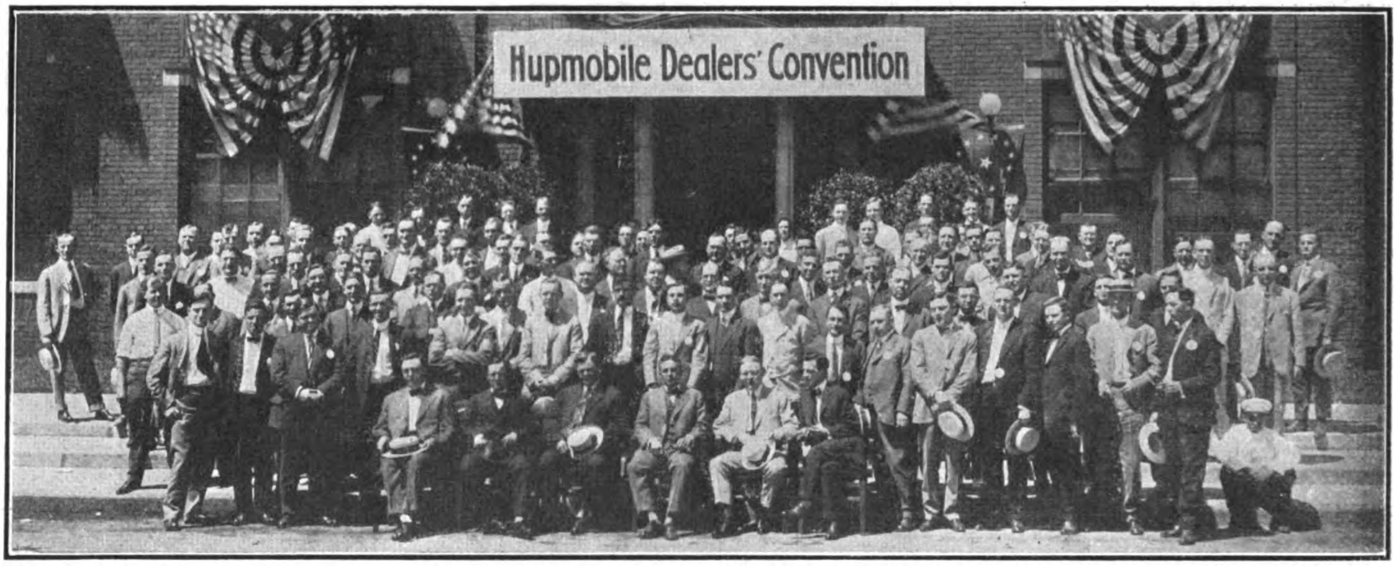
Delivery Cars Built Like Product

DETROIT, MICH., Aug. 1—The First French Perfumery Co., 931 East Jefferson avenue, Detroit, a new concern, has hit upon a clever scheme to advertise its product. The trade mark of its perfume is Smellme and the perfume itself is principally sold in metal cartridges. Two cars have been built with special metal bodies having exactly the shape of the little perfume cartridges, and bearing on both sides the trade name of the perfume. The rear part of the car is used to carry packages just as a delivery car.

The two cars left Detroit a month ago and all the large central and western cities will be visited. The cars attracted a great deal of attention on the streets of Detroit.



Novel advertising scheme devised by a Detroit perfumery company



Gathering of Hupmobile dealers during the recent convention at the factory of the company in Detroit. The meeting lasted 3 days

Klaxon Co. Sues Sparton Dealer

General Automobile Supply Company, New York City, Is Defendant—Action Due To New Patent

NEW YORK CITY, August 4—The United States Patent Office has recently issued to the Lovell-McConnell Mfg. Co., of Newark, N. J., maker of Klaxon, Klaxonet and Klaxet warning signals, patent No. 1,105,324, on application filed July 10, 1911. The claims of this patent cover the motor case with screw-thread and locking-ring adjustment, which the Klaxon company states is an important feature of all Spartan horns now on the market and of the Sparks patent No. 1,048,436, granted December 24, 1912, under which they are marketed.

It is claimed by the Lovell-McConnell Mfg. Co. that the application on which the present patent was granted was filed 10 months before Sparks filed his application. Lovell-McConnell has brought suit in the Federal Court for the Southern District of New York for infringement of this patent against the General Automobile Supply Co., a New York dealer in Sparton horns.

Newtone Maker Is Defendant with Dealer

NEW YORK CITY, July 30—Judge Veeder in the Federal Court for the Eastern District of New York has signed an order making the Automobile Supply Mfg. Co., Brooklyn, N. Y., the Newtone horn manufacturer, a party defendant in the suit brought by the Lovell-McConnell Mfg. Co., the Klaxon horn manufacturer, against Julius Bindrim, a Brooklyn dealer in automobile supplies, selling Newtone and Newtone Superior horns. The Klaxon maker claims infringement of letters patent No. 1,094,403, granted April 21, 1914. This patent was described in THE AUTOMOBILE for July 16, 1914. The plaintiff claims that the Newtone Superior horn is an infringement.

Royalty of 50 Cents on Master Vibrators

NEW YORK CITY, Aug. 4—The motion of the K-W Ignition Co., Cleveland, O., for a new appeal in the suit brought by the Unit Coil Co., Jersey City, N. J., has been denied by the United States Circuit Court of Appeals in Ohio. The Unit Coil Co. charged infringement of the Willard E. Dow patent, No. 752,384, dated February 16, 1904, for an electrical igniter for explosive engines, and the Reuben Willard, Jr., patent, No. 754,666, dated March 15, 1904, for induction coil.

The defendant was ordered to pay a royalty of 50 cents on each one of its master vibrators manufactured since March 1, 1912, and to continue this payment, the injunction against manufacture not to take effect if this condition is complied with.

Norwalk Agency Claims Territory Invasion

NEW YORK CITY, Aug. 3—The Norwalk Motor Car Co. of New York has brought suit in the United States District Court in New York city asking that the Norwalk Motor Car Co., of Martinsburg, West Va., be restrained from shipping Norwalk cars into the New York city territory. The New York Norwalk company had a distributor's contract which the manufacturer determined to terminate because of alleged violations of the agreement. The matter will be heard September 8.

Sue Grand Rapids Truck Stockholders

GRAND RAPIDS, MICH., Aug. 1—For the purpose of trying to recover more than $100,000 for the creditors of the bankrupt Grand Rapids Motor Truck Co., suit in chancery has been filed against 64 stockholders of the defunct concern by the Grand Rapids Trust Co., trustee. The trust company claims that this sum is due on capital stock issued and it also holds that the unpaid balance upon the capital stock which was contracted for, subscribed for or owned by any of the stockholders made defendant, and which balance amounts to the difference between the par value of the stock and the amount actually paid thereon, constitute an equitable asset which is liable and should go for payment to the creditors.

Refinancing for U. S. L. Co.

BUFFALO, N. Y., Aug. 3—Plans are under way for the refinancing of the United States Light & Heating Co., Niagara Falls, N. Y., which recently was placed in the hands of receivers in equity. A H. Ackerman, vice-president and general manager prior to the receivership, has been made general manager under the receivership. Assets are said to be three times the liabilities.

235 Studebaker Dealers Drive from Factory

DETROIT, MICH., July 31—It was Studebaker "Drive Away Day" Wednesday, July 29, when 235 automobile dealers from the Chicago territory who had arrived here in a special train of 12 Pullman cars in the morning, drove out in the afternoon headed for Chicago and many other Western towns in their brand new Studebaker 1915 demonstrators.

"Drive Away Day," the third which the Studebaker Corp. has arranged thus far this season, was the biggest in the history of that concern.

In the party which left Chicago on the special train were dealers from Illinois, Indiana, Iowa and Wisconsin, some located 1,000 miles from Detroit. A stop was made at South Bend, Ind., where the visitors made a tour of the various

Studebaker plants. The train reached Detroit early Wednesday morning and after breakfasting the dealers went to plant No. 1 on Piquette avenue, where the 235 new Studebaker cars were turned over to the 235 dealers who started in the the cars for Clark park. A pathfinding car took the lead on the 300-mile journey to Chicago, while a car carrying a supply of tires ended the procession.

The dealers had been asked to keep in line until South Bend, or 170 miles out of Detroit, and this they did and thus caused the country people along the route to line the roadway and remain wondering at the unusually long procession of brand new cars.

Orders Multiplied at Hupp Meeting

DETROIT, MICH., Aug. 1—The 3-day dealers' convention of the Hupp Motor Car Company came to a close Friday night when the 200 dealers and officials of the company actually inaugurated the 1915 Hupmobile business, beginning in the shape of a banquet at the Hotel Ponchartrain.

"With double the number of dealers from all over the United States and Canada in attendance and orders on hand for more Hupp cars than ever before in our history," said President J. Walter Drake, "we have every right to call this the most successful Hupp convention. As we expected, the new 1915 Hupmobile was enthusiastically received by every dealer at the meeting, so much so, that every one of them has doubled and in some cases trebled their requirements for 1915. Dealers generally report very favorably on the financial situation, both in the United States and Canada, and they are looking forward to a big year for the automobile industry. Although none of our foreign dealers were in attendance at this meeting, our foreign sales continue as one of the most important factors in our business, and we are planning a record number of shipments abroad during 1915."

Lozier Opens $100 Photograph Contest

DETROIT, MICH., August 4—The Lozier Motor Co. has promoted a photograph contest open to all with cash prizes totaling $100 of which $50 will be the first prize, $20 the second prize, while there will be three cash prizes of $5, one of $4, one of $3 and four of $2 each. The photographs must be relative to the Lozier light four and should be as much as possible live pictures showing the car at work or at play, at the seashore or in the mountains, climbing, speeding or going through the mud, in fact any picture which makes the car appear in motion. All photos should be addressed to the advertising department of the company which they must reach not later than August 25.

TORONTO, Aug. 1—Dodge Brothers, Detroit, have appointed E. P. Clarkson as their district representative for this territory.

DETROIT, MICH., Aug. 1—The Knight Tire & Rubber Co., of Canton, O., has taken over the Detroit agency and changed it into a branch. The headquarters are at 580 Woodward avenue and Fred Harrington is the manager.

Mulford Stars at Galveston Beach

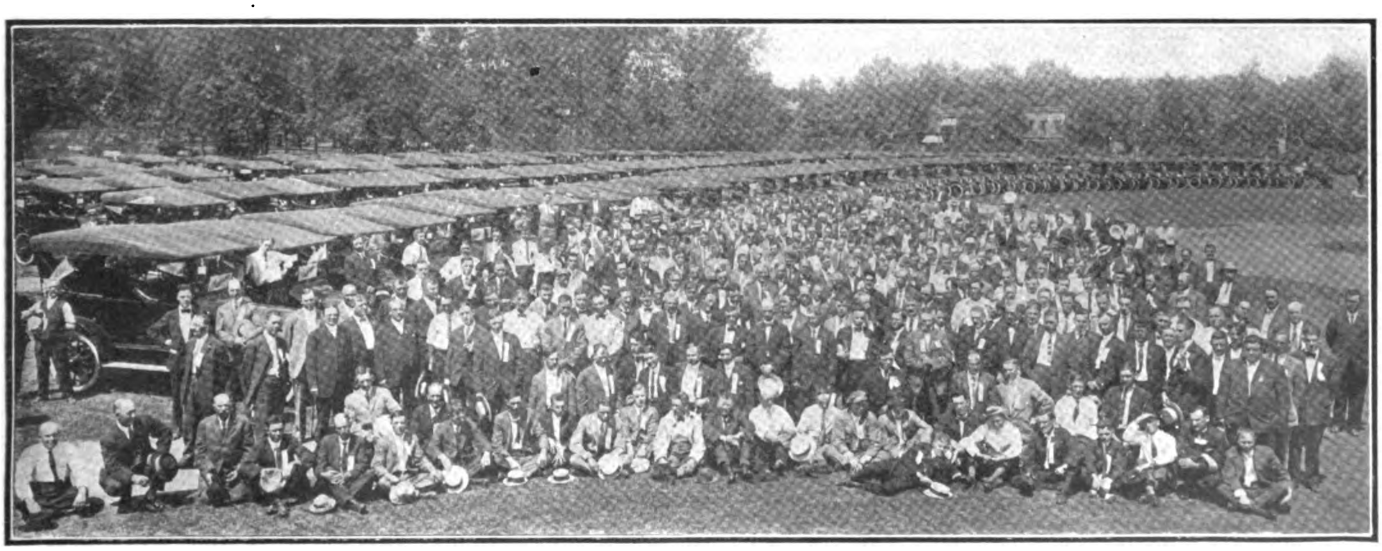
Drives His Peugeot to Victory in 10 Out of 16 Events at 85 to 110 M. P. H.

GALVESTON, TEX., Aug. 4—*Special Telegram*—Ralph Mulford, whipping his big French Peugeot about the beach race course at a speed of from 85 to 110 miles per hour was the hero of the Galveston Beach races this year. Out of the sixteen events Mulford took first money in ten. He lost but one event entered and in this he was second.

His rivals for honors and money were Alley and Rickenbacher, both of whom drove big Duesenbergs and at many times pressed the winner so hard that the excitement was thrilling. In the first 50-mile event Mulford beat Alley bv 4 seconds. In the second 50-mile event he outdistanced the Duesenberg by 1 second. Rickenbacher was driving this time. In the last 50-mile race Mulford was winner by 3 minutes. The big Peugeot's time for the 150 miles, originally called the cotton carnival sweepstake race and later divided into three different events, was 138 minutes and 15 seconds.

Lecain, Tipans, Jessop, Jones and Chandler pulled down money at the races.

Event	Car	Driver	Time
	Thursday, July 30		
10 miles	Locain	Chevrolet	10:44
	Melaun	Studebaker	11:40
10 miles	Mulford	Peugeot	7:57
	Alley	Duesenberg	8:05
50 miles	Mulford	Peugeot	39:44
	Alley	Duesenberg	39:48
	Rickenbacher	Duesenberg	43:00
	Friday, July 31		
10 miles	Lecain	Chevrolet	11:12
	O'Donnell	Duesenberg	11:13
10 miles	Mulford	Peugeot	9:526
	Alley	Duesenberg	9:538
	Chandler	Braender Bulldog	9:578
	Handicap.		
15 miles	Mulford	Peugeot	15:00
	Alley	Duesenberg	15:02
	Chandler	Braender Bulldog	15:13
	Saturday, August 1		
5 miles	Mulford	Peugeot	3:596
	Rickenbacher	Duesenberg	4:006
10 miles	Rickenbacher	Dueesnberg	11:49
	Tippans	——	11:51
20 miles	Mulford	Peugeot	19:264
	Kickenbacher	Duesenberg	19:30
	Monday, August 3		
15 miles	Mulford	Peugeot	15:256
	Alley	Duesenberg	15:266
	Rickenbacher	Duesenberg	15:296
	Handicap.		
10 miles	Mulford	Peugeot	10:352
	Alley	Duesenberg	10:526
50 miles	Mulford	Peugeot	45:296
	Alley	Duesenberg	50:288



1915 Studebaker demonstrators which were driven from Detroit factory by 235 dealers

Three Mercers Swell Elgin Entries to 17

Concern Felt for De Palma, En Route from Germany — Practice This Week

CHICAGO, ILL., Aug. 3—Three Mercers have been added to the entry list of the Elgin road races, scheduled for August 21-22, bringing the total number of cars engaged to date to seventeen. Two of the Mercers come from the company direct, the drivers nominated being Spencer Wishart and Ed. Pullen, while the third is nominated by Ed. Schillo, the local Mercer agent, who has engaged Charles W. Luttrell, of Chicago, as pilot.

A change of entry also was made the latter part of last week. W. H. Harris, inventor of the Harris drive, which does away with the differential, has bought one of the Marmons belonging to Charles E. Erbstein, the Chicago lawyer and has taken over the entry. Mel Stringer will drive this. The seventeen, which are entered for both days, are as follows:

CAR	ENTRANT	DRIVER
Peugeot	E. J. Schroeder	Not named
Stutz	Stutz Motor Car Co	Oldfield
Stutz	Stutz Motor Car Co	Anderson
Sunbeam	W. Ziegler, Jr	Grant
Sunbeam	W. Ziegler, Jr	Babcock
Peugeot	L. C. Erbes	Burman
Marmon	C. E. Erbstein	Heinemann
Duesenberg	F. Duesenberg	Rickenbacher
Mercedes	E. C. Patterson	De Palma
Stutz	W. Ziegler, Jr	Dearborn
Braender Bulldog	Braender Tire & Rubber Co	Chandler
Duesenberg	F. Duesenberg	Not named
Marmon	W. H. Harris	Stringer
Tahis	F. Robinson	Roberts
Mercer	Mercer Automobile Co	Wishart
Mercer	Mercer Automobile Co	Pullen
Mercer	Ed Schillo	Luttrell

Considerable anxiety is felt over De Palma. He was scheduled to sail from a German port last Wednesday, bringing with him the Grand Prix Mercedes. He cabled Tuesday he was to get away the next day, but it is not known whether or not his steamer was one of those recalled by wireless after the war broke out.

The Kane county course is being put in the best of shape. Already it has been oiled once and the second coat will be put on this week. It is expected that informal practice will start the latter part of the week.

Labor Day Matinee for Brighton Beach

NEW YORK CITY, Aug. 3—The Motor Dealers' Contest Assn. of New York city, at a meeting this week decided to hold a matinee race meet at the Brighton Beach track Labor Day, September 7. It is hoped to secure as entries a number of the drivers in the Elgin races, August 21 and 22. George H. Robertson is chairman of the racing committee and will receive entry blanks at 1789 Broadway.

Creosote Blocks for Minneapolis Speedway

ST. PAUL, MINN., Aug. 3—The Minnesota Motor Speedway Assn. has incorporated at $1,000,000 paying a filing fee to the secretary of state of $525. The speedway is to be built between the Twin Cities. Those promoting the scheme for a 2-mile motor course are W. T. Ansley of Minneapolis, W. F. Pascle and E. H. Ehrhorn, Chicago. The promoters report they will have the motordrome ready for races next year.

Cincinnati Speedway Project Chartered

CINCINNATI, O., Aug. 4—This is the latest city to have hopes of a motor speedway. The Cincinnati Motor Speedway Co. has been incorporated at $100,000 for the purpose. The incorporators are W. T. Foley, F. D. Hirst, T. A. Tauwald, Jr., C. A. Gintor and A. H. Morrill.

Races and Run for Argentine Republic

BUENOS AIRES, ARGENTINA, July 31—Argentina has so far afforded the best South American market for European automobiles, showing that much may be done to expand American sales in her territory. It is therefore of commercial interest that the Automobile Club of Argentina has decided to hold its annual grand prize run from January 3 to 10, 1915, over the course Buenos Aires—Rosario—Cordoba and return, which represents a distance of 1,700 kilometers (1,060 miles). The going will be treated as a reliability run and the return as a race. Entries at $30 per car can be made until October 15 and at $50 up to December 15. The event is open for all cars and nations without power limit, but each vehicle must be fully equipped and carry two persons. January 7 will be given over to an excursion from Cordoba. On January 8 there will be a 1 kilometer championship race, on January 9 a race from Cordoba to Rosario, 450 kilometers, continued by another race on January 10 from Rosario to Buenos Aires, also 450 kilometers.

37 in 2-Day Ohio Reliability

COLUMBUS, O., Aug. 3—The reliability contest held under the auspices of the *Ohio State Journal*, of Columbus, O., July 30 and 31, was a success in every particular. In all thirty-seven cars started the contest from the office of the newspaper and all but one car finished the tour. The route lay through the principal cities and towns in the central part of the state as follows: Newark, Lancaster, Circleville, Washington C. H., London, Springfield, Mechanicsburg, Marysville, Marion, Mt. Vernon, Delaware and back to Columbus.

Officials and members of the Columbus Automobile Club acted as starters and checkers. Fred Boyd, in a Cole, acted as pacemaker. In all there were four classes in which prizes of cups were given to the first and second.

The winners were: Owners' Class—G. A. Wilson, London, Buick, first, and Fred C. Myers, Columbus, Great Eagle, second.

Dealers' Class, division A, cars selling under $1,250: Kaiser Motor Car company, Hupmobile, first, and The Ohio Auto Sales company, Regal, second.

Division B, cars selling from $1,251 to $2,000—Brasher Motor Car company, Cole, first, and the Standard Motor Car company, Hudson, and The Tywman Motor Car company, Interstate, tied for second place. Both contestants waived their rights to the cup which was awarded to Miss Mable Kinkead, who drove a Hudson throughout the tour.

Division C, cars selling for more than $2,000—F. E. Jolly, Pilot, first, and E. J. Thornton, Winton, second.

New Traffic Rules in Washington Aug. 10

WASHINGTON, D. C., Aug. 3—One week from today many important changes in the traffic regulations will go into effect in this city. One of the most important of the new rules is that no vehicle, except a commercial vehicle, loading or unloading, shall stand for more than 15 minutes at any place on Fourteenth and Fifteenth streets, between Pennsylvania avenue and I street, the most congested section in Washington, between the hours of 8 in the morning and 6 at night. Exception is made of government vehicles.

Another important regulation is that every horse-drawn vehicle shall have a metal tag so affixed on the right side as to be visible 20 feet. A charge of 50 cents is to be made for each tag. No vehicle horse drawn or motor propelled will be allowed to approach within 15 feet of any street car while the same is stopped or stopping for the purpose of taking on or unloading passengers, nor within such distance of the place where a passenger shall have left the street car until the passenger shall have reached a place of safety. Vehicles moving north or south will have right of way over those moving east or west.

The regulations also prohibit the use of a motor muffler cut-out as well as unnecessary or excessive smoke. Electric or acetylene headlights are prohibited on the streets unless the rear reflectors are removed or the front glass is either ground or covered with some material of sufficient density to prevent dazzling or blinding to persons using the streets.

The new regulations expressly set forth that pedestrians should avoid interference with traffic and to this end should not step from the sidewalk without first looking to see what is approaching. They are further admonished to cross the street at a right angle, preferably at a regular crossing at the end of a block and, where a traffic policeman is stationed, wait for his signal. Under the old law, which has never been enforced, pedestrians were compelled to cross a street at a regular crossing, but under the new regulations it is optional where they cross, although the regulations ask pedestrians to use the regular crossings instead of crossing at any point.

There are 80 sections in the new regulations and nearly all of them apply to motorists. Violations call for fines ranging from $1 to $40 for each offense.

Factory Miscellany

Auto Body Co. Adds—The Auto Body Co., North Lansing, Mich., has started work on the large addition to its factory building, a full force of men being at work excavating on Turner street where the new structure is to be built. When completed the addition will be flush with Turner street on the north and will be 60 feet wide by 140 feet long with an "L" on it 65 feet by 110 feet. It will be three stories high, built of brick and fully equipped with new machinery. The total ground area of the entire factory building will cover nearly two acres in the heart of North Lansing, when the new addition is completed. The company has over 400 men on its pay roll at the present time. In order to supply the factory orders a night shift consisting of men who labor in those divisions of the factory that are back in their work, has been put on.

Faultless Rubber Builds—The Faultless Rubber Co., Ashland, O., will build a three-story 80 by 120-foot factory.

Will Rebuild Havers Plant—Plans are being prepared for the rebuilding of the plant of the Havers Motor Car Co., Port Huron, Mich. The loss to the plant and equipment has been computed at $125,000.

West Lorne Motors Equipping—The West Lorne Motors Co., West Lorne, Ont., contemplates the purchase of some new equipment for the manufacture of automobiles and motor fire trucks and engines. H. A. Carmichael is manager.

Wilson Plant Nearly Completed—New plant of Wilson Tire & Rubber Co., in Harvard Park, Springfield, Ill., will be under cover within 4 weeks. Machinery will have been placed by the middle of September. The main building is 200 by 300 feet and is in the form of a hollow square, having an interior court of 100 by 200 feet.

Sphinx Co. May Soon Operate—At a recent meeting of the Sphinx Motor Car Co., held in York, Pa., plans were discussed for the beginning of operations of the new company. The several sites offered to the company for the location of its plant were discussed in detail, but no definite action was taken in the matter. Offers of real estate have been received from York, Lancaster and Reading. The new company sustained the loss of all its blue prints, drawings and specifications in the fire at the body plant of Charles K. Darone & Co. The latter concern had been awarded the contract to build the first twenty-five Sphinx bodies. The Sphinx company is capitalized at $160,000.

Ford Service Building for Fargo—Ford sales agencies in North and South Dakota and Montana will be served from a large assembling and distributing plant which is to be built at Fargo, N. D., within the next few months, according to an authoritative announcement made there this week. It is definitely stated that that branch will employ a force of about 300 men and that all Ford cars sold in the Northwestern States will be assembled there, the parts being shipped from the factory at Detroit. The site for the new plant is 120 by 150 feet, and, although the details of the plans are not known, it is said that the building is to occupy the entire site and will be three or four stories in height, making it one of the largest Ford branches in the country.

New Bosch Service Stations—The Bosch Magneto Co., New York City, has recently added to its list the following supply stations: Pollard Auto Co., 232 Main St., Nashua, N. H., J. F. Charley Auto Co., Evansville, Ind., Weeks Garage, Patchogue N. Y., C. A. Gossard Auto Co., 122-124 S. Fayette St., Washington C. H., O., Harnell Garage, Babylon, N. Y., N. J. Auto & Supply Co., 38 N. Delaware Ave., Camden, N. J., Reilly Bros. & Raub, 44-46 No. Queen St., Lancaster, Pa., Central Auto & Supply Co., Jackson, Mich., Le Jeal Cycle & Mobile Works, 1721-1723 Sassafras St., Erie, Pa., Shrive Incorporated, 64 Warburton Ave., Yonkers, N. Y., S. H. Heginbottom & Son, Saginaw, Mich., Mattoon Motor Car Co., Mattoon, Ill., Eric J. Gustafson, Rockford, Ill., Ward's Vulcanizing Works, 27 So. Main St., Concord, N. H., Lawrencville Auto Co., Lawrenceville, Ill., W. A. Sanford, 52 No. Main St., So. Norwalk, Conn., Cadillac Motor Car Co., 202 Government St., Mobile, Ala., Rippowam Garage, Stamford, Conn., and the Gibbes Machinery Co., Columbia, S. C.

Thomas Car Nearly Completed—The Thomas car of Saginaw, which Lansing builders are making is under construction at the plant of the Acme Engine Co., North Lansing, Mich. All parts of the car have been made and the assembling process is under way. The car will be on the streets about August 16. If it meets expectations, a plant will be established here for its manufacture. W. H. Porter, L. E. Rowley and a number of other prominent local men are interested in the project.

For a small car it is unique in design, having a stream-line body, pointed radiator, electric lights, left steer and center control. It will have four cylinders, water cooled with a thermo-syphon system and 18 horsepower. The rear axle will be a gearless differential and the car will have a shaft drive, sliding gear transmission, with three speeds forward and one reverse. A commodious tail box in the rear will carry all necessary equipment needed on a trip of any distance. Other specifications are a 28-inch wooden wheel, with a 3-inch tire; two side lights, a large head light in front of the radiator; motor 2¾ inch bore by 4-inch stroke.

The Automobile Calendar

Aug. 2-9	Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16	Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17	Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupé de l'Auto Race.
Aug. 27	Brooklands Track, England; Annual Automobile Race.
Aug.	Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug.	Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7	Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15	Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2	S. A. E. European Trip.
Oct. 16-26	Paris, France, Automobile Salon.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14	London, England; Olympia Show.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 15	Paris, France, Kerosene Motor Competition.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in the Industry

Motor Men in New Roles

PYKE Now in Charge—Harry N. Pyke assumed charge of the Boston branch of the Chalmers Motor Car Co. on August 1, when the Whitten-Gilmore Co. dissolved and relinquished the agency. He had been with the Chalmers Co. for 6 years, the greater part of the time at New York.

Tackerbury Joins Puritan Co.—The Puritan Mfg. Co., Detroit, has appointed W. W. Tackerbury, formerly of the Metal Products Co., as assistant general manager.

Willman Studebaker Advertising Manager—G. L. Willman has been appointed advertising manager of the Studebaker Corp., Detroit, Mich. His duties commenced August 1.

Fern Winton's Vancouver Manager—W. S. Fern, formerly of Spokane, Wash., has recently been appointed sales manager for the Winton Motor Carriage Co., at Vancouver, B. C.

Henshaw on the Sick List—Charles S. Henshaw, sales manager of the Alvan T. Fuller Co., Boston distributors of Packard cars, is just recovering from an operation for appendicitis.

J. H. Ficken in New Position—J. H. Ficken, who recently resigned from the staff of the United States Tire Co., is now on the sales staff of the Kelly Springfield Tire Co., in the New York City territory.

D. Dalton Ohio Automobile Inspector—Daniel Dalton has been appointed automobile inspector of Ohio. His duties will be to travel the state and see that all cars are properly registered and that chauffeurs are licensed.

Sidney P. Bowman to Change Quarters—The Sidney P. Bowman Co. has leased the building at 1710 Broadway, New York City, and will occupy it as an agency for Oakland automobiles as soon as alterations are completed.

Ficken Representing Kelly-Springfield Tire—J. H. Ficken has left the employ of the U. S. Tire Co., Akron, O., where he has been for a number of years, and will in the future represent the Kelly-Springfield Tire Co., in New York City.

J. Doyle Gets Dodge Detroit Branch—J. Doyle, for 6 years manager of the Detroit branch of the Ford Motor Co., and at present distributor for Saxon cars for the state of Michigan, has been selected by Dodge Bros. as their Detroit representative.

Heftler Returns from France—V. R. Heftler, president of the Zenith Carburetor Co., Detroit, Mich., returned on July 25 from a month's trip to France. While on the continent Mr. Heftler attended a gathering of factory heads from the different Zenith carbureter branch factories to discuss the business outlook for 1915 and to hold a general get-together meeting.

Paige Resigns from National—A. J. Paige, M.E., who has been assistant mechanical engineer for the National Motor Vehicle Co., Indianapolis, Ind., for over 3 years, has resigned to devote some time to the development of a new motor of his design.

New Place for Asher—A. I. Asher is having erected a new brick and concrete structure of two stories and basement at the corner of Green and Spruce streets, Worcester, Mass., which he will occupy as a salesroom and service department early this fall.

Flint Jeffery Detroit Representative—The Thos. P. Jeffery Co., Kenosha, Wis., manufacturer of the Jeffery cars, has appointed as its Detroit representative H. J. Flint, formerly manager of the Hupmobile Sales Co., and later with the Oldsmobile agency, of Detroit.

Travis at Locomobile Factory—E. A. Travis, for some time manager of the Boston Locomobile branch, has been appointed assistant sales manager at the factory at Bridgeport, Conn., and A. P. Hawes, of the local branch, has been appointed to fill the vacancy.

First Automobile Show—The first automobile show of the 1915 season will take place at Salem, N. H., during the first week in September, when Chester I. Campbell, manager of all the Boston motor shows, will have charge of a big section set aside at Rockingham Park that week, where dealers in Boston, Lowell, Lawrence, Haverhill, Nashua, Manchester and other New England cities will have a chance to exhibit their new models. It will be an outdoor show.

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Garage and Dealers' Field

Taxicabs in Mt. Vernon—H. M. Ball has started a taxicab and automobile livery business.

Bladensburg, O., Organizes Club—The Bladensburg and Martinsburg Automobile Club was organized recently by twenty-five owners. S. C. Horn was elected president.

New Garage in Cleveland—Plans and specifications have been prepared for a four-story building at the corner of Adams and Thirteenth streets for the Roberts-Toledo Automobile Co. It will be used as a garage and salesroom.

New Garage at Brockton, Mass.—Elbridge W. Anderson, of Brockton, Mass., has had work started on a brick and concrete garage on Beach street that will accommodate 30 cars as well as having space for a repair shop.

Ohio Convicts Build Truck—The state of Ohio is now operating an automobile truck which was built by the convicts in the Ohio Penitentiary. Ohio is the first state in the Union to embark into the automobile business.

Boston Cadillac Agency Moves—The salesrooms of the Cadillac Automobile Co., Boston, Mass., have been moved to the main building, 664 Commonwealth avenue, from where the entire Cadillac business and service is now operated.

Lee Tire Makes a Move—The Boston branch of the Lee Tire and Rubber Company, that has been located at 10 Park Square ever since it was opened in that city a few years ago, has been moved to larger quarters in the Motor Mart near by.

Post Office Trucks in Cleveland—The U. S. Post Office Department has decided to install nine automobile trucks in the parcel post service in Cleveland, O., within the coming month. With this increased equipment the service will be greatly improved.

Maguire Building New Place—J. W. Maguire, Boston agent for the Pierce-Arrow, is building a new service station on the Charles River boulevard in Cambridge between the Ford and Gray & Davis plants. It will be ready for occupancy in a couple of months.

Haynes Co. Branch in San Francisco—The Haynes Automobile Co. has recently established a direct factory branch in San Francisco under the California corporation name of the Haynes Auto Sales Co., Inc., with C. H. Haynes at the head and Fred Hauger sales manager.

Harry Ford's Mission—President Harry Ford, of the Saxon Motor Car Co., is spending some time in Boston to secure a new agency for the Saxon there which was thrown on the market by the dissolution of the Whitten-Gilmore Co. He expects to sign up with a new dealer in a few days.

Willard Officers Hold Banquet—T. A. Willard, head of the Willard Storage Battery Co., Cleveland, O., and other officers of the company, tendered a banquet to thirty branch managers gathered from all parts of the country. The visitors spent a day at the plant. These meetings are held every 6 months.

New Cole Additions—A. S. Blakely, identified with the editorial end of the automobile industry, has joined the Cole Motor Car Co., Indianapolis, Ind., and will have charge of the factory publicity department. H. C. Bradfield, previously in charge of the department, has been promoted to field sales representative.

$1,000,000 Building in Montreal—Automobile interests in Montreal, Que., are planning a million-dollar automobile building. The ground floor will likely be used as a garage for members of the Automobile and Aero Club of Canada, while offices on the others floors will be occupied by automobile salesmen, supply firms, etc.

Increasing His Plant—Henry F. Walker, of Medford, Mass., who has the agency for several cars in his city, is building a large service station in the rear of his present establishment, 49 Main street, that will have accommodations for 30 cars in addition to the repair shop. The building is of concrete and will be finished in a few weeks.

Boston Lozier Secures Location—The Leghorn Motor Sales Co., formed in Boston last week to handle the Lozier, has secured salesrooms at 793 Boylston street, and after alterations are completed the company will have its formal opening Monday, August 10, when some of the Lozier factory officials will be present to give the new agency a send-off.

Accessories for the Automobilist

A ROTARY Valve Motor, Fig. 1, in which the valve is directly cooled by passing water through it, has been brought out by Henry P. T. Van Kueren, an engineer in the bureau of highways, Philadelphia, Pa. The single rotating valve serves both intake and exhaust ports in turn, the valve being cut away to allow the passage of the gases.

One of the features of the motor is the method by which the pressure on the rotating valve is varied so that when the gases are exploding the valve is held tightly, but on other strokes the pressure is reduced and thus the wear is lessened. This is effected by means of a sleeve between the piston and the cylinder, the upper part of which carries the rotary valve. Thus when an explosion occurs the pressure of the gases on this sleeve holds it tightly against the rotating valve while on the other strokes the pressure in the cylinder is slight and, therefore, the wear on the axle is reduced.

In operating the valve a silent chain is employed, it being driven from the crankshaft and passing over the magneto sprocket and an idler pulley. Thermo-syphon cooling is used.

The motor bore is 4 inches, while the stroke is 4.5. The valve is 2.5 inches in diameter, and its walls are .25 inch thick. The port areas are 3.19 square inches, or 25.4 per cent. of the piston-head area. The bearing surface between cylinder and valve is 6.16 square inches per cylinder. The motor weighs 405 pounds. Five main bearings are used and the crankshaft is 1.5 inches in diameter.

The timing is as follows: Intake opens 2.5 degrees after upper dead center, and closes 26.5 degrees after lower center; the exhaust opens 26 degrees before lower dead center, and closes 2.5 degrees before upper dead center.

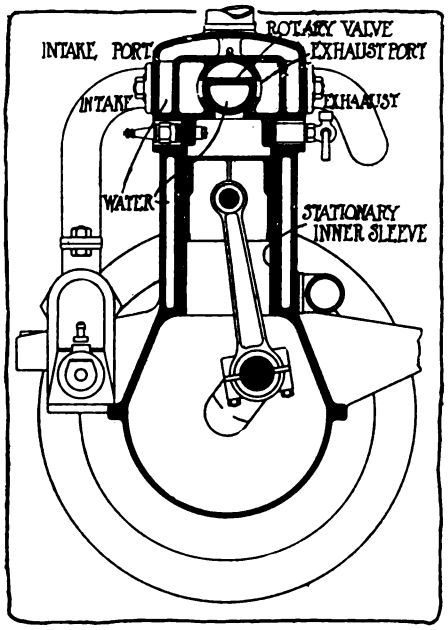


Fig. 1—Van Keuren single-sleeve, rotary valve motor

Robbins' Ford Bodies—With inclosed passenger car bodies for Ford cars being manufactured by a number of concerns and sold at a comparatively low figure, many owners of these vehicles transform the open car to a closed one at the first sign of cold weather. A line of Ford inclosed bodies is manufactured by Irvin Robbins & Co., Indianapolis, Ind., which consists of three styles, a three-passenger coupe, a four-passenger sedan and a five-passenger sedan. A commercial body is also made. These bodies sell for from $100 to $500, and because of the standard dimensions may be fitted to the Model T chassis in a short time. The Robbins bodies are said to be finished in the best fashion, having double adjusting windshields, dome lights, sashless windows, carpeted floors and many other appointments which will appeal to the owners. The illustrations in Fig. 2 show three passenger car bodies and the commercial body also.

Lane Pressed-Steel Jack—A pressed-steel jack which is light in weight, compact, easily handled and has no loose parts has been announced by Lane Bros. Co., Poughkeepsie, N. Y. This jack has a pressed-steel frame, a wrought steel lift bar and is made in three sizes—Nos. 5, 6 and 7, which weigh 4¾, 7¼ and 8 pounds respectively. The No. 5 has a capacity of 1,800 pounds and the other two 3,000 pounds, and the prices are $1.50, $2.50 and $2.75. When no weight is on the lift bar it may be dropped by pinching the trip levers without working it down, notch by notch.

Double Rubber Tubes—Inner tubes made of alternate plies of red and grey rubber, the former giving maximum elasticity and imperviousness to the air while the latter adds strength and toughness, are announced by the Double Fabric Tire Co., Auburn, Ind. It is stated that these tubes are 50 per cent. thicker than the ordinary tube. Double rubber tubes vary in price from $3.45 for the 28 by 3 size to $10.85 for the 38 by 5.5.

Gurney Ball Bearing Catalog—The Gurney Ball Bearing Co., Jamestown, N. Y., has just issued a new catalog which is descriptive of its full line of radial, radio-thrust and duplex bearings. Tables of loads and speeds that are permissible are given, and these should prove valuable to all users of ball bearings.

Haynes Dimmer—The Haynes Automobile Co., Kokomo, Ind., has offered a solution to the problem of eliminating the dazzling glare from headlights by the use of two simple devices which will be regular equipment on the new Model 30 light six car. The headlight bulbs are frosted on the upper half only, so that the rays reflected upward are diffused and softened, thus eliminating the objectionable blinding effect on drivers of passing cars in the country. The rays reflected downward through the clear glass of the bulbs are projected straight ahead onto the road.

For congested city driving, a second means is employed. The two headlights are switched into series, which action cuts down the illumination by reducing the voltage across each lamp.

Curtis Equalizing Spring System—In order to keep all four wheels on the ground at all times, Curtis & Glennon, Chicago, have brought out the device shown in Fig. 3, which consists of a beam M flexibly mounted at a point P and attached at the point A to a special shackle and at B to an arm. This arm is attached to a flat coil spring contained in the cylinder, shown, the spring absorbing most of the shock transmitted. When the car rides over rough ground the beam moves vertically and causes the spring in the cylinder to compress. With the Curtis device the frame tends to keep one position and the wheels stick

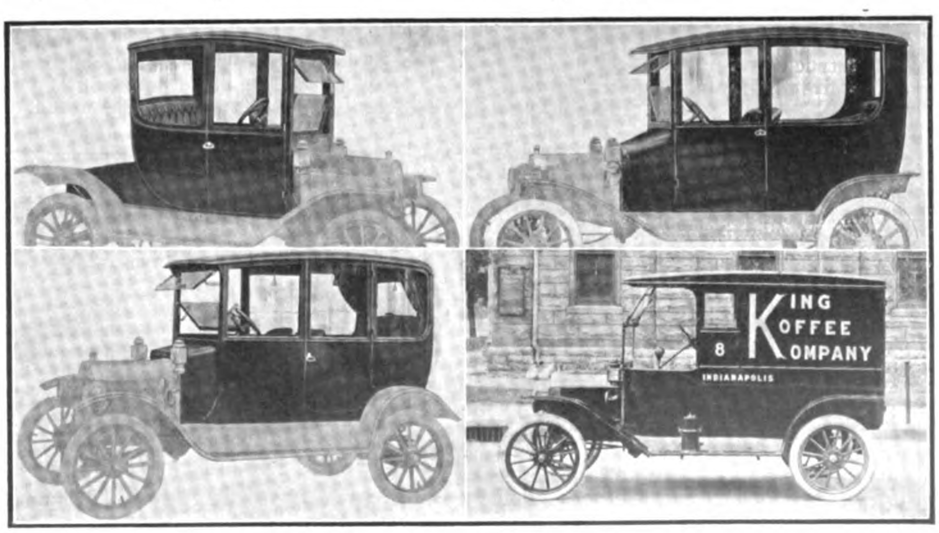


Fig. 2—Four types of bodies made by Robbins & Co., Indianapolis, Ind., for Ford cars

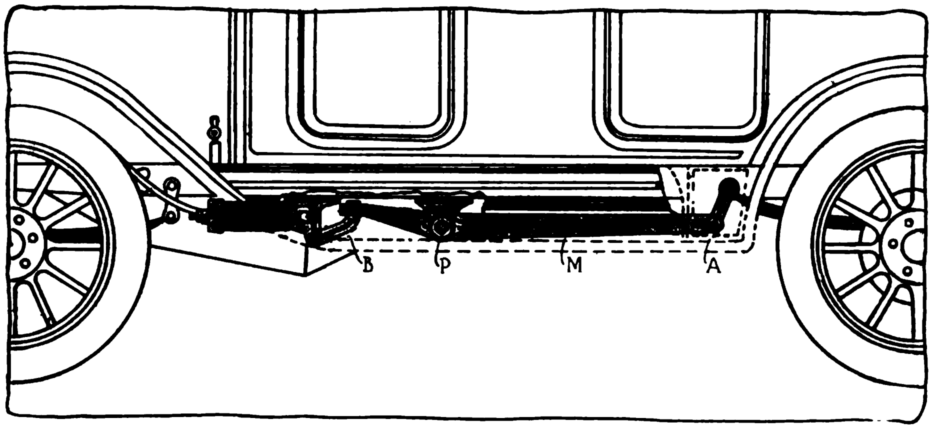


Fig. 3—Curtis equalizing spring system designed to keep the wheels from leaving the ground

to the ground. When demonstrated to an AUTOMOBILE representative the device showed good results on a 1910 Pierce-Arrow, which was driven over exceedingly rough roads at 25 miles per hour without causing the passengers to fly off the seat.

Pyralin Dimmer Goggles—A new type of goggle which is designed to protect the motorist from the blinding rays of strong headlights by darkening the upper half of the goggle is made by the Dimmer Goggle Co., Whiting, Ind. This goggle is made from a substance called pyralin, which is flexible, strong and cheap. The lower part of the goggle is amber color and the upper dark green. In the illustration, Fig. 4, three styles are shown. A having silk edges, B rubber binding, and C is a type designed especially for women.

Simplex Shock Absorber—Front and rear shock absorbers of the helical spring type are made by the Keystone Spring Works, Philadelphia, Pa. Two types are offered, one for Ford cars and another for larger machines. The former sells for $10 per set and the latter, Fig. 5, for $20. All parts are case hardened.

Jiffy-Jax Tire Savers—To prevent the deterioration of the tires due to contact with oil and water on the garage floor the Jiffy-Jack Co., Cleveland, O., has brought out a set of four jacks, Fig. 6, selling for $5, which enable the owner to quickly raise the wheels of the car from the floor. The jacks are applied to the hubs of the wheels and a single movement of the jack lever raises the wheel.

Goodyear S. V. Tire—A feature of the Goodyear S. V. Truck tire is the economy to the truck owner.

The first and most noticeable item is the total absence of steel fastenings of any kind. The first cost on fastenings for a truck tire of the demountable type ranges from $3 to $7 per wheel, and on the old style pressed-on type, the supplemental band may cost from $3 to $9 per wheel. Taking the most popular size tires, this charge for steel equipment represents about ten per cent. of the total cost of the tire, or in other words, the purchase of an S. V. tire can be considered as a ten per cent. reduction in price, it is stated.

The weight of the steel fastenings in the case of a demountable type tire, or the weight of the supplemental band in the old style pressed-on tire is great enough to represent an additional yearly expense of well over a hundred dollars when the cost of carrying it around is estimated at fifteen cents per ton mile. The economy idea is further driven home

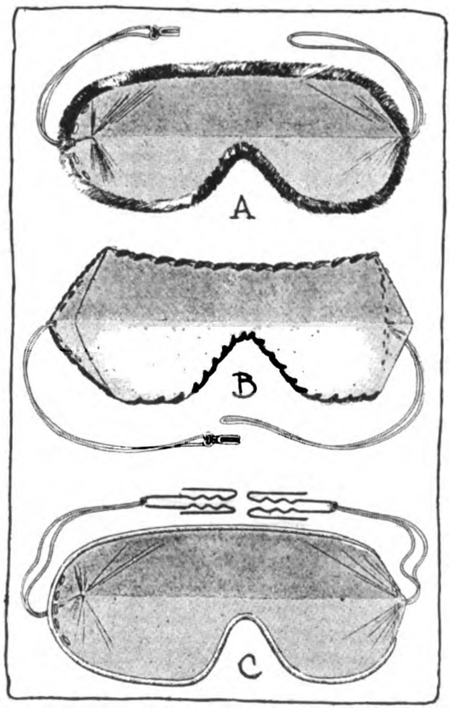


Fig. 4—Three types of Pyralin goggles

by the fact that the additional weight referred to is not borne by the springs.

Ajax Dimmer—Most of the dimming devices brought out recently are applicable only to electric headlights, but the Ajax, Fig. 7, made by the Wanner Mfg. Co., Chicago, is designed for use on acetylene burning lamps and consists of a disk of dull-finished steel interposed between the burner and the reflector.

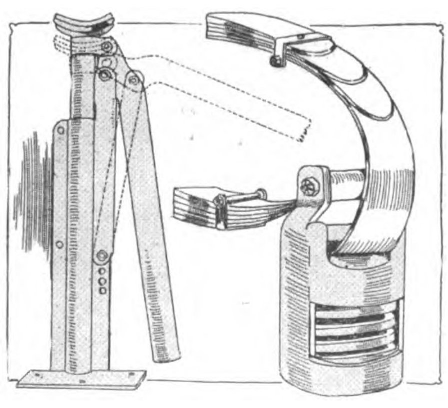


Fig. 5—Right—Simplex shock absorber
Fig. 6—Left—Jiffy-Jax tire savers

The disk is fitted to a thumb screw clamp attached to the base of the burner and when it is desired to dim the lamps the thumb screw is loosened and the disk turned so that it lies between the reflector and the gas light. The Ajax sells for $1 per pair.

Buell Explosion Whistle—A whistle, Fig. 8, made by the Buell Mfg. Co., Chicago, Ill., is installed in the explosion chamber of the motor and utilizes the high pressure of the explosion to blow it, the principle being the same as a steam whistle on a boiler using high-pressure steam. It is generally screwed into one of the unused valve caps, but when a spark plug hole only is available a fitting as shown in the photograph is used to carry both spark plug and whistle valve. Theoretically it is not good practice to lift the spark plug the ¾ inch this fitting does, but in practice the loss is so slight it cannot be noticed. The chief advantages of this whistle are the particularly effective pulsating note it produces, the absolute certainty of its operation, its self-cleaning features due to the high pressure used, and its extreme simplicity and ease of installation.

Compac Tents—The Compac Tent Co., Indianapolis, Ind., is marketing a tent made especially for motorists. The Compac tent forms a simple means of shelter and can be carried around on the runningboard of the car, for it occupies a small space, as shown in Fig. 9. No poles are required for erection and the tent can be set up on either side or at the rear of a car. The floor of the tent is made of the same material as the tent and by stuffing grass, etc., under this floor, the use of ordinary cots is not necessary. Compac tents are made in a variety of materials, the prices ranging from $31.50 for the 7 by 5 foot size to $48.30 for the 7 by 10 foot.

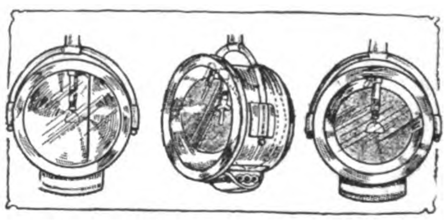


Fig. 7—Ajax dimmer for acetylene headlights

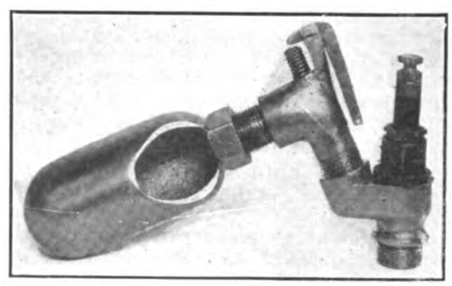


Fig. 8—Buell explosion whistle

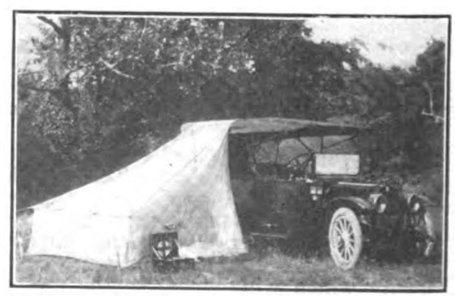


Fig. 9—Compac motor tent

The Automobile

United States Has 1,548,350 Cars

Registration to July 1 Shows Gain of 294,485 in First 6 Months of 1914

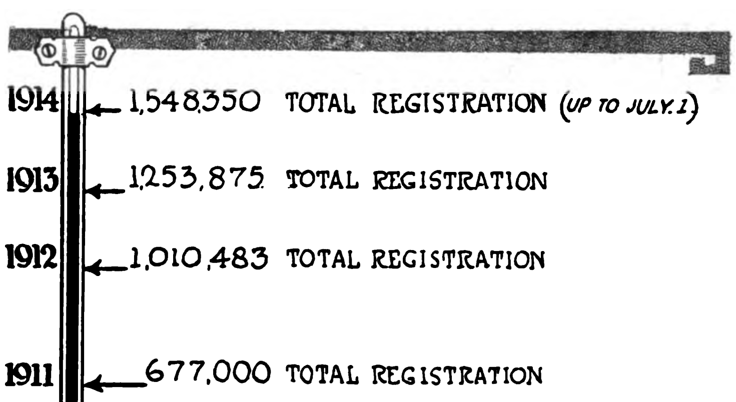
By Donald McLeod Lay

FROM all indications, the year 1914 will be one of the greatest in the history of the automobile industry. Surprising as were the gains in other years, 1914 bids fair to surpass them all, for the registration officials of the various states report increases in nearly every instance, the total registration for the United States amounting to 1,548,350 automobiles and motor trucks up to July 1. These figures, of course, include both the gasoline and electric vehicles as well as a number of steam machines. In arriving at this total all cases of duplicate registration, due to the registration of non-residents in the various states and re-registration upon transfer of ownership, are subtracted.

On January 1, 1914, allowing for all duplicate registration, there were 1,253,875 cars and trucks in use in the United States. By July 1, there had been an increase of 294,485 over this figure, a gain which is particularly surprising and significant when all the talk of hard times, lack of prosperity, etc., is considered.

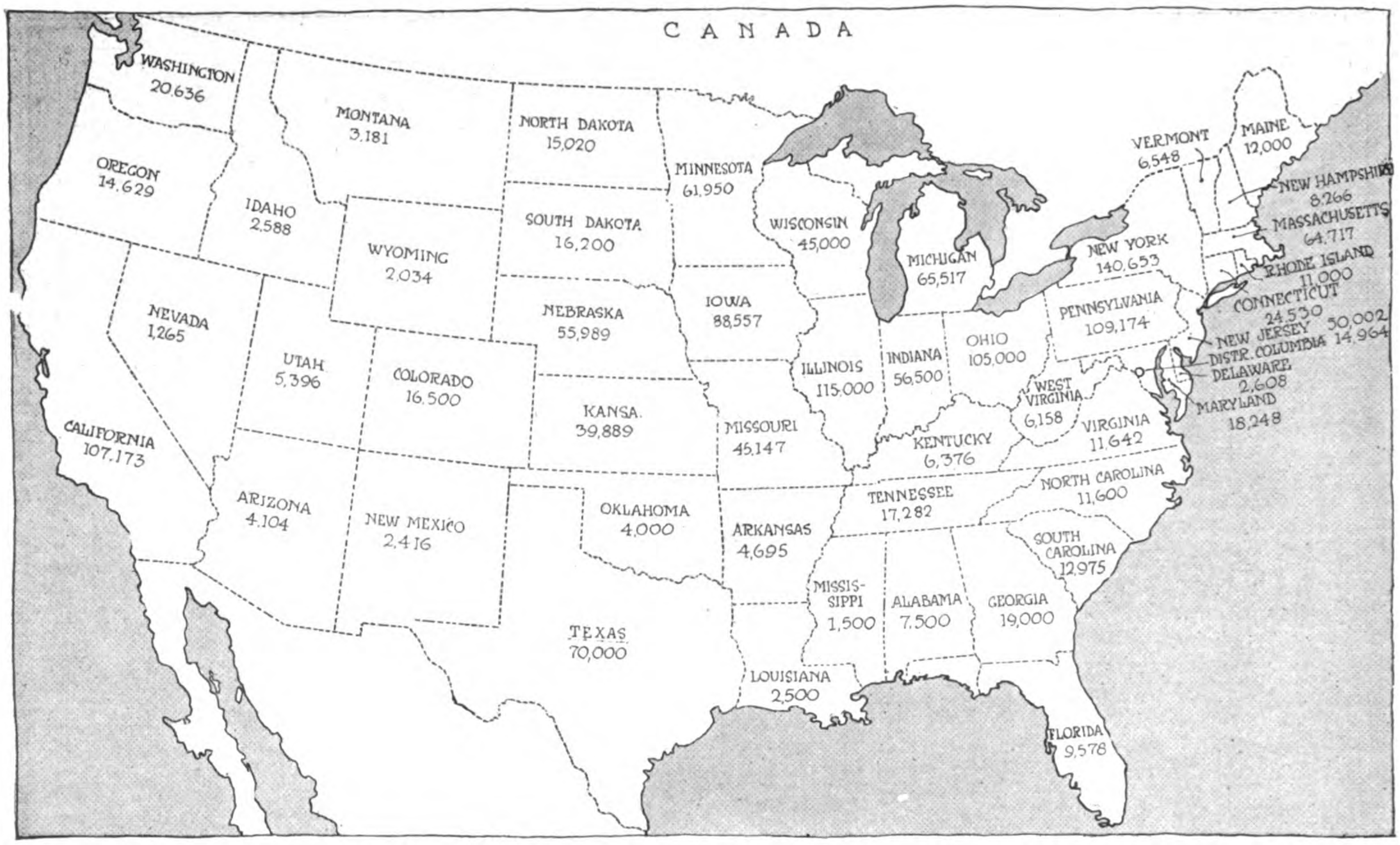
From the number of new registrations during the first half of 1914 it is apparent that the people of the United States have been buying cars in even greater quantities than ever before. The increase in the number of automobile owners is especially noticeable in the smaller communities and on the farms. In fact, the tremendous amount of money invested in automobiles and accessories in several of the states has drawn the attention of prominent business men and produced a strong impression upon the banking fraternity.

The present standing of the states in respect to the number of automobiles and motor trucks may be seen by referring to the tabulation on this page. New York still leads the van with 140,653, after all duplicate registrations have been allowed for, a



New York	140,653	Oregon	14,629
Illinois	115,000	South Carolina	12,975
Pennsylvania	109,174	Maine	12,000
California	107,173	Virginia	11,642
Ohio	105,000	North Carolina	11,600
Iowa	88,557	Rhode Island	11,000
Texas	70,000	Florida	9,578
Michigan	65,517	New Hampshire	8,266
Massachusetts	64,717	Alabama	7,500
Minnesota	61,958	Vermont	6,548
Indiana	56,500	Kentucky	6,376
Nebraska	55,989	West Virginia	6,158
New Jersey	50,002	Utah	5,396
Missouri	45,147	Arkansas	4,695
Wisconsin	45,000	Arizona	4,104
Kansas	39,889	Oklahoma	4,000
Connecticut	24,530	Montana	3,181
Washington	20,636	Delaware	2,608
Georgia	19,000	Idaho	2,588
Maryland	18 248	Louisiana	2,500
Tennessee	17,282	New Mexico	2,416
Colorado	16,500	Wyoming	2,034
South Dakota	16,206	Mississippi	1,500
North Dakota	15,020	Nevada	1,265
Dis. of Columbia	14,964	Total	1,548,350

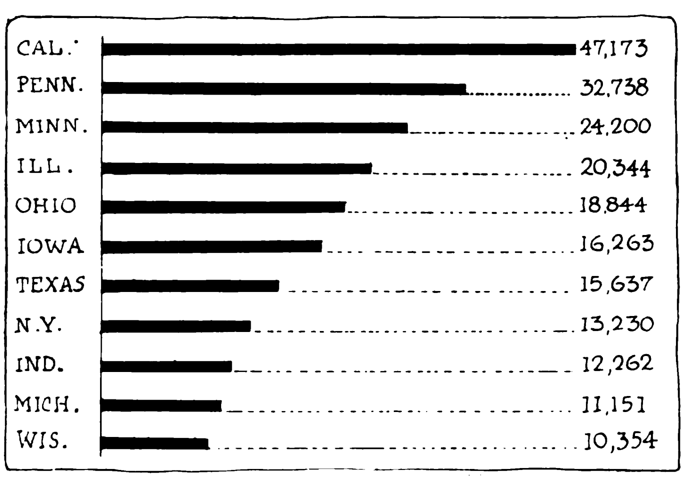
Registration to July 1, 1914, allowing for duplicate registration



Map showing actual registration of automobiles and trucks up to July 1, 1914, excluding duplicate registrations

gain of 13,230. Illinois proudly claims second place with 115,000, an increase of 20,344. A startling change, however, has taken place after this. Pennsylvania has sprung into third place with 109,174, taking first place according to the proportion of gain among all the states with 32,738. The figures given for California up to January 1, 1914, were incomplete, owing to the fact that a new law went into effect last fall and the registration of the cars in that state had not been completed by that time, the registrations being given as only 60,000. Under the new law, however, California stands fourth in rank, the registrations amounting to 107,173, allowing for duplicate registrations. The apparent increase of 47,173 is misleading in that both the new registrations and those which had not been completed under the new law up to January 1 are included.

Ohio, which stood third at the beginning of this year is now in fifth place with 105,000 cars and trucks, an increase of 18,844 in 6 months.



Eleven states showed increases of over 10,000 cars. The California figures, however, are misleading, owing to the new law

Iowa, which was fifth on January 1, is now in sixth place with 88,557, an increase of 16,263. The farmers in this state have been buying cars in great quantities, so much so that the president of a railroad which has lines in this state made a public statement a few weeks ago to the effect that Iowa people are spending more money for automobiles and accessories than for railroad fares inside the state. He went on to say that the public is more interested in the price of rubber than in the price of steel rails and more interested in good highways than in good railroads. Such a statement as this coming from such a source may be taken as strikingly indicative of the progress which Iowa is making as an automobile state.

Texas Shows Big Gain

Texas is one of those states which unfortunately has no state automobile registration and consequently it is not easy to obtain statistics regarding the number of cars and trucks in use in the Lone Star commonwealth. The Dallas Chamber of Commerce, however, made a census of the state for this purpose last fall and at that time reported that there were 54,363 cars in use in Texas. In response to a letter from THE AUTOMOBILE, the Chamber reported that while no census has yet been made for the first half of 1914, it is positive that 70,000 is a very conservative figure for the number of cars and trucks in use in Texas up to July 1. This puts the state in seventh place and credits it with a gain of 15,637 cars and trucks. On January 1, Texas was credited with 54,363 cars, which gave it ninth place.

Michigan, which stood eighth on January 1, retains its old position with 65,517 cars, an increase of 11,151.

Massachusetts, which was sixth at the beginning of the year, is now ninth, but with 64,717 cars, compared with 61,746, a gain of 2,971.

Minnesota has shown an unexpected increase, jumping from fourteenth place at the beginning of the year to tenth place July 1 with 61,950 machines registered, a gain of 24,200, putting the state second in the order of gains for the first 6 months, the abnormal figures for California not considered.

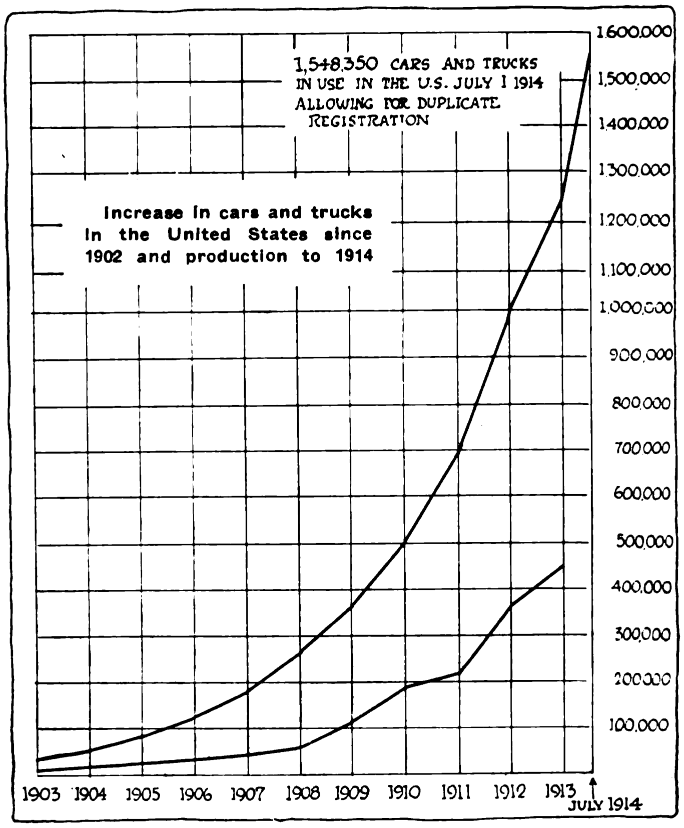
Three other states have registrations of over 50,000, Nebraska having 55,989, an increase of 8,715 over the figures for the first of the year, Indiana which is credited with 56,500, or 12,262 more than on January 1, and New Jersey, which is still barely over the mark, having 50,002, an increase of 489 for 6 months.

Three other states have over 35,000 cars, Missouri having 45,147, Wisconsin 45,000 and Kansas 39,889. The rest of the states taper down from Connecticut with 24,530 and Washington with 20,636 to Mississippi with 1,500 and Nevada with 1,265. Nevada has always had the last position in the order of registrations, but is now beginning to show some promise of mounting a little higher in the table, having gained 134 cars in the first 6 months of 1914.

Little Improvement in Laws

The automobile law situation is but little improved this year. Two of the states, California and Kentucky, are under new laws and several of the other states are making or are contemplating making changes in their motor vehicle legislation. Among these is Massachusetts, which has recently enacted some amendments to its statutes. The Michigan law is in the uncomfortable predicament of being declared invalid by the State Supreme Court, so a new act will have to be drawn for that state. The District of Columbia, Florida and Texas are still licensing cars perennially, that is, each car is licensed but once and not every year as is the case in most of the states. Minnesota has triennial registration, that is,

(*Continued on page* 330.)



Automobile Registration in Each State in the Union up to July 1, 1914, with Duplicate Registrations

State or Territory	Total Registration	New Registration	Registration up to July, 1914	Gasoline Passenger Cars in Use	Gasoline Commercial Cars in Use	Electric Passenger Cars in Use	Electric Commercial Cars in Use	Non-Resident Registration*	Re-Registered**	Chauffeurs Registered	Total Fees	Remarks
Alabama	7,500	2,000	5,500	***	***	***	***	None	***	1,000	$92,000	
Arizona	4,293	710	3,583	4,027	208	16	None	None	189	1,000	30,638	
Arkansas	4,695	1,695	3,000	***	***	***	***	None	***	270	4,965	
California	107,173	47,173	60,000	***	***	***	***	None	***	15,347	***	New law
Colorado	16,500	3,500	13,000	***	***	***	***	None	***	2,200	60,833	
Connecticut	24,530	1,267	23,263	21,555	2,375	400	200	***	***	31,050	364,948	
Delaware	2,608	225	2,373	***	***	***	***	***	***	2,467	30,152	
Dist. of Col.†††	17,464	839	16,625	16,276	603	710	90	2,500	***	21,795	10,086	Perennial reg.
Florida	10,078	706	9,372	***	***	***	***	***	***	***	***	Perennial reg.
Georgia	19,000	....	22,000	18,335	335	315	15	***	500	***	***	New law
Idaho	2,588	415	2,173	***	***	***	***	***	***	***	***	
Illinois	115,000	20,344	94,656	***	***	***	***	***	***	17,489	595,362	
Indiana	57,000	12,262	44,738	53,000	2,000	1,000	500	None	500	2,398	385,000	
Iowa	88,557	16,263	70,294	***	***	***	***	***	***	12,000	199,445	
Kansas	39,889	5,523	34,366	***	***	***	***	***	***	None	41,000	
Kentucky††	6,376	....	7,210	***	***	***	***	***	***	***	***	New law
Louisiana†	2,500	Lower est.	3,200	***	***	***	***	***	***	***	***	
Maine	12,700	2,130	10,570	12,195	498	5	2	500	200	None	166,000	
Maryland	18,248	3,994	14,254	16,558	1,440	150	100	***	***	***	***	
Massachusetts	64,717	2,971	61,746	56,990	6,209	823	695	***	***	13,935	780,364	
Michigan	65,517	11,151	54,366	***	***	***	***	***	***	***	196,551	Law invalid
Minnesota	62,000	24,200	37,800	***	***	***	***	***	50	***	***	
Mississippi†	1,500	Lower est.	3,000	***	***	***	***	***	***	5,257	***	Triennial reg.
Missouri	46,143	8,003	38,140	***	***	***	***	***	996	***	201,857	
Montana	3,181	....	5,686	***	***	***	***	***	***	***	8,000	
Nebraska	55,989	8,715	47,274	***	***	***	***	***	***	***	***	
Nevada	1,265	134	1,131	1,201	64	***	***	***	***	None	3,840	
New Hampshire	8,766	1,330	7,436	8,651	50	45	20	500	***	2,662	146,049	
New Jersey	51,849	489	51,360	49,567	2,282	***	***	***	1,847	55,532	668,394	
New Mexico	2,436	715	1,721	***	***	***	***	***	20	***	16,764	
New York	145,894	13,230	132,664	123,722	12,180	7,000	2,992	1,630	3,611	56,042	1,351,826	
North Carolina	11,600	1,600	10,000	***	***	***	***	***	***	***	75,000	
North Dakota	15,095	2,025	13,075	15,065	15	15	None	None	75	***	48,456	
Ohio	105,000	18,844	86,156	***	***	***	***	***	***	5,000	591,596	
Oklahoma†	4,000	Lower est.	4,900	***	***	***	***	***	***	***	***	
Oregon	14,629	672	13,957	***	***	***	***	***	***	1,351	69,111	
Pennsylvania	112,916	32,738	80,178	100,000	3,000	7,455	2,461	1,000	2,742	23,370	1,067,295	
Rhode Island	11,000	818	10,182	***	***	***	***	***	***	***	***	
South Carolina	12,975	1,475	11,500	***	***	***	***	***	***	***	2,500	Local reg.
South Dakota	16,200	1,622	14,578	***	***	***	***	***	***	***	***	
Tennessee	17,282	3,179	14,103	***	***	***	***	***	***	***	34,564	
Texas‡	70,000	15,637	54,363	***	***	***	***	***	***	***	***	Local and perennial reg.
Utah	5,396	928	4,021	4,939	117	117	6	***	***	***	2,728	20 steam cars
Vermont	6,781	863	5,918	6,592	180	4	5	***	233	1,443	127,619	
Virginia	11,642	2,620	9,022	***	***	***	***	***	***	***	101,878	
Washington	20,636	....	24,178	***	***	***	***	None	None	None	41,272	
West Virginia	6,158	1,070	5,088	***	***	***	***	***	***	250	60,174	
Wisconsin	45,000	10,354	34,646	***	***	***	***	***	***	***	236,640	
Wyoming	2,034	450	1,584	***	***	***	***	***	***	***	***	
	1,554,300	285,879	1,279,950	508,673	31,556	18,055	7,086	6,130	10,963	271,858	$7,812,907	

NOTE.—3,000 steam passenger cars and 250 steam trucks are included among the gasoline machines. Dots indicate that previous figures are doubtful, discrepancies indicating that the registration officials have made an error in reporting. *The number of cars registered belonging to residents of another state. **Number of cars registered owing to changes of ownership, etc. ***Not listed separately by registration officials. †Estimated on basis of population with reference to location and sectional registration. ††New law makes registration figures low. †††Figures are high as many re-registrations are included. ‡Estimate furnished by Dallas Chamber of Commerce, which states that figures given are very conservative.

War Closes French Car Factories

Activity Is Confined to Aeroplane Plants—American Manufacturers Have Orders Cancelled—Tire Prices Go Up—Big Demand for Cars Here, However

War Booms English Trade

By J. Sidney Critchley, President of the Institution of Automobile Engineers

By Western Union Cable

LONDON, ENGLAND, Aug. 11—The position of the industry here is being severely tried. All private sales are for the present dead, and all programs for 1915 are at present in abeyance. Many passenger cars are being bought for war purposes which will keep some factories busily employed for the time being.

Export trade, in view of the seas being open, it is anticipated will be maintained or even increased when permission to export cars can be obtained.

Due to most of continental factories being closed or working exclusively for governments, continental agents here are absolutely cut off from supplies. Supplies of materials from Belgium, France and Germany are no longer available. All manufacturers will be compelled to rely on home materials. For example, the stock of Bosch magnetos is very limited and all available supplies will be required for commercial vehicles.

The great demand for commercial vehicles for transport will keep this branch of the industry very busy as large numbers both new and second-hand have been taken over, including some hundreds of London omnibuses.

The withdrawal of horses also increases the demand for commercial vehicles.

This branch will have a booming time, but output may be retarded by lack of materials and restricted output of passenger vehicles must prevail.—Sidney Critchley.

NEW YORK CITY, Aug. 12—*Direct news from Paris, France, of the effect on the French automobile industry* of the prospects of war—Our Paris correspondent gives some information of what the actual declaration of war ere this has caused. On August 1 all purchasing by the factories stopped, and where cars were ordered, but had not been delivered, customers were refusing to take them.

Workmen were being discharged from all factories, and in many cases production was so low that the department heads were taking inventory.

In further commenting on the situation, W. F. Bradley, resident correspondent of THE AUTOMOBILE in Paris, writes under date of August 1:

"*Should war break out the result will be to close three-quarters of the automobile factories in France.* Not only would the demand cease with the breaking out of hostilities, but in very many cases so many men would be called up for military duty that it would be impossible to run the works. In one particular factory every foreman and head of a department was required to do duty as a soldier within a week of the call to mobilize, and some of these men had to be at their post within twenty-four hours of the call.

"Activity is confined to the aeroplane and aeroplane motor factories. The section of the Renault factory producing aeroplane motors is under army control; the same applies to the whole of the Gnome motor works, as well as to the Le Rhone factory. Aeroplane builders, as well as aeroplane motor manufacturers are forbidden to supply private customers.

"Everything necessary has been done to put practically the whole of the Paris motorbuses at the service of the army at a moment's notice should the call come. These vehicles would be rapidly transformed to act as meat wagons. Automobile truck owners, having subsidized vehicles, have received intimation to hold them in readiness for delivery to the military authorities at any time.

"A close inspection has been made in the various factories of the different types of cars which could be seized for army requirements if war breaks out. These cars would be used for carrying staff officers and would be driven by factory mechanics acting as military reservists. A considerable increase has been made to the reserves of gasoline, lubricating oil and automobile tires held by the army authorities."

Accessory Business Injured

American manufacturers have already felt the effects of the European war. Two or three large accessory manufacturers have received cable orders to cancel all shipments to Europe, and their branch houses in such cities as London, Paris and Berlin have been closed.

With automobile manufacturers the situation is somewhat worse, because buying has practically ceased in all the belligerent countries. It is a case of demand as well as supply returning to zero in less than a week. Several American makers today find themselves with cars for European shipment on hand. Several of these makers build chassis with right-hand steering for Europe and left-hand steering for the domestic market. It will be difficult to dispose of these vehicles unless attention is turned to the South American market where the rules of the roads in some places call for the steering wheel on the right side.

Many representatives of the American industry are at present in Europe where they have gone on different missions, some to inspect the foreign plants, and others on pleasure trips. Little, if any, concern need be given for them as the situation has greatly clarified so far as tourists are concerned since the opening of the war.

Tire Prices Up

In America the tire situation has been affected more directly than any other, as a result of the war, due to the fact that practically all crude rubber, coming from either Ceylon and the Straits Settlements, is brought in English bottoms, and until the British navy is prepared to protect its mercantile marine there will undoubtedly be a shortage of rubber and the price which has already jumped from 55 cents to $1.12 may go much higher. Nearly 70 per cent. of American rubber comes from the East, and it would be difficult to get supplies so long as commerce on the high seas is hampered. Fortunately the touring season is near an end, July and August being the heaviest months, but in spite of this the situation is not desirable, as the tire makers are short on stock, being practically at the close of the 1914 season, and there is little crude on hand in New York City, and very little in London and little in transport. Many of the rubber companies report a stock on hand adequate for 30 to 60 days. They are already shutting off on manufacture.

Our Southwestern Market

With the foreign market in Europe closed by the war American manufacturers are looking about for other fields. Owing to the good crops in the southwestern district, there is certain to be greater prosperity and more car buying than formerly. In the southwest territory adjacent to Kansas City, the farmers have just completed harvesting the crop of winter wheat which is 50 per cent. larger than any other previous year, and as the prosperity of that section depends almost entirely upon that one crop, the value of this to the automobile industry is apparent.

In 1913 the value of the wheat in Kansas alone—all of which is in the Kansas City territory—totalled about $50,000,000. This year conservative estimates of the final value of the 180,000,000 bushels produced in that state place it at $120,000,000. In 1912 the value was $70,000,000 and in no single year has it ever gone above the $100,000,000 mark.

Eighty dealers in Kansas City will handle the motor cars that will be sold in Kansas, northern Oklahoma, southern Nebraska and western Missouri. Fifty-five others will handle the tires and accessories.

At this time stocks are down to a minimum and large shipments are being received daily from the factory. The figures of the Kansas City Motor Car Dealers' Association show that 100 cars a day are being shipped into that city.

The local Buick agency expects to sell 1,000 cars before January 1. Its 1914 business already shows an increase of 25 per cent. over the corresponding months of 1913 and it is now 125 carloads behind its orders.

The Moriarty Motor Co., Lozier, Abbott, Regal and Detroit, will sell 300 cars before January 1. Its 1914 business is ahead of its 1913 sales.

The local Overland factory branch sold 2,048 cars in the fiscal year ending August 1, an increase of 512 cars over its sales of the previous year. It has asked for 3,500 cars for its business during the next 12 months.

The Bond Motor Co, handling the Maxwell until August 1 and now the Oldsmobile, reports a 50 per cent. increase for its business so far this year.

The Velie company has prepared for a 25 per cent. increase during the next six months.

The fiscal year of the Ford company closes on October 1. During the ten months from October 1, 1913, to August 1, 1914, its sales increased exactly 45 per cent. over the sales of the previous 12 months. The company expects to reach a final increase for the fiscal year of 1914 of 65 per cent. Plans are being made to double the capacity of the Kansas City assembling plant.

The 1914 business of the Studebaker shows an increase of 250 cars sold during 1914, or a total of 1,450. An increase or 25 per cent. is expected during the next season.

The Hudson-Brace Motor Co. (Hudson) sold 200 more cars this year than last and estimate they will handle forty to forty-five cars a month until the first of January.

The Hupmobile agency sold 600 cars during the twelve months ending August 1 and are making preparations to increase that number to 800 during the next year.

This increase of sales has brought about the construction of enlarged buildings for the Kansas City branches. The Overland, Case and Jackson companies already have moved into especially designed and constructed buildings. The Hupmobile and the branches of the Republic and Federal tire companies have commenced the construction of new and enlarged quarters. Other firms are remodeling their buildings.

Carl G. Fisher and Party Escape War

President of Speedway and Prest-O-Lite Co. Reaches Home—Racing Drivers in French Army—Factories Active

INDIANAPOLIS, IND., Aug. 11—*Special Telegram*—Carl G. Fisher, president of the Indianapolis Motor Speedway and of the Prest-O-Lite Co., reached home this morning accompanied by Mrs. Fisher and John Aitken of the National company, having escaped from the European war. The party came back on the White Star liner *Laurantic*, an English ship, which landed at Montreal Saturday.

"We were just 6 hours ahead of the war net," says Mr. Fisher. "We had some trouble getting away, but it pales into insignificance when compared with the difficulties others are having. There must be at least 100,000 Americans trying to get home.

"We were at Le Mans when the war cloud broke, prepared to watch the running of the little Grand Prix. We lost no time in hurrying to England, whence we sailed on the *Laurantic*.

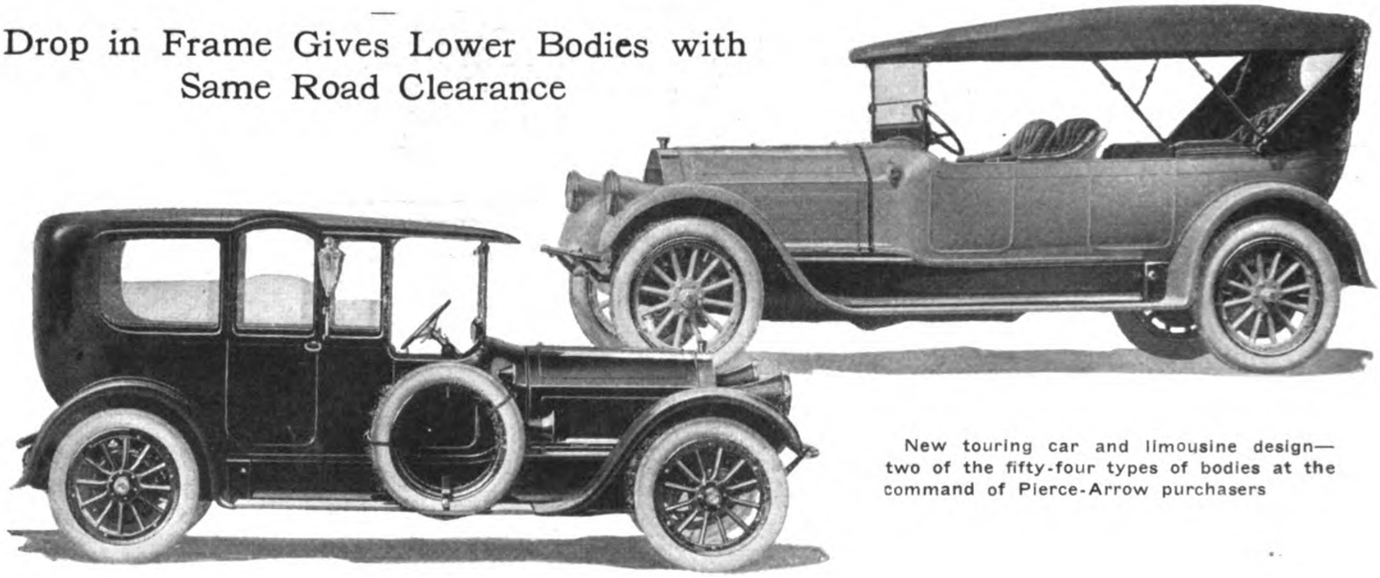
"It looks as if the war would last for some time. In England they are not confiscating motor cars, but I understand they are in Germany and several other countries. The war is demonstrating to everyone just how valuable the automobile is; in fact, it is invaluable. The various governments find it particularly adaptable to the troops. They can load fifty soldiers in one motor truck and move them faster than they can by freight train.

"The foreign motor car factories will not be shut down for the reason that their products are needed for war purposes. But the factories are greatly handicapped by so many of the workmen being reservists. Boillot is aide de camp and driver for the generalissimo of the French army, Goux is a mine layer in the army, while Thomas, winner of the last 500-mile race is an aviator in the French army.

"As to what effect this will have on the next 500-mile race it is hard to say. However, I look for the war to be over by that time. There will be enough of the foreign cars to insure European representation while I look for more American cars then ever."

Pierce Offers 54 Body Types

Drop in Frame Gives Lower Bodies with Same Road Clearance



New touring car and limousine design—two of the fifty-four types of bodies at the command of Pierce-Arrow purchasers

ONE primary change has been made in the Pierce-Arrow series three cars as compared to the preceding model known as the series two. This has been a drop in the central portion of the frame. With this single change the entire appearance of the new line has been altered and in connection with its adoption one or two other minor changes have been necessitated. The principal alteration that has come up on account of the dropped frame has been the abandonment of the gravity gasoline feed and the substitution of a pressure feed system with the gasoline tank at the rear of the chassis. The introduction of the pressure feed has in turn caused a change in the raising of the carbureter and hence an increase in its accessibility. Prices are:

	38-C 3	48-B 3	66-A 3
Touring	$4,300	$5,000	$6,000
Five-passenger	4,300	4,900	5,900
Roadster	4,300	4,900	5,900
Limousine	5,200	6,000	7,000
Vestibule brougham	5,350	6,200	7,200

With but one exception, no change has been made in the prices. The one exception concerns the largest limousine which now lists at $7,000 instead of $7,100. The prices of the other models remain as before.

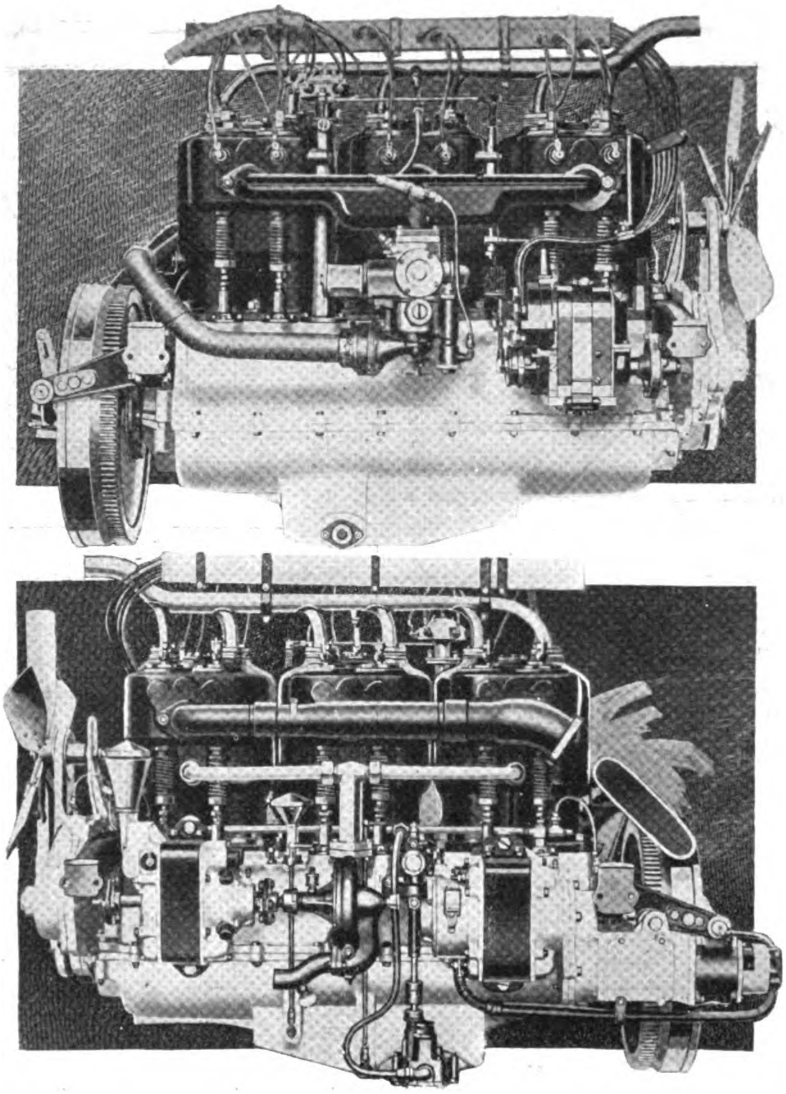
On all three of the sixes which compose the Pierce line it has been found possible on account of the increase in drop of the frame to lower the bodies and running boards without reducing the road clearance. There are also a number of other minor chassis changes which are designed to increase the convenience and comforts of the driver. The control members, including the accelerator, hand throttle and spark control, have been simplified; the electric starter is operated by a single push button on the dash in place of a pedal and, in place of the plugs heretofore used, a Yale lock is provided for the bank of switches. The engine cannot be started if the bonnet is locked and the key removed from the ignition switch. The engine primer has been simplified and the housing of the universal joint between the clutch and the gearbox has now been extended to cover the entire mechanism.

It is in the body work that the Pierce company offers an exceptionally wide choice to the purchaser. There are fifty-four body types and a practically unlimited number of color schemes to choose from. The Pierce company states that in offering such a wide range of choice it is excelling in variety even the foreign builder who sells his chassis separately. All of these bodies are entirely new in design. The standard brougham, landaulet, suburban and landau bodies have rounded corners, domed roof and in general lines which have been kept simple but at the same time follow the stream design of up-to-date practice. In addition to these standard types there are many modifications and combinations of different design. The brougham-landaulet and the suburban-landau are arranged with unusually wide side windows, and are built with only flat roofs. All standard dome roof designs have arch doors. All standard and optional flat

Divided front seat used in Pierce-Arrow series three touring car roof designs are built without the arch doors.

In addition to the different body designs and to the general improvement in appearance by reason of the lower cars, many noticeable features stand out in the new models. In fact the Pierce-Arrow Co. states that this new model has more power, a better get-away, more speed, greater comfort and more style than any other model turned out by the company. The increase in power and pick-up is ascribed to the force-feed gasoline system and the style and appearance to the lowering of the bodies.

The fenders are of new and wider design and are calculated to give better protection against mud and water than formerly. A Pierce top which has been named a Solitaire because it can be operated by one person is standard equipment on all the touring cars. The standard touring cars are fitted with individual front seats arranged with a space between to give easy passage from the front to the rear compartment. An undivided front seat will be provided if specified at no extra cost. All Pierce cars continue to be built with right drive and right control as in all the former models.



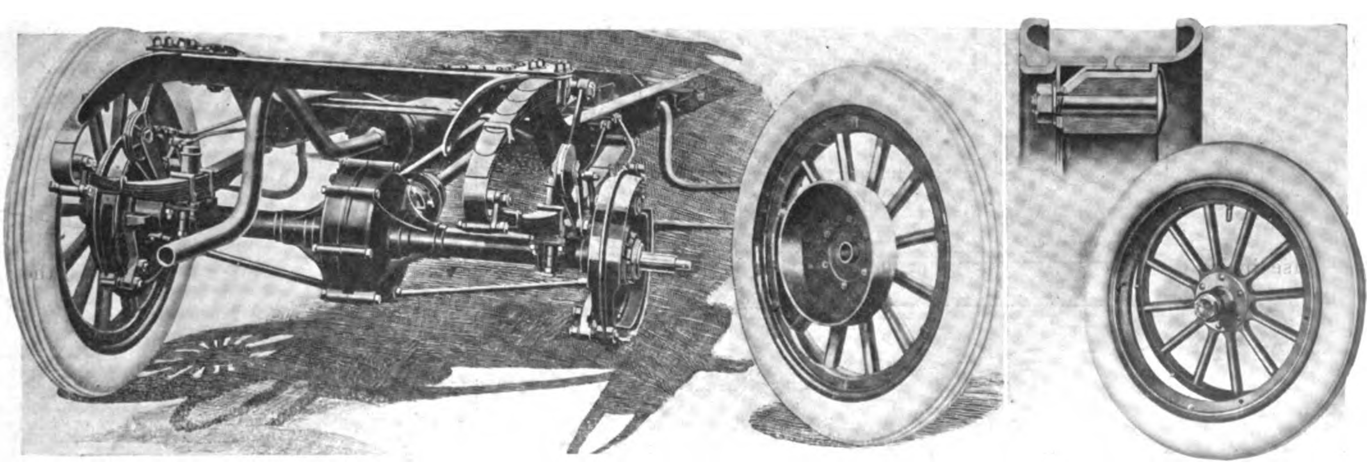
Left and right side of the six-cylinder Pierce-Arrow motor. All three sizes are similar in design

Two electric lights are provided in the backs of the touring car front seats to light the tonneau steps. The tail light and license illuminator are now combined in a unit and a rear bumper protects the gasoline tank against collision. The headlights are carried on the front fenders as in series two, but they have been moulded into the fenders with a more graceful curve and are now one of the most perceptible points of difference between the series two and series three models.

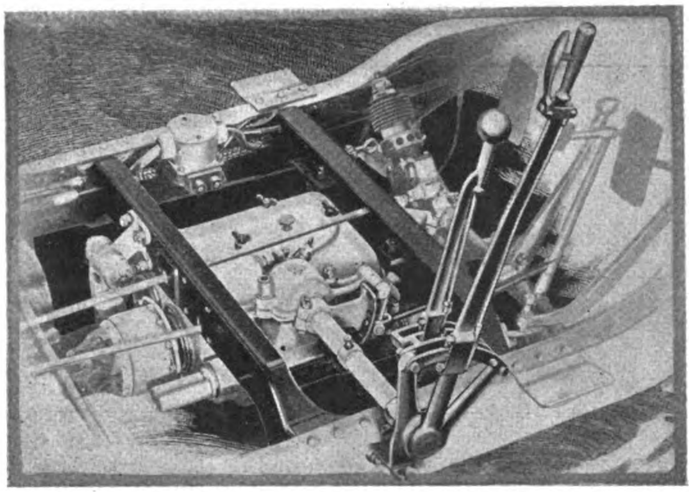
All three Pierce-Arrows are built along similar lines. The 66-horsepower is known as the 66 A-3; the 48 as the 48 B-3 and the 38 as the 38 C-3. The power plants of all these chassis are, of course, different in size, the largest being 5 by 7 inches; the 48, 4.5 by 5.5, and the 38, 4 by 5.5 inches. With the exception of the differences in size, lines of design of these three models are entirely similar and a description of the Pierce-Arrow product can be hence given as a unit.

All three engines are six-cylinder types with the cylinders cast in pairs and have interchangeable inlet and exhaust valves located on opposite sides of the cylinders. The object in keeping the T-head design, according to the Pierce engineers, is to keep the valve area large and at the same time to maintain as short an overall length as possible. The crankshafts are provided with seven bearings and each bearing is lined with a white bearing metal that is imported from England. The bearing bushings are carried within a bronze shell and the white metal is cast directly into this shell.

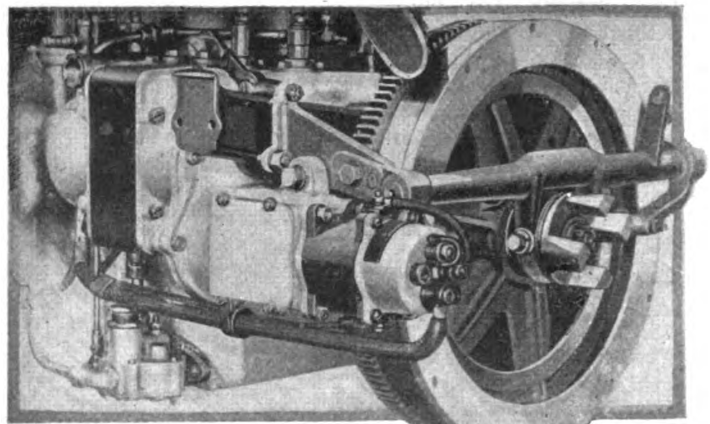
The pistons have their wristpins at about the center and carry three rings above this point. At the bottom of this piston there is a wiper ring for distributing the oil. The connecting-rods are I-beam in section and are held at their lower point by bearings lined with the same material as is used in the main bearings. One point in Pierce-Arrow prac-



Left—Rear construction of the Pierce, showing running gear, springing and torque members. Right—Construction of the Johnson patent demountable rim



Pierce four-speed gearbox mounted amidships



Mounting of the generator and cranking motor

tice which is considerably different from that generally employed is the use of a built-up camshaft. The cams are pinned to the shaft and the Pierce company states that out of 165,000 camshafts they know of less than ten cases in which the holding pins have sheared or become loose giving a percentage of failure of less than .005 per cent.

Lubrication is by force feed. The oil is carried in a reservoir beneath the crankcase. A gear pump driven off the camshaft forces the oil through a long horizontal tube from which it is distributed to the two end and central main bearings and to the timing gear case. From the bearings to which the oil is pumped it passes by means of the hollow crankshaft to the other main bearings and to the big end bearings of the connecting-rod. At each of these points there is a hollow core through which the oil is forced to the bearing surfaces. The connecting-rods carry leads up which the oil passes to the wristpin bearings and through the hollow wristpins to the walls of the cylinders. On the end of the horizontal main oil lead, there is a pressure gauge which registers the pressure under which the oil is being fed. This system is designed to be positive and to vary uniformly with the speed of the motor. While there is no splashing of the oil all the interior parts of the motor are reached by the spray thrown off by the connecting-rods through centrifugal force.

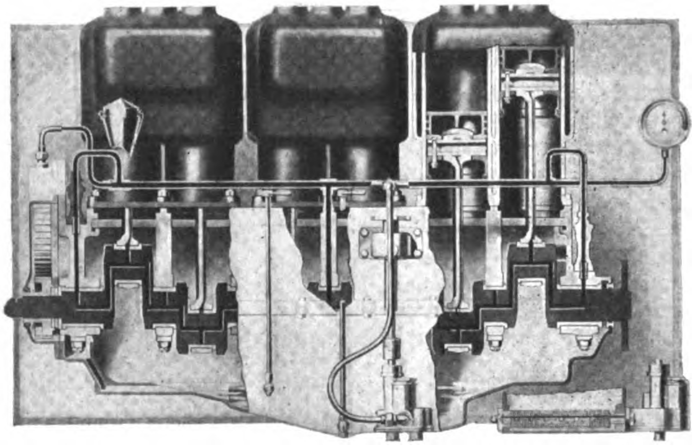
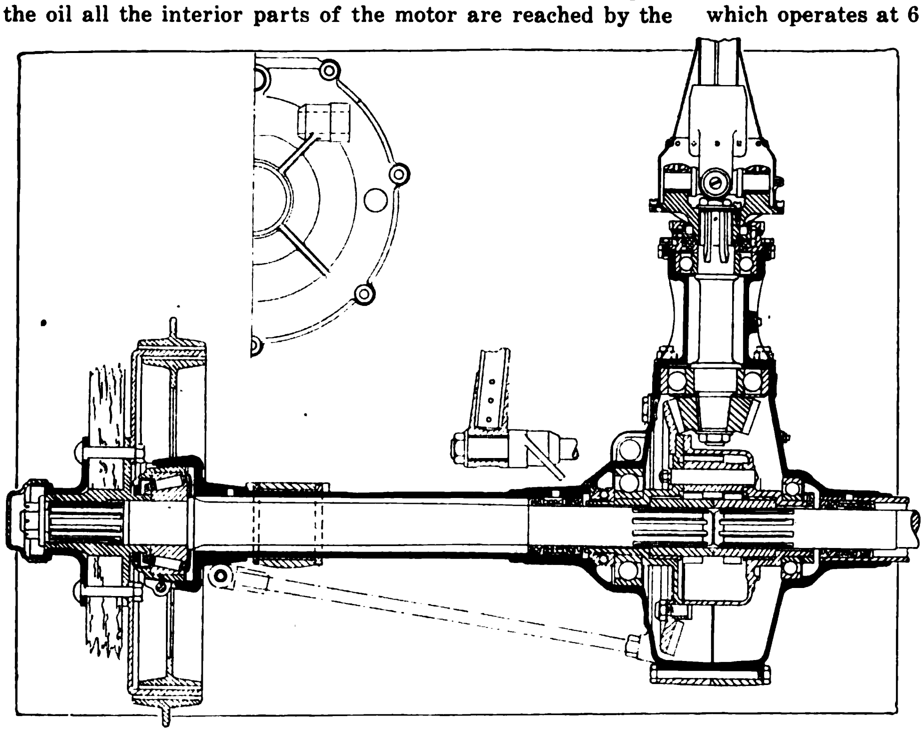


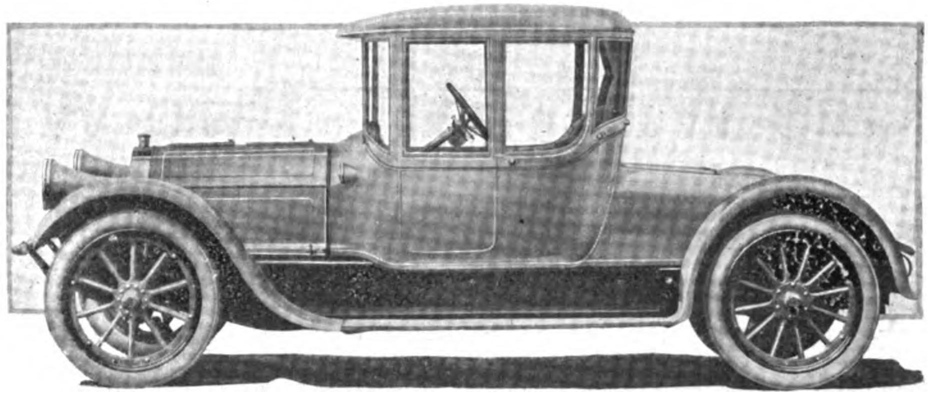
Diagram of the Pierce oiling system

The electrical equipment includes a starting and lighting system and two independent ignition systems. Starting and lighting are taken care of by a Westinghouse two-unit outfit which operates at 6 volts. All the wiring throughout the car is done by the single-wire system, the return conductors being carried in copper tubes attached to the frame. The ground connections are soldered to the copper tubes and in connection with the chassis frame form the feed conductors of the circuits. An over-running clutch breaks the connection between the cranking motor and the engine when the crankshaft is driven under the impulses of the engine. A feature which is of importance in the installation of the starting system is the incasing of all electrical units such as the gears, shifting rods, starting switch, etc. The main source of ignition current is provided by a Bosch magneto, while for the secondary ignition system the storage battery is used as a source of current supply through separate induction coils and commutators.

The gasoline system has been entirely revamped. The carbureter is the same in all essential details but the jet sizes, for instance, had to be changed in shifting from the gravity to the



View showing the construction of the semi-floating rear axle pressure feed. Owing to the higher position of the carbureter there is no possible danger of recondensation of the fuel in the upper part of the manifold and the result has been a car with a much quicker pick-up than previously. The Pierce gasoline tank will now be found on the rear of the car and the objection to this position, namely, its liability to damage, has been answered by the application of the rear bumper.

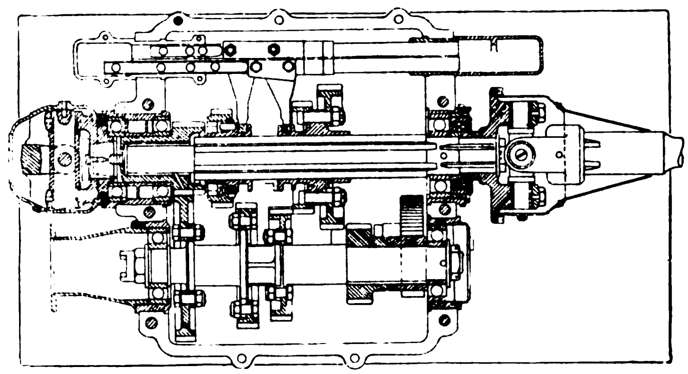


Side view of the latest design in Pierce coupés

Power is transmitted from the motor to the running gear through a cone clutch. Pierce clutch design is distinctive in that it is kept constantly lubricated by means of an oil ring so designed that a small quantity of neat's foot oil is held constantly in contact with the leather. In order to gain additional smoothness, flat springs are placed beneath the leather surface of the clutch.

Four speeds are provided. The gearset is a sliding selective design held in an aluminum alloy case. This case is divided into two separate sections to permit of ease in assembly and to cut down to the limit repair costs. The gears are carried upon cylindrical six-spline shafts and the material of which they are made is chrome-nickel steel. In finishing these gears they are held to a limit of .0005 inch in order that the total backlash through the entire train of gears is a minimum. An interlocking device is also fitted which renders it impossible to change speed while the clutch is engaged. The same interlock also prevents two gears from being meshed at the same time. An air pump for inflating tires is connected through a clutch to the gearbox countershaft.

The shaft drive is provided with a universal at both ends and also a sliding joint at the rear to compensate for the vertical free motions. There is a torque rod also for taking the drive and this is fitted with a spring cushioned and swivelled front support and a pivoted rear connection to take all the torsional strains. The order in which the drive is taken through this transmission scheme is first through the front universal joint, then through the shaft, sliding joint, rear universal joint, beveled pinion shaft and then through the beveled pinion and gear into the differential.



Constructional view of the gearbox

The universal joints are of the cross and yoke type with nickel steel pins, steel yokes and bronze bushes. The rear end of the driveshaft is hollow and splined, the splines sliding in corresponding flutes in the rear universal joint, thus providing the compensation for the rising and falling of the chassis due to the action of the rear springs. Lubrication of the sliding joint is provided by means of a charge of grease which is contained in the hollow end of the driveshaft.

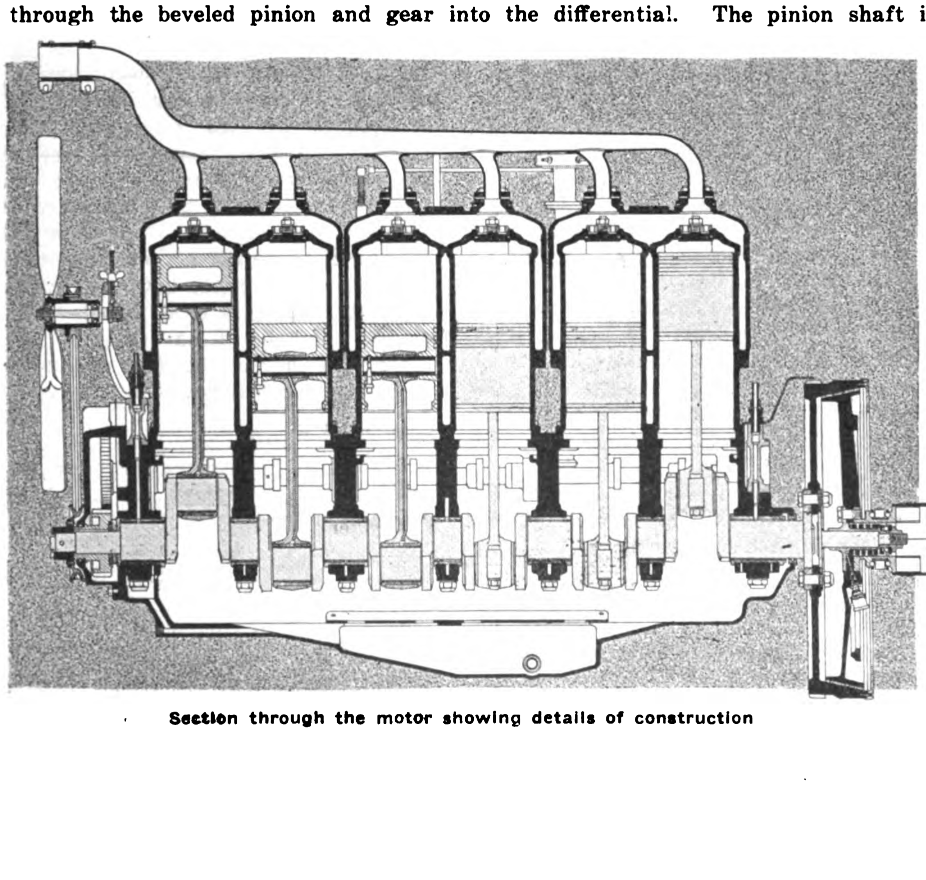
The beveled pinion shaft housing is entirely separate from the main axle housing, but it is bolted securely to the latter. The pinion shaft is carried on two annular ball bearings designed to take both radial and thrust reactions from the bevel pinion. The bevel gears are of chrome-nickel steel.

The rear axle is a semi-floating design, the axle shaft being of chrome nickel steel and ground to size in order to give it the maximum torsional strength. The axle housing, incasing the driving shafts, is of nickel steel, brazed and riveted into the pressed steel housings inclosing bevel gear and differential assembly.

The front axle is an I-beam having a long drop which commences directly at the steering knuckle and sweeps into the center of the axle in a gradual curve. The steering torque rod is at the level of the lower part of the axle and the steering gear itself is a multiple screw and nut type of semi-irreversible design. The gear ratio of the steering gear is such as to provide a reduction of 1.5 to 1 in favor of the driver.

Equipment is more luxurious than

(*Continued on page* 330.)



Section through the motor showing details of construction

One-Wire vs. Two-Wire Systems

By W. H. Conant

Member Electrical Equipment Division Society of Automobile Engineers

THERE is danger that serious misunderstanding may arise concerning this problem of proper wiring systems for gasoline cars. There are really two questions:

1—SHALL THE S. A. E. ADOPT ANY STANDARD FOR WIRING SYSTEMS?

2—SHALL THE STANDARD WHEN ADOPTED CALL FOR A REGULAR DOUBLE-CONDUCTOR WIRING OR A SINGLE WIRE WITH GROUNDED RETURN?

First, then, why should the Society—which is equivalent to saying the automobile industry—adopt *any* wiring standard?

The use of electric wires in motor cars has been a gradual evolution from the period in which ignition was obtained solely from dry cells and spark coil. Plain "Annunciator wire was used with its cotton thread covering dipped in paraffin. It is a far cry from that to the present-day method of installing the best rubber-covered stranded cable in metal conduits with junction boxes and other approved fittings.

Standard Lamp Base

That lamps and sockets might be had in the open market at better prices, a standard form of lamp base was adopted with uniform dimensions. As in the case of all adopted standards, this brought out considerable difference of opinion and agreement was reached only after consideration of all viewpoints.

Difficulty has been experienced in obtaining proper insulation for two contacts in these standard receptacles but as it has developed that there is ample room to thoroughly insulate and connect *one* conductor in the space allowed, many car makers have ordered lamps and sockets so designed.

We have, therefore, many thousands of lamp bulbs and receptacles in use of both kinds which are not, of course, interchangeable. Car owners are not able, as a result of this situation, to obtain lamps or other electrical fittings with as great facility or economy as if there were but one standard.

As improved economy in design and manufacture is an aim of the S. A. E., it would seem entirely proper that it *do* adopt a standard as outlined.

The Short-Circuit Argument

Consider the arguments advanced in favor of each system over the other:

Those who oppose the one-wire plan base their objections largely on the matter of safety from fire. They contend that with the entire frame and body acting as one of the two conductors, or being in such electrical contact that they *may* so act, the danger from short-circuit is very great. If a short-circuit occurs with the large current-carrying capacity formed by the frame and large wire, the storage battery capacity is such for short periods that very serious arcs, or flashes of electrical fire, may be formed and the car destroyed by fire or the individual injured.

The claim is made that many chances are offered for producing such short circuits by means of a wrench or screw-driver in attempting to make connections or adjustments. It has even been said that the chances of accident are not twice as much with one-wire, as with two, but *fifty* times as great. The figure fifty, of course, is used arbitrarily to emphasize the point, as much difficulty would be experienced in trying to determine the exact value of this factor.

Exponents of the two-wire plan claim that the history of electrical development proves the wisdom of double conductors and that the exceptions of street railways and third-rail locomotives, which use grounded returns, are irrelevant comparisons because the apparatus is cared for and operated only by trained men.

Two-Wire Arguments

They further state that users of single-wire outfits have found it necessary to install fuses in all their circuits and point to this as a proof of danger to be encountered.

A further claim is that if lamp brackets become loose, poor contact results causing lights to flicker. This assumes that brackets really carry current as part of the return circuit. It is also said that with so-called dual magnetos a grounded return scheme is not practical.

So much, then, for one side of the case and it should be noted that the writer is not expressing an opinion either way in this article but is endeavoring to make clear the opposing views and reasons therefor. In no report of the recent discussion at Cape May has there been presented the real reasons in *favor* of single-wire systems and one publication has gone so far as to use its editorial columns against *any* standard. Because of the unfortunate hour at which this matter was discussed and the small attendance at that late hour, very little of the reasons *favoring* one-wire were presented at the S. A. E. Summer Meeting.

Economy a Factor

No electrical man approaches this subject with any leaning toward grounded circuits. It smacks too much of call-bells, gas lighting and self-winding clocks—that is to say, crude beginnings of a great art. It is evident that good reasons must have convinced those electrical engineers who now favor this form of wiring for automobiles. That motor car makers, mechanical engineers and business men should favor it has no bearing on the merits of the question, for they may consider *only* economy. If, however, economy means manufacturing facility and production stimulant, their views become increasingly vital.

Socket Small for Two Wires

THE TWO-WIRE PLAN IS OPPOSED BECAUSE OF THE CLAIM THAT IT IS NOT POSSIBLE TO HAVE WORKMAN-LIKE CONNECTIONS AND PROPER CONTACT IN PRESENT SOCKETS WHERE TWO CONDUCTORS MUST BE HANDLED IN SUCH SMALL SPACE.

Much trouble is experienced in making the original installations and in keeping it free from defects in service. If a corresponding amount of trouble were given by ignition or carburetion, it must be admitted that co-operative efforts to correct it would be welcomed by all concerned. Such trouble is not found, however, where a single contact is used in this same socket. Ample room is left for proper insulation and for making a substantial wire connection.

Both Need Fuses

With two conductors so close together as is necessary in the space allowed, the ease with which a short-circuit may be found is striking. In fact, it is extremely difficult *not* to cause a short-circuit with screw driver, soldering iron or other tool in working on the apparatus. This shows that the danger from fire is present with *either* system and leads to the point that fuses should always be used regardless of the type of wiring. The need for fuses, then, with one-wire system is no argument against it and the neglect of two-wire advocates to recognize the need of fuses in their outfits is no reason for overlooking the importance of this safeguard.

Lamp Brackets No Carriers

It is commonly understood by "grounded-return" that current is conducted to the lamp, or other device, by a single wire and returns thence through the bracket and frame. Present day systems have modified that plan so that only the name remains. The wire is carried in a metal conduit—preferably copper—from which it is properly insulated. This conduit is in itself the return conductor and is only grounded, or connected to the frame, to prevent any potential difference between it and other metal parts of the car. From this it is evident that lamp brackets do *not* carry current and would not cause the lights to flicker by becoming loose.

Larger Wires Possible

As large wires are necessary to avoid appreciable drop in voltage between battery and electrical devices, the use of one wire permits of a large one being installed in a conduit of reasonable size. To use two wires of this desirable size would require a much larger conduit. The difference in cost would be determined partly by the extra wire and partly by the more expensive conduit. The ease with which connections are made to sockets is a further advantage.

Might does not make right but it is claimed that a decisive majority of automobile manufacturers has adopted the one-wire system and an overwhelming percentage of all 1915 cars will be thus equipped.

The purpose of this article is to focus attention upon the subject that it may receive the attention necessary to a proper decision when next it is considered for action. NOTHING CAN BE GAINED BY CONTINUING BOTH SYSTEMS TO THE DISADVANTAGE OF PUBLIC AND PURCHASING AGENTS ALIKE AND THE EARLY ACCEPTANCE OF ONE AS RECOMMENDED PRACTICE WILL SIMPLIFY A NUMBER OF PROBLEMS.

The S. A. E. Committee's Object

It should be stated that the Electrical Equipment Division of the S. A. E. Standards Committee did not expect to rest content with the simple recommendation for a particular system. It looked upon this action as the first step in a program of suggesting improved details of sockets, contacts and other items included in wiring outfits. If it could be understood how thoroughly this committee had canvassed the entire situation, approaching it without any preconceived prejudices, more consideration would be given its report. That the question has been up for over 2 years with many discussions by able, competent and experienced engineers from all branches of the industry, should carry weight with those who may have considered the subject but superficially and briefly.

Motor Comparisons Absurd

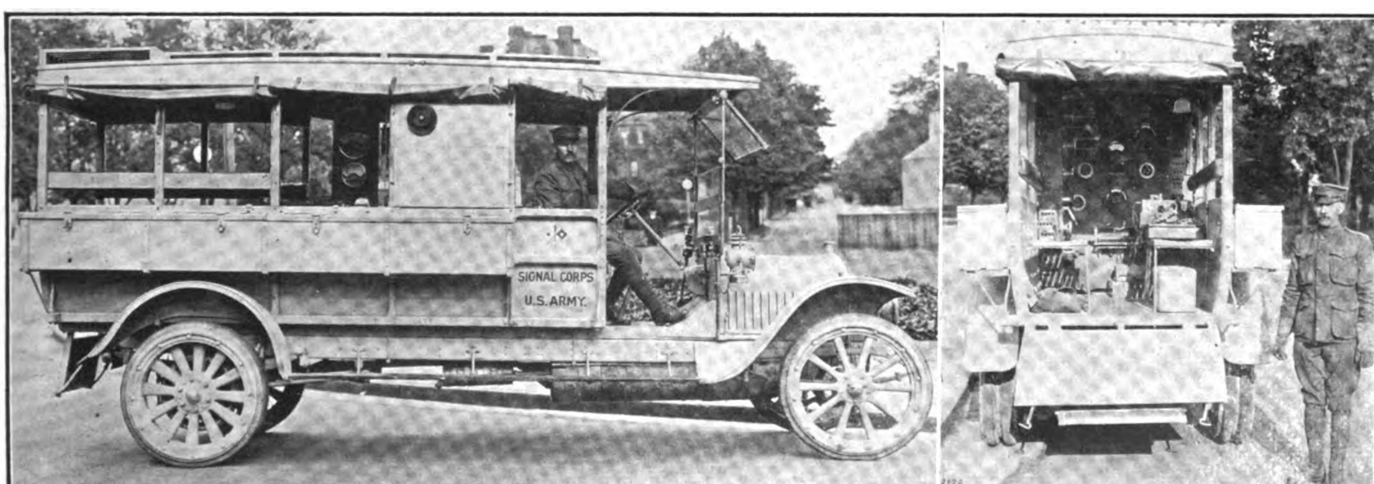
The statement that a six- or a four-cylinder motor might as well be proposed for standard practice is little short of absurd, even for an exaggerated illustration. The history of motor car standards is replete with similar objections to every advance that has been made. It is well to bear in mind that while an active opposition or minority, is necessary to keel the majority working along the right lines, no opposition is ever *constructive.* No amount of selecting things *not* to standardize will help in any way the great work the Society has been and is doing. No industry has ever been so benefited by co-operative labors nor has it ever been thought possible to so discuss, compromise or standardize details and methods as has been the case in this American automobile industry.

800-Mile Wireless Outfit on White Truck

A portable wireless outfit that can be set up in 12 minutes and is capable of sending messages over a radius of 800 miles under favorable conditions and receiving messages from points 2,500-miles distant, has been built for field service in the United States Army by the White Co., Cleveland, O.

Umbrella-type antennas are used, this part of the outfit being mounted at the top of an 85-foot mast which is built in nine sections. The top section is raised by hand but the others are hoisted aloft by a block and tackle suspended from struts mounted on a platform on the roof of the truck. These struts are quickly detachable when not in use. The guy wires are attached to the fifth section of the mast. When disassembled, the nine sections are carried in compartments built along each side of the truck. The counterpoise or artificial ground, consists of a heavy insulated wire. For convenience in grounding, there is a socket on the outside of the truck body into which a ground-wire fits.

The great range of the new equipment and the speed with which it may be brought into action is due to the employment of a powerful electric generator driven by the gasoline motor through a train of gears. The generator delivers electric current of 500 cycles at 110 volts and has a capacity of from 18 to 32 amperes. This current is interrupted by a relay, operated by the sending key, and is transformed so that it leaves the truck at a pressure of 22,000 volts and an amperage varying 8 to 12. As the current rises to the top of the antennas the voltage rises to approximately 90,000, while the amperage approaches zero.



Special White truck for carrying a portable wireless outfit in the Signal Corps of the U. S. Army

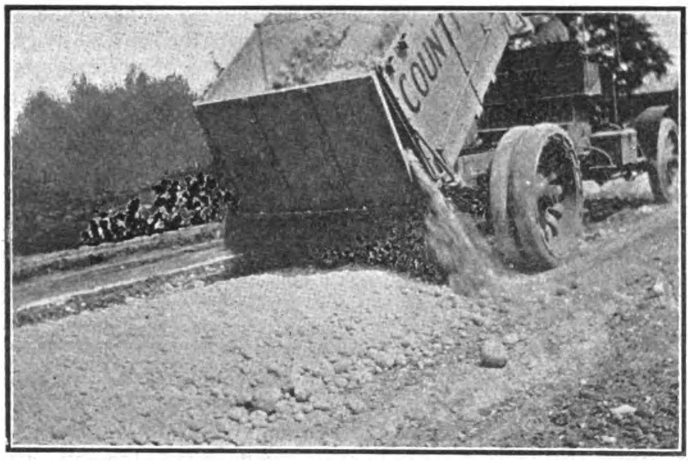


Fig. 1—Ingenious method of spreading gravel

The Rostrum

Special Small Car Garages Will Reduce Rent

EDITOR THE AUTOMOBILE:—The cost of garaging is the greatest factor hindering the extended use of the small car and cyclecar in the city, and the solution of the problem would seem to be separate garages for these machines.

Garage rent is now the largest item in figuring the cost of operation, and it is therefore important to reduce this to a minimum. It is of greater moment than fuel or tire economy.

The objection to storing these small cars in garages that are designed for automobiles of all sizes is that the floor space is so laid out that the small machines take up just as much space as the large ones. The ordinary garage is laid out into a certain number of rectangles, each one of which is of sufficient size to accommodate the largest car, and therefore a cyclecar with 36-inch tread and 100-inch wheelbase will occupy this space sufficiently to prevent any utilization being made of the remainder of it. For this reason the garage proprietor is reluctant to reduce the rental he has set for this space, although he will to a certain extent, especially if he is anxious to get the business, because the average owner has an idea that the amount paid should be proportionate to the size of the car, not thinking that the small machine takes up as much room as the large one.

The answer to this problem is special garages, or special floors in the garages now in use, for the accommodation of small cars exclusively, and the floor space can be laid out accordingly, the spaces being both narrower and shorter. Then the rental can be reduced proportionately with the result that many of us who are wondering whether we can afford a small car or a cyclecar will then feel able to stand the expense.

New York City. CYCLECAR.

Motor, Long Idle, Balks

Editor THE AUTOMOBILE:—I have a six-cylinder motor which has just been carefully overhauled and placed in first class condition, but I cannot get a single explosion, even on a prime subjected to a good hot spark. This engine has been idle for nearly a year and in this time has probably gone stale. I feel that all it needs is a few explosions to warm it up and lend it a little life. What I wish to find out is if you know of any chemical, such as ether, that would explode very easily. If so what are the proper mixtures. The method I use to turn this motor over enables me to spin the engine at one-third the speed that I turn the crank. Is this too slow?

New York City. WALTER BOWLES.

—Ether vaporizes more readily than gasoline, but for that matter you might use acetylene gas.

However, your motor should start readily on gasoline and there is no reason for using ether, acetylene gas or some other makeshift in warm weather, although there might be in cold.

It would seem that the reason your motor refuses to start is that you crank it at too low a speed. With the crank attached directly to crankshaft, spin the motor after priming the cylinders with gasoline.

Possibly the spark plugs are dirty or moist so that the sparks are short-circuited. Clean the spark plugs thoroughly in this case. Also see that the carbureter is in adjustment.

There is no such thing as a motor going stale and with a good spark in each cylinder and a proper mixture your motor should start without trouble.

Simple Method of Spreading Gravel

Editor THE AUTOMOBILE:—Fig. 1 shows a simple method that I saw employed recently to spread gravel or crushed stone to an even depth. This saved two or three laborers. The truck is a 5-ton Peerless with dumping body.

The device is a catch, made in a blacksmith shop, which will permit the truck tail gate to swing open only a certain number of inches. It has three steps, one of which spreads the load, with the truck in first speed, at a depth of 6 inches, another 8 inches and another 10 inches. It works equally well on up or down grade or on the level. The accompanying photograph shows the results that are obtained.

Bexar, Tex. H. A. CALMAN.

How to Adjust Rayfield G

Editor THE AUTOMOBILE—Will you please give me a full description of the adjustments of the new G3 Rayfield carbureter?

South Bethlehem, Pa. SUBSCRIBER.

The adjustment of the new G 3 Rayfield resembles largely that of the model C described in THE AUTOMOBILE for July 16, 1914, the difference being that there is no air-valve adjustment. All model G carbureters are the same, the numeral appended indicating the size.

When adjusting a Rayfield carbureter, Fig. 2, bear in mind that all adjustments are turned to the right for a richer mixture.

Before adjusting the carbureter be positive there are no obstructions in the gasoline line; that manifold connections are absolutely tight and free from air leaks; that valves and ignition are properly timed, and there is a hot spark and good compression in all cylinders.

With throttle closed and dash control down, close the nozzle needle by turning the low-speed adjustment to the left until block Y slightly leaves contact with the cam M. Then turn to the right about one and one-half turns. Open the throttle not more than one-quarter. Prime the carbureter by pulling steadily for a few seconds on the priming lever G. Start the motor and allow it to run until warmed up. With retarded spark, close the throttle until the motor runs slowly without stopping. Turn the low-speed adjustment to the left one notch at a time until the motor idles smoothly. If the motor does not throttle low enough, turn the stop arm screw A to the left until it runs at the lowest number of revolutions desired.

Then advance the spark about one-quarter and open the throttle rather quickly. Should the motor back-fire it indicates a lean mixture. Correct this by turning the high-speed adjusting screw to the right about one-quarter turn at a time until the throttle can be opened quickly without back-firing. Should the motor not back-fire, turn the high-speed adjusting screw to the left until it does. Then turn to the right until the motor runs smoothly and powerfully.

Adjustments made for high speed will in no way affect the low speed. If loading (choking) is experienced when running under heavy load with throttle wide open, it indicates too rich a mixture. This can be overcome by turning the high-speed adjustment to the left.

The low-speed adjustment must not be used to get a correct mixture at intermediate or high speeds. The automatic air valve should always be seated when the motor is throttled down to its lowest speed.

Before starting the motor when cold observe the following instructions: Open the throttle not more than one-quarter (if opened more starting will be difficult); enrich the mixture by pulling up the dash control; prime the carbureter well by pulling on priming lever G for a few seconds. When stopping the motor pull up the dash control. Open the throttle about one-quarter and switch off the ignition. This leaves a rich mixture in the motor, which insures easy starting.

Why Racers Use Castor Oil

Editor THE AUTOMOBILE—I notice that in the racing events both here and abroad the cars use castor oil as a motor lubricant. What advantages, other than less smoke, has this oil?

Leesburg, Fla. W. H. HOWELL.

—Castor oil has a greater viscosity than any other oil, used for motor lubrication, at the high temperatures experienced in racing motors. Therefore it helps to prevent the passage of the gases past the piston and the flow of the oil up into the combustion chamber, where it would burn and cause smoke. Since very little of the castor oil makes its way up to the combustion chamber, there is very little that is burned, but most of it is used for lubrication with the secondary advantage that much less oil is necessary.

It is not advisable to use this oil in everyday work, however, because it causes a heavy carbon deposit.

According to Professor F. Bendemann, in reviewing the

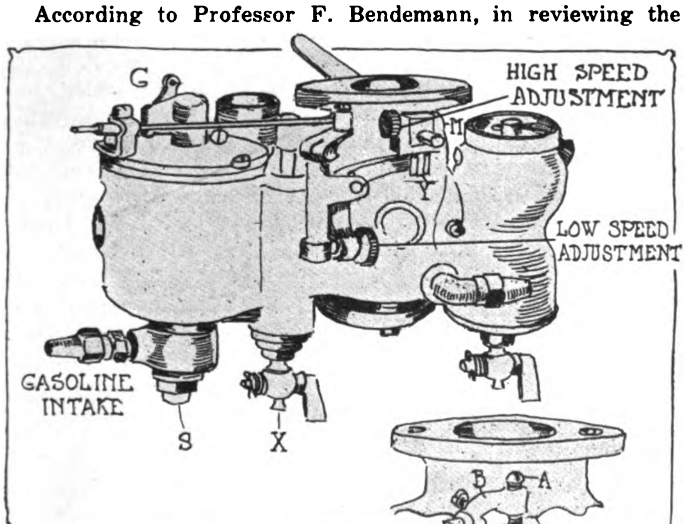


Fig. 2—New Rayfield G carbureter, showing adjustments

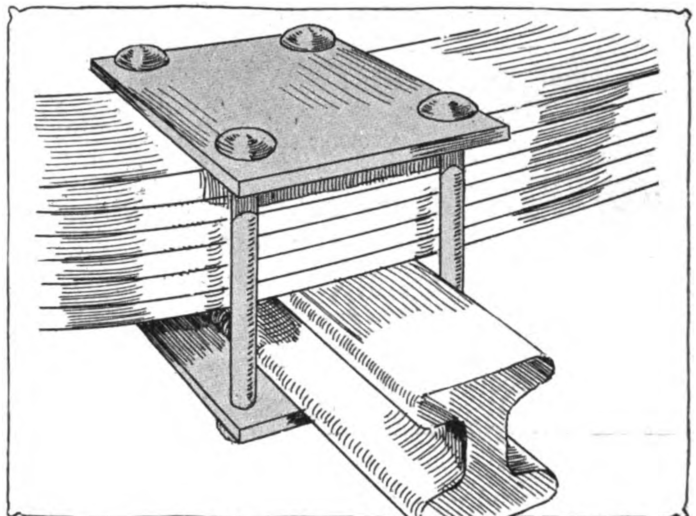


Fig. 3—Simple substitute for broken spring clip

progress in motor construction by the German builders, "at high temperatures castor oil retains its viscocity and lubricating properties considerably better than good mineral oil, as shown by the tests summarized in the appended table:

	Minimum Heat Units per kilogram	Viscosity in Engler Degrees at temperatures centigrade 60 deg.	100 deg.	120 deg.
Mineral oil, No. 1	10,116	3.37	1.65	1.41
Mineral oil, No. 2	10,080	2.75	1.46	1.20
Castor oil	8,298	10.72	2.72	1.95

"Castor oil is therefore still indispensable for air-cooled motors, but for the water-cooled motors at the contest one or the other of the two mineral oils referred to in the table was always sufficient."

Substitute for Broken Spring Clip

Editor THE AUTOMOBILE—A simple method of mending a broken spring clip is shown in Fig. 3, and as it saved me from being held up a long time on the road it is possible that it will be of service to some other motorists.

While touring in New England recently I noticed that the car developed a tendency to run to one side of the road, and finally it got so bad that I stopped to examine. I found that the right spring bolts holding the clip had given away and allowed the axle to slip back several inches.

There was a small village not far away and I drove the car to it slowly, and I had a blacksmith take two flat pieces of iron 1-4 inch in thickness and about 3 inches square and drill a 1-4-inch hole in each corner. Then I got four 1-4-inch carriage bolts about 8 inches long and improvised the spring clip shown.

Determination of Car's Age for Insurance

Editor THE AUTOMOBILE:—As the insurance rates on automobiles rise with the age of the car, when is a 1914 car purchased in July one year old, if the makers announce their 1915 model in August? What is the practice in other cities in this respect? It seems to me, that for insurance purposes, that a car's age should date from the time it is delivered to its original purchaser. The improvements on the present standardized automobile are seldom enough to make any material difference in the risk.

Pittsburgh, Pa. MURRAY FAHNESTOCK.

—A 1914 car is one year old from the date of purchase, but a 1915 car purchased in 1914 is given a lower rate the following year than if it had been a 1914 car.

Take for example a 1913 $2,000 car purchased in July, 1913, then the premium for insurance against fire and theft would be 2 per cent. the first year. The following year this

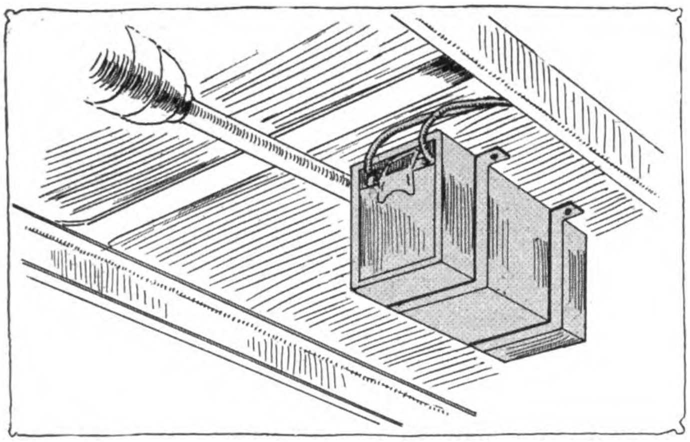


Fig. 4—Method of suspending battery from tonneau floor

car would be insured for 80 per cent. of its purchase price, or $1,600, and the rate would be increased to 2.75 per cent.

But if this car had been a 1914 car and had been purchased in July, 1913, although the premium the first year would have been the same as before, the second year the rate would have remained at 2 per cent. of $1,600, instead of rising to 2.75. In other words, the payment on the 1914 car for the second year would be two-hundredths of $1,600, or $32, while the premium on the 1913 machine would be two and seventy-five one-hundredths or $44. These rules apply to the principal companies all over the country.

Peculiar Play in Steering Gear

Editor THE AUTOMOBILE:—Will you please tell me in your next issue how to take up the play in the steering gear on a 1911 Model 30 Oakland. It is not in the steering knuckles or the drag link nor is it in the gear housing. Can it be taken up?

Isanti, Minn. EDWIN BOSTROM.

—It may be that the tie rod pins are loose, that the wheel bearings are worn or that the steering arm attached to the shaft running from the steering gear housing is loose. This shaft is squared and the arm is clamped in place over it. If the arm is merely loose, you should be able to tighten it by turning up on the nut, but if the play is very great a new part may be necessary.

Data on Design of Small Motor

Editor THE AUTOMOBILE:—I am designing a small gasoline engine, air-cooled, two-cylinder, vertical four-cycle, with 3-inch bore and stroke, to run at about 2,000 revolutions per minute.

1—What compression would it be best to figure on getting?

2—What size should the bearings on the crank and camshafts be, both diameter and length? Would three bearings on each be best? Would first-class babbitt metal be satisfactory?

3—What kind of steel is it best to use in the cams? How are they fastened to the camshaft and can they be fastened so as to be adjusted to different timing?

4—Would you advise roller or flat-ended push-rods?

5—What size and of what steel should the valve stems be with 1.5-inch valves?

6—Would the fact that the explosions occur irregularly, that is with intervals of 180 degrees and then 540 degrees, be objectionable?

7—Do you think that provision for cooling the lubricating oil would be of value?

Glen Ridge, N. J. PERCY S. WILSON.

—1—Make the compression 40 pounds.

2—Three bearings would be better than two for a motor of this speed. Make the crankshaft bearings 1.25 inches in diameter and 2 inches long, or longer if you do not have to consider the overall length of the motor. The camshaft should also have three bearings 2 inches long and 1 inch in diameter. Babbitt metal should be satisfactory.

3—Three and one-half per cent. nickel steel should be used. The cams should be pinned and keyed. It would be better, however, to make the cams and the camshaft in one piece as it is difficult to hold the cams securely. The timing can be varied by changing the meshing of the camshaft gear with respect to the crankshaft gear.

4—Use push-rods with roller ends.

5—The valves may be made of nickel, carbon or tungsten steel. Satisfactory valves should be obtained from any reputable manufacturer.

6—The irregular explosions offer a slight objection but it is not serious. Many motors of this type have been built in the past. It is better to do this than to have both pistons on the same crank throw, which would be required if the explosions occurred at equal intervals.

7—The operation of the motor would be slightly improved by cooling the lubricating oil.

Why Spacers Are Used in Annular Bearings

Editor THE AUTOMOBILE:—Why is it that spacers are placed between the balls in an annular ball bearing, but not in a cup and cone type? I should think it would make a stronger bearing if the race were completely filled with balls.

Los Angeles, Cal. J. W. BAER.

—The reason for this is simple. It is impossible to insert more balls in the annular type without cutting away a piece on one side of one race, thereby weakening the construction.

The method of inserting the balls is shown in Fig. 5, where it will be noted that the inner and outer members are placed eccentrically and the balls inserted, and then the balls are kept equal distances apart by spacers.

If a full race of balls is used, however, a notch for inserting the balls must be made and while a piece is put in to fill up this opening it is a source of weakness.

Place Battery Under Floor Boards

Editor THE AUTOMOBILE—I have an S. G. V. 1910 model and would like some advice as to the best location for a storage battery for an electric horn. The running boards are not available because a large tool box is carried on one side and the spare tires are on the other. Nor do I see how it can be placed under the seats because the gasoline tank is under the front one and the back one is too shallow.

New York City. R. P. W.

—The only solution seems to be to suspend it under the floorboards of the tonneau, as indicated in Fig. 4. Have a wooden box made just large enough to contain the battery and then have a blacksmith bend up two strips of iron to go around the container and bolt to the floor. The iron may by any convenient section, such as 1-8 inch by 1 inch. Have the bands made a little small so that they will fit snugly.

The battery may be held from slipping out of the open end by barring the opening by means of a bolt. If the closed end of the battery box is placed forward sufficient protection against mud, dust and grease will be afforded.

Weights of Pierce-Arrow Cars

Editor THE AUTOMOBILE:—In your issue of July 23 you gave a table of comparative weights of the Pierce, Packard and Peerless cars, in answer to a correspondent's inquiry. The correspondent, however, asked for the weights of these cars with the tanks empty, we presume he means without water in the radiator and without gasoline in the tank. These weights are at variance with our figures. The 38 horsepower is the most out. The weight of our 38-horsepower 1915 model is 4,263 pounds, the 48-horsepower is 5,050 pounds and the 66-horsepower is 5,450 pounds. These weights are for cars fully equipped with gasoline tank and radiator full, and also include two spare rims on the running board, four shock absorbers, a full set of tools with spare cans of oil and grease, one man top and glass front. The 38-horsepower is our five-passenger model and the 48- and 66-horsepower are our seven-passenger models. The weights of these cars fully equipped but without water and gasoline are:

38-horsepower, 4,057 pounds.
48-horsepower, 4,776 pounds
66-horsepower, 5,171 pounds.

We, as a rule, do not care to give the weights of our cars for the simple reason that our customer is apt to compare these weights with those given by other manufacturers and these weights may not include such equipment as we supply and may be without water and gasoline. Then again it must be remembered that our gasoline tanks are larger than some of our competitors, our 38-horsepower carries 26 gallons and the 48- and 66-horsepower carry 32 gallons.

These weights often show up to disadvantage and we think that in comparisons of this kind every feature should be the same in both cases, otherwise these comparisons are of no value.

Buffalo, N. Y. D. FERGUSON,
Mechanical Engineer Pierce-Arrow Motor Car Company.

The Chemistry of Combustion

Editor THE AUTOMOBILE—1—Will you please explain the chemical action that takes place in an automobile motor when the spark ignites the charge. Kindly use simple language as I am not a chemist.

2—Also state what effect the presence of moisture has on this action.

St. Paul, Minn. R. J. FOWLER.

—1—Assuming a perfect mixture, when combustion takes place when the spark occurs what actually happens is that the carbon and hydrogen, the elements in the gasoline, are reacted upon by the oxygen in the air in the cylinder, with the result that part of the oxygen combines with all of the hydrogen to form water and the rest of the oxygen combines with the carbon to form carbon dioxide. Directly after combustion the temperature of the gases is so high that the water is in the form of steam, but by the time it passes out of the exhaust pipe into the atmosphere it is merely vapor in the exhaust products. The nitrogen in the air remains neutral, that is, it is not affected by the combustion, but is merely heated up.

Gasoline is a combination of several oils forming a series that has the general chemical formula C_nH_{2n+2}, but for simplicity it will be assumed that gasoline is composed entirely of hexane, which contains 6 atoms of carbon combined with 14 atoms of hydrogen; this is expressed by the simple formula, C_6H_{14}.

Then combustion may be represented by the following equation:

$$\begin{array}{ccc} \text{Gasoline} + \text{Air*} & = & \text{Water} + \text{Carbon dioxide} \\ C_6H_{14} + O_2 & & H_2O + \quad CO_2 \end{array}$$

*Only one-fifth of the air is oxygen, the remaining four-fifths consisting of nitrogen and other inert gases, but these may be disregarded as they have no effect on the chemical action.

The above equation only holds good providing the mixture is perfectly proportioned and absolutely homogeneous. If there is too little air the combustion will not be complete and the result will be that there will not be enough oxygen to completely burn the carbon or the hydrogen in the gasoline. If there is just a little air lacking the result will be that there will not be enough atoms of oxygen to combine with all the carbon atoms to make carbon dioxide, CO_2 and therefore some of the molecules will have an atom of oxygen missing, that is, CO or carbon monoxide will be formed. With still less air it might happen that some of the atoms of the carbon in the gasoline could not find any oxygen to unite with, with the result that they will remain as carbon, and it is these small particles of carbon that indicate too rich a mixture by turning the exhaust into black smoke.

Too little air might leave some of the hydrogen atoms in the gasoline without any oxygen to combine with, and therefore some free hydrogen might be found in the exhaust.

With too much air there would be some free oxygen in the exhaust.

These remarks are assuming that the gasoline is perfectly vaporized and that the mixture is homogeneous. It is easily seen, however, that part of the charge might be too rich and another part weak, with the result that all the exhaust products mentioned will be found in the exhaust gases at the same time.

Suppose that the gasoline did not vaporize readily. Then part of the fuel would be carried into the cylinders in small globules. In the vicinity of these globules the mixture would be very rich, while some place else it might be weak.

2—The addition of water to the charge has no effect unless sufficient is added to absorb an appreciable amount of heat. When combustion takes place the water is turned into steam, and then as the temperature rises the steam is broken up into its constituent elements, hydrogen and oxygen, and a certain amount of heat is absorbed by these gases when this change takes place. Then as the temperature drops the hydrogen and the oxygen unite again to form water, and the same amount of heat is given off, so that the change does not affect the amount of heat produced nor does it change any of the gases.

Oil Trouble Caused by Wear

Editor THE AUTOMOBILE:—I have a 1914 Ford to repair and the front cylinder gets too much oil. It works all right when it has a clean plug, but after running about 100 or 150 miles, it misses. Can you give me some idea as to what the cause of the oily cylinder is?

Bath, Mich. ALBERT DETLUFF.

—The trouble is undoubtedly due to a worn cylinder piston or rings or to the openings in the three rings being in alignment. An inspection of this cylinder should show where the trouble is and if the piston or rings are worn they should be replaced.

The missing, of course, is due to the plug becoming fouled with oil.

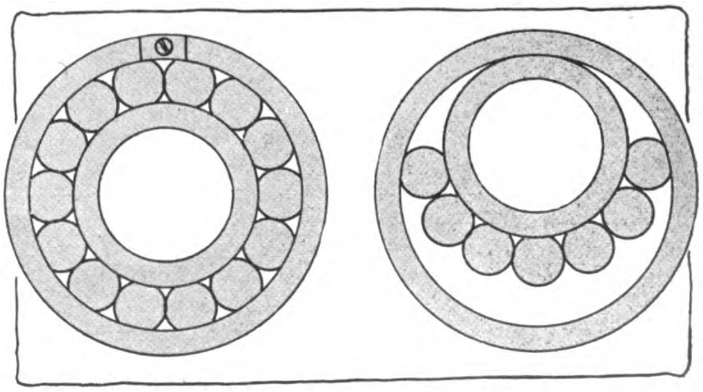


Fig. 5—Two types of annular ball bearings to show method of assembly. At the left is a full race and in order to insert the balls a part of the outer race is removable. If the races are made solid, then fewer balls must be used so that they can be inserted by placing them eccentrically, as at the right

The Engineering Digest

Design Features of Single-Valve Gnome Motor in Which Speed and Power Are Regulated Through Exhaust

CRANKCASE USED AS RESERVOIR FOR RICH, INEXPLOSIVE FUEL VAPOR CONSTANTLY RENEWED

SINCE it was found that the type of motor developed by the German Daimler company for aviation purposes (features of which were described in THE AUTOMOBILE of October 16 and 23, 1913) was also used in the Mercedes racing cars which carried away the principal honors in the recent Grand Prize race in France, the new features of other aviation motors are being watched more closely in the automobile industry. Even the improvements found of value for the motors with revolving cylinders, though these are still uneconomical with fuel and oil, are looked into, so as to keep account of all constructive and operative possibilities of the internal combustion engine.

In this class the Gnôme has long stood pre-eminent by its performances, and a description of its latest model, the *monosoupape* or single-valve type, and the method for obtaining speed and power variations by varying the stroke of the exhaust valves, will therefore be found of general interest. The description is furnished by Karl Feederle and Friedrich Hansen, residents of London, who have had ample opportunity to become familiar with the *monosoupape* Gnôme and contend that theirs is the first exhaustive exposition of the important features in this motor.

Efforts to get away from inlet valves in the pistons and to effect the intake of a fresh charge at the end of the instroke of the piston, while maintaining the four-cycle principle, began with the makers of the Gnôme motors in 1911, but acceptable results were not accomplished till 1913, when the first usable *monosoupape* model was shown at the Paris aero-salon. It was next exhibited at the Olympia show in March of this year.

It is a true four-cycle motor, with the difference from the usual arrangements that the introduction of fresh gas at the inner dead center of the piston takes place in this way that the rarefied fresh air contained in the cylinder at that moment is mixed with an over-rich gasoline vapor mixture which enters through slits in the cylinder wall. All the functions are rounded up within four piston strokes.

Details of the Cycle

The working sequence is as follows: The large exhaust valve remains open for 90 degrees after the burnt gases have been expelled and during this period the piston makes one-half of its instroke, drawing fresh air through the exhaust valve and cooling the latter. The valve now closing, this air is rarefied until the piston reaches a point corresponding to 155 degrees from the upper dead center, where it passes a circle of 10 slits in the cylinder wall, each 25 millimeters long and 5 millimeters high. The over-rich vapor mixture now enters through these slits, raising the cylinder contents to atmospheric pressure and forming an explosive mixture. On the outstroke of the piston, the compression of this mixture naturally begins at the same point—now 25 degrees past inner dead center—and continues till the ignition is effected by the magneto, at any point from the outer dead center to 15 degrees before it, according to the speed of the motor. The exhaust is opened 60 degrees before inner center and the centrifugal action pushes the burnt gas out rapidly; 35 degrees further on in the course of the piston the slits come into action again and relieve whatever pressure may still be present by providing an exit to the crank chamber, whereafter the outstroke of the piston cleans the gases completely out.

The patent protection for this new construction of the Gnôme motor relates mainly to the feature that the fresh gas mixture entering through the slits is so rich that it cannot normally be ignited from the burnt gas which may have entered the crank-chamber, and it is noted that the amount of such hot gas at all events must be small because the exhaust valve is opened 35 degrees before the slits. A further precaution is that the cylinder in the vicinity of the slits is provided with larger cooling-fins than are customarily used at the inner or lower ends of cylinders. In addition, the sleeves which connect cylinders with the crankchamber —B in Fig. 2—are provided with projections which serve partly to guide the portions of the cylinders which are below

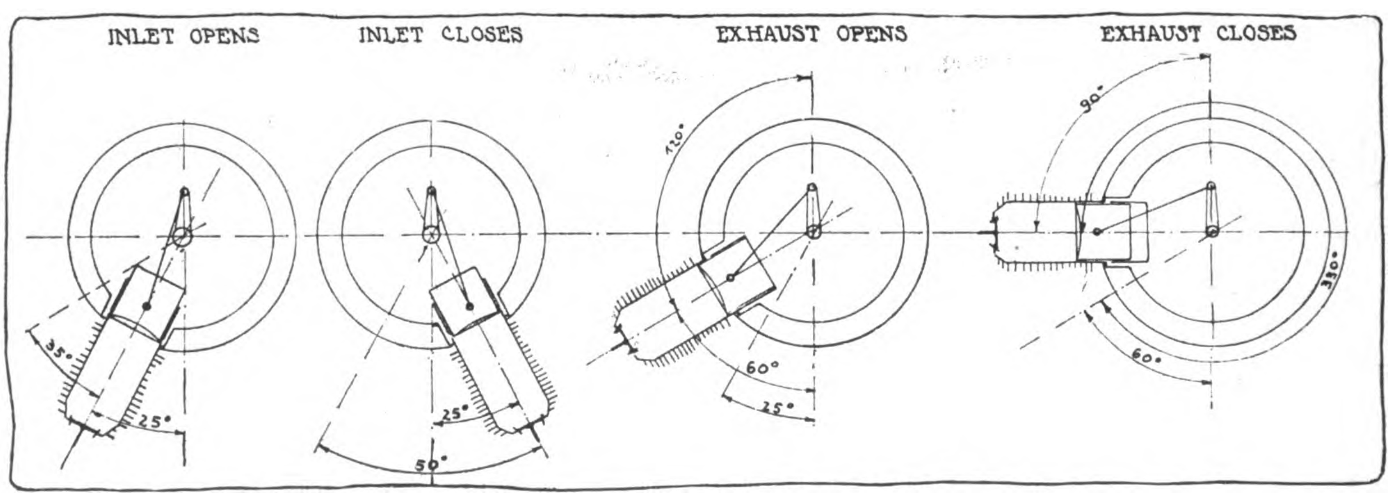


Fig. 1—Four-cycle valve-timing of new Gnome single-valve 100-hp. motor

the slits and also break up and cool the exhaust gas which may enter through the slits, so as to bring them below the temperature which might cause ignition of the fresh charge of vapor.

The arrangement of the cycle here described is illustrated in the four diagrams of Fig. 1.

Throttling by Exhaust Valve

The importance of keeping the fresh vapor so rich that it cannot be ignited made it inadvisable to attempt throttling by means of a butterfly valve acting upon a carbureter, as by this means the danger of getting too much air with a throttled charge would be obvious and the air might make the charge ignitable in the crankchamber. To control these proportions, the gasoline is taken to the motor through a small gear pump G actuated by gears from the motor, while the required air enters through the hollow propeller hub P of the motor, the stationary crankshaft remaining closed, in contrast with previous practice. In Fig. 2, which represents a section through the 100-horsepower Gnôme *monosoupape* with 9 cylinders and is drawn to scale, the channel F for the gasoline from the gear pump to the gasoline jet may be followed without difficulty. The jet J, which is nothing but a small perforated tube, lies before the middle of the intake port bored in continuation of the bore of the propeller hub and the current of air carries the constantly flowing fuel with it, filling the crankchamber with the desired over-rich and non-explosive mixture. No regulation, apart from the motor speed, is provided for reducing the fuel feed.

In order to be able to vary this speed and the power of the motor the stroke of the exhaust valves has been made variable. The construction serving this purpose is shown in Fig. 3, A, B and C, diagrammatically. A1A1 is the axis of the cylinder and of the exhaust valve; *a* is the rocker arm with fulcrum at *b*, and *c* indicates the position of the rocker arm when the exhaust valve is closed; *d* is the actuating-rod and *e* the guide for the tappet-rod *f*; *l* a ring which is turnable in the valve gear casing of the motor; *g* a small lug on this ring carrying pivotally the roller r_2 and the sliding-piece *h* upon which the roller r_1 of the tappet rod runs; *n* is the cam by which the valve is controlled. The ring *l* can be turned by means of a rod *z*, the latter

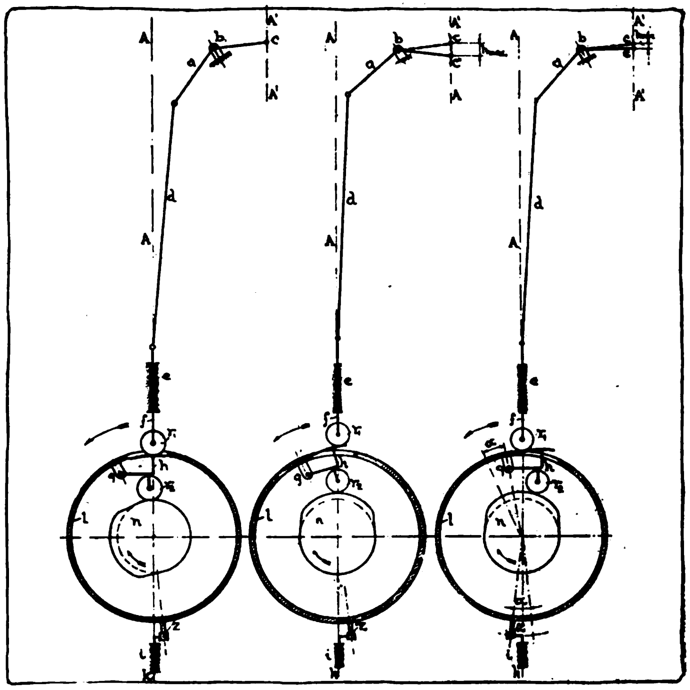


Fig. 3, A. B and C—Diagrams of variable-lever-arm system for operating exhaust valves

being first turned by the rod *k* which is mounted in the bearing sleeve *i*.

Fig. 3A shows the position of this mechanism with the valve closed, Fig. 3B with the valve opened to its maximum and Fig. 3C the same position as Fig. 3B, only with the ring *l* so turned that the valve opening is at minimum. The variation in the valve lift, as will be seen, is obtained by displacing the roller r_1 upon the sliding piece *h* with relation to roller r_2, whereby the lever arm by which the cam acts upon the tappet roller is lengthened or shortened.

Details of this mechanism can be followed in Fig. 2. Within the stationary crankshaft there is mounted a spindle S which at one end carries a triple-threaded screw T and at the other end a sliding piece U serving to turn a lever V attached to it and from the outer end of the latter extends a rod W which passes through the assembling-flange of the crankcase between two cylinders and serves to turn another lever Y to and fro, thereby turning the ring *l* as above referred to. The spindle in the crankshaft is actuated either directly by a handwheel or, as shown in Fig 2, by a pulley operated by cables. The longitudinal movement of the spindle amounts to 20 millimeters and corresponds to a half turn of the pulley.

In practice this arrangement for throttling on the exhaust has proved extraordinarily reliable and it is possible by means of it to vary the motor speed from 300 to 1,250 revolutions.

The advantages of the construction over the prior Gnôme construction consist first in dispensing with the automatic inlet valves in the pistons, so that these now can be made much lighter, and secondly in the reduced number of moved parts—one inlet valve in the motor taking the place of the many—by which the reliability of the motor has been much enhanced. It is also contended that the oil consumption has been reduced but the

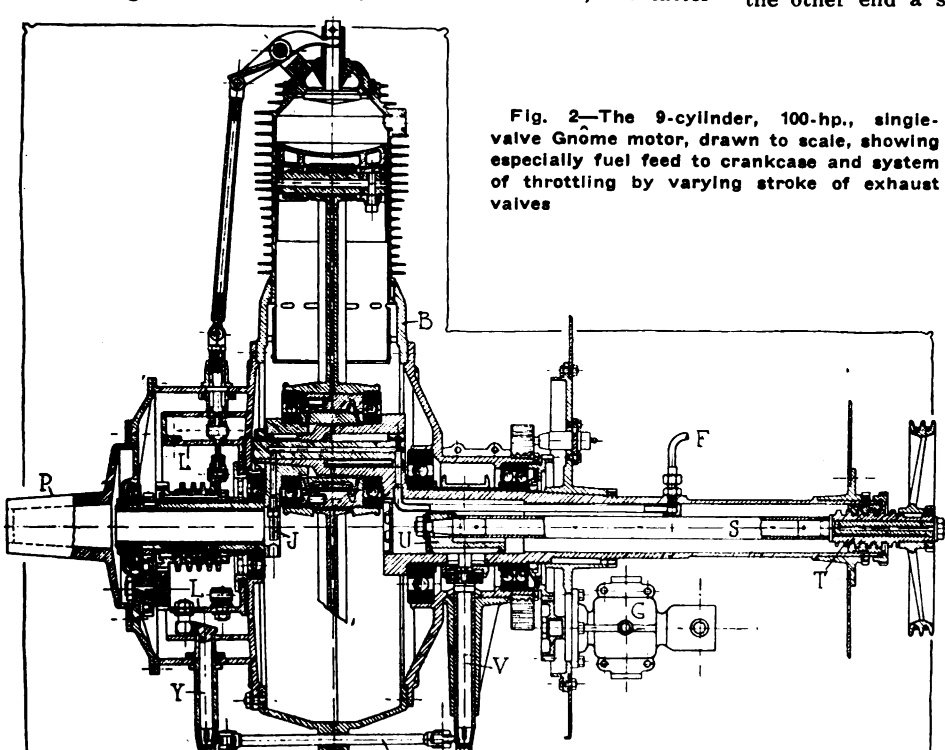


Fig. 2—The 9-cylinder, 100-hp., single-valve Gnôme motor, drawn to scale, showing especially fuel feed to crankcase and system of throttling by varying stroke of exhaust valves

writers have made the experience that considerable quantities of oil are still thrown into the cylinders through the intake slits and out through the exhaust valves. The fire risk is reduced because no opening in the motor exists on the back side toward the gasoline tank. It is a disadvantage, however, that despite all caution circumstances can arise under which explosions can take place in the crankchamber; even explosions strong enough to injure the motor. They can occur when for any reason the constant flow of gasoline is obstructed wholly or in part, as by clogging of the gasoline conduit, or when the gasoline in the tank is used up to the last drop. In these cases the gas already in the crankchamber becomes explosive because air alone continues to flow into it. Usually the result is only that the motor stops, but there is at any event an injurious effect upon pistons and joints.

The workmanship of the *monosoupape* model shows plainly the great experience gained at the Gnôme works. Some of the measurements are therefore interesting. The cylinder walls, turned from a good cast steel, are 2 millimeters thick. The crankcase is a very clean-lined sheet steel stamping made in two halves with turned-out bays for the cylinders. When the crankcase is assembled the cylinders are wedged into these cut-outs and keyed against turning. The joints with the case are of course outside of the slits in the cylinder walls, and farther inward the cylinders are aligned by means of the before-mentioned projections or teeth upon the metal of the casing. The exhaust valve is 50 millimeters in diameter, its stem 14 millimeters. The valve springs are of 3-millimeter steel wire bent to hairpin form and coiled with 2 1-2 turns. The maximum stroke of the exhaust valves is 10 millimeters and the minimum 3 millimeters. The valve seats, screwthreaded, and the valve guides, formed as simple two-armed yokes, are made very strong and in one piece with the fulcrum piece for the rocker arms. Bearings and lubrication are as in earlier models. The *monosoupape* is made in two sizes, one with 7 cylinders of 110 millimeter bore and 150 millimeter stroke giving 80 horsepowers at 1,200 revolutions per minute, and another with 9 cylinders of the same dimensions giving 100 horsepowers.—From *Der Motorwagen*, July 20.

Recent Court Decisions—Owner Held Liable

By George F. Kaiser

RESPONSIBILITY of a motorist for damages caused to his car depends on whether or not the driver was or was not engaged in his business at the time of the accident, says the Court.

A collision occurred between two automobiles, one of which was driven by a 19-year-old daughter of the owner. She usually drove the car, but at the time of the accident had turned the wheel over to a cousin at whose house she had been calling in company with her younger sister. The Court said it was a question whether or not she was engaged on her father's business at the time of the accident and answered the question affirmatively, saying that when a parent has an automobile and a child is authorized to use it at any time and the child injures a person, it is error to say that as a matter of law the parent is not liable. The Court also said that the fact that an agent when driving a car on his master's business permits a stranger to drive it, the master is not thereby relieved from liability.—*Kayser vs. Van Nest*, 146 *N. W.*, 1091.

Texas Repair Man's Lien

Texas Court holds automobile repair man has a lien for storage and repairs.

A car owner placed his car with a motor company for repairs, with the understanding that it was to be put in first class condition. A dispute arose as regards the bill and the owner, refusing to pay, the dealer advertised the car for sale. The owner then sued them for $1,000 damages to the car, $385 for loss of use of the same and asked that an injunction be granted restraining the sale. The owner claimed that it was agreed that $35 was to be paid by him to cover all charges for labor and materials. The defendant denied this agreement and claimed $73.17 was the reasonable value of the work and also asked payment at the rate of $5 per month for the period during which the owner refused to accept the car and pay the bill.

The repair man recovered judgment for the charges and for storage at the rate of $2.50 per month, the Court saying: "At common law warehousemen had a special lien on property stored with them for their proper charge in connection with the specific bailment and the right to retain possession until paid, and such lien and right were preserved by the revised Statutes of 1911, Act 5671, providing that nothing in Chap. 8 relating to liens of which such article is a part should impair or effect liens arising at common law or in equity and hence a company engaged in the business of repairing and storing automobiles is entitled both at common law and in equity to liens on a car for storage charges after the owner improperly refuses to pay for the repair and remove the car.—*Macolm vs. Sims Thompson Motor Car Co.*, 164 *S. W.* (*Tex.*) 924.

Suit of Newsboy's Father Reversed

Court holds that where a father sues a motorist to recover for money he has spent for hospital services, and to hire a physician to attend his son, who was run down and injured by an automobile, he is entitled only to recover the reasonable value.

A newsboy was run down and injured by an automobile. His father sued, as guardian, and recovered $750 for his injuries. He then started another action against the automobile owner, claiming $5,500; $5,000 for loss of services to the father, and $500 for expenses. The jury gave him a verdict for $500. When the motorist appealed, the case was reversed, because the court held that it was wrong to put in evidence all that the son earned as a newsboy, when part of his earnings consisted of tips, as tips were too indefinite to be properly computed.—*Forgeson vs. Hanford*, 139 *Pac.*

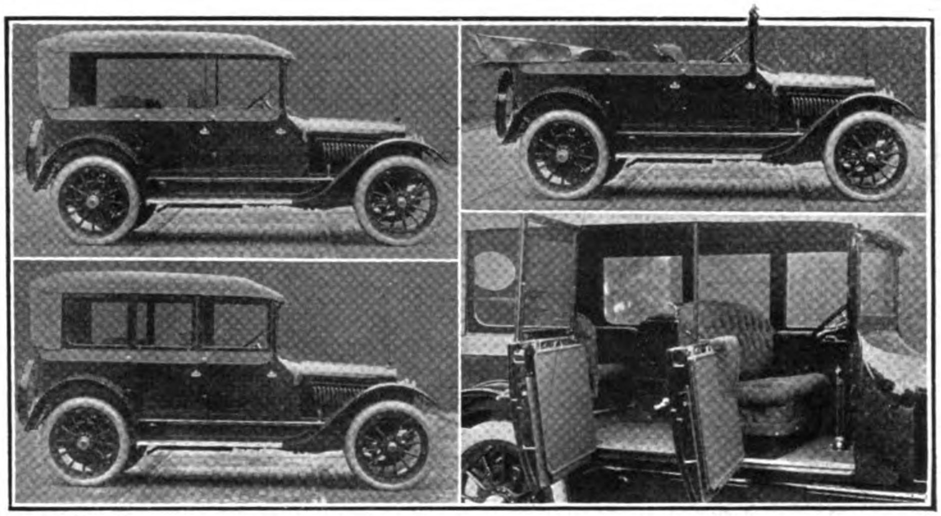
Motorist Not Liable

California Court says that it is the duty of foot pedestrians to look both ways before starting to cross a street, particularly when the street over which the pedestrian intends to cross is a busy thoroughfare in the heart of the business district of a great city and that the fact that a motorist violates a speed ordinance does not prevent the Court from finding the pedestrian guilty of contributory negligence and refusing to allow him to recover for his injuries.

This case was a suit for personal injuries caused by an automobile in Oakland, Cal. The chauffeur was found to have been guilty of negligence because he drove his car at a speed in excess of that allowed by the city ordinance and gave no warning on approaching the street crossing. The injured person sued both the chauffeur and the company by which he was employed. It was found that the chauffeur was not on the company's business, however, so he was held not to be liable and then the Court further finding that the pedestrian was guilty of contributory negligence absolved the company from liability and rendered judgment against the injured person.—*Davis vs. John Breuner Co. et al.*, 140 *Pac.* (*California*) 386.

Wide Doors in New Convertible Bodies

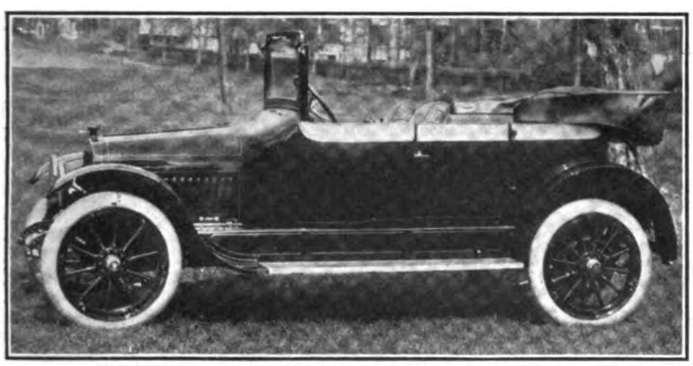
Springfield Company Has Three New Bodies—Sedan, Limousine and Runabout Types



Four views of new Springfield limousine type. Note three windows, instead of four

THREE new convertible bodies with exceptionally wide window spaces have recently been added by the Springfield Metal Body Co., Springfield, Mass. In the limousine and sedan types the window space has been divided into three panels, giving a better lookout and, since the doors are wider, easier entrance and egress. In addition a convertible runabout type, also with wide doors, is offered.

The new limousine is built with five and seven-passenger bodies and differs from former models in that the doors have been widened considerably, the front one now being 22 inches and the rear 27; in this way the window between the two doors in the older models has been eliminated. This change not only gives the passengers more room but it simplifies the raising or lowering of the sides. The door windows are on hinges and lay on the inside panel of the doors. They are covered by a pad of the same material as the upholstery, and in raising the sides it is merely necessary to swing these pads out of the way and pull up the windows. Only the rear windows are carried in a pocket on the back of the driver's seat, while in the old type the windows between the doors are also carried here. Thus it is seen that it is less trouble to put up the sides on this new body.



Sedan with top and sides down

The sedan type is similar to the limousine except that it has a single door 25 inches wide. There is an aisle between the front seats which are of the chair type. This model is designed with seating capacity for four or five people.

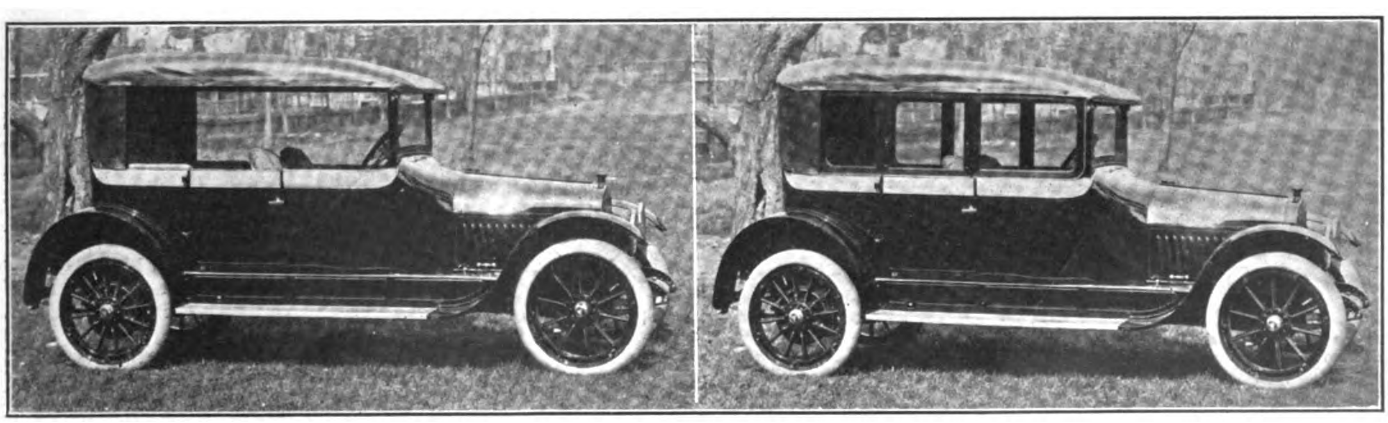
The runabout is made with either a two or three-passenger body.

The painting and the upholstery as well as details concerning the interior fittings are left to the individual taste of the purchaser. The upholstery material may be hand-buffed leather, broadcloth or motocloth.

The prices of the bodies mounted are: Runabout, $900; sedan, $900; five-passenger limousine, $1,300; seven-passenger limousine, $1,400.

The advantages of the convertible type of body are almost too well known to require enumeration. It does the work of two bodies, one of the closed and another of the open type, and further has the advantage of being able to change from one to the other in less than 5 minutes. In changeable weather this is of special advantage because one day it may be pleasant enough for the touring type of body while the following day it may be cold and inclement enough to make the closed type highly desirable.

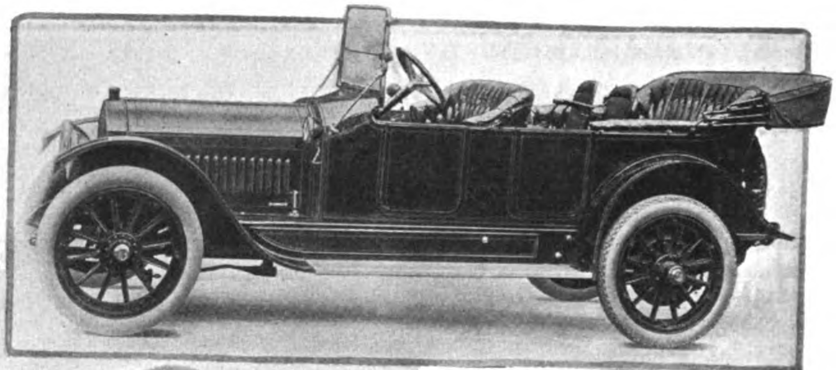
These bodies may be mounted on any standard chassis.

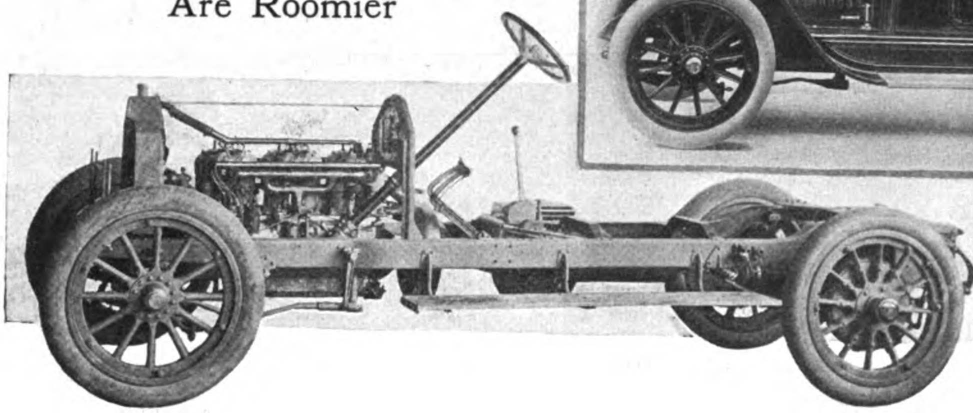


Left—Sedan with top raised. Right—Sedan fully inclosed

1915 Republic Is 2 Inches Lower

Clutch Has Springs Under Facing—Steel Timing Gears Used—Bodies Are Roomier





Above—1915 Republic six-cylinder, seven-passenger touring car for $2,950. Note new method of fastening windshield

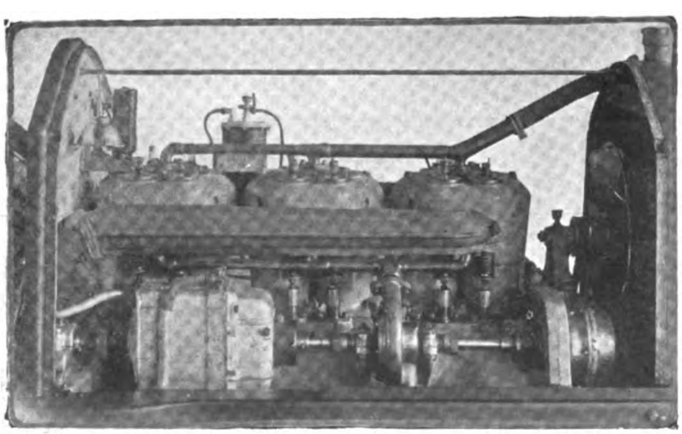
Left—Side elevation of six-cylinder chassis on which two, four and five-passenger bodies are mounted

MARKED body changes, a reconstructed clutch, steel timing gears and the introduction of the Stewart-Warner vacuum gravity gasoline feed are the changes in the Republic Six for 1915. The cowl has been lowered and lengthened, the distance between the dash and front seats increased 2 inches, the seats lowered 2 inches and the method of fastening the windshield has been improved, giving a longer, lower car than the preceding model. The price of the car remains the same at $2,950 for the two, four- and five-passenger bodies.

T-Head Six-Cylinder Motor

The chassis which carries all the body models made by the Republic Motor Car Co., of Hamilton, O., has a wheelbase of 133 inches. The power plant, which remains the same as in the 1914 model, is a six-cylinder 4.25 by 5-inch motor, rated by the manufacturer at 60 horsepower and having a formula rating of 43.5. It is of T-head design with the cylinders cast in pairs.

The cylinders are cast of close-grained gray iron and carry 2.25-inch interchangeable exhaust and intake valves. The pistons are of good proportions, measuring 5.5 inches in length. The connecting-rods are of I-beam section and are 11 inches in length. The crankshaft is carried on four main bearings, the front and center ones are 2.5 inches long and the rear which carries the strains imparted by the starting motor, which engages with the flywheel, is 3.5 inches long, providing a good margin of strength at this point. The crankshaft diameter is 2 inches.



Right side of six-cylinder motor 4.25 by 5 inches, used in the 1915 Republic. The manufacturer rates this motor at 60 horsepower. Its formula rating is 43.5. Note mounting to Delco generator on pump shaft

Two Camshafts Employed

There are two camshafts, each with the cams cut integrally on the shaft. The camshaft bearings are four in number and the diameter of the camshafts is 15-16 inch. The two center camshaft bearings and the rear bearing are 2 inches in length. The forward camshaft bearing which receives the thrust given by the timing gear in driving the shaft is made 2.75 inches in length. This year the timing gears are made of steel whereas in the 1914 model the gears were of cast iron.

Force-Feed Lubrication

The motor is oiled by a force-feed system. The oil is carried in a reservoir beneath the crankcase and is pumped from this by a gear pump which takes the oil through a sight feed on the dash and then forces it through an independent lead to each of the main bearings and by means of a hollow crankshaft to the lower connecting-rod bearings. From the latter point the oil is thrown to the cylinder walls.

Delco Lighting, Starting and Ignition

The electric equipment of the car consists in a Delco lighting, starting and ignition plant. The Delco system installed on this car has one special feature which distinguishes it from other Delco designs in that the starting drive and the generator drive are independent. The control is also the latest design, starting being accomplished by merely depressing a pedal. The Delco ignition system is a dual design. The running current is supplied by the generator and the battery supply for starting from the storage battery.

Stewart Gravity Feed System

The gasoline system is the Stewart-Warner vacuum gravity system. A 21-gallon gasoline tank is supported from the rear of the frame members. The system comprises a float tank attached to the dash of the car and two pipes, one of which runs from this tank to the carbureter and the other to the fuel tank. The suction of the motor draws the fuel first into the small dash tank from which it flows by gravity to the carbureter. It is claimed that this system does away with the disadvantages of a pressure feed and is still simple. A Rayfield carbureter is used.

The cooling of the motor is effected by a gear-driven centrifugal pump which forces the water through a cellular radiator and through the cylinder water jackets.

Springs Under Clutch Facing

The clutch which has been rebuilt this year is still of the cone type but instead of having cork inserts there are a series of flat springs placed beneath the leather. The springs are twelve in number equally spaced about the periphery of the cone. The operating mechanism of the clutch has not been altered. The pedal for the clutch also operates the service brake. Another pedal operates the emergency brake, thus permitting the operator to put on both sets of brakes and at the same time to keep both hands on the steering wheel. The gearset is the same as in the past, furnishing four forward speeds. The gears and shafts are of 3.5 per cent. nickel steel operating on Hess-Bright ball bearings.

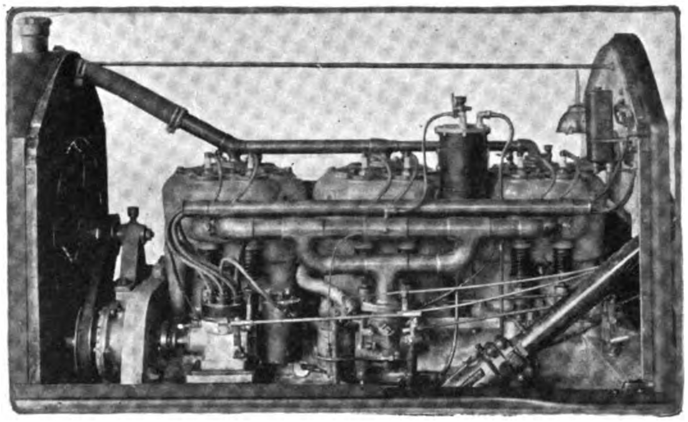
Hess-Bright Bearings Used

The driveshaft operates the bevel gear differential through a 3.5 per cent. nickel steel pinion. The axle is a floating design inclosed in a pressed steel housing and runs on Hess-Bright annular bearings. The shafts are vanadium steel and the gears are chrome vanadium. The front axle is a drop-forged I-beam and the running parts are carried on Hess-Bright ball bearings.

The chassis frame is of pressed steel channel, 5 inches in depth, and made up of 3-16 inch material with integral gusset plates to meet the strains of the rear spring suspension. It is narrowed at the front end to shorten the turning radius and has a dropped construction over the rear axle.

Left Drive and Center Control

The tread of the car is standard, and the wheels are 36 inches in diameter, taking 4.5-inch tires. The front springs are chrome vanadium, 2 by 38 inches. The rear springs are three-quarter elliptical 2.25 inches wide and 50 inches long. They are fitted with rebound straps. The brakes operate on drums bolted to the rear wheels and are 2.5 inches wide by 16 inches diameter. Left drive and center control is used. The steering wheel is 18 inches diameter.



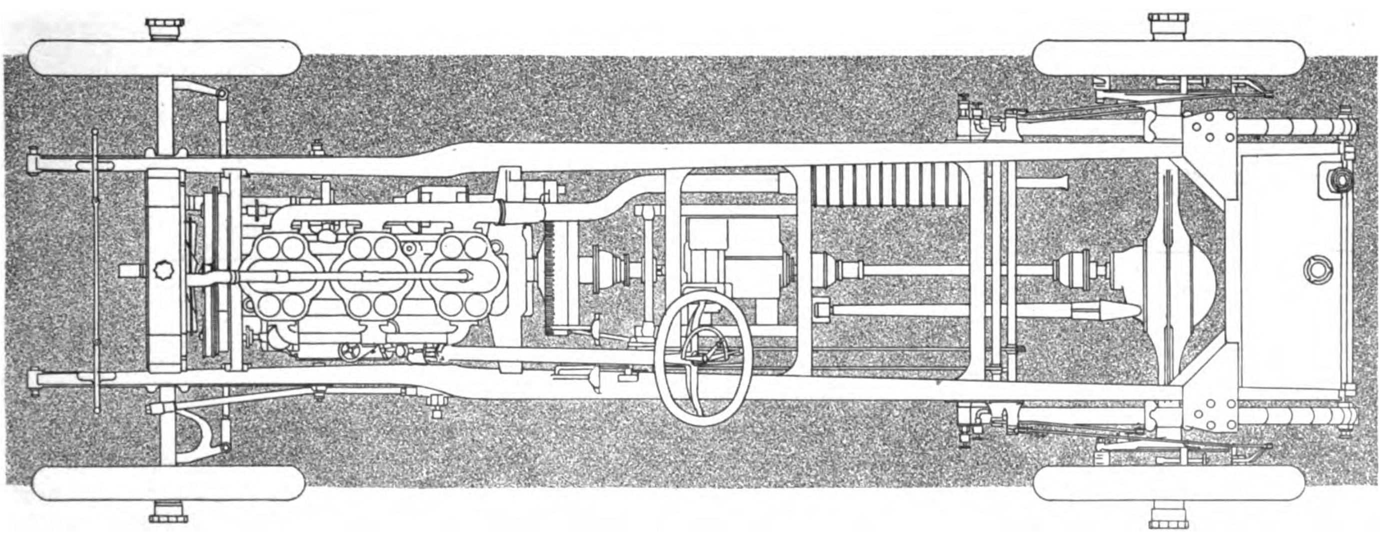
Left side of six-cylinder motor used in 1915 Republic, showing mounting of Rayfield carbureter, intake manifold and hot air intake for carbureter brought between front pairs of cylinders. Also note mounting of Delco ignition system. This is a dual design, the running current being supplied by the generator and the battery supply for starting being taken from the storage battery

New Company To Build Light Car for $800

PONTIAC, MICH., July 31—Men well known in the automobile trade all formerly connected with the Oakland Motor Car Co., are now organizing a new company which is to have a capital of not less than $300,000 and which is to build a light, popular-priced automobile, which it is said will cost between $800 and $900. The promoters are, former vice-president George E. Daniels; former assistant sales manager Howard Bauer; J. H. Newmark, former advertising manager; W. R. Williams and L. Eccleston. The concern will probably locate in Pontiac although this has not been definitely decided.

$825,394 in Packard Truck Sales in 4 Months

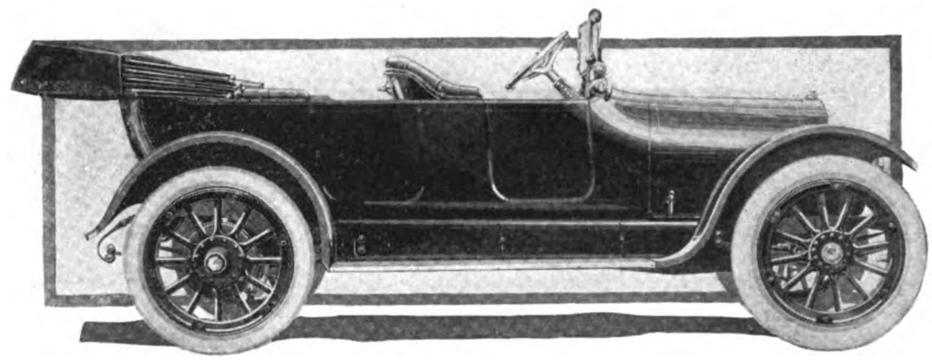
DETROIT, MICH., July 31—During the 4 months from March to June, 1914, the motor-truck business of the Packard Motor Car Co., Detroit, has been near 60 per cent. greater than during the corresponding period in 1913. During June the number of trucks sold represent a sum of $825,394, or $256,994 more than in June, 1913. "If the business continues that way," said one of the officials of the Packard company, "and we see no reason why there should be a slacking down, it will probably mean the biggest business year the Packard company has had in the sale of its trucks."



Plan view of Republic chassis, showing main gasoline tank at the rear from which fuel is led to the float tank attached to the dash of the car, whence it runs to the carbureter and motor by gravity. Note strong torsion rod from differential housing to cross-brace at rear of gearbox

New Streamline Overland Has Left Drive

Four Cylinder Chassis Continued Practically Unchanged—Reciprocating Parts Lighter—Many Minor Refinements



Overland four cylinder, five-passenger touring car for 1915. Note the streamline body with left drive. This car uses 34 by 4-inch tires and sells for $1,075

UNDER the name of Model 80, the 1915 Overland four-cylinder car is a continuation of the Model 79 introduced for 1914. The new car remains the same in all the elementary features and important dimensions as in 1914, but has been refined throughout to give a larger, roomier design of up-to-date appearance.

Graceful Streamline Body

The striking feature of the new model is the large, graceful streamline body with its left drive. This is the first year that the steering wheel has been mounted on the left in Overland cars. In shifting from right to left drive little change has been made in the chassis. In fact, the only alteration necessitated in the motor is the bending of the exhaust manifold closer to the cylinders.

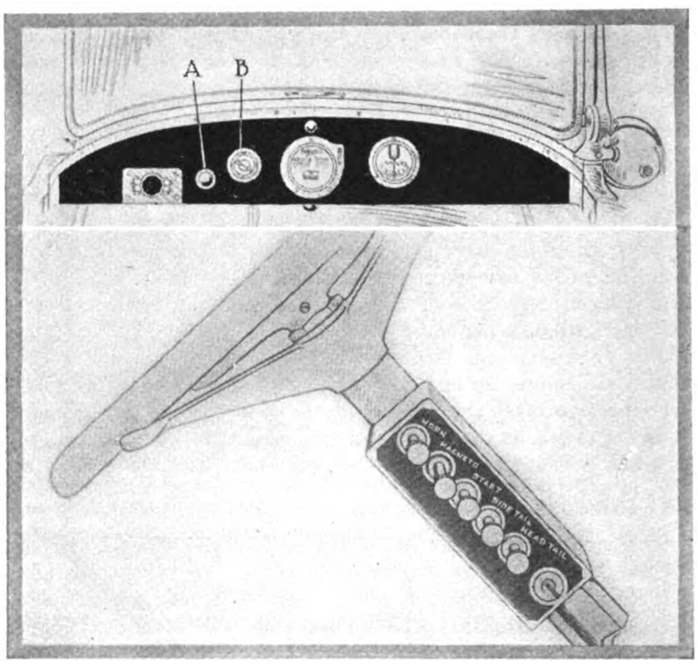
Improvement in Oiling System

The chassis remains practically the same as it was on the Model 79. The motor has not been altered, with the exception of a small improvement in the oiling system, which has been made to insure all cylinders securing an equal amount of oil on level roads and when ascending a steep grade. The change provided to accomplish this result is the moving of the oil feed to the forward end of the crankcase. The reciprocating parts have been lightened by making the webs in the pistons thinner than last year, and the piston rings are now balanced by having drilled holes which allow the gases to get behind the rings.

For easier assembly and to do away with metallic sounds, a union joint has been placed in the exhaust pipe just back of the motor. Ignition is now by Bosch high-tension magneto driven at crankshaft speed through a leather coupling. The carbureter is also improved by having a hot-air attachment for both the primary and auxiliary ports.

New Features of Control

In moving the steering gear to the left, the gear control is set farther forward from the front seat than it was in the previous model. Other features of the control have also been changed: A switch box is now attached to the right side of the steering column, 2 inches below the wheel. Through this keyboard the electric horn, lights and ignition are controlled without the effort of stooping forward to the instrument board. The starter button is also on this keyboard and must be pressed before the starter pedal. This arrangement has been made so that it is not possible for the driver to throw in the starter by accidentally stepping on the starting button. Pressing a button on the steering column operates a solenoid which unlocks the sliding gear. The current is connected when the armature shaft sliding gear meshes with the teeth of the flywheel gear.

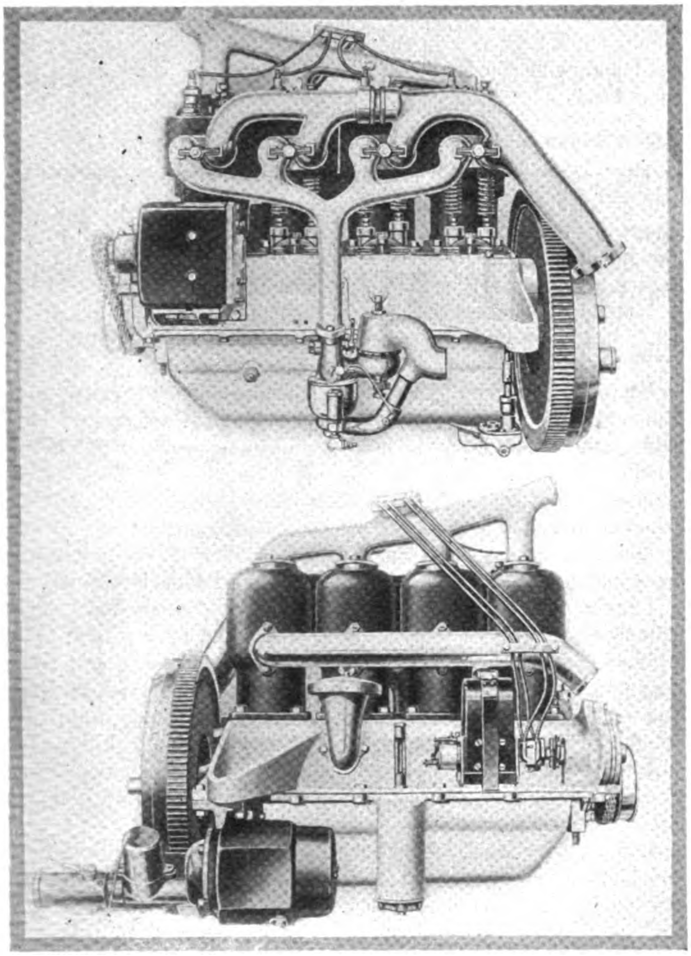


Above—Cowl board of 1915 Overland. A is the primer and B is the sight feed for the oil in which a small vertical wheel operated by the oil always shows how the oil is flowing when the motor is running. Below—Control switches mounted on steering column, forming a centralization of electrical control

There is a muffler cut-out on this model which can be operated by kicking a small lever. The accelerator is of new design and a side rest is provided for the foot to eliminate strain when driving for a long distance. The pedals on the coupé model are now adjustable. A new sight feed will be found in the layout of dash instruments. This is an ingenious device which has a small vertical wheel operated by the oil passing through the sight feed. When the oil clogs the feed so that the ordinary sight feed would not be visible, with this device it is still possible to see the revolving wheel and thereby follow the oil flow.

Body Has Been Greatly Enlarged

The body has been greatly enlarged and provides an exceptional amount of space both in the forward compartment and in the tonneau. Though the wheelbase remains at 114 inches, the space has been utilized better and larger seats and many other features of comfort included. The rear seat,



Above—Valve side of Overland four-cylinder motor for 1915. Note the unusually low mounting of new Schebler carbureter insuring proper feeding of fuel under all conditions. Lower—Exhaust side of 1915 Overland motor showing high-tension Bosch magneto driven through a flexible leather coupling, oil level indicator and location of starting motor. Note large water intake pipes for thermo-syphon cooling system, and also method of conducting wires from magneto to plugs.

for instance, is now 49 inches wide inside. The front seat is 40 inches wide, and the backs are 19.5 inches high in the rear and 17 inches in the front. The seats are 20 inches deep in the rear and 19 inches in front.

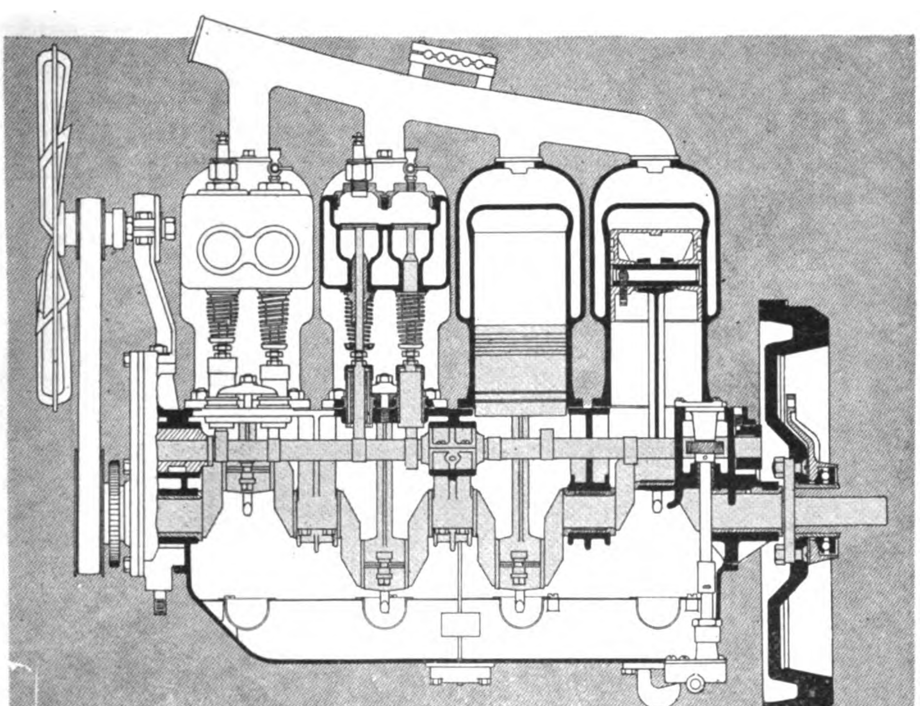
Curtains Stored in Front Seat Back

Many interior refinements are to be noted. There is a new top which has its storm curtains stored in a metal box directly behind the front seat, rendering it possible to put these curtains up without disturbing the passengers in the tonneau. Instead of the leather straps which ordinarily hold the folded-down top, the new Overland has a unique clamp which holds the top back securely and at the same time prevents all rattling. Leather pockets are now provided in all the doors and in addition these doors are hung on concealed hinges with inside-operated latches placed so as to make it impossible to catch in the clothes of a passenger leaving the car.

The front seat has a division between the driver and the front passenger, whereas in the Model 79 the front seat was all in one. The windshield is now built directly on the top of the cowl and provides rain vision and ventilating facilities, at the same time being waterproof. The fittings on this windshield are smaller than on the previous design. The folding windshield brackets are now vertical in place of the sloping brackets used before. These changes are in line with the development of the streamline form of car used this season. The radiator is molded into the body curve and the engine hood slopes gradually to the new form of cowl dash. The body line then sweeps without abruptness to the full curved tonneau back, giving a well-rounded design, which follows the modern trend in body design without offering anything of a radical departure from standard practice.

Body Is 3.25 Inches Lower

The floating axle is continued and the brakes are unchanged, but a new design of front axle is employed, which, together with the body frame, brings the body 3.25 inches closer to the ground. The rear springs are now underslung and both front and rear are the same shape as in the Model 79. The rear springs are longer than they were, being now 48 by 2 inches whereas they were formerly 42 by 1.75 inches. On the Model 80 the frame has been given a drop of 3.25 inches. It is much stronger, having a channel section 3-16 inch deeper, 1-4 inch wider and 1-64 inches thinner in the webb than the previous model. The wheel size of the car has also been increased and now 34 by 4-inch tires are used in place of the 33 by 4.

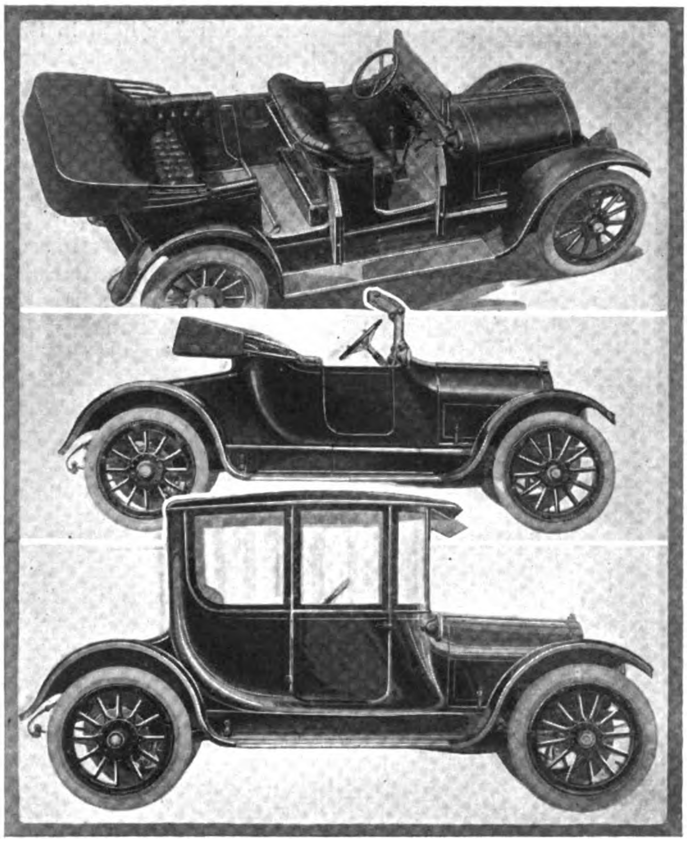


Part sectional view of 1915 Overland motor showing mounting of spark plugs directly over intake valves and priming cups directly over exhaust valves

Electrical System Slightly Changed

The starting and lighting system has been re-designed in many particulars: while in the previous model the starter shaft was connected with the crankshaft by silent chain, it now meshes directly with a gear wheel on the flywheel. With the new starting system the Overland engineers claim that the motor can be cranked under ordinary circumstances at from 190 to 200 revolutions per minute. The electric generator, which is a separate unit, is mounted on the left side of the motor and is driven by silent chain. The features of this system will be described later.

The price of the standard touring car model, seating five passengers, is $1,075. The two-passenger roadster



Top—Body view of 1915 Overland five-passenger touring car, showing arrangement of instruments on cowl board, centralizing control on steering column, left drive, hand control quadrant set forward for easy egress, pockets in doors and container for side curtains behind front seat. Middle—Two-passenger roadster design fitted on four-cylinder chassis. Bottom—Four-passenger coupé

is offered at $1,050, while the four-passenger coupé, which comes equipped with 35 by 4.5 non-skid tires, is listed at $1,600. These prices include full equipment, and are the same for the touring car, $25 less for the roadster and $50 more for the coupé than they were for the previous model.

Motor Develops 35 Horsepower

The Overland power plant has its four cylinders cast singly and set 9-16 inch off center. The cylinders are L head shape, carrying the valves and manifold all on the left side of the motor. The bore is 4.125 and the stroke 4 5 inches, developing, according to the Overland engineers, 35 horsepower on the brake at normal speed. The pistons have two rings, each of which is a double design providing compression and lightness in small space. There are two oil grooves below the wristpin. The wristpin is held solidly in the piston boss and is of hollow design. The wristpin bearing is lined with bronze. The connecting-rods are I-beam section and are connected to the crankshaft at the crank bearing by two bolts.

Five-Bearing Crankshaft

The crankshaft is a carbon steel drop forging having five main bearings. The length of the main bearings are respectively 3.5 inches and 2.125 inches. The rear bearing has the first mentioned length, having to carry the flywheel and to take the thrust of the starting motor. The other four bearings are all the same length.

The camshaft is also a carbon steel drop forging and is carried on three bearings. The length of the rear end bearing is 2 inches, the front bearing is 2.25 inches and the center bearing 2.75 inches. The diameter of the camshaft is .9375 inch. The cams are integral with the camshaft and act directly on the push-rods of the valves.

The tappets are held in long guides which are designed to prevent oil from leaking past the bushings. The valve springs are held in cup-shaped disks and the valves are also provided with bushings at the point where they enter the cylinder.

Spark Plugs Over Intake Valves

The spark plugs are placed directly over the intake valves and priming cups are placed over the exhaust valves. The shape of the ports and the method of extending the water jackets around them are shown in the sectional view of the motor. Valve opening diameter 1.625 inches, intake lift 11-32, exhaust 13-32 inches.

Cooling By Thermo-Syphon

Cooling is accomplished by a thermo-syphon system and the water jackets, together with the water intakes and outlets, have been kept large with a minimum amount of curvature to meet the requirements of this system. Cooling is further aided by a six-blade fan driven by a belt. The fan bracket is bolted to the crankcase. A change has been made here for this season in that the fan now runs on ball bearings in place of the plain bearings used in Model 79.

Lubrication of the motor is secured by the constant level splash system, in which the oil is circulated by a pump. The oil reservoir is in the bottom half of the crankcase and from this point the oil is taken by a gear pump and forced through the new sight feed on the dash. The oil lead runs along the length of the crankcase and keeps the splash troughs constantly full. The scoops on the bottoms of the connecting-rods keep the bottom of the motor filled with a thick oil mist.

Current for ignition is supplied by the Bosch magneto mounted on a bracket at the right front end of the motor. The drive is through a leather coupling and the leads are carried in fiber blocks which are held on the water intake and outlet pipes.

Bosch Single Ignition Used

At the speed at which the motor cranks the engine, there is no need of an auxiliary system for starting and hence the Bosch single ignition has been adopted. The generator which supplies the current for the storage battery is mounted on the left side of the motor at the front end and is driven by silent chain off the crankshaft. The generator cuts in at a car speed of 7 miles an hour and reaches its maximum output of 14 amperes at 18 miles per hour. Regulation of the current is effected by a compound shunt winding in the armature of the generator. The cranking motor is series wound, operating at 6 volts through a gear which meshes directly with the flywheel.

Double Heating of Carbureter Intake

The gasoline system is by gravity. On the touring cars the capacity of the tanks is 15 gallons and on the roadster 30 gallons. The carbureter is the latest design of Schebler Model R, provided with a double heated air intake which takes care of both the primary and auxiliary air supplies. This arrangement is shown in the side view of the motor. The carbureter primer has been moved from the steering column to the cowl board and by its use a rich mixture can be provided for starting. No amount of gradient which will ordinarily be found can affect the flow of gasoline to the carbureter, as it is hung exceptionally low. The straight part of the intake manifold extends vertically upward to some distance before it branches out in the balanced Y in passing to the cylinder ports.

New Gear Ratios Adopted

The clutch is a leather-faced cone provided with a brake to aid in gear shifting. This design has not been changed in any particular. The gearbox, while the same in nearly every particular, now has a different set of gear ratios and the countershaft has been made adjustable by the addition of two adjustment screws, one at either end. The gear ratios are now as follows: First—11 7-16 to 1; second—6 7-8 to 1; third—3 3-4 to 1; reverse—14 3-4 to 1.

With these ratios at 1,000 revolutions per minute of the motor, the car would be traveling 8.85 miles per hour on first speed; 14.65 miles per hour on second speed; 27.0 miles per hour on third speed and on reverse 6.86 miles per hour.

Rear Axle Gearbox Continued

As in the past, the Overland gearbox is mounted at the rear and bolts by means of a broad flange against the housing of the rear axle. The propeller shaft, which is of cold rolled steel, high forging stock, is 1.125 inches in diameter and is inclosed in a torque tube which is flanged at its rear end and is there connected to the gearbox, while at its forward end it terminates in a forked yoke which is connected flexibly to a cross member of the frame, thus permitting a rising and falling action of the rear axle. There is only one universal in the driving line and this is located at the front end of the driveshaft.

Three-Quarter Floating Rear Axle

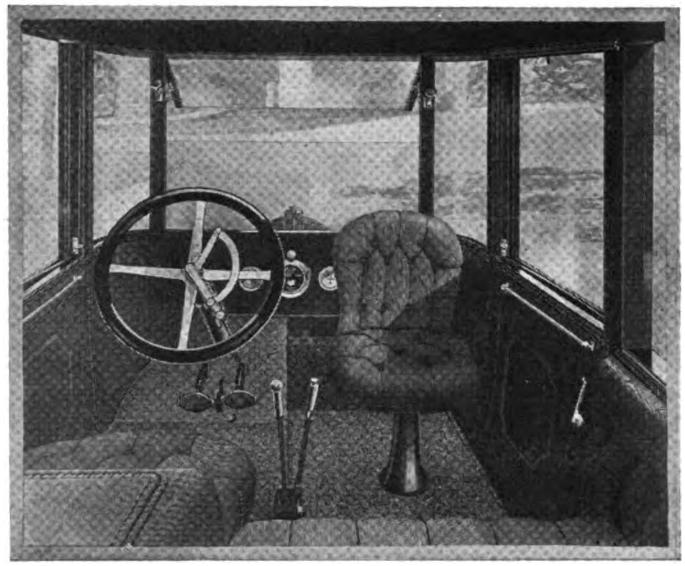
The floating rear axle is carried on Hyatt roller bearings. In this, the outer bearing is mounted on the outside of the axle housing. By this arrangement the shaft does not carry the weight of the car but merely transmits the driving stresses. There is a thrust bearing on the axle shaft at its inner end, which takes up any side thrust.

Longer Springs Are Used

Longer springs are now used to accommodate the larger body. The brakes are the same as on the Model 79, having a drum diameter of 13 inches inside. The front axle is new. It is a drop forged I-beam. The steering knuckle spindle is equipped with Timken taper roller bearings. While the steering gear has been moved over to the left side, it has not been changed in any other particular. It is an adjustable worm and full gear type with the housing bolted to the side frame. The steering wheel diameter is 18 inches and on this the spark and throttle levers are mounted as usual.

Touring, Roadster and Coupé Bodies

In body work the Overland car for 1915 provides either a five-passenger touring body or a two-passenger roadster. There is also the four-passenger coupé. The body is a streamline design and the frame, running-board brackets and battery box are concealed by mud shields, which add materially to the appearance of the car by giving it a long, low appearance. The swivel seat used in the coupé may be faced either forward or backward.



Interior view of Overland coupé. The entire interior is finished in Bedford cloth. Levers operate the windows, foot pedals are adjustable and all passengers face forward. This car sells for $1,600

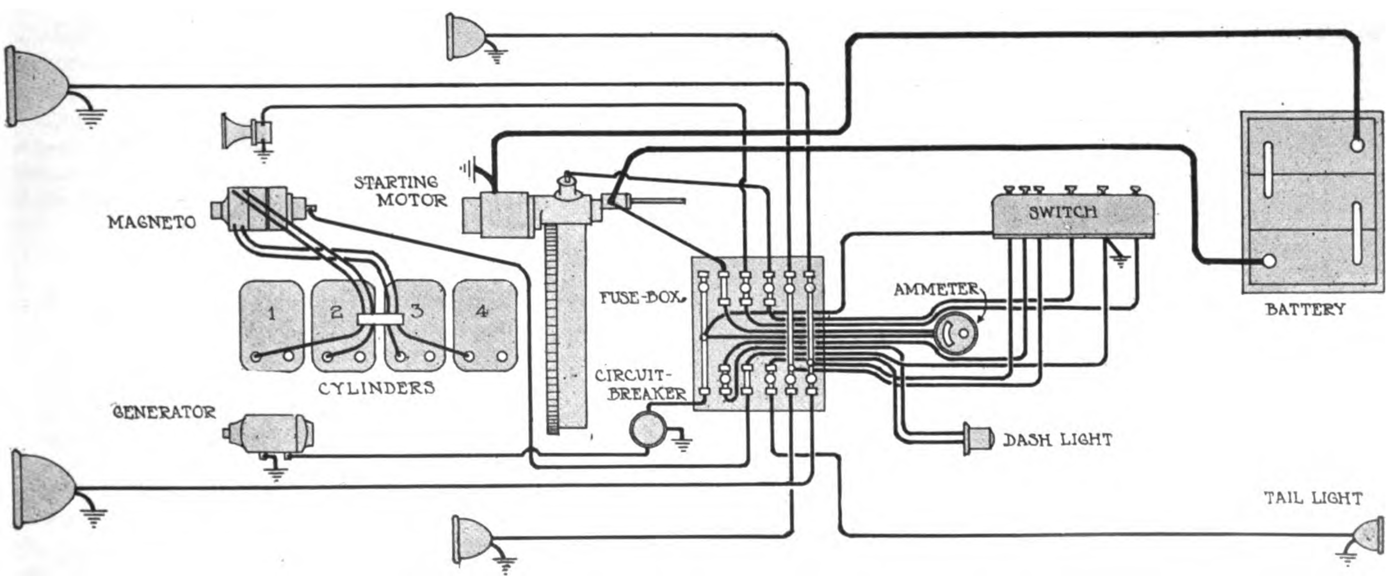
Tires are carried at the rear on all models.

All cars come fully equipped with starting and lighting systems and carry side lamps, being one of the few 1915 designs which provide lamps in this position. The fenders are crowned and the latest ideas in top and upholstery work have been incorporated.

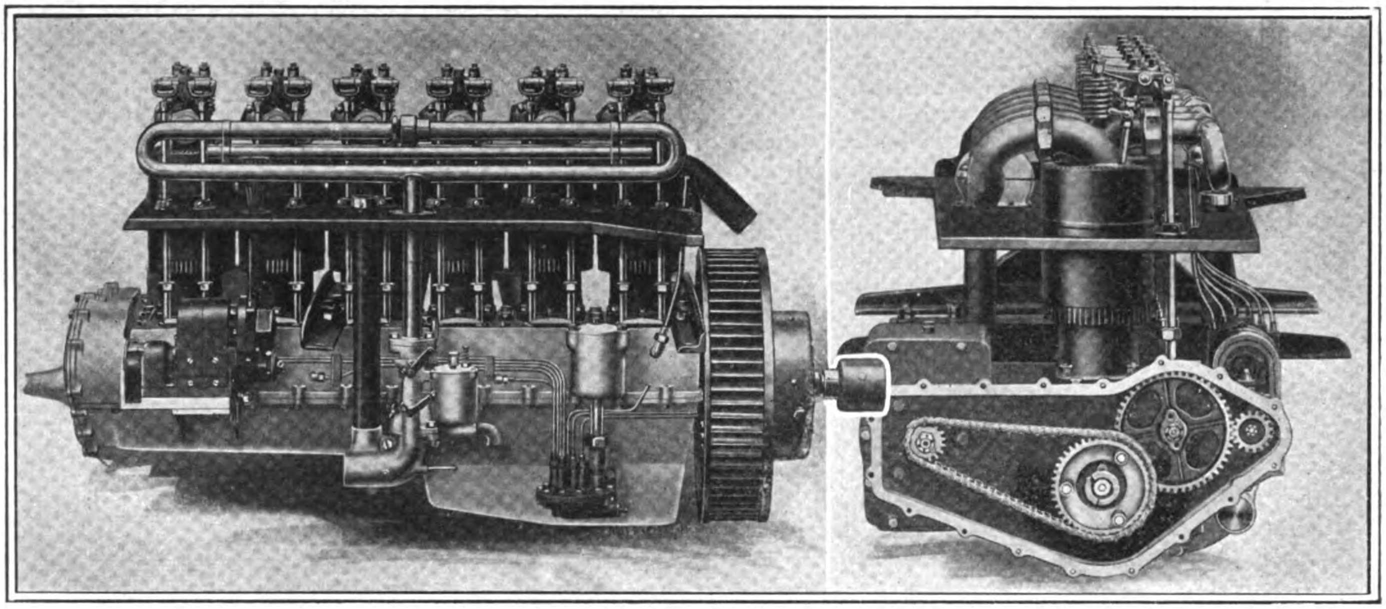
Chile Has Active Automobile Clubs

SANTIAGO DE CHILE, July 1—The Automobile Club of Chile has been organized with a membership of more than 135. The objects of the club are to establish clubhouses with all facilities for the members of the club, to report highway conditions and to study the possibilities of obtaining lower prices for imported fuel, tires and other necessities.

Another active Chilean Automobile Club is that of Valparaiso which is composed of some thirty members, all interested in the increase of the automobile industry.



Wiring diagram of the electric system used on the 1915 four-cylinder Overland



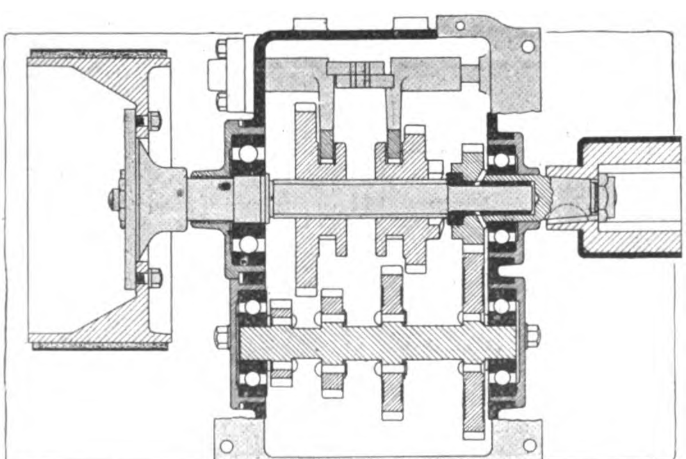
Side view of the motor showing redesigned intake and a front view with the gear cover removed

Franklin Uses Skew Bevel Drive

Many Detailed Body Refinements and Better Equipment—Prices $150 Lower on Series Six

IN bringing out the Series Six car which followed the Series Five without a break in production, the most important change that the Franklin company has made has been the reduction of $150 on the price of the touring cars and roadsters, while on the closed cars a still greater reduction has been made. The reason assigned for the reduction is that the factory has been able to reduce its costs by the concentration on one model, an occurrence of a year ago. By this concentration the use of special machinery and improved factory methods has practically doubled the factory output without increasing the building area.

The body lines of the Franklin are now more graceful than previous models. The body is larger, the seat sides higher and the upholstery finished off more luxuriously than ever before. The sloping hood has been continued, but has been given a more gradual slope, and this in connection with the use of a shutter effect on the front of the hood instead of the old-type grill has given a more sturdy and powerful appearance.



Sectional view of the gearbox showing shifter mechanism and bearing

In the motor only one slight change will be found and that is the fitting of the oil adjustment on the cowl board. The starter is lighter and more accessible than before, and, while it is still the Dyneto system, it has been improved so that it is now 40 pounds lighter than the model used last year. Both the commutator and brushes have been improved.

The only other change of importance on the chassis itself is in the rear axle. Now skew bevel gears are used, whereas previously the straight bevel type was employed. These gears are made by the Brown & Sharpe Mfg. Co., and had been adopted with a view to obtaining silent action. A number of little detail points such as the wing pivot bolts, front springs, magneto attachment, etc , have been improved. For instance, the magneto is now attached by means of two dowel pins and a divided metal strap over the top in place of the bolted-on brackets used last year. In the front springs the deflection was 1 inch to 180 pounds. It is now 1 inch to 200 pounds. No change whatever has been made in the rear springs. In the spring pivot bolts a new bushing has been employed which incorporates a felt washer intended to keep the dirt out and the oil in.

Cord Tires Standard Equipment

Better equipment will be found throughout the car. Most noticeable is the employment of either the Goodrich Silvertown cord or the Goodyear Power Saver tires as regular equipment. This is in line with the move made by makers of the highest priced cars for this season. Another provision this year which is an innovation for the Franklin company is the fitting of a power tire pump. This is a Hartford single-cylinder design and the pump itself, together with the bracket supporting it and the clutch for engaging it to the motor drive, only weighs 6.5 pounds. By the use of this power pump the Franklin company claims to have removed the only excuse for the heavier demountable rim in place of the Q.D. type which they employ. This light rim equipment is in line with the work throughout the car where everything has been done to make it as low in weight as possible. On the series six the Golde one-man top with curtains that can be operated from the inside will be found. On this top the side curtains fasten to the windshield, making a weather-tight joint. In adopting this top a new style of windshield had to be fitted and this is now the double-glass, rain vision, either half of which can be adjusted in any position.

Improvements in the Body Work

In the body work the front doors have been made wider and set back a little, permitting of easier passage in and out of the car. The mudguards are also wider to better protect the sides of the body from mud and water. They are made after the same pattern as the former mudguards, but the rivets are now invisible. The side lights have been eliminated and the headlights have been equipped with two bulbs. These are 12-volt types and are connected in parallel. The electric terminal connection has been moved under the cowl board and a trouble lamp with 12-foot cord is now supplied. The upper hinges of the door are concealed and the door handles are now on the inside. The battery location has been changed and while it was formerly invisible it is now both invisible and accessible, having been shifted from the chassis frame to a weather-tight box between the sill and the running board. The fuses are also located at this point so that it is easy to reach them for replacement.

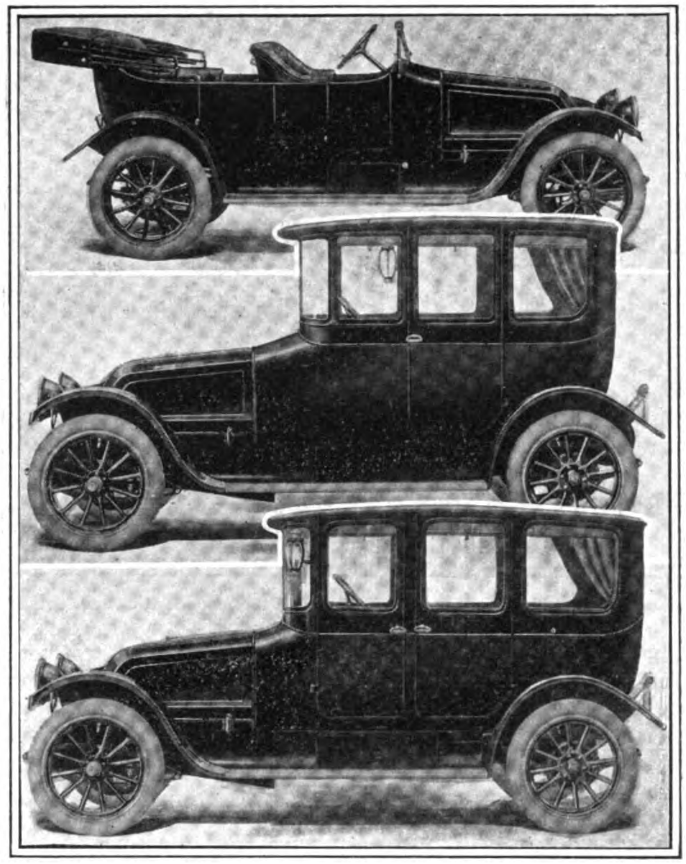
Luggage Carrier Regular Equipment

Franklin is one of the few cars which fit a luggage carrier as regular equipment. The design of this, however, has been improved still further, and now folds up closer to the body. Extra tire carriers are also provided on the rear of the car. The instruments for the control of the car are now mounted on a cowl control board directly below the windshield. This board carries a speedometer, horn button, hand-pressure pump, hot and cold air control, carbureter adjustment, oil control, starting and lighting switches. This gives a neater and more compact bank of switches than the previous design. The speedometer is also better, being a 60-mile Warner with a more accessible and more readily disconnected drive.

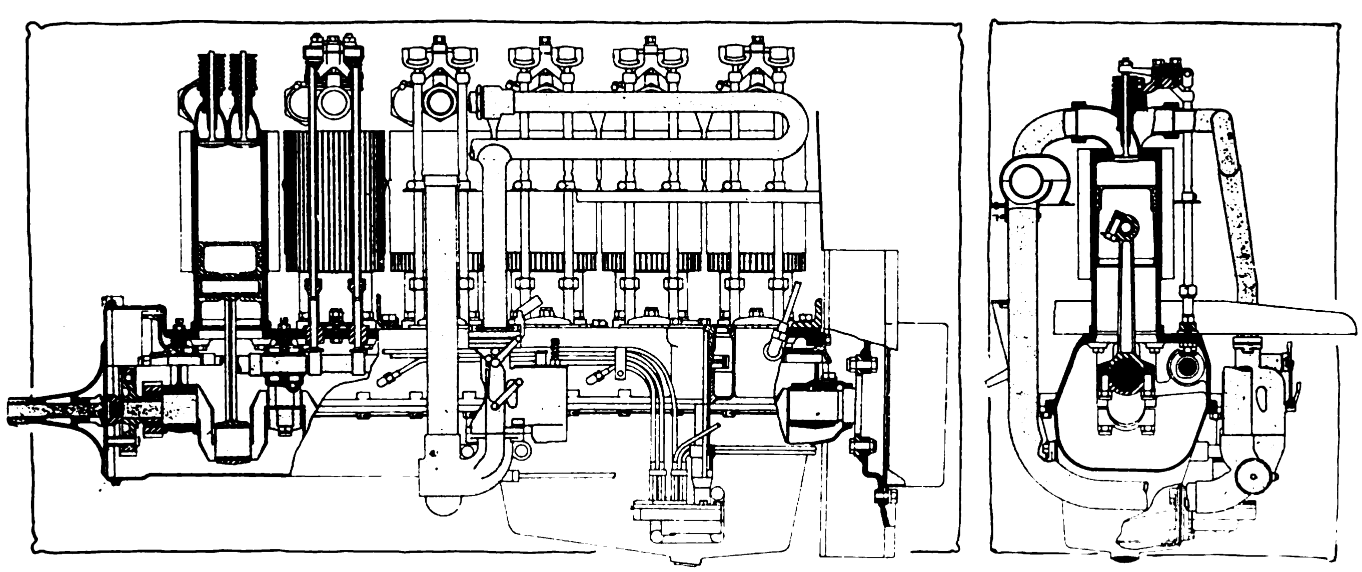
Air Cooling Is Continued

The air-cooling features of the Franklin car have not been changed. In fact, none of the typical features of Franklin design, such as the wood sills, elliptic springs and light-weight methods throughout the car are altered in any way. The six cylinders are cast independently and have a bore of 3.625 inches and a stroke of 4 inches. The valves are located in the head of the motor and their method of operation is shown in a longitudinal section of the motor given herewith. Each cylinder has an independent valve mechanism operated by an overhead rocker arm and each valve can be removed and reassembled without interfering with any other mechanism. The vertical air flanges surrounded by metal jackets are the main source of heat radiation in the direct cooling scheme used on the Franklin cars. The fan is a product of the Franklin company, having a series of blades which resemble the blades of a turbine.

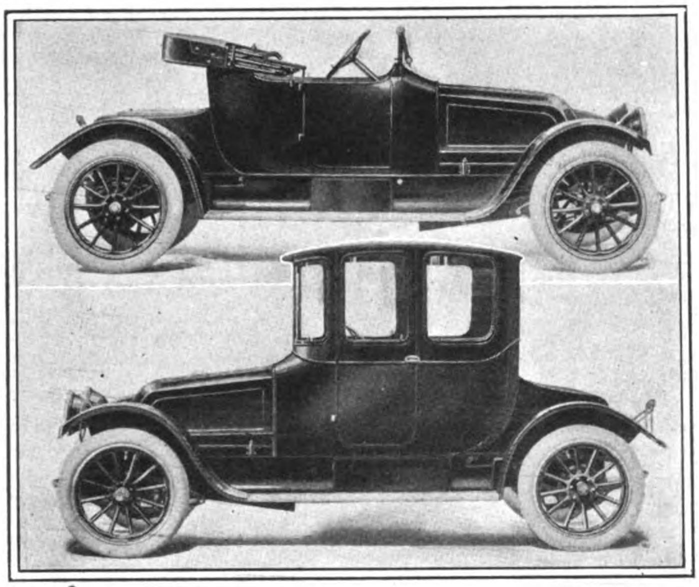
Seven main bearings of plain type are used to carry the



Three types of bodies which are standard on the Franklin chassis



Side view of motor showing a section through one of the cylinders and an end section taken transversely



Franklin roadster and coupé bodies. Note the gentle hood slope

crankshaft. These bearings are babbitt lined and are hand scraped. The bearing supports are bridges in the upper part of the crankcase which is cut through in the horizontal plane of the crankshaft axis. These bearings are lubricated directly by a circulating four-speed system. The oil is taken from the reservoir in the lower part of the crankcase, and forced by means of a gear pump driven off the camshaft through a series of individual leads, one of which passes to each main bearing. The oil sight feed on the dash is in the direct circulation line, and by its use the operator can at all times note the amount of oil passing through the system.

Dyneto Starting and Lighting System

For lighting and starting the 12-volt Dyneto outfit has been fitted. In mounting this electric system the primary object has been to make the motor generator as accessible as possible and at the same time to place it in such a position that it would be most apt to remain clean. The system consists of a motor generator connected to the crankshaft by a silent-chain drive. A storage battery floats on the line. The winding of the motor generator is such that it acts as a generator at speeds of above 12 miles per hour and at this time begins to charge the storage battery. At speeds below 12 miles per hour the motor generator acts as a starting motor and is drawing current from the battery which is utilized in cranking the engine. When the car is stopped there is a reverse current cutout which prevents the battery from discharging itself through the motor generator. For ignition an Eisemann magneto is used. This is mounted on the left and driven off the camshaft gear.

The Franklin company makes its own carbureter, and this season this will be found to be the same as in the previous model, except for the dash adjustment of the gasoline supply, which is a new feature. A rod operating on the needle valve and terminating on a ball-ended handle which is in easy reach of the driver secures immediate and perfect adjustment.

Emergency Fuel Arrangements

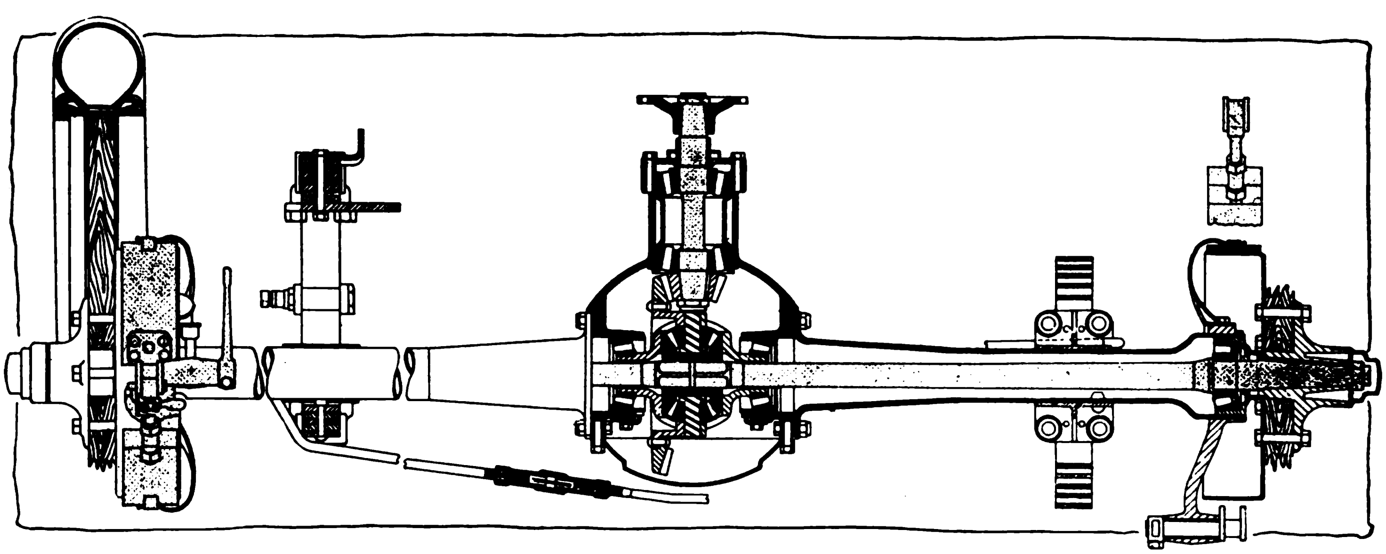
Gasoline is fed to the carbureter by gravity. The tank is located under the front seat and has a capacity of 14.5 gallons. There is a reserve tank of 2.5 gallons. There is a gasoline valve and separator in one fitting on the bottom of the gasoline tank and the handle for operating it is on the top of the tank, under the driver's cushion. The valve provides a main reserve and closed position and in this way the driver is always certain of sufficient fuel to reach the next supply station, should he be caught unaware.

No change will be found in the clutch. It is a multiple disk running in oil and is housed within the flywheel of the motor. A feature which is continued is the lubrication with graphite grease of the clutch trunnion by means of a cup carried on the sill of the car with a handle on the outside of the frame.

The amidship gearbox remains the same as in previous Franklin models. Three speeds are furnished and the gear-shifting mechanism is mounted in the center as before. On direct drive the reduction of the Franklin cars is 3.71 to 1. The rear axle is a semi-floating design which remains the same as in the series five except as the skew bevels replace the straight bevel. The differential and pinion shafts are carried on roller bearings. Taper roller bearings are used throughout the axle as will be noted in a reference to the sectional view of the axle given herewith. Aluminum is used throughout the car wherever possible, an example of this is the rear-axle gearcase which is a model of lightness.

Five Types of Bodies Fitted

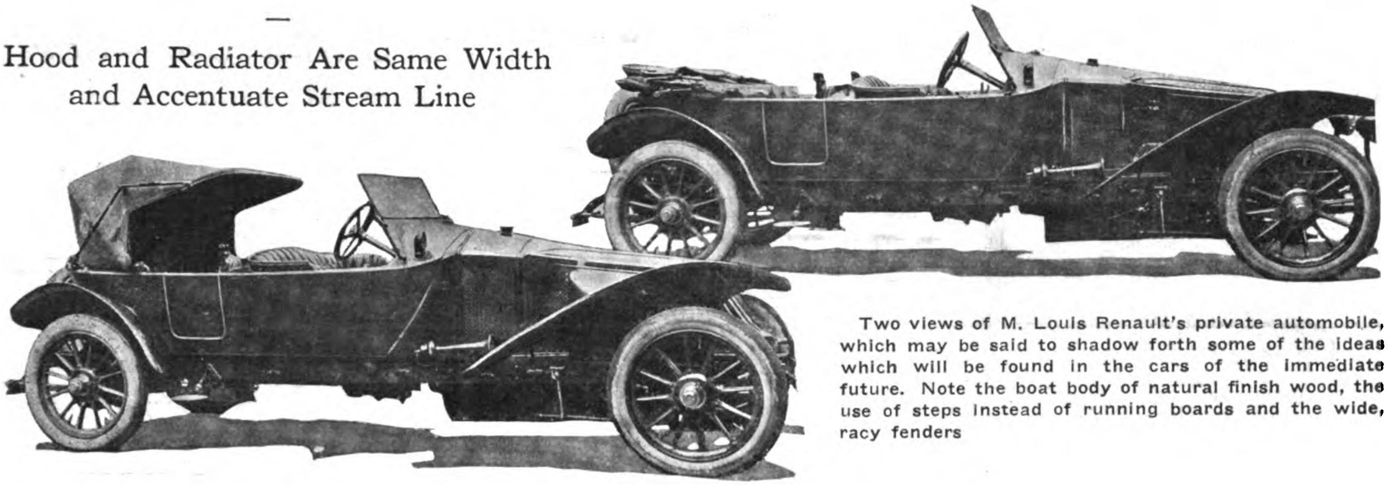
Five types of bodies are fitted to the one Franklin chassis. They are the touring car, roadster, coupé, sedan and berlin. The weights of these cars are respectively 2,750, 2,630, 2,788, 2,924 and 3,121 pounds, fully equipped. The standard color for all types is Brewster green with black trimmings. All the bodies are aluminum over a wood frame. The chassis frame is second-growth ash made in laminations. Full equipment is included in the selling price of the car.



Sectional view through the rear axle, which has not been changed except for the adoption of the skew bevel gear

Renault Has New Radiator Design

Hood and Radiator Are Same Width and Accentuate Stream Line



Two views of M. Louis Renault's private automobile, which may be said to shadow forth some of the ideas which will be found in the cars of the immediate future. Note the boat body of natural finish wood, the use of steps instead of running boards and the wide, racy fenders

PARIS, July 29—Interest attaches to Louis Renault's private automobile by reason of the fact that it is the forerunner of the cars which will be offered to the public for the 1915 season. No technical details regarding the car are available, but there are a number of features which can be observed by an external examination.

The most important of these is the new shape of radiator and hood. Instead of the radiator standing out wider than the hood, leaving a number of tubes exposed on each side of it, the rear of the hood is now the same width as the radiator and forms an unbroken line with it.

Radiator Is Lower

The radiator is also made considerably lower, so that the top of the hood, the top of the radiator and the scuttle dash form an unbroken line. In order to get the same cooling efficiency as when the tubes were directly exposed to the draft, the radiator is made considerably deeper than formerly and the rear portion of the hood is cut away and a metallic trellis fitted in each side. By this arrangement Renault maintains his sloping hood and yet secures the unbroken line which up to the present has only been attainable with the radiator in front design.

Boat Body of Wood

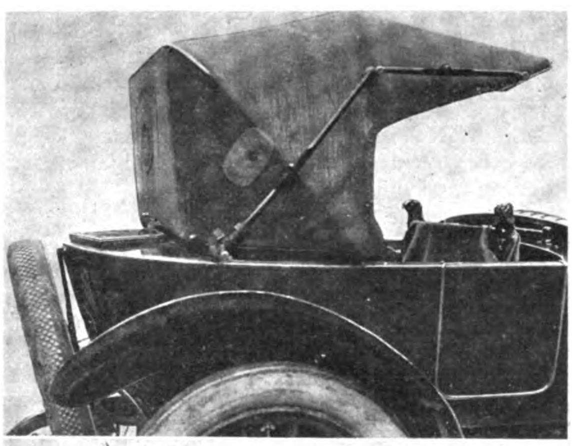
This chassis carries a special sporting type boat-built body polished in the natural wood. It is joined up to the radiator without any break in the continuity of the lines, and has a wind screen with the lower portion permanently tilted rearwards.

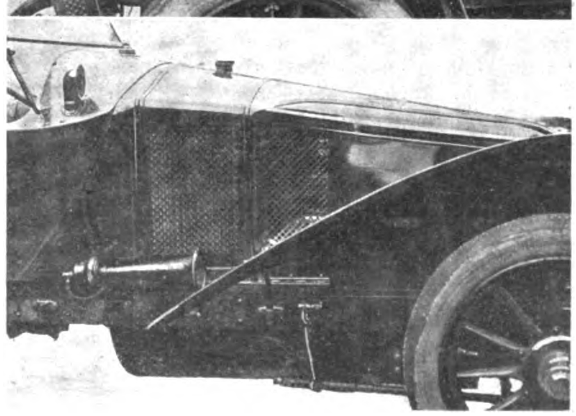
Steamship ventilator cowls are carried on the top of the scuttle dash in order to supply air to the fore compartment. Electric lighting is now a standard equipment, the generating motor being at the fore end of the motor under the hood. Batteries are carried within the frame member, alongside the driveshaft.

Detachable Wood Wheels

This car is equipped with Renault detachable wood wheels, which now form a part of the standard equipment.

The boat-built body has no running boards, but merely a step for each door. The top is of the Victoria type covering the rear seats only. Right in the stern of the boat body is a tool locker, with admission to it through a hinged locker in the boat deck. Rear suspension remains unchanged, being provided by long semi-elliptical underslung springs.





Above—Victoria type top and provision for carrying spare wood demountable wheel at rear. Note rear deck of boat body

Lower—How the radiator slopes into the hood on Renault car. Note steamship type ventilator in cowl

Smooth Body Lines

An inspection of the accompanying illustrations will give the reader an idea of the attractive qualities of the design, the smooth sweep of the body lines and the harmonious blending of the radiator and bonnet.

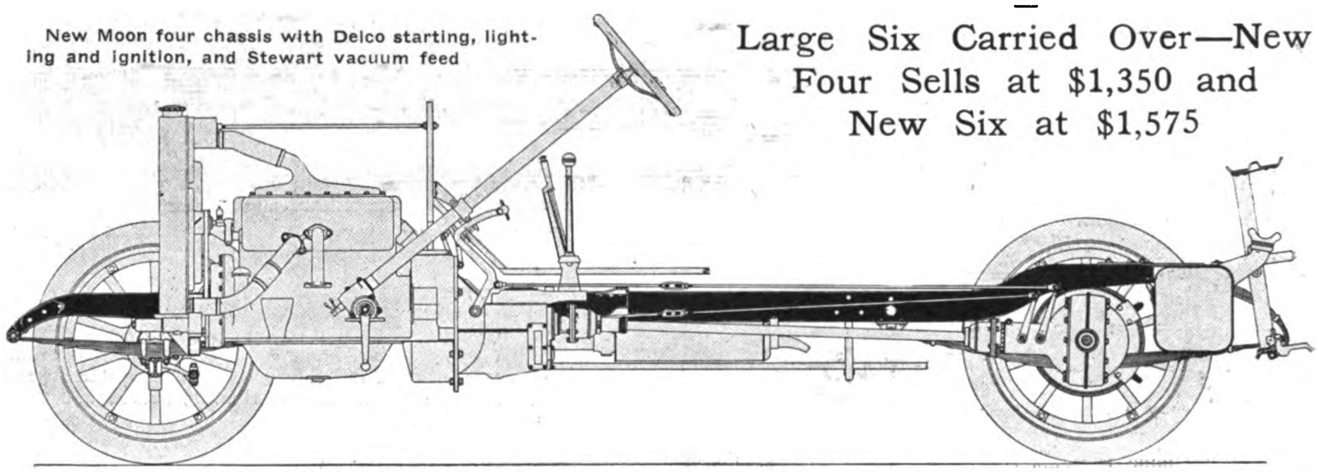
One somewhat discordant note is the mounting of the electric horn on the outside at the right of the radiator. This, however, could easily have been avoided. The sweeping lines of the fenders give the car a racy appearance, which is heightened by the absence of running boards.

In the illustrations at the left some of the detail features of this new car may be seen somewhat more clearly than in the illustrations of the entire car at the top of the page. For instance, the method of carrying the spare demountable wood wheel at the end of the rear deck may be seen in the upper illustration which also shows the tool compartment in the rear deck, the robe rail at the back of the front seat and the Victoria top.

Moon Has New Four and Small Six

Large Six Carried Over—New Four Sells at $1,350 and New Six at $1,575

New Moon four chassis with Delco starting, lighting and ignition, and Stewart vacuum feed



THE 1915 season of the Moon Motor Car Co. is being confined to three models, two sixes and a four, of which only one, which is known as the large six, being a carried-over model. The two models are a four and a six, the four selling at $1,350 and the six at $1,575.

All three models use Continental motors, 1915 marking the close of the Moon-made motor in any models. These motors all lean to the long-stroke classification. The small four has cylinders 3.75 by 5. In the small six the sizes are 3.5 by 5 and in the larger six the cylinders measure 3.75 by 5.25. The four and small six use L-head block types and the larger six has the cylinders in blocks of three.

Other features of the line are Delco starting, lighting and ignition; Stewart vacuum gasoline feed; Hotchkiss drive from the rear axle to the frame in which the torque rod is eliminated, and improved streamline bodies.

Although all three models give evidence of Moon practice of 1914, there have been a number of mechanical changes with a view to decreasing weight, improving the riding qualities and giving better service. The new four and new six are equipped with roadster and five-passenger touring bodies only, at the price mentioned, while the larger six comes through with roadster, four-, six- and seven-passenger bodies. It lists at $2,250.

The 4-38, the four-cylinder model, and the 6-40, the small six, entirely new cars for this season, are somewhat similar in construction and in the general outside appearance. The four has shown 21 miles to the gallon of gasoline according to the Moon company.

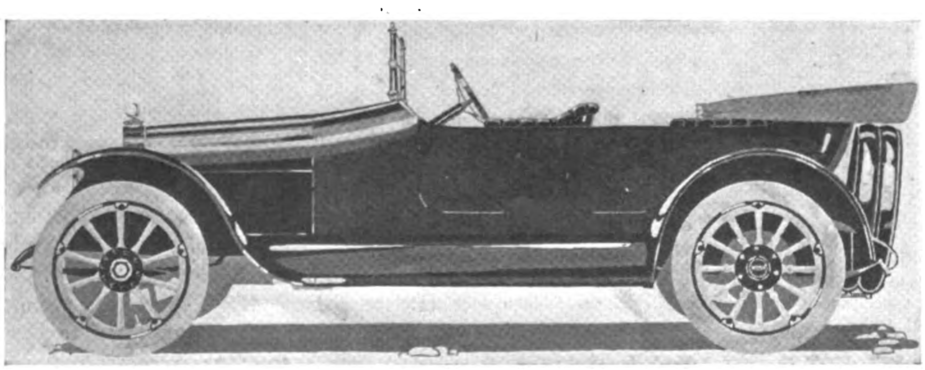
It is stated that this engine shows 44 horsepower at 2,200 revolutions per minute. An improved one-wire Delco starting, lighting and ignition system is used and an added feature this year is the Stewart-Warner vacuum feed by which the carbureter is fed by gravity even though the fuel tank is located in the rear of the chassis. The engine drive is taken by a dry disk clutch and then by a three-speed selective gearset, both of these members, with the motor, forming a unit power plant. Both clutch and gearset are products of the Warner Gear Co., Muncie, Ind.

The propulsion of this car as well as the new six is by the Hotchkiss drive which eliminates the torque rod, simplifies the chassis and makes the springs take the driving strains. A new type of braking system is used in all the 1915 cars, designed by engineer H. L. Goodspeed who has reduced the number of system parts from fifty to twenty-two. In the 1914 cars an equalizer system was in use which required a long equalizing beam at about the center of the chassis. In the new system a more direct action from pedal to brake bands is obtained with the equalizing beam in the rear almost above the rear axle housing. Brake adjustment is easier and danger of binding from lack of lubrication is eliminated.

Underslung Springs on Four

The 4-38 has a wheelbase of 120 inches and has underslung rear springs which so lower the body as to give it a decidedly smart appearance. This body, as well as those of the other Moon cars, is of the true streamline type with a graceful curve from the windshield base to the radiator. The latter is a new one with a slightly rounded front. The driver's compartment has 44 inches of leg room and the tonneau is also comparatively roomy. Concealed hinges and locks, clean running boards, crowned fenders and other features in demand are to be seen. Drive is on the left with control levers in the center with the instruments well grouped on the cowl board. The headlights have dimmer control.

The new six possesses many of the features of the new four but with its longer wheelbase, greater power and light weight, supplies the demand for a car midway between a four and a heavier six. The Continental motor is of L-head construction, with cylinders cast in block. All Continental features such as helical timing gears, splash-pressure oil-feed, large bearings, etc., are to be seen.

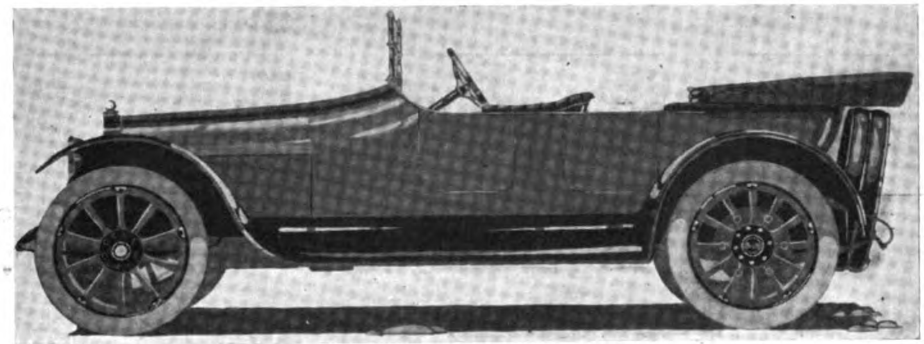


New Moon four-cylinder listing at $1,350

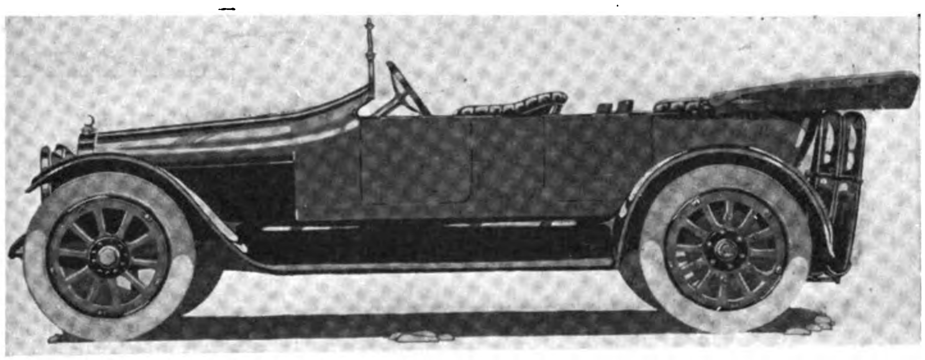
Clutch and Gearset in Unit

The clutch and gearset, in unit with the motor, are of similar general design as those used in the four, but the parts are slightly heavier to care for the greater strains. The drive from the three-speed gearset to the floating rear axle is by shaft and bevel gearing. The new brake equalizing system described in a previous paragraph is a feature of this car also. The springs are underslung and the drive is taken through them as in the four, eliminating all the usual driving members. In order to obtain a short turning radius the frame has been narrowed in front.

The streamline body is somewhat on the same order as that used on the four. Drive is left with control in the center and the cowl arrangement, carrying of the extra tires in the the rear and the general interior body arrangement is the same as in the four. The wheelbase is 120 inches and the tires 34 by 4 inches.



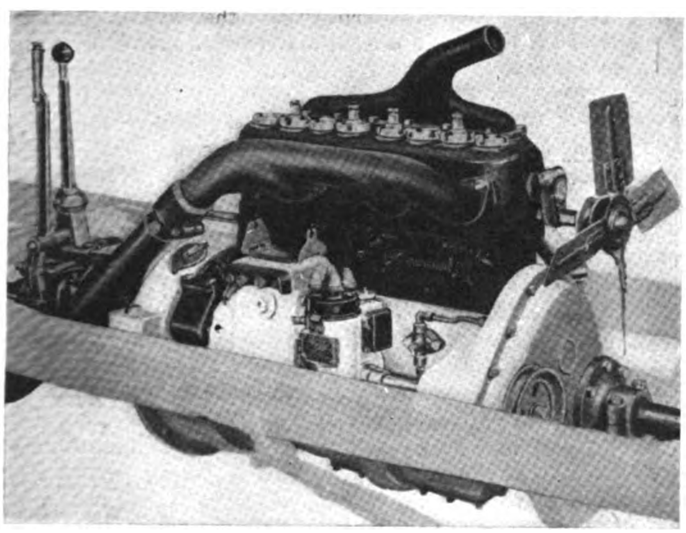
New Moon light six selling for $1,575. It has a block motor. The drive is taken through the underslung springs, as in the four-cylinder car



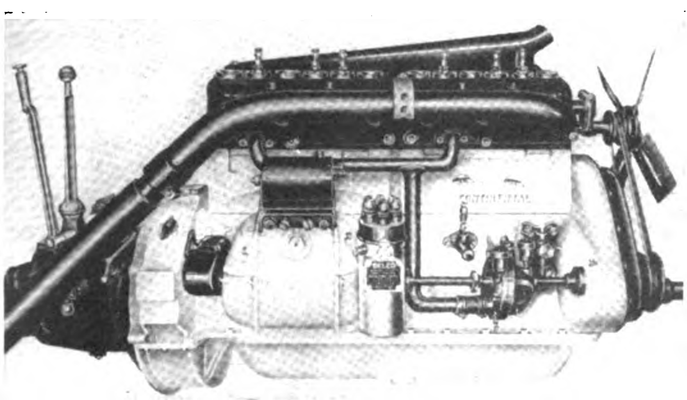
Moon large six with L-head motor 3.75 by 5.25 inches

Large Six Wheelbase Increased

The changes in the 6-50 or large six are important ones. The wheelbase has been increased from 129 to 130 inches, the doors widened from 21 to 22 inches, the rear seat upholstery has been made deeper, more leg room has been provided for the driver and the tonneau extra seats are improved. The disk clutch has been reconstructed and the method of holding the plates changed so that wear is reduced. It is stated by the company that 150 pounds has been cut from the rear axle, due principally to the adoption of a crucible steel housing instead of the malleable iron one used in 1914. The brake drums have been increased from 14 to 16 inches in diameter, the silent chain drive of the Delco distributor adopted and a new braking system installed.



Exhaust side of Moon 4-38 motor for 1915



Exhaust side of Moon 6-40 motor used in light six. Note mounting of Delco electrical system

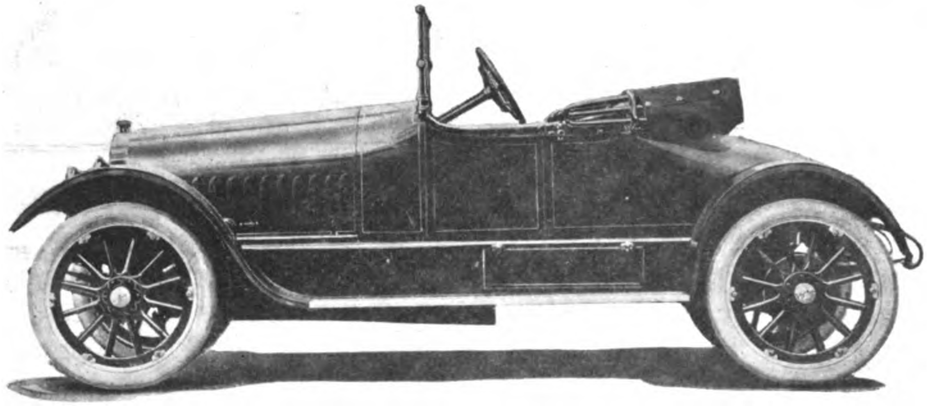
The body has very pleasing lines and the tonneau and driver's compartments are roomier. The tires used are 35 by 4 1-2 inches and the equipment includes Stewart-Warner vacuum fuel feed, headlight dimmers, top with boot which also covers the top bows, Delco system, clock speedometer and other instruments set flush in the cowl board and Collins curtains, as well as a Klaxon horn.

The carried over model, the 6-50, has the same engine as used in the 1914 model with improvements in detail and the equipment necessary to bring it up to date. The cylinders have a bore and stroke of 3 3-4 by 5 1-4 inches, and are cast in blocks of three. The Delco system of improved design has been installed and the circuit breaker feature of last year retained. With this breaker it is possible to tell whether there is an open or short circuit in the system. The battery for this system is an Exide and is placed behind the apron near the front right fender. Circulating splash oiling is used and cooling is by centrifugal pump driven by shaft from the timing gears.

The new type of disk clutch has been placed in this chassis but the gearset of last year, a four-speed affair, has been retained without changes. The floating rear axle and Moon one-piece axle housing are as before, with the exception that a reduction in weight has been made. The springs of this car are overhung and the drive is by torque members as in the 1914 model. The new type of brake equalizing system is used on this model. A rear axle feature is the centrifugal oil-draining device inside the hubs. This device gathers oil likely to make its way from the differential housing to the brake drums.

Unbroken Lines on 1915 Herff-Brooks

Price Unchanged on Four and Six —Steering Wheel Hinged—Extra Seat in Four



Smooth lines of 1915 Herff-Brooks six-cylinder roadster

TWO cars, a four and a six, are announced as the 1915 line of the Herff-Brooks Corp., Indianapolis, Ind., with unchanged prices at $1,100 and $1,375 respectively, but with a great number of mechanical and body changes which mark them as distinctive types of the coming season. A complete transformation has been effected by entirely new body lines, which give the cars a foreign look. The hood has no break, making a long sweep from the cowl to the newly shaped radiator, with generous curves from the cowl to the rear. But the fight for improvement has not stopped with the new bodies, for there are two other attractive features which stand out above the rest. The steering wheel of the 1915 Herff-Brooks four and six is of the folding down type. This wheel is hinged to the post on one side and when desired it may be folded back so that entrance and exit from either side of the car is easy. The five-passenger touring cars now contain an extra seat for a sixth passenger, this auxiliary chair folding into a tool box under the front seat. Right drive and center control have been abandoned on all models and left drive with center control adopted.

Wheelbase of Four Longer

Aside from the feature changes mentioned a number of mechanical improvements have been made in both four and six. The wheelbase of the four has been lengthened 2 inches, from 116 to 118 inches, and the bore increased from 4 1-8 to 4 1-2 inches. Bosch ignition supplants the magneto and dry cells of the 1914 four and six and a Stromberg carbureter is used instead of the one supplied previously. The old-style top gives way to an improved one-man top.

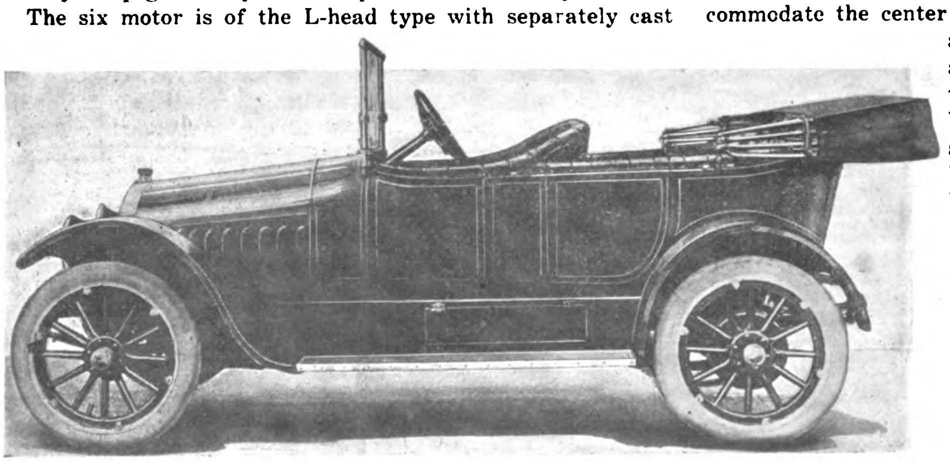
The six motor is of the L-head type with separately cast cylinders with individual valve inclosures to exclude dirt and house noise. The bore and stroke of this motor is 4 by 4 1-2 inches, the same dimensions having been used in 1914. Cooling is by pump circulation with the pump in front of the timing gear case, a rather unusual position for this member. Behind the pump is the new Bosch magneto and on the same side is the newly-adopted Stromberg carbureter. The right side of the engine is clean except for the crankcase breather and the water pipe. Lubrication is by splash-pressure in which oil is carried by a gear pump from a crankcase sump, sent through a strainer and then to a sight feed on the dash from which it makes its way to individual troughs under the connecting-rods.

Six Motor Has Seven Bearings

The motor having separately cast cylinders, calls for a crankshaft with more than the usual number of supports. Seven are used in this engine each 1 3-4 inches in diameter. The camshaft requires but three supports and this shaft operates push rods moving in square guides instead of round ones which are usually seen. The valves are 1 7-8 inches diameter and have a 5-16 inch lift. The timing gears are helically cut. A semi-steel mixture is used for crankcase metal and the case is supported by four arms cast with the crankcase. Every casting in this, as well as the four motor, comes from the Herff-Brooks foundry.

Clutch design has not been altered appreciably. The clutch is of the inverted cone type with spring inserts and incorporated with this clutch is a brake which prevents spinning when making gear changes. The gearset which is of the three-speed selective type has been redesigned to accommodate the center control feature, but the gears, shafts and general arrangement is the same as that used on the 1914 six. From the gearset to the rear axle no changes have been made. The inclosed drive shaft is equipped with one universal of large size and within this joint is a hollow brass compartment which holds sufficient grease to lubricate it for 5,000 miles. This is but one instance of removing the periodic greasing tour from the owner and in many instances oiling is taken care of automatically. The rear axle is of the semi-floating type and operates on ball bearings.

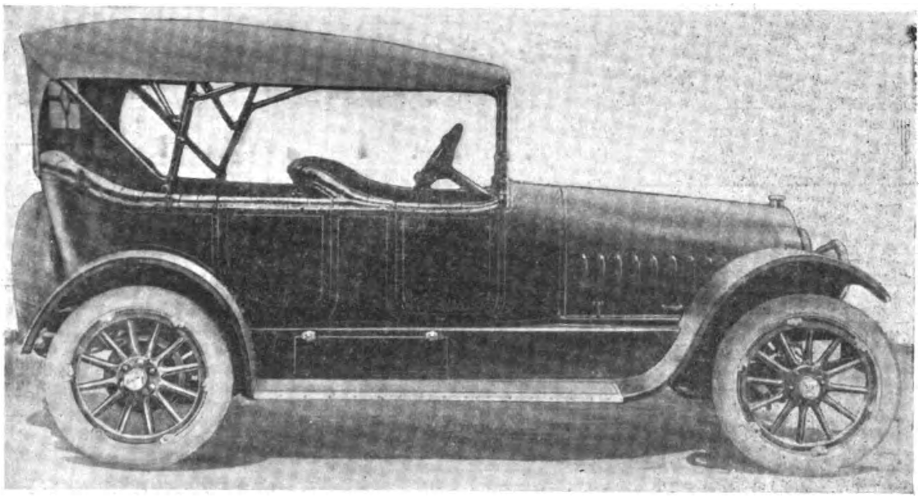
The new Aplco starting and lighting system is of the single-unit type, the motor-generator being driven by silent



Herff-Brooks four-cylinder car with extra seat for sixth passenger chain from the shaft extending from motor to gearset. The battery for this system is supported by steel hangers under the tonneau floorboards where it is accessible.

The new six body is much larger than the 1914 body and is an entirely new job throughout, as mentioned previously. All the instruments are finished in black and nickel and are mounted on a board where they can be reached easily by the driver.

The 1915 Herff-Brooks four has a larger motor, the new dimensions being 4 1-2 by 5 inches against 4 1-8 by 5 inches used in 1914. This engine is of the L-head type and has its cylinders cast in block. The oiling, cooling, carburetion, ignition, starting and lighting units are the same on the four as on the six and it differs only in general design. The crankshaft is supported by five bearings, the push rod guides are held in place by clamps, which practice is not used on the six. From the motor to the rear axle the four and six are similar in design, but the latter is smaller in proportion. All chassis receive a thorough test and are rigidly inspected before leaving the factory.



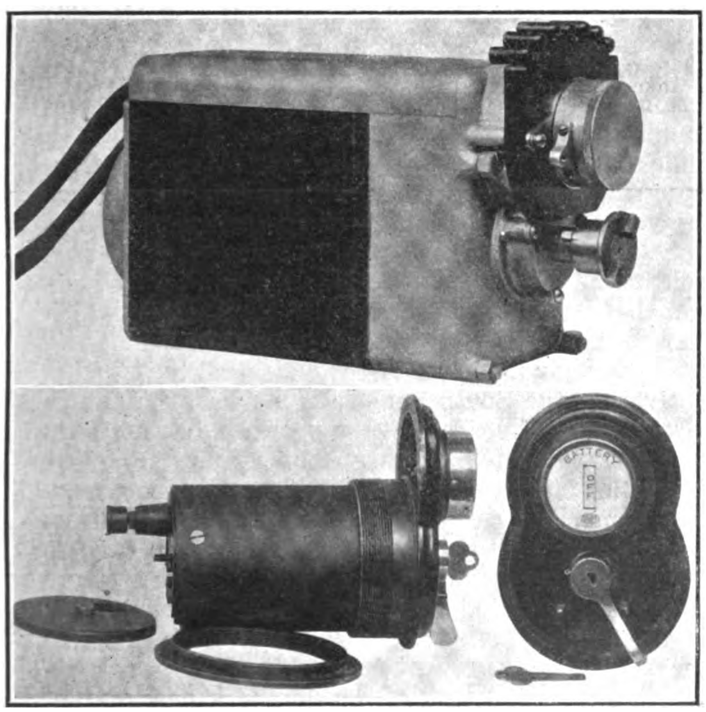
Herff-Brooks six-cylinder with one-man top, smooth lines and clean running boards

Samson Engineering Co. Brings Out Starter

THE Samson Engineering Co., recently incorporated under the laws of Kentucky, with a capitalization of $350,000, and with headquarters in Louisville, Ky., will shortly have on the market a starting, lighting and ignition system.

One unit performs all these functions, and it is arranged to be driven at crankshaft speed. All reducing gears are integral with the machine. The wiring is extremely simple, using a grounded return. No cutout or regulator is used in this system, as the ignition switch connects the armature to the battery, and provision is made for automatically tripping this switch if it is left on by oversight.

The same voltage is used for the lamps as for the starting; this can be either 6 or 12 volts, as specified.



Samson unit starting, lighting and ignition system. Upper view shows complete unit and, lower, the dash coil and switch

The motor-generator armature is arranged in four multiple circuits, which by means of the brush arrangement allows the starting current to produce maximum torque and the generating current is produced by connecting the multiple circuits in series to produce low-speed generating values.

The starting switch is built into the generator and connects directly to a push-rod or pedal, there being no gears to mesh. The gear reduction is of such construction that the engine is free at all times. Arrangement is provided that a back fire from pre-ignition will allow the engine to reverse its motion without exerting a strain upon the starter.

The voltage regulation is taken care of by having the shunt field connected across one multiple circuit so that its current is tapered off in proportion to the voltage drop, due to the current increase in the armature turns.

The current delivered by the armature curve obtains its maximum at 400 revolutions per minute, and has a tapering characteristic from this point, diminishing approximately 50 per cent. at 1,500 revolutions per minute.

The transformer and breaker design is such that the current through the primary circuit is of equal value at high and low engine speeds, it being impossible by this method to get full efficiency from the engine at extreme high speeds without consuming too much current for the ignition at low speed. The ignition current being of such low value does not disintegrate the breaker points.

The ignition is automatically advanced and arranged for hand-control if desired.

The dash coil carries upon its face an indicator showing the charging, provision also being made for emergency dry-cell ignition. A removable key is provided to lock the ignition lever.

The starter is designed so that it is easy to get to all points for cleaning and inspection. It is also dust and waterproof.

Two types of these starters will be put upon the market:

Type A, which is designed for the largest cars and weighs approximately 60 pounds complete. Type B, which is designed to crank a 3 1-2 by 5, six-cylinder motor, and weighs approximately 40 pounds.

The cranking speed on both these models is over 100 revolutions per minute, the current consumption being well within the range of a medium-sized battery.

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Two Tire Blades

THE effects of the European war have been brought closer to the American automobile owner by the increase in tire prices than was deemed possible a month ago. In a week the price of crude rubber has jumped from 55 cents per pound to $1.10. Where the price limit is no one knows. The British ships, which bring the crude to our shores, are largely tied up by the war hostilities, and should a war of many months continue we would be confronted with a serious tire crisis by next spring.

"Making two blades of grass grow where one formerly grew" can perhaps to-day be applied in the tire field. If we can add 1000 miles to the life of a tire it should be done. Tire makers, in addition to boosting prices should start a country-wide campaign of education on greater tire care. Attention can be drawn to more careful watchfulness of the inflation pressures, to the more accurate alignment of the vehicle wheels and to the repairing of tread cuts to prevent water entering and rotting the fabric. There is ample room for missionary work of this nature. There is a big field in which to cultivate the second blade. A campaign for slightly slower speeds, cutting 5 miles per hour off, will accomplish much.

"I'll Find a Way or Make It"

WITH overcast skies and the smoke of battle filling Europe from corner to corner; with commerce on the high seas at a standstill with many companies to which American automobiles have been exporting; with some gates of motor car supplies from Europe locked by the armed hostilities, and with every country in the civilized world more or less directly or indirectly affected by the turmoils of war precipitated a week ago, the American automobile maker must view the situation calmly. Instead of weeping over what has already been lost and mooding over the gloom that the future may unfold, it is the better part to pin on the old Roman badge, "I'll find a way or make it."

But a short fortnight ago America was on the crest of its European export boom. Business was coming our way. The powerful cumulative force of years spent in developing export business seemed to be lending its impetus to increase future business. But just when the sun shone with brightest splendor the sullen boom of the distant guns was heard, and to-day the work of years seems temporarily suspended, and for how long no one but the gods can answer.

Already the dire results of the war are being experienced in America in spite of her neutrality. Sales of cars in those countries directly engaged in the war have practically ceased. Buyers are refusing to take deliveries in France, and the situation is still more acute in Germany. Before war was declared French factories had suspended all buying, some of them had partially closed down, and with the declaration of war it was expected that every factory would close its doors. For the time production in Europe has practically ceased, but still supply is not dropping behind demand because demand ceased at the same instant.

Our makers will have to turn to other fields. To our south lies another continent, South America, settled largely by those of Latin origin, with Anglo-Saxons in some parts. At present Europe commands the big business in Brazil, in Argentina, in Chile and the other countries in South America. Germany has had large trade with them; France has enjoyed a large percentage of the business, as has Italy. These countries of South America must now look to the United States for many of the products that they have been purchasing in Europe, but which they cannot obtain at present. Here lies the opportunity for our makers. Already several have begun cultivating the South American market, the efforts covering 6 or 7 years, but the progress has not been up to par. To-day offers an opportunity for more intensified cultivation of this field as an export market. American car builders who have received orders to cancel all shipments to Europe can turn to the South. Accessory makers, and there are many of them confronted with similar cancellations, will have to follow the same policy, and where 12 or 20 per cent. of their product reached the European market, it will be the task of developing a new market for this in South America.

Rubber Shipments Affected by War —Tire Prices Climb

Values of Crude Product of Plantation Quality Rise from 55 Cents a Pound on August 1 to $1.10—Eastern Sailings Cancelled—Brazil Season Off

NEW YORK CITY, Aug. 10—Crude rubber has reached the remarkable market price of $1.10 a pound for plantation quality and $1.12 for Para, climbing since August 1 from respective prices of 55 and 70 cents.

This doubling of values of the important commodity is due to the effect of the European war on shipments of rubber from the great plantations of Ceylon and the Malay states that produce two-thirds of the world's supply. All Far Eastern rubber cargoes are cleared out of Singapore for London, the primary rubber market. Sailings from both of these ports have been cancelled.

The establishment of an American merchant marine or a decisive battle at sea or peace are the only vistas of hope that importers hold up to the automobile industry.

Stores of free—non-contracted—crude rubber in New York City, it is said, do not exceed 500 tons. London has about 1,000 tons collected on shipping docks. Perhaps 1,000 tons are now en route for and about 1,000 tons actually being unloaded in this country.

Altogether the supply in sight appears slim when it is realized that the consumption in America is about 65,000 tons a year.

And there is no hope from Brazil or Mexico at this time, say the importers.

"A small stock probably has accumulated in Brazil and Para that wouldn't last one of our factories a few days," said Francis R. Henderson, of the rubber importing firm of Henderson and Korn today.

"This small stock will reach us easily as shipments from Brazil have not yet been affected—and they probably won't be. The Booth line, English, controls the Brazilian shipping, of course, but there is talk of turning over all of the business to the Lloyd Braziliero, the Brazilian line that sold out to Booth. Under the neutral Brazilian flag, cargoes will come safely and regularly.

"But this doesn't help the rubber situation a trifle. At this time of the year nearly all of the world's supply of rubber comes from Singapore. As a matter of fact, most of the world's supply of rubber at any time of the year clears out of Singapore, coming from Ceylon and the Malay states, largely the latter.

"The Brazilian crop moves from October 1 to April 30. Rubber is not gathered during other times of the year, as the country is flooded with torrential rains and the plantations have to be abandoned. During the harvest season there is a steady market, so that no stores are permitted to accumulate. Therefore, we can not depend on Brazil until after the first of October and then only for normal quantities.

"The normal Brazilian rubber crop is now about 40,000 tons. American industries consume between 65,000 and 70,000 tons a year.

"The great rubber fields of the Far East, however, produced 70,000 tons in the last year and that is why all eyes in the rubber world turn East. The crop is an all-year-'round one. Incidentally, the rubber harvest is now in Ceylon and Malay, the yield being very small until about 10 years ago when it suddenly began to pick up and outstripped all others.

"Mexico offers no hope. The little crop there of past years probably is zero this year because of the revolution. Mexico couldn't keep one factory busy a week.

"We have no idea what factory stocks may be. Factories buy from us.

"There is nothing that we can do to relieve the situation. It seems to be up to the United States just now. No banking relief is needed. What we need is ships, ships that won't be interfered with on the high seas, and plenty of ships."

Most Tire Companies Advance Prices 10 to 20 Per Cent.

NEW YORK CITY, Aug. 10—The price of tires has been raised by nearly all the larger tire companies from 10 to 20 per cent. The action is due to the effect of the European war upon the crude rubber situation, the price of the crude product having advanced 100 per cent. in the eight days ending last Friday, August 7.

Crude rubber is just as plentiful as ever, but the war has tied up the London rubber market, through which most of the rubber used in the United States is bought, and English ships, which carry most of the rubber from East India and Brazil, are wary about navigating when hostile battleships are likely to molest them.

After affairs adjust themselves it may be possible for neutral vessels to supply the demand by transporting Para rubber from South America; also the war may not last long, all of which may relieve the situation; but as it is the majority of American tire builders have no more than enough to last them from six weeks to three months.

The tire-buying season, however, is about over, July and August are the two big tire months of the year and in September the demand falls off as touring declines. For this reason tire manufacturers generally carry a low stock of crude rubber at this time of year and work the made-up stock down low in cleaning out for the following season.

Also since manufacturers with long-time contracts were badly "stung" a couple of years ago when the price dropped they have bought more or less from month to month ever since and none of them carry very heavy stocks. Whatever contracts exist are for a certain quantity to be delivered every month and at this time the rubber traders are unable to fulfill their contracts.

Price Movement in Principal Makes of Tires

34 x 4 Size

Make of Tire	Per cent of Increase	Plain		Non-skid		Tube		Date in Effect
		Was	Is	Was	Is	Was	Is	
Empire	12.5	$24.35	$27.40	$30.50	$33.85	$5.45	$6.25	Aug. 11
Federal	12.5							
Firestone	12.5-15	26.20	29.45	30.50	33.85	Gray 4.90 Red 5.45	5.65 6.25	Aug. 7
Fisk—Bolted-on	15	30.30	34.85	36.35	41.80	5.60	6.45	Aug. 8
All others	15	26.25	30.30	31.60	36.35	5.60	6.45	Aug. 8
Goodrich and Diamond	12.5	24.35	27.40	26.05	29.30	Red 5.45	6.15	Aug. 8
Silvertown Cord	12.5	38.55	43.35	41.25	46.40	Gray 4.90	5.50	Aug. 8
Goodyear	20	24.35	29.20	28.50	34.20	4.90	5.90	Aug. 6
Kelly-Springfield	None will be made.							
Lee	None as yet.							
McGraw	Probably will advance.							
Michelin	None expected to be made.							
Overman	None to be made for the present.							
Pennsylvania	12.5 Prices being adjusted.							
Racine	None as yet.							
Republic	About 12.5 to 15.							
Swinehart	No raise. 10 per cent cut from dealers' and consumers' discounts.							
United States	12.5	24.35	27.40	33.55	37.75	Red 5.42 Gray 4.90	6.15 5.50	Aug. 8

The price of tires, beginning nearly a year ago, dropped a total of 28 per cent. This was due to competition and a low price for crude rubber. The present increase has sent it about half-way back and whether other increases are contemplated would not be stated by the tire men.

Should the war end in a short time, one tire man stated, the price of crude rubber would probably go lower in this country than it had been. This, he said, would be caused by the inability of European factories to recover their normal condition and take the rubber offered by the world's markets, all of which rubber would be sent to this country and glut the market.

Present Advance Based on Apprehension

The tires which are being sold at the present time and on which the price has been raised are not being made from the crude stock on which the price jumped. The increase in tire prices is based more upon a feeling of apprehension as to future conditions and it will be several weeks in most cases before any of the high-priced crude is made into tires

Because of this some of the manufacturers have declined to raise until the cost of production increases. The Kelly-Springfield, Ajax-Grieb and Michelin companies are standing pat on their former prices, and the attitude of those who state that they will not raise is indicated in the statement of Van H. Cartmell, president of the Kelly-Springfield Tire Co.:

"We always base our selling price on our manufacturing cost," he stated, "and while we are able to manufacture at former and present prices we shall not raise the retail price of our tires. If the war should continue and it becomes necessary for us to make future purchases of crude rubber at advanced prices we would increase the selling price in proportion to the advance in the manufacturing cost."

Horace De Lisser, chairman of the Board of Directors of the Ajax-Grieb Rubber Co., expressed a like sentiment. Mr. De Lisser urged manufacturers to maintain an attitude of calm and said no increase would be made in Ajax tires until the cost of making them was increased by the necessity for purchasing crude rubber at advanced prices. This company is not heavily stocked with crude or tires, but is selling at former prices.

The increases made range from 10 to 20 per cent., the average being from 12.5 to 15 per cent. The highest increase was made by the Goodyear Tire & Rubber Co., Akron, O., which advanced 20 per cent. The Fisk Rubber Co., Chicopee Falls, Mass., was next in line with 15 per cent.

Goodrich and Diamond tires went up 12.5 per cent., as did Empire, Pennsylvania, Federal and United States. Republic's increase, like that of Firestone, ranges between 12.5 and 15 per cent.

Racine, Lee, McGraw and many others, many of them lesser manufacturers, have not made advances and state that they have not yet made decision. In many cases, however, the "little fellows" plan to imitate the big ones.

Instead Cuts Discounts

Swinehart did not raise its list price, but instead cut the discounts given to the dealer and the consumer. Where the dealer got, for instance, 10 and 10, he now gets 10 only, and where the consumer got 10 and 5 for cash, he now gets 5 for cash. The dealer is credited with having cut from the list under the previous arrangement, so that in order to make his former profit he will have to sell at list without a cut.

The dealers' discounts remain unaltered in other cases. They range from about 15 to 25 per cent. In some cases there will be a slight adjustment, but it will not be radical.

The movement in solid tires is erratic. United States boosted the price 15 per cent., while others state that they will not raise or have not made decision. It was stated by one tire man that the price of solids would not necessarily follow pneumatics inasmuch as solids may be built of less costly material and still be highly satisfactory. Para and a cheaper rubber—sometimes reclaimed—is used in solid tires. Firestone made a move in solids like that of Swinehart in pneumatics and cut the discount by 10 per cent. of the list.

Tire importers have supplies on hand for about six months and hope their European factories will be running again by the first of the year. In New York there are several imported tires; Prowodnik, made in Riga, Russia; Englebert, made in Liege, Belgium; Gaulois, made in Clermont-Ferrand, France.

The Gaulois Tire Corp. luckily got in three separate cargoes early this week and is well fixed. The Columb Tyres Import Co. has a good stock of Prowodniks. The Englebert Tyre Co. received cable advices that the factory, which is on the battle line of the Belgian and German armies, is at present practically at a standstill, Belgians being busy at other things than tire building. Prowodnik plans to raise its prices about 10 per cent.

United States Has 1,548,350 Cars

(*Continued from page* 297.)

cars are licensed once every 3 years instead of every year. Louisiana, Mississippi and South Carolina continue to have their automobilsts register with the local authorities, there being no state registration.

Lack of Uniformity

It is to be deeply regretted that there is so little uniformity about the automobile laws in the various states as this aspect of the situation is not only very inconvenient to tourists, but it also renders it very difficult to obtain statistics and especially so in regard to the various classes of vehicles, comparatively few of the states segregating these.

Many Delinquent Licenses

Referring to the table of registrations on page 297, it will be seen that there is apparently a decrease in registration in Georgia, Kentucky, Louisiana, Mississippi, Montana, Oklahoma and Washington. Telegrams to the respective Secretaries of State of Georgia, Montana, Oklahoma and Washington brought out the fact that the apparent decrease is due to delinquent licenses, while in Kentucky the new law is responsible for the lower registration and in Mississippi and Louisiana lower and more accurate estimates have been secured.

Owing to the incomplete registration figures, only twenty-five of the states were able to give information in regard to the number of chauffeurs in the state. Four of these stated that no chauffeurs were registered and the total number of the chauffeurs registered in the other twenty-one states was 271,858.

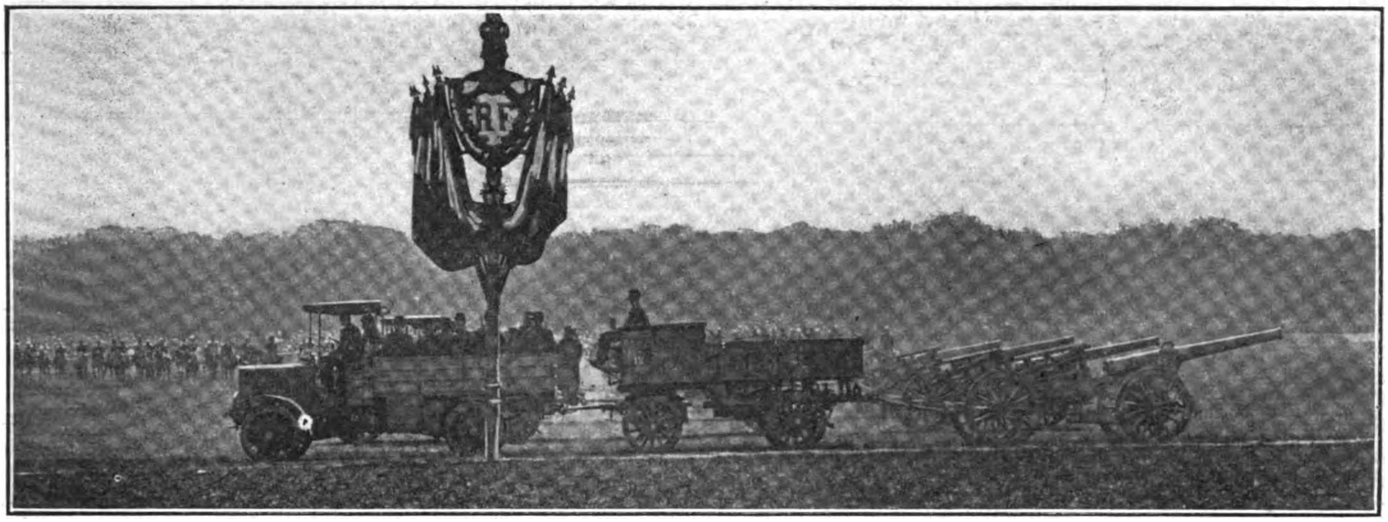
Thirty-four states were able to give the total in fees received, which amounted to $7,812,907, two states having over $1,000,000 income from this source, New York with $1,351,826 and Pennsylvania with $1,067,295.

Of course, the totals in the table on page 297 are very inadequate for the number of gasoline passenger cars and trucks and electric passenger cars and trucks, figures being available in comparatively few of the states. Such as are given, however, are significant.

Pierce Offers 54 Body Types

(*Continued from page* 303.)

ever before. Wire wheels may be secured at an extra cost but the standard cars are fitted with wood wheels having the Johnson patent demountable rims. The extra tires and rims are carried on the running board and this year the Silvertown cord tires will be found as standard equipment. In addition to the actual constructional features of the car all models will be regularly equipped with hand inspection lamps, and a full instrument board which includes the clock, speedometer, odometer, oil and gasoline pressure gauges, voltmeter, ignition and light switches and starter button. Magnetic gasoline tank gauges are now fitted on the tanks. In addition there is the power-driven air pump for inflating tires, a bulb and electric horn, collision bumper, trunk rack, shock absorbers, a supply of oils and grease, extra valve and spring, storm curtains, mud aprons, ventilators, tonneau lamp and in inclosed cars there is an adjustable foot rest, Waltham clock, umbrella holders and everything else that makes for luxury.



Four-wheel drive tractors hauling heavy guns in annual military display at Longchamps

War Injures Only European Trade

Will Not Hurt Commerce with British Oceania or U. S. Territories

WASHINGTON, D. C., Aug. 8—While the European war is sure to cut deep into the foreign motor car trade of this country, government officials here believe that markets in South America, Asia, Oceania, Africa, to say nothing of the noncontiguous territories of the United States, will be productive of much business within the next few months. That the war, if continued for any length of time, will be a serious blow to American motor car makers is conceded by all acquainted with conditions abroad, but government officials charged with the duty of advancing export trade assert that many markets now practically untouched can be made productive if proper means are taken to exploit American cars. Canada, of course, will continue to take many cars and is likely to prove the one best bet in the sale of cars abroad.

At the present time, leaving out Canada, British Oceania is our best customer for motor cars. During 1913 Australia and Tasmania took 2,083 pleasure cars, valued at $1,896,990, and seventeen commercial cars, valued at $23,027; New Zealand took 958 pleasure cars, valued at $990,837, and one commercial car, valued at $1,201. Minor shipments were made to other parts of Oceania, together with more than $200,000 worth of parts.

In South America our best customer is Argentina, which in 1913 took 1,062 pleasure cars, valued at $1,181,735, and thirty-five commercial cars, valued at $78,000. Shipments of parts, not including engines and tires, were valued at $74,138.

Brazil is the second best customer in South America, that country taking last year from this country 987 pleasure cars, valued at $1,035,247, and thirty-six commercial cars, valued at $75,073, and parts to the value of $108,859. Colombia followed with the importation of 110 pleasure cars, valued at $113,334, together with three commercial cars, valued at $6,112, and parts to the value of $18,676.

The Central American states are small buyers, Costa Rica, Guatemala, Honduras, Panama and Salvador, buying only eighty cars in 1913.

Just to show what a ripe field is awaiting American motor car manufacturers in foreign lands, the following quotation from a report sent by Consul General Sammons, at Shanghai, China, is interesting: "The interest in motoring, among both the native and foreign populations, is steadily increasing in Shanghai and other parts of China. The increase in the importation of American cars continues. As far as can be ascertained the total net importation of motor cars for China during 1913 amounted to $359,862, being an increase of $180,676 over the previous year."

In this connection is it also interesting to note that the salary of a Chinese chauffeur, according to Consul General Sammons, is from $15 to $20 a month.

Figures compiled from official records show that during 1913 Europe took 233 commercial cars, valued at $198,277, and 7,555 pleasure cars, valued at $6,044,229. To offset this North America took 554 commercial cars, valued at $1,147,622, and 7,460 pleasure cars, valued at $9,164,078; South America purchased 105 commercial cars, valued at $214,773, and 2,715 pleasure cars, valued at $2,950,432; Asia, 26 commercial cars, valued at $46,698, and 1,631 pleasure cars, valued at $1,418,090; Oceania, 63 commercial cars, valued at $119,437, and 3,573 pleasure cars, valued at $3,481,618; Africa, 12 commercial cars, valued at $10,334, and 1,359 pleasure cars, valued at $1,217,346. Exports of parts to these five grand divisions of the globe aggregated in value $5,240,599 in 1913, of which $1,272,881 went to Europe, $3,259,830 to North America, $275,295 to South America, $105,132 to Asia; $260,779 to Oceania and $66,682 to Africa. In addition more than half a million dollars worth of motor cars and parts were shipped to the noncontiguous territories of the United States during 1913.

A Rim and Tire Standard in Europe

PARIS, July 29—Official announcement will shortly be made by the general secretary of the International Union of Automobile Manufacturers of the general adoption by all European countries of the S. M. M. A. standard for rims and tires. The British standardized millimeter rim was decided upon in June of last year and tolerances adopted in September, 1913. The Society has purchased a complete set of rim-checking templates and printed specifications covering its standard. This British standard was brought before the International Union of Automobile Manufacturers, which comprises the makers in every European country, and after a certain amount of discussion was adopted by them in its entirety. The official notice may go out in a few days, and the result will be to standardize the whole of the pleasure car rims in European countries.

Members of British Institute of Automobile Engineers in front of F N factory at Liege

Big Competitions Off in France; War Stops Army Trials

Racing and Touring Calendar Annulled —International Cyclecar Trials Abandoned but Grand Prix de France May Be Run

PARIS, FRANCE, Aug. 1—With threats of a general war in Europe, all automobile demonstrations in France have been cancelled.

The International 6-day trials for cyclecars and motorcycles, which should have been held in the Alps next week, have been indefinitely postponed. President Poincare's official automobile tour through the Alps has been abandoned. The annual trials for army automobile trucks, which has been in progress around Versailles for the past 3 weeks, has been ordered to be stopped, the vehicles still in the competition being accepted as suitable for the government subsidies, and all being ordered to remain at the disposition of the government.

The three races at Le Mans on August 15 and 16 have been kept on the program and will be run if the political situation improves, while the date for receiving entries has been deferred. There are three distinct events: the Grand Prix de France for 4 1-2 liter cars, the motor cycle and cyclecar Grand Prix, and a light car race. It is now certain that neither Delage nor Mercedes will run in the Grand Prix de France; this practically leaves the race in the hands of Peugeot, for their only serious rival is Schneider.

No Curtailment by Continental Motor Co.

DETROIT, MICH., Aug. 10—The Continental Motor Manufacturing Co. denies absolutely that there will be any let up in the activities of the concern pending the European war because of difficulty in obtaining certain alloys and high-grade metals, of which the concern is one of the most extensive users in the world. In fact, the outlook for the business is such that the extensive additions to the plant started some time ago will be pushed along as much as possible. These additions consist in wings to the testing and machine shops, and a large amount of new machinery is being added to the general equipment. From now on the Continental company will also make all the metal stampings used in its various models of motors.

De Palma Arrives with Grand Prix Mercedes

NEW YORK CITY, Aug. 7—Ralph De Palma arrived to-day with one of the Grand Prix Mercedes after an exciting getaway from Germany, because a few hours' delay would probably have prevented him obtaining the machine.

De Palma will drive his new mount at Elgin and possibly at the Vanderbilt and Grand Prize races at the Panama-Pacific international exposition next winter.

If De Palma can win another Vanderbilt cup race, the Vanderbilt trophy will become his permanent property. Should De Palma decide not to drive the Mercedes he may be seen at the wheel of the Vauxhall, which he drove in the Grand Prix on July 4. While he had transmission trouble then, he believes the car's motor to be the most phenomenal he has seen.

British Engineers Just Back from Liege

NEW YORK CITY, Aug. 10—It is of interest to note that on the recent trip of the British Institution of Automobile Engineers to Belgium, Liege was one of the places visited. The Minerva and F N works were inspected, the former concern is a well-known manufacturer of Knight-motored automobiles, while the latter produces automobiles, motorcycles and firearms. It is only known in the United States as the producer of one of the first four-cylinder motorcycles, a large number of these machines having been imported several years ago.

Kelly-Springfield Sells 1,000 Trucks

SPRINGFIELD, O., Aug. 10—One thousand Kelly-Springfield 1-ton trucks have been purchased by the National Pure Water Co., Kansas City, Mo. This tremendous order will be delivered at the rate of 100 per month during 1915.

The National Pure Water Company has the exclusive rights and patents on a new hydro-electric water purifying machine. It is the intention of the company to lease these machines to agents in all sections of the country. When the agency is taken over, a complete outfit, including motor truck, settling tanks, cooling stands, bottles, etc., is sold by the National Pure Water Company. In this way the equipment of every agent will be uniform and the parent company will know that they are properly equipped to handle all business in the right way.

The contract signed by the National Pure Water Company provides not only for delivery of one thousand trucks but they further agree to allow The Kelly-Springfield Motor Truck Company, Springfield, O., to furnish all gasoline driven motor truck equipment which may be purchased.

The trucks are to be uniformly equipped. Each is to have a platform body to carry 54 five-gallon bottles of the pure water.

The chassis will be the standard Kelly-Springfield K-30 with 120-inch wheelbase and 9-foot loading space back of driver's seat.

Rudge Whitworth To Send Manager Here

NEW YORK, Aug. 10—John Pugh, manager of Rudge Whitworth, Ltd., will sail for New York August 19 to visit several factories in the automobile industry. Mr. Pugh has been one of the leading exponents of the wire wheel in Europe.

Ford Price Reductions Rule in Canada

FORD, ONT., Aug. 8—Buyers of Ford cars in Canada are to share in profits from August 1 of this year to August 1 of next year. Prices have been reduced as follows: Touring car now $590, formerly $650; runabout now $540, formerly $600; town car now $840, formerly $900.

Should the Ford company be able to obtain the maximum efficiency in factory production and the minimum cost in the purchasing and sales departments and can reach an output of 300,000 cars between the above dates, and should they reach this production they agree to pay, as the buyer's share, from $40 to $60 per car on or about August 1, 1915, to every retail buyer who purchases a new Ford car between August 1, 1914, and August 1, 1915.

300 Dealers at Jeffery Convention

KENOSHA, WIS., Aug. 6.—Discussions, tests and entertainment occupied the time of 300 dealers attending the annual Jeffery convention this week.

The Jeffery Chesterfield Six was explained in all its details and the dealers were enthusiastic in approving the new model.

Talks were made by L. H. Bill, assistant general manager, and E. S. Jordan, secretary and sales manager. It was emphasized that the Jeffery policy is to share with dealers all fruits of its sales experience as well as engineering practice.

Truck Club To Hold Detroit Convention

NEW YORK CITY, Aug. 12—In response to the general feeling that motor truck interests should get together, the Motor Truck Club of America has plans on foot for a motor truck convention to be held in Detroit on October 7, 8, 9 and 10. Other associations have been invited to join the convention. Yesterday Mr. George H. Duck, president of the club, completed arrangements with the Detroit Bureau of Commerce to hold the meetings in the convention hall of the Cadillac Hotel, which seats 1,000 persons. The Motor Truck Club will have its representative in the office of the Detroit Convention and Tourists' Bureau of the Detroit Bureau of Commerce.

J. Lee Barrett, secretary of the bureau, has been placed in charge of arrangements, accommodations, etc. At a meeting of the trade held yesterday afternoon, the convention was given hearty endorsement and local committees appointed.

S. V. Norton, of the Packard Motor Car Co., was appointed chairman of the general committee; M. L. Pulcher, of the Federal Motor Truck Co., chairman of the finance committee: John H. Thompson, of the Thompson Auto Co., chairman of the dealers' committee; W. D. Anderson, of the Anderson Electric Car Co., chairman of the electric vehicle committee, and R. B. Spencer, of the Denby Motor Truck Co., chairman of the publicity committee. The program is to be arranged by the regular committees of the Motor Truck Club of America.

The tentative program divides the junta into three sections, the first day being manufacturers' day, the second, dealers' day and the third and fourth get-together days.

Wilson Co., Top Makers, To Build Trucks

DETROIT, MICH., Aug. 8—A 1 1-2-ton truck will be placed on the market early in September by the C. J. Wilson Co., automobile tops and trimming manufacturers, located at Warren avenue and Fifteenth street, Detroit. The company, of which C. J. Wilson is president and general manager and Stanley C. Wilson, secretary-treasurer, has no connections with the C. R. Wilson Body Co., also of this city. G. Earl Porter, formerly with the Admiral Motor Truck Co., is the designer of the new truck, and G. A. Freeman, formerly with the Warren Motor Co., has become purchasing agent.

Winton Motor Car Co. Is New Name

CLEVELAND, O., Aug. 10—Papers have been filed with the Secretary of State changing the name of the Winton Motor Carriage Co., of Cleveland, O., to the Winton Motor Car Co.

New Moon Uses 1 Gallon Fuel Each 21 Miles

ST. LOUIS, MO., Aug. 7—A trip of 678 miles in a Moon Four-38, in which one-half gallon of oil was used, was made this week by Chief Engineer Goodspeed of the Moon Motor Car Co., who made a trial run in the new model to Moline, Ill., from St. Louis and return. Goodspeed drove the car 172 miles in two days he was in Moline, showing its paces.

On the trip to Moline an average speed of 20 miles per hour was maintained and the gasoline mileage was 21 miles to the gallon of fuel.

Sparton Claims Horn Patent

JACKSON, MICH., Aug. 11—Editor THE AUTOMOBILE—A case that has been pending in the patent office at Washington for some months in which the Lovell-McConnell Mfg. Co. has been trying to prove that it was the inventor of certain improvements in adjustability of motor-driven horns, has been decided against them. The patent was issued some time since to Wm. Sparks of the Sparks-Withington Co., and in passing on the matter the patent examiner stated that the Klaxon representatives were unable to prove that said Sparks was not the inventor.—Wm. Sparks, general manager Sparks-Withington Co.

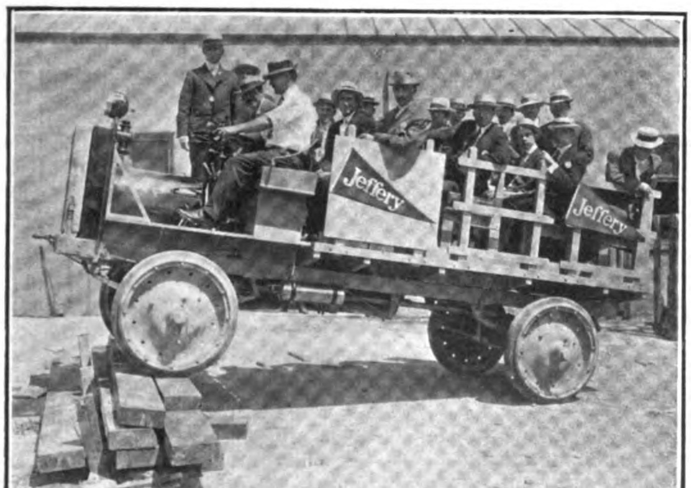
Savage Promoters Under Arrest for Fraud

DETROIT, MICH., Aug. 11—The three chief promoters and officers of the Savage Motor Car Co., which was organized in Detroit last June, to manufacture a four-cylinder light car costing $650, have been arrested by federal officers upon the charge of having used the U. S. mails to defraud. The three officers under arrest are president Delbert H. Cummings, secretary-treasurer-general manager R. W. Fishback and vice-president E. E. Taylor.

According to Detroit and Cincinnati post office inspectors, a large quantity of literature concerning the new Savage 20 car to be, was mailed out from Cincinnati and Chicago to every section of the country, for the purpose of inducing those who might become interested to secure the agency for the car. In order to get the Savage company's agency the customer was required to sign a contract for at least eight cars and make a deposit of $25 per car as an advance payment and a guarantee of the good faith of the depositor. It is further claimed that the agency for certain counties was secured by the payment of $100.

All told, it is claimed by post office inspectors E. E. Fraser of Detroit and Morgan Griswold and H. S. Smith, Cincinnati, that $50,000 cash was thus received by the Savage Motor Car Co., and the arrested officials told the authorities that it was with the money thus received from the prospective dealers that they intended to start the manufacturing of their cars.

The local post office authorities will ask their superior officers in Washington to issue a fraud order against the Savage Motor Car Co., and have the offices on Lafayette avenue placed in charge of government officials.



Two stunts performed by Jeffery four-wheel drive Quad in test last week before a crowd of newspaper men

Storage, Up—Gasoline, Down —New Plan of N. Y. Garagemen

Rents To Be Raised So That Abnormal Profit on Fuel Will Not Have To Be Made

NEW YORK CITY, Aug. 10—If the work of the storage committee which has been working among the garages on New York's West Side is successful prices of storage in that section of the city will be generally advanced September 1. Also, gasoline will be lowered to a point where the price gives the garage a five-cent profit and no more.

The committee is made up of West Side members of the New York Garage Association, and it has been the hope of the whole organization that sometime storage throughout the city might be placed on a paying basis and the profit on gasoline made normal. Up to the present there has been little if any profit in storage, the profit of the business being derived from gasoline, which has been sold at an abnormal profit.

Many independent gasoline stations have recently sprung up in and about the city selling at a small margin, and this has cut into the garage gasoline trade. Garages which insist that patrons buy gasoline in the garage have met opposition. All recognize the advisability of putting storage on a paying basis and making the retail price of gasoline follow the wholesale figure. The agitation is not new but has not been successful up to now.

The present movement was inaugurated on the West Side by Morris Segall, of the Apthorp Garage, who is being aided by William M. Haradon, Royal Garage; H. M. Gibson, Lincoln Square Garage; A. Debblee, Long Acre Garage, and James S. Griffin, International Garage. They have canvassed the West Side and report that sentiment is in favor of the move. A meeting of the West Side garagemen will be held before September 1.

The Royal Garage has informed its patrons that its rates will be adjusted September 1. The proprietor states that he will make this move regardless of whether the others raise or not. August 1 he dropped gasoline from 25 to 20 cents and under the new storage rates will drop it to 18, allowing a five-cent profit.

The proposed rates are in Grades A and B, depending somewhat on the locality and more on the style of building, whether old or modern. Grade A rates would be $40 for open cars and $45 for closed cars; Grade B rates would be $5 lower, $35 and $40.

Walpole Tire Sale Again Postponed

BOSTON, MASS., Aug. 6—Judge Dodge, in the United States District Court, to-day postponed the sale of the Walpole Tire & Rubber Co., which was set for Aug. 12. This action was taken on agreement of all parties concerned as a precautionary measure in view of the existing financial conditions arising out of the war in Europe.

The court has set Aug. 31 for a hearing on the question of fixing another date for the sale.

Market Reports for the Week

Tin and rubber are the only two commodities that were appreciably affected by the war during the week. Rubber is now 8 cents higher. It jumped from $1.07 to $1.15 last Friday and has remained at the latter figure ever since.

Tin is 5 cents higher per hundred pounds, the market price now being 65 cents. No transactions in cottonseed oil or silk are recorded, while all the other products have not changed price to any extent.

Material.	Wed.	Thur.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony	.06	.07	.15	.18	.15	.18	+ .12
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	......
Bessemer Steel, ton	19.00	19.00	19.00	19.50	19.50	19.50	+.50
Copper, Elec., lb.	.12⅜	.12⅜	.12¼	.12¼	.12¼	.12³⁄₁₀	—.00³⁄₄₀
Copper, Lake, lb.	.12½	.12½	.12½	.12½	.12½	.12½	......
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.93	.93	.93	.93	.93	.93	......
Lead, 100 lbs.	3.85	3.70	3.85	3.85	3.85	3.70	—.15
Linseed Oil	.60	.60	.60	.60	.60	.60	......
Open-Hearth Steel, ton	19.00	19.00	19.50	19.50	19.50	19.50	+ .50
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	......
Petroleum, bbl., Pa., crude	1.65	1.65	1.65	1.60	1.60	1.60	— .05
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	......
Rubber, Fine Up-River, Para	1.07	1.07	1.15	1.15	1.15	1.15	+. 08
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	60.00	61.00	60.00	65.00	64.00	65.00	+5.00
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	......

Newtone Co. Wins Right To Defend Its Dealers

NEW YORK CITY, Aug. 8—Editor THE AUTOMOBILE—To correct an erroneous impression given by an article in your issue of August 6, where you referred to recent Lovell-McConnell litigation, with the implication that the Lovell-McConnell Co. had succeeded in winning a preliminary skirmish by making the Automobile Supply Manufacturing Co. a defendant, we would advise you that the facts in this matter are just the other way about.

On July 6, the Lovell-McConnell Co. filed a suit against Julius Bindrim, a Brooklyn automobile supply dealer, and by the next day the Automobile Supply Manufacturing Co. had placed the subpoena in the hands of their own patent counsel who succeeded in obtaining a copy of the papers on July 9. The Automobile Supply Manufacturing Co. at once sought to intervene and defend this suit against its dealer, but the Lovell-McConnell Co. refused to consent to the request, and the matter had to be argued in court where the Lovell-McConnell Co.'s counsel again opposed it. Nevertheless, and in spite of the Lovell-McConnell Co.'s opposition, the Automobile Supply Manufacturing Co. succeeded in obtaining from Judge Veeder an order permitting them to intervene and defend the suit.

As correctly set forth by your issue of July 16, page 140, the Hutchison patent in suit is for the "*non*-rigid elastic connection between driver [or cam] and the diaphragm." The Newtones and Newtone Superiors have a *rigid non*-elastic connection and of course are not infringements.—The Automobile Supply Manufacturing Co.

Prosecute Doctors for Using Red Cross Emblem

MILWAUKEE, WIS., Aug. 8—A crusade against the illegal use of the Red Cross emblem on motor cars of physicians, ambulances and other vehicles has been put under way by the United States district attorney at Milwaukee. About 50 prominent physicians and officials of the municipal government are waiting with fear and trembling the result of federal court indictments.

All have pleaded not guilty upon suggestion of the federal judge, although in most every case the defendant was prepared to plead guilty. There being no precedent, Judge F. A. Geiger suggested a not guilty plea to afford time to look up the constitutionality of the act and to decide in what manner fines should be imposed. It is likely that all defendants will finally plead *nolle contendre* and be subjected to nominal fines.

Compromise in McDuffee Contract Suit

DAYTON, O., Aug. 8—Robert Walker and W. E. Strong, receivers for defendant companies in the case of Brown & Sharp Manufacturing Co. *vs.* Dayton Motor Car Co., *et al.*, have filed a petition with the U. S. District Court in Cincinnati, O., authorizing a compromise of the $75,000 breach of contract suit started by the McDuffee Automobile Co. against the Dayton Motor Car Co. in the local common pleas court.

Indianapolis Injunction for Chain Infringement

INDIANAPOLIS, IND., Aug. 7—George F. Kreitlein, doing business under the name of the Guarantee Tire & Rubber Co., Indianapolis, has been permanently enjoined by Judge Francis E. Baker of the United States District Court from infringing patents on a tire grip of which the Weed Chain Tire Grip Co. is the licensee and the Parsons Non-Skid Co., Ltd., a British company, is the holder of the patents.

U. S. L. Receivership Hurts Rubber Works

BUFFALO, N. Y., Aug. 11—Claiming that the recent appointment of receivers for the United States Light & Heating Co. crippled the business of his concern, Elias L. Toy, of Philadelphia, Pa., last Thursday afternoon filed action here in United States district court against the Buffalo Rubber Mfg. Co., asking that a receiver be appointed for that company. Judge Hazel immediately granted the request and John A. Lynch, of Buffalo, was appointed receiver, bond being placed at $2,500. Saturday an answer by the directors of the Buffalo Rubber Mfg. Co. was filed in federal court admitting the allegations charged against them by Elias Toy, of Philadelphia. They replied that the company is insolvent and they approved of the receivership.

The petitioner, president of the rubber company who filed the affadavit accompanying the petition, states that when the United States Light & Heating Co., of Niagara Falls, N. Y., recently went into hands of receivers, the Buffalo Rubber Mfg. Co. was unable to continue the manufacture of rubber because the receivers for the heating company cancelled a large quantity of orders. The complainant claims that the rubber company will be unable to manufacture and market its goods until the heating company again begins operations as usual.

Mr. Toy alleges that the company has numerous creditors in different states and cities. The petitioner's claim consists of $350 for money loaned on a note. He alleges that the company has a floating debt of about $9,000 and many individual claims and notes aggregating $2,000, which are due and unpaid. In urging that a receiver be appointed Mr. Toy alleged that several suits had been brought against the company for collection of obligations and that other proceedings are threatened. The petition also maintains that the property of the defendant in this state is subject to judgment, execution and other proceedings, with the result that unless a receiver were appointed there would be a multiplicity of suits and complicated litigation. The assets of the company, Mr. Toy states, are greatly in excess of the liabilities and with proper care can be conserved and the business again placed on a firm basis.

Overland To Retire 250,000 Preferred Stock

TOLEDO, O., Aug. 10—The Willys-Overland Co., through its New York agent, the Bankers' Trust Co., has sent letters to all holders of Overland $5,000,000 preferred, asking them to set prices on their stock. During the present month $250,000 of preferred stock will be retired, in accordance with a provision of the company's charter.

"The redemption price of our preferred stock is $110 a share," said Royal Scott of the Overland general offices. "The Bankers Trust Co. has been authorized to go into the market and procure the $250,000 of stock that is to be retired. Stockholders will be given a chance to offer their stock at redemption price, or less. If a sufficient amount is not offered voluntarily, redemption of the required amount will be forced. The letters from stockholders will be opened August 25 or thereabout."

Half Rates for 1914 Licenses in California

TACOMA, WASH., Aug. 8—W. R. Ormsby, of the state motor vehicle department of California, has issued the following bulletin, effective Aug. 1:

"The attention of the public is called by the motor vehicle division to the fact that, beginning August 1 and terminating December 31, the fees for the registration of automobiles are one-half the regular fee. Also the fees for the registration as dealers in automobiles are one-half the regular fees.

"For the registration of motor vehicles, owned by or under the control of a manufacturer or dealer in motor vehicles, if such persons operate upon the public highways not more than five automobiles the revised fee is $25, and $5 for each automobile in excess of the five so operated."

Cleveland-Galion Wants To Declare Dividend

CLEVELAND, O., Aug. 10—The Cleveland-Galion Motor Truck Co. has asked authority to pay a second dividend of 15 per cent. to its creditors in a report filed in the Cuyahoga county court. This report also shows receipts and disbursements from April 23 to July 21. A hearing is scheduled for August 19.

Interstate Commission Allows Freight Raise

NEW YORK CITY, Aug. 10—Freight rates for the shipment of automobiles in the Great Lakes district are affected by the final publication of the decision of the Interstate Commerce Commission, allowing "a horizontal 5 per cent. increase in rates."

The increases apply only in the Central Freight Association territory, which lies between Buffalo and Chicago. Shipments to points east of Buffalo will not share in the advance, or through shipments to the Pacific. Part of the 5 per cent. will be allowed on freight for the South, however.

Taking the case of a freight rate which is 50 cents per 100 pounds, the net increase amounts to 5 per cent. which on first-class merchandise brings the figure to 52½ cents. Motor cars, however, are classed at 110 per cent. of first class rates, which brings the figure to 57¾ cents per 100 pounds.

Fifty Miles of Wider Roads Built in Massachusetts in 1914

Whole Mileage of State Is Now 980.37, the Additions Having Lower Crown and Bituminous Binder

BOSTON, MASS, Aug. 8—The annual report of the Massachusetts Highway Commission has been issued containing the facts relative to roads and motor vehicles which interest road builders and motorists. According to it the total length of state highways now completed is 980.37 miles, of which a mileage of about 49.5 was done last year.

There has been expended on these roads since the work was first undertaken just $9,288,143.35. This does not include the money spent by towns and cities.

The report states that for the past 3 years there has been a constant increasing interest on the part of city and town officials to secure good roads, and the commission has extended a great deal of aid to such officials. County officers also have done their share to increase the state mileage.

About $2,690,000 was available for maintenance and constructive work last year and out of this much was accomplished in the way of resurfacing highways, strengthening bridges, etc.

The commission feels that it needs more men for its engineering department for it states, "To increase from $650,000 to more than $3,000,000 for road expenditures in five years, without a corresponding increase in the working force, and to secure good results are certainly worthy achievements for any office or any force."

Building Wider Roads

The commission has continued its policy of making the main roads wider, usually building 18 feet of stone surface instead of 15 feet, which was formerly the standard width. It has also continued to use on such roads some bituminous binder and has been reducing the crown of the road 1 inch to the yard in width, not only to make the road less slippery, but also in order that the traffic will distribute itself over the whole width of the highway. This additional width and bituminous binder which is now necessary increase the cost of construction from 50 to 75 per cent. The 8-hour law and the workingmen's compensation law have also largely increased the cost. The increase in traffic, particularly of motor trucks, is responsible for the increased width and cost of the highways now.

The commission has started experimental work on a sand and clay road in Gay Head under the direction of an engineer from Washington, and if it is found that it will stand up in Winter many more miles will be constructed on the South Shore where there is an abundance of material, and because of the low cost of such highways.

The commission has done work in 222 cities and towns and $287,000 was available for this work. The report states that what were formerly country roads have now become main highways because of the adoption of motor vehicles for business and pleasure and this has been the cause of a big expense for maintenance. Some of the state highways are 20 years old but the average of all is about 10 years. While adequate for some years after they were constructed they are too narrow now in some places, and are wearing out badly in others. It will cost from $8,000 to $10,000 a mile for reconstruction, but the work must be planned far ahead, and be done gradually or in a few years many miles of state highway on the heavily traveled routes will give out and go to pieces. The work should be planned and at least 100 miles a year done from now on so that at the end of 5 years at least 500 miles will be widened and reconstructed. The engineers estimate that at least $3,000,000 is needed for the immediate widening and reconstruction of the through routes.

Some system of uniform traffic counts should be adopted from a formula that would give the weight or damage done by the different kinds of traffic, based on the weight per yard width per year, or per day, so that results may be compared, according to the report.

Some of the facts connected with the automobile department are very interesting. It shows that out of 5,847 persons examined to drive motor vehicles 671 failed. In 1912 of 5,936 examined 347 failed showing that the examiners are more strict apparently, for almost all the failures were on the road test in handling vehicles.

Mulford at Elgin with Peugeot—Entries Now 19

Next Week's Big Road Race Will See the First Constellation of American Stars in Competition—De Palma Arrives from Europe with Grand Prix Mercedes

CHICAGO, Aug. 10—Ralph Mulford with a third Peugeot, the one in which he cleaned up at Galveston and which also was Boillot's mount in the last 500-mile race at Indianapolis, is the nineteenth entrant in the Elgin road races which are booked for August 21-22. The entry is made by the Peugeot Import Co. of New York. Prior to the recording of the Mulford entry Frank Fox nominated the Gray Fox with Howard Wilcox as pilot.

Entries to Elgin close next Saturday but even if no more come in before then, the Chicago Automobile Club already has a field that surpasses anything ever before secured for the Kane county classics. In the way of drivers it has such celebrities as Ralph de Palma, Bob Burman, Barney Oldfield, Spencer Wishart, Ed Pullen, Gil Anderson, Ralph Mulford, Ed Rickenbacher, Harry Grant and Howard Wilcox, while in the way of cars there are three Peugeots, three Stutzes, three Mercers, two Marmons, two Duesenbergs, two Sunbeams, a Mercedes, a Braender Bulldog, Pahys and the Gray Fox. When Moross names the Maxwells with Tetzlaff, Hughes and Carlson, then the list will round out well. It looks as if twenty-five cars would start each day.

Already the drivers are hurrying to Elgin and informal practice now is going on. The Sunbeams, Duesenbergs, This, Marmons and the Dearborn Stutz already are there.

Poor Track, Slow Races at Worcester

WORCESTER, MASS., Aug. 8—The International Racing Club came to the Greendale track to-day and staged a series of races that brought out about 300 people, an attendance that was very disappointing to the promotors of the meet. As no arrangements had been made to put the track in shape, and it was so dusty that even with two cars going at once it was dangerous, the big event of the day, the 25-mile event, was called off because the drivers were afraid to risk their lives. So instead the program was lengthened out into one, two and three-mile events with the same cars. When the races were all over Jack Laviolette had captured five events, Pete Bourque three, Burlingame two and Weldon and Reynolds one each. The summary:

Two miles—Won by Laviolette, Mercer; Weldon, Lozier, second. Time 2:44.

Two miles—Won by Bourque, National; Reynolds, Knox, second. Time 2:40.

Two miles—Won by Weldon, Lozier; Burlingame, Knox, second. Time 2:39.

One mile speed trial—Laviolette, Mercer, 1:17¼; Bourque, National, 1:17½; Reynolds, Knox, 1:32.

Three miles—Won by Burlingame, Knox; Reynolds, Knox, second. Time 4:31.

Two miles—Won by Laviolette, Mercer; Bourque, National, second. Time 2:38.

One mile—Won by Laviolette, Mercer; Bourque, National, second; Weldon, Lozier, third. Time 1:15.

One mile—Won by Bourque, National; Reynolds, Knox, second. Time 1:28.

Two miles—Won by Bourque, National; Weldon, Lozier, second. Time 3:00.

One mile handicap—Won by Laviolette, Mercer; Reynolds, Knox, second. Time 1:18.

Two miles—Won by Burlingame, Knox; Reynolds, Knox, second. Time 2:55.

Three miles—Won by Reynolds, Knox. No time taken.

Lorraine-Dietrich Wins Touring Car Race

PARIS, July 29—Angers has held a 231-mile road race for touring cars only, in which the winner was François Sisz, who drove a Lorraine-Dietrich at an average of 65.6 miles an hour. Although the winning machine carried four passengers and had the touring equipment required under the rules, it is only fair to state that it began life as a pure racer and even took part in one of the French Grand Prix races.

In contrast to the winner, which was a racer disguised as a touring car, there were about a score of others which had genuine touring car chassis equipped as much like racers as the rules would allow.

The Lorraine-Dietrich, which has a piston displacement of about 670 cubic inches, was followed home by a Hispano-Suiza of only 183 cubic inches at an average speed of 58 miles an hour, this being maintained over a course of a difficult, winding nature. Arthur Duray, on a Turcat-Mery, came third a little more than a minute behind the Hispano-Suiza. Fourth place went to a Cottin-Desgouttes, and fifth and sixth places to Chenard-Walcker cars of 3.5 by 5.9 inches bore and stroke. The faster of these two cars averaged a little more than 57 miles an hour.

An interesting performance was that of a little Gregoire of only 2.7 by 5.5 inches bore and stroke which won tenth place at an average of nearly 52 miles an hour. This was a stock car driven by Bignan, the designer of the motor, and was put in at the last moment when the car originally entered had to be withdrawn owing to an accident.

The following is the summary of the race:

CAR	DRIVER	TIME
Lorraine-Dietrich	Sisz	3 31 06
Hispano-Suiza	Antoine	3 58 57
Turcat-Mery	Duray	3 59 39
Cottin-Desgouttes	De Franck	4 00 19
Chenard-Walcker	Glaszmann	4 04 41
Chenard-Walcker	Dauvergne	4 10 51
Aquila-Italiana	Leduc	4 10 52
Nazzaro	Baratteau	4 26 01
Hispano-Suiza	Bara	4 27 06
Gregoire	Bignan	4 37 49
Rolland-Pilain	Sire	4 56 15
Scap	Molet	4 59 54

Brighton Beach Preparing for Labor Day Races

NEW YORK CITY, Aug. 10—Rapid progress is being made with the preparations for the race meet at Brighton Beach on Labor Day. This will be the first speed carnival offered to New Yorkers this year.

It is expected that many of the contenders at Galveston beach and Elgin will be among the starters.

The star event will be a 100-mile race for a $1,000 purse, $500 to the first, $300 to the second, $150 to the third and $50 to the fourth.

Columbus Race Sanction To Sloan Protested

COLUMBUS, O., Aug. 10—The Columbus Automobile Club and the Columbus Auto Trades Association, which combine both the owners and dealers of the city, have protested to the A. A. A. against the granting of a sanction to J. Alex. Sloan, of St. Paul, to hold a two days' race meeting on the track of the Columbus Driving Association August 15 and 16. The sanction had been granted previous to the energetic protest of the local organizations.

Strong pressure is being brought to bear on the A. A. A. to withdraw the sanction. If it is not withdrawn the Columbus Automobile Club and probably the Ohio Automobile Association will withdraw from the A. A. A.

It is claimed that the Columbus track is unsafe for fast racing, which is shown by the records of the 200-mile race in 1913 when two men lost their lives.

Race Celebrities for Minnesota State Fair

MINNEAPOLIS, MINN., Aug. 10—Several well-known race track stars have been retained for automobile days at the Minnesota State Fair, September 7-14. The races will be on the Hamline one-mile dirt track September 12. Prizes aggregate $1,500. Among the entries are Louis Disbrow, Barney Oldfield, Eddie Rickenbacher, Bill Knipper, Johnnie Raimey, Eddie Hearne, Fred Horey and Joe Cleary.

NEW YORK CITY, Aug. 7—In the recent races at Galveston, in which Mulford took ten out of the sixteen events, Rajah spark plugs, made by the Rajah Auto Supply Co., Bloomfield, N. J., were used. One set of plugs lasted the whole meet. It is stated that no attention whatever was given to this part of the equipment.

Durant Vice-President of Monroe Co.

FLINT, MICH., Aug. 7—The election of officers of the Monroe Motor Co., which was organized last week, has taken place. R. F. Monroe is president and general manager; W. C. Durant, vice-president; A. G. Bishop, treasurer; Curtis R. Hathaway, secretary; W. C. Rowles, R. F. Armstrong and A. B. C. Hardy, together with the officers, make up the board of directors.

Factory Miscellany

FORD Enlarges in Canada—A $300,000 addition to the Ford Motor Co.'s plant at Ford City, Ont., will be erected at once, the new section to replace the only remaining old buildings now known as the "old wagon works." The new building will be six stories high and 200 feet square. It will be of reinforced concrete, of the same design as the main building of the plant.

Between 400 and 500 new men will be employed when it is completed, and the floor space of the plant will be increased nearly 50 per cent. The company is at present building assembling factories in Toronto and this city and will start another in London, Ont., before the fall. These plants will have a capacity of 25 cars a day each, and the Ford City plant will supply them with finished parts.

Michigan Brass Plant Moved—The Michigan Brass & Foundry Co., which was purchased recently by capitalists of Battle Creek, Mich., is being moved to the latter city.

1,000 Engers Next Year—President F. C. Enger of the Enger Carriage Co., Cincinnati, O., has been in Detroit for some time for the purpose of getting the necessary material for the building of 1,000 Enger cars for next year.

Equipping Billings & Spencer Plant—The plant of the Columbia Motor Car Co., recently acquired by the Billings & Spencer Co., Hartford, Conn., is being put in order. The first lot of equipment was moved into the building about the first of August.

Argo Executive Offices in Jackson—The New York City office of the Argo Motor Co., Inc., at 7 East Forty-second street will be discontinued August 1. On and after that date the executive offices of the company will be at Jackson, Mich., where the factory is located.

A. O. Smith Co. Has Outing—The 3,000 employees of the A. O. Smith Co., Milwaukee, pressed steel frames and parts, participated in a monster outing with their families at Waukesha Beach on Saturday, August 8. More than 11,000 persons were on the grounds.

Gramm - Bernstein Expanding — The Gramm-Bernstein Manufacturing Co., of Lima, O., maker of motor trucks, will soon start the erection of a large addition to its factory. B. A. Gramm, general manager, says the work will be rushed to completion some time in September.

Ford Building in Cleveland—The contract for the branch factory building for the Ford Motor Co., Detroit, which is located on East 117th street, Cleveland, has been awarded to Morrow Bros., Baltimore, Md. The structure will be 157 by 296 feet and four stories in height. It will be of brick, steel and concrete construction.

Fisher Body to Enlarge—To provide for increasing business, the Fisher Body Company, Detroit, has acquired a five-story building with 100,000 sq. ft. of floor space at Forest and Grandy avenues, for use as an additional unit to its present plants. It is being equipped for automobile body production.

Patent Farm Tractor—Curry and Richmond Dort, two young men living at Westerville, O., have secured patents on a motor driven tractor which they claim will revolutionize farm work. The machine is in the form of a light motor-driven farm tractor embodying different devices which will adapt it to pumping water, grinding feed, cutting wood, churning and other farm work.

Packard Patrols Go 80,188 Miles—The nine Packard automobile patrols which the police department of the city of Detroit is using covered a total of 80,188 miles during the year ending June 24, 1914. The average mileage per patrol was 8,909 miles, while the average daily mileage per vehicle was 24.4 miles. A total of 50,613 runs were made during the year, or an average of 5,623 per car, or over fifteen per day per car.

Ford Increases Minneapolis Plant—The Ford Motor Co. has bought two lots for an addition to its ten-story building at Fifth avenue, N. and Fifth street, which is not yet completed. The additional space gives the company an entire square of land and will enable it to double the size of its $750,000 assembling plant. The lots cost $37,950. For the present the land will be utilized for a side track and to run cars upon.

Mitchell Six Fire Fighter — The Mitchell-Lewis Motor Co., Racine, Wis., last week made delivery of a new type of fire chief's car to the city of El Paso, Tex. The car is built on the Mitchell De Luxe Six chassis as a roadster, and has room for three passengers. Chemical extinguishers, lanterns, ropes and other pieces of small equipment for fire-fighting are ingeniously arranged in and around the car, which is a small fire department in itself and capable of 70 miles per hour with its 4¼ by 7 inch six-cylinder motor.

Automobile Works for New Orleans—Capitalized at $1,000,000, the Southern Automobile & Supply Co. has been organized to establish automobile works at New Orleans. It plans the construction of seven buildings to cover five acres and the installation of machinery to manufacture every part of an automobile, for constructing motor-boats and gasoline engines, etc. The buildings are to be fireproof, and construction bids will be opened about November 15, while the machinery proposals will be opened about December 1.

The Automobile Calendar

Aug. 2-9	Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16	Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17	Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupé de l'Auto Race.
Aug. 27	Brooklands Track, England; Annual Automobile Race.
Aug.	Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug.	Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7	Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 9-11	Convention Paving Brick Mfrs. Assn., Cleveland, O.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15	Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2	S. A. E. European Trip.
Oct. 16-26	Paris, France, Automobile Salon.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14	London, England; Olympia Show.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 15	Paris, France, Kerosene Motor Competition.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 9-16	Philadelphia Automobile Show.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in  the Industry

Motor Men in New Roles

Hogle Leaves Alma—W. M. Hogle has resigned as general sales manager of the Alma Motor Truck Co., Alma, Mich.

Stanley Takes Lewis in Milwaukee—The Stanley Steamer Co., 321 Fourth street, has taken the agency for Lewis cars.

Winter Wizard Electric Representative—The Wizard Electric Lamp Co., San Francisco, Cal., has appointed H. L. Winter its Detroit sales representative.

Overland Has Boston Outing—The annual outing of the men handling Overland cars under the direction of Connell & McKone, of Boston, was held recently near Boston.

Fields Chalmers Assistant Sales Manager—The Chalmers Motor Co. has appointed Jos. Fields, formerly of Fargo, N. D., assistant sales manager, of its Detroit plant.

Gaither Takes Wahl Agency—The Gaither Auto Company, 241 North Fourth street, Columbus, O., has taken the distributing agency for the Wahl in the entire state of Ohio for 1915.

Die Shop in Milwaukee—Edward A. Kickhaefer, of Milwaukee, has organized the Kickhaefer Mfg. Co. and established a shop for the production of dies and stampings at 199-201 Clinton street.

La Fournier Changes—Jack La Fournier, formerly connected with the Vulcan Mfg. Co., will manage a new garage and repair shop, being erected at the corner of State and Erie streets, Painesville, O.

A. T. Mosher Goes to Chalmers—A. T. Mosher, formerly head of the wholesale department of the Nordyke & Marmon Co., has become state representative for the Chalmers Auto Co., distributors in Indiana for the Chalmers and Peerless.

Paige-Detroit Agency in Nyack—The Rockland County Sales Co. has been organized in Nyack, N. Y., to act as Rockland county distributors of the Paige-Detroit. W. C. Beattie, formerly with the Sprague Electric Works, will assume active charge.

Horne Transferred—Charles W. Horne, who traveled in the middle western states for the Gibson Auto Co., has been transferred to Birmingham, Ala. R. M. Beck, who traveled for the same company in Southern territory, has been transferred to southern Illinois.

Girard Wins Promotion—Frank J. Girard, who has been in charge of the Peerless branch at Columbus, Ohio, located at 168 North Fourth street, has been appointed district manager for the Peerless and will make his headquarters in Columbus. He will have all of central and southern Ohio in his territory. A service station with all parts will be maintained at 111 East Lynn street, with R. L. Gardner in charge.

Morse on World Trip—A business trip around the world to investigate the automobile business and its requirements from the American point of view and to look after the business done by its various agents and representatives in foreign countries, is the program mapped out by E. C. Morse, sales manager of the Hudson Motor Car Co., Detroit, who sails this week for South America, and then will go to the other big countries in Asia, Australia, Africa and Europe.

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Garage and Dealers' Field

M. & F. Sales Absorbs Consumers—The Consumers Tire Co. has been bought out by the M. & F. Sales Co., which has removed from 422 Jefferson street to 701 Wells street. E. N. Ircink, formerly with the Aermore Mfg. Co., Chicago, has become sales manager.

Goodrich Has Toronto Store—The B. F. Goodrich Co., of Akron, O., will be represented in Canada henceforth, for the Diamond Tire brand, by the J. F. Holden Rubber Co., 699 Yonge street, Toronto, which has handled Morgan & Wright and Dominion tires for years.

Electric Tool Co. in Milwaukee—The International Electric Tool Co. has been organized here, Wm. R. Sorgel being president; Wm. H. Gaulke, vice-president and secretary, and E. K. Rundle, treasurer. The concern will make a line of electrical tools for garages, machine shops, foundries.

Brillion Garage Transferred—The Calumet Garage Co., Brillion, Wis., has been purchased by Edward Colvar, of Manitowoc, Wis., and Adolph Valesky, of Collins, Wis., who will continue the business under the style of Brillion Garage. The concern will distribute the Overland in this territory.

Ohio Making Roads—The Ohio Highway Commission on August 4 awarded road improvement contracts in the Buckeye State amounting to $2,629.000, which call for the construction of 178 miles of highways in almost every county of the state. A large part of the work is to be done during the present season.

Modern Garage in Menominee—The Dugas Motor Co., of Menominee, Mich., has purchased a site and will proceed immediately with the erection of a $20,000 garage building at 315 Ogden avenue. It will be a two-story, of liberal dimensions and contain a large repair shop, equipment for which is now being purchased.

Dodge Agent in Connecticut—The Hartford Motor Car Co. is in the process of organization for the purpose of representing the Dodge Bros. car in Hartford, Tolland and Middlesex counties. Charles E. Walker, F. M. Ridler and Ralph A. Barkman, who have been connected with the Pope Mfg. Co., are prime movers in the project.

Big Accessory Store in Superior—The Motorcraft Store, 1716 Broadway, Superior, Wis., is the name of a new establishment opened Aug. 1 by A. C. Eveland & Co. The store carries the largest stock of motor car and cycle accessories, tires, etc., in the northwest. Mr. Eveland formerly was associated with the Kelly Hardware Co., of Duluth, Minn.

Remy Increases Service Stations—The Remy Electric Company, of Anderson, Ind., recently opened new service stations with D. F. Holliday & Co., 344 N. Delaware street, Indianapolis, Ind.; Perry-Mann Electric Co., Columbia, S. C., and Washington Auto Supply Co., Seattle, Wash. In each of these service stations a skilled mechanic is stationed with a full line of parts for Remy equipment.

To Auction Used Cars—Monthly auction sales of used cars are to be held by the Claypool Hotel Garage Co., Indianapolis, the first sale having begun August 8. The monthly sales will continue two or three days. The company is buying used cars throughout Indiana and adjacent states and announces that it will buy only cars that are in good running order. The company plans to provide an outlet for dealers and manufacturers for used cars.

Minneapolis Overland Dealer Building—Bowman & Libby, Inc., distributor for the Overland cars, are in possession of a block of ground on Great Northern trackage which will become the site of a huge warehouse to carry at least 1,500 cars. The building will be three stories, mill construction, with sprinklers. With a double-deck arrangement it will be practically a six-story building. Three hundred feet of railroad trackage will enable the firm to unload seven freight cars at a time. The building will cost $75,000 and will be ready Dec. 1. The firm will concentrate its storage, now in three warehouses, for winter distribution of machines. The building is to be of brick and terra cotta exterior, 100 by 300 feet.

Canadian Cyclecar Ready—The first Canadian company to make an announcement of a completed vehicle is the Welker-Doerr Company, of Berlin, Ont. The machine is a true cyclecar termed the Wel Doer and seats its two passengers side by side with the driver at the right. The wheel base is 100 inches, the tread 36 inches and the weight 500 pounds. The motor is a two-cylinder, air-cooled unit, rated at 9-13 horsepower. Ignition is by Berling dual magneto. Transmission is by friction, with final drive by belt. The frame is of reinforced white ash, on quarter-elliptics.

Baby Rex Made in Edmonton—The first to be manufactured in Edmonton will be the Baby Rex. A company, the directors of which are P. S. Osser, managing director; Charles J. MacMillan, manager, and A. A. Howard, director and secretary-treasurer, has secured incorporation under the name of Rex Motors of Canada, Limited. It is the intention of the company to establish their plant in Norwood. The car they will build is designed on decidedly unique lines, and it has many points of distinction for a light weight car. The engine is of the aeroplane type. It has sixteen horsepower and will develop a speed of from six to sixty miles an hour and in ordinary running will make 45 miles on a gallon of gasoline. There is nothing in the car to freeze, the engine being air-cooled. Its weight is 750 pounds. It is equipped with self starter and wire wheels.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

Delaware

DOVER—The Lighthouse Tire Co.; capital, $1,000,000; to manufacture, sell and buy motor cars, tires and accessories.

WILMINGTON—Pittsburgh Motor Car Co.; capital $100,000; to manufacture motor cars and all kinds of motors. Incorporators: J. M. Frere, H. J. Davis and G. Shearer.

Illinois

CHICAGO—Lincoln Motor League; capital, $2,500; to manufacture, repair and deal in motor cars. Incorporators: A. H. Maurer, C. E. Hall and W. A. McGivern.

Indiana

FT. WAYNE—Ft. Wayne Overland Auto Co.; capital, $5,000; to deal in motor cars. Incorporators: James S. Walsh, Thomas F. Gaskins and George H. Zehender.

Massachusetts

BOSTON—Chalmers Motor Co. of Massachusetts; capital, $100,000; to deal in motor cars. Incorporators: J. J. Murray, Boston; J. L. Hermanson, Brookline; and others.

BOSTON—Mohawk Motor Car Co.; capital, $40,000; to deal in motor cars. Incorporators: C. E. Bosworth, Whitman; H. E. Fullam, Lynn; and others.

Michigan

DETROIT—The Western Gear Mfg. Co.; capital, $5,000; to manufacture gears and other motor car parts. Incorporators: John Saunson, Oscar Palm and Victor Palm.

KALAMAZOO—Safety Fire Motor Car Co.; capital, $10,000.

Minnesota

DULUTH—East Wheel Auto Co.; capital, $100,000. Incorporators: N. J. Upham, T. F. Upham and others.

New York

BROOKLYN—Fred S. Phinney,; capital, $5,000; to manufacture cars and accessories, etc. Incorporators: F. S. Phinney, 100 Madison St., Brooklyn; A. N. Phinney, Brooklyn; A. S. Phinney, New York.

BUFFALO—Hudson-Oliver Motor Co.; capital, $15,000; to deal in motor cars and car supplies. Incorporators: E. G. Oliver, George B. Wesley and Charles W. Pooley, all of Buffalo.

BROOKLYN—Classon Garage, Inc.; capital, $3,000. Incorporators: Patrick H. Mulrear, 28 Kosciusko St.; Edw. H. Mulrear and Albert W. Mulrear, both of 862 Bedford Ave., all of Brooklyn, N. Y.

BROOKLYN—Cooper Flexible Transmission Co., Inc.; capital, $160,000; to manufacture transmission appliances for cars, etc. Incorporators: Ben C. Holt, 50 Church St., New York, N. Y.; Minnie Howe and Sidney C. Yeemans, both of 221 Borden Ave., Long Island City, N. Y.

BROOKLYN—Fred S. Phinney, Inc.; capital, $5,000; motor car accessories, etc. Incorporators; Arthur S. Phinney, 108 West 45th St., New York, N. Y.; Fred S. Phinney and A. N. Phinney, both of 190 Madison St., Brooklyn, N. Y.

BROOKLYN—Kruger Bros. & Co., Inc.; capital, $4,000; to repair cars, etc. Incorporators: John Kruger, 209 12th St.; Jas. C. Kruger, 365 56th St., and Jos. Kruger, 254 Prospect Ave., all of Brooklyn, N. Y.

BUFFALO—Meinhard Auto Service Specialties Sundries Supply Co. Incorporators: C. J. Staples, C. H. and T. P. Meinhard, all of Buffalo.

BUFFALO—W. & L. Mfg. Co.; capital, $30,000; to repair motor cars. Incorporators: H. Z. White, 183 West Tupper St.; B. O. Lee and P. W. Lee, all of Buffalo.

HEMPSTEAD—Baker Rim & Auto Supply Co.; capital, $5,000; to conduct a sales agency. Incorporators: H. L. and G. H. Bankney and O. J. Ipsen, both of Garden City, and others.

NEW YORK—Garrett Auto Service Co.; capital, $10,000. Incorporators; H. G. Commons, 210 West 78th St.; R. D. Whiting and W. G. Stahlnecker, all of New York City.

NEW YORK—J. Dolton & Co., Inc.; capital, $900; to repair and store cars. Incorporators: Jack Dolton, Jos. C. Dolton and Wm. N. Plein, all of 354 West 50th St., New York, N. Y.

NEW YORK—Lighthouse Tire Co., Inc.; capital, $5,000; to manufacture and deal in rubber tires for motor cars etc. Incorporators: John McLaren, F. B. Knowlton and S. V. Dowling, all of 154 Nassau St., New York N. Y.

NEW YORK—Otto Gutzmann, Inc.; capital, $12,000. Incorporators: Otto R. Gutzmann and Paula Gutzmann, both of 911 Amsterdam Ave., New York, N. Y., and Martin Beickert, 1876 Broadway, New York, N. Y.

NEW YORK—Riebe Ball Bearing Co., Inc.; capital, $20,000; to manufacture ball bearings and car accessories. Incorporators: Jos. Hever, 77 Essex St., Hackensack, N. J.; Emil M. Lowy and Leo. L. Lowy, both of 920 Prospect Ave., New York, N. Y.

NEW YORK—S. S. Garage Co., Inc.; capital, $5,000. Incorporators: Chas. G. Evans, 233 Broadway; John F. Staiber and Harry B. Stowell, both of 153 West 54th St., all of New York, N. Y.

NEW YORK—Uneeda Tire Filler Co.; capital, $100,000; to manufacture and deal in motor car accessories. Incorporators: M. E. Rosenthal, New York; J. Golden, Brooklyn; T. Bilgn, New York.

SARANAC LAKE—Shelley Tool Co.; capital, $10,000; to deal in motor cars, motorcycles, machinery, etc. Incorporators: Nathan M. John H. and Hattie B. Shelley, all of Saranac Lake.

Ohio

CINCINNATI—Cincinnati Speedway Co.; capital $10,000; to build and operate a motor speedway. Incorporators: W. T. Foley, F. D. Hirst, T. A. Tauwold, Jr., G. A. Ginter and A. H. Morrill.

CLEVELAND—Windemere-Euclid Garage Co.; capital, $10,000. Incorporators: Carl R. Baker, C. F. Taplin, Earl H. Wells, V. M. Harris and E. M. Golding.

CLEVELAND—Fenfar Co.; capital, $10,000; motor car parts. Incorporators: E. W. Farr, C. W. Fenner, F. J. Breeler, Otto Gutzmann, W. E. Ward and C. A. Ebert.

CLEVELAND—The Hudson-Stuyvesant Motor Co.; capital, $25,000; to manufacture motor cars and supplies. Incorporators: F. E. Stuyvesant, Richard L. Kreesen, B. J. Guthery, R. E. Williams and H. M. Hodet.

CLEVELAND—Simplex Distributing Co.; capital, $10,000; to sell motor cars. Incorporators: F. S. McGowan, E. A. Foote, A. R. Manning, Jr., S. Chestnutt and M. N. Job.

PORTSMOUTH—Motor Fuel & Lubricating Co.; capital, $5,000; to deal in motor cars, accessories and supplies.

Washington

SEATTLE—Auto Specialty Co.; capital, $10,000. Incorporators: J. F. Hill, H. M. Kerr and L. Frank Brown.

Wisconsin

MADISON—Star Tire & Rubber Co.; capital, $5,000; to manufacture and deal in tires and rubber goods. Incorporators: J. W. Mort, C. E. Mort and M. M. Mort.

NEW YORK—Whitefield Motor Car Co., Inc.; capital, $175,000. Incorporators: Morgan J. O'Brien, 2 Rector St.; Alan J. Corey, 91 William St., and Dewees Dilworth, 140 Broadway, all of New York, N. Y.

Virginia

RICHMOND—Overland Motor Co.; capital, $5,000 to $20,000; to deal in motor cars. Incorporators: D. P. Browder, O. C. Granger and others, all of Richmond.

GARAGES AND ACCESSORIES

California

LOS ANGELES—The Over-All Roller-Bearing Co.; capital, $500,000. Incorporators: T. W. Starr and others.

Delaware

WILMINGTON—Day Tire Protector Co.; capital, $100,000; to manufacture motor car tires. Incorporators: F. K. Hansell, Philadelphia, Pa.; G. H. B. Martin and E. T. Vennel, both of Camden, N. J.

WILMINGTON—Mogul Starter Co.; capital, $100,000; to manufacture and deal in starting devices for internal combustion engines, etc. Incorporators: W. H. Harris, E. J. Enlers and J. F. Southard, all of Chicago, Ill.

Illinois

CHICAGO—Chicago Gear Co.; from $10,000 to $30,000.

ST. LOUIS, MO—George C. Brinkman Motor Car Co.; from $15,000 to $50,000.

Michigan

DETROIT—Central Oil Co.; capital, $200,000; to deal in gasoline. Incorporators: Roy F. Francis, Otto C. Zoller, Robert J. Morrison and Edward C. Hoffman.

DETROIT—Detroit Starter Co.; capital, $20,000; to manufacture motor car starters and other devices. Incorporators: Alonzo B. Porter, John W. Fitzgerald and F. Joseph Lamb.

DETROIT—General Garage Co.; capital, $5,000. Incorporators: J. Frank and Florence D. Boydell, John C. and Bessie N. B. Wood.

DETROIT—Home Service Co.; capital, $1,200; to deal in motor car supplies. Incorporators: Roland C. Simon, Lorenz Diebel and James E. Dale.

DETROIT—Spranger Rim & Wheel Co.; capital $100,000; to manufacture motor car wheels and rims. Incorporators: N. M. Spranger, Frank Spranger and Clara B. Dettmer.

DETROIT—Western Gear Mfg. Co.; capital, $5,000; to manufacture gears and other motor car parts. Incorporators: John Saunson, Oscar Palm and Victor Palm.

Missouri

KANSAS CITY—Auto Jack & Storage Co.; capital, $25,000. Incorporators: Robert Parker, L. H. Parish and R. E. Stucker.

New Jersey

NEWARK—New Jersey Motor Utilities Co.; capital, $50,000. Incorporators: John McLean, F. B. Knowlton, I. O. Dowling, all of New York, N. Y.

Automobile Agencies Recently Established

PASSENGER CARS

Arizona

Phoenix..........Jeffery......McArthur Brothers

California

Los Angeles.......Car-Nation..Herbert T. Brown
San Francisco.....Hupmobile...Linz-Sanborn Motor Co.

Canada

Montreal..........Moon.......Savigny & LaLonde
Toronto, Ont......Pullman.....R. C. Todd, Todd's Gar.

Connecticut

Hartford..........Herff-Brooks.E. H. Harris
Hartford..........Stearns.....The Britton Co.
Mystic............Franklin....Mystic Auto Station

Idaho

Orofino...........Detroiter....W. T. Bennell

Indiana

South Bend.......Overland....Overland-South Bend Co.

Iowa

Des Moines.......Franklin....Johnston Motors Co.

Massachusetts

Boston...........Lozier......Leghorn Motor Car Co.
Worcester.........Pullman....Peter Welin

Michigan

Kalamazoo........Studebaker..L. E. Kraft

Missouri

St. Louis.........Stutz.......Stutz Automobile Co.

North Carolina

Charlotte.........Pullman.....Auto Sales Co., Inc

New Hampshire

Dover............Pullman.....Granite State Garage
Manchester.......Pullman.....H. L. Lamprey

New York

New York........Lexington...Partridge, Clark & Kerrigan, Inc.

Ohio

Cleveland.........Maxwell.....W. H. Barger Co.
Columbus.........Empire......S. W. Schott
Columbus.........Hudson......The Standard Motor Car Co.
Newark...........Saxon.......Warren S. Weiant, Jr.
Toledo...........Mitchell.....H. E. Throne

Oregon

Portland..........Jeffery......Frank C. Riggs

Pennsylvania

Erie..............Pullman.....Erie Penn Auto Co.

Rhode Island

Providence........Hudson.....R. W. Powers
Providence........Paige-Detroit....J. C. Tucker Co.

Tennessee

Memphis..........Buick.......The H. A. White Auto Co.

Washington

Seattle...........Mercer......Pacific Coast Agency
Spokane..........Lozier.......The Moylan-Reilly Auto Co.

COMMERCIAL VEHICLES

Alabama

Birmingham.......Koehler.....Drennen & Co.

Maine

Augusta..........Koehler.....Chas. Floyd Smith

New York

Westbury.........Koehler.....Michael J. Knipfing

Pennsylvania

Philadelphia.......Garford Trucks....Garford-Phila. Co.
Sanitarium........Koehler.....W. L. Fourney

Texas

Houston..........Koehler.....Young & Dwire

Accessories for the Automobilist

HELICAL Shock Absorber — The Helical Shock Absorber Co., Louisville, Ky., is marketing a device that operates on an entirely new principle and which is very simple and effective. It is shown in Fig. 1.

A steel helical screw passes through and meshes with an internally threaded bronze nut, which is pivotally mounted in a steel ball. This ball in turn forms a universal joint and is attached by an arm which is rigidly fixed under the lower spring clip.

The top of the helical screw is attached to a leather universal joint; and is also rigidly fixed to an arm set under the top spring clips.

These universal joints keep constant alignment and provide for pitching and side lashing of the car. Projecting from the bottom of the ball is a steel tube containing the lubricant; and the up and down movement of the screw automatically feeds the oil needed.

A fluted leather dust cover protects the screw between the two universal joints. This shock absorber offers little or no resistance to the normal up and down movement of the springs; and does not come into positive action until the spring is compressed to the farthest point in either direction, and tends to return suddenly. At the point of sudden reversal of the spring action, the helical screw must also reverse, but it reverses with sufficient attrition to break the shock or the rebound, and the spring again returns normally and without the usual resultant shock. It takes care of these shocks regardless of their rapidity of repetition.

An advantage of the principle used in this shock absorber is its effectiveness under any load. No adjustments are necessary for the load and it is quick and automatic under all conditions. A set of four weighs only 34 pounds.

The device has had an experimental experience of 2 years, and has proven most satisfactory to all users, it is said.

The list price for a set of four Helical Shock Absorbers is $75.00.

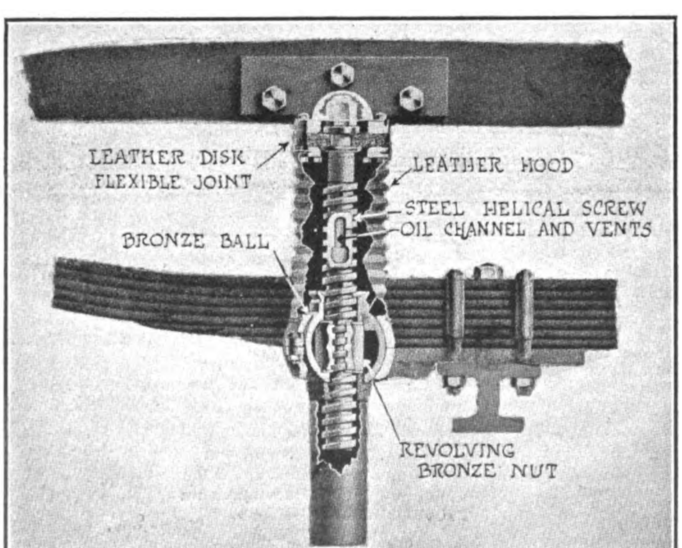


Fig. 1—New shock absorber in which a helical screw is employed

Ajax Electric Headlight Dimmer—A new type of headlight dimmer for electric headlamps has been introduced by the Wanner Mfg. Co., Chicago, called the Ajax and consists of a fluted aluminum cup as shown in Fig. 2, which fits around the base of the bulb. A small brass spring is used to prevent the cup from rattling. The Ajax, which has successfully passed the Chicago inspectors of headlight dimmers, spreads the light over a large area and still gives a good driving light. A pair sells for $1.

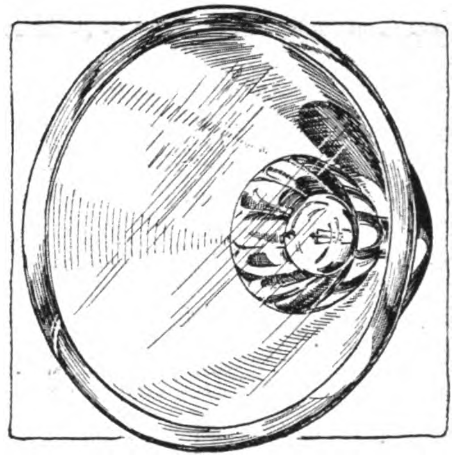


Fig. 2—Ajax headlight dimmer

Gittatit Pliers with Offset Jaws—Instead of making the jaws straight, the H. D. Smith & Co., Plantsville, Conn., has brought out a new design of slip joint pliers, Fig. 3, that are offset so that a pin or nut can be gripped when in a recess or depression.

In pulling cotter pins the heel of the offset often can be used as a lever to draw out the pin.

The tool is well-finished with polished jaws and is 7 inches long over all. The list price is $5.50 per dozen.

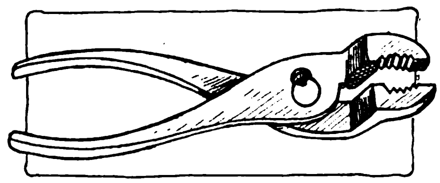


Fig. 3—Gittatit pliers wtih offset jaws

Goodrich Rubber Bucket—A collapsible bucket, Fig. 4, that will stand alone has been brought out by the B. F. Goodrich Co., Akron, O. It holds 2.5 gallons and should be popular with motorists as it folds up into a small space, yet when water is needed for the radiator or when camping along the road it can easily be obtained. The price is $1.50. A feature is the strainer spout. No valves or springs are used in the construction, the water pressure on the rubber being sufficient to hold the bucket in place.

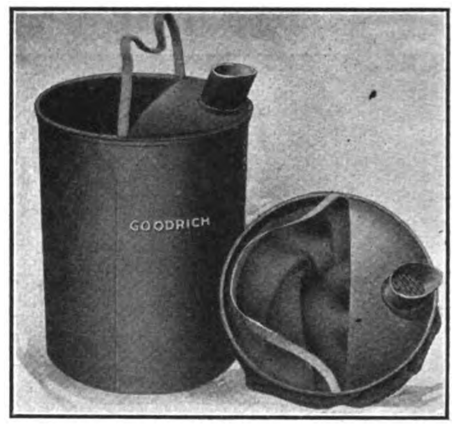
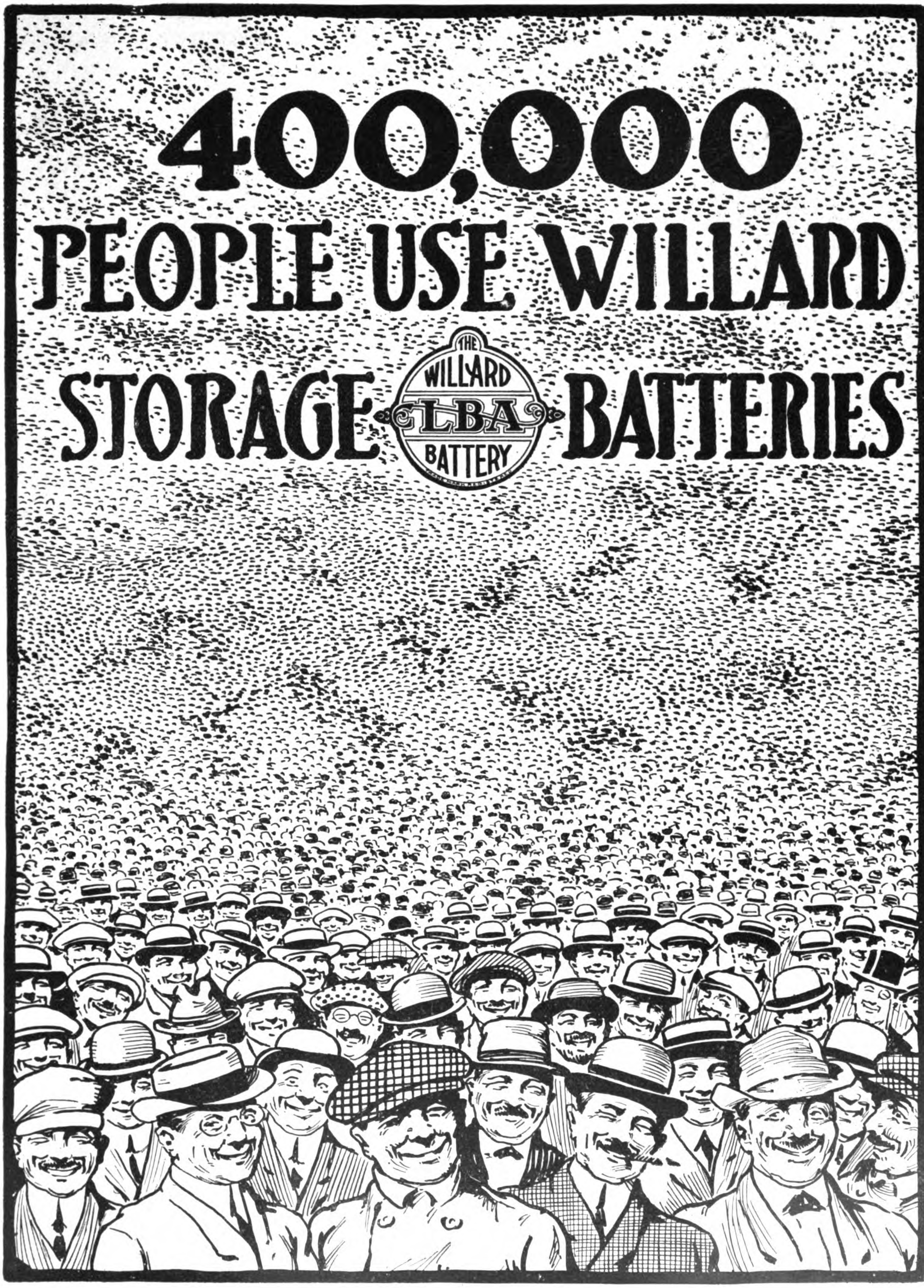


Fig. 4—Goodrich rubber bucket open and closed

Amco Frictionless Bronze — By means of a new process of combining a large percentage of lead with copper and tin, the American Metal Co., Pittsburgh, Pa., claims to have a bearing metal that is especially adapted for high speed machinery or where the pressures are heavy. It requires no babbitt surface and because of its toughness will wear infinitely longer than the best babbitt metal, it is stated. The composition consists of 30 per cent. lead, 65 per cent. copper and 5 per cent. tin. It is claimed that the large percentage of lead renders this metal as frictionless as any babbitt metal.

Joy-Ride Tire Compound—The Fiber Manufacturing Co., 1649 Court place, Denver, Col., is making a tire compound called Joy-Ride, which is a non-adherent, non-soluble compound, mixed with water, and a small percentage of denatured alcohol to prevent freezing. The selling plan adopted by this firm assures the unqualified satisfaction of the user. The liquid is sold only through its own representatives, at a permanent filling station; a written guarantee is given by the firm to every user that money is refunded if there is loss of air by a puncture to the size of a 20 penny spike.

Generating and Decarbonizing Outfit—Fig. 5 shows a complete generating and decarbonizing outfit, made by the Oxygen Generator Co., Inc., 304 River St., Troy, N. Y. Its operating cost per cylinder is but 14 cents. As the usual charge for cleaning is $1 per cylinder the profit


400,000
PEOPLE USE WILLARD
STORAGE BATTERIES
THE
WILLARD
LBA
BATTERY

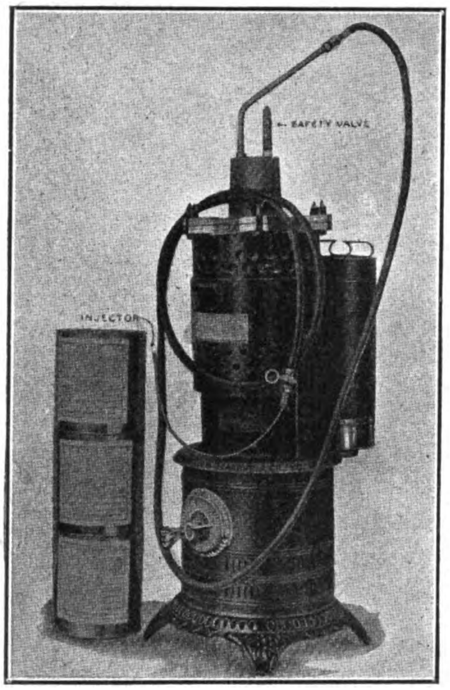


Fig. 5—Oxygen generating and decarbonizing outfit

is large. Therefore, while especially for the garage its low cost puts it within the reach of the individual owner. The complete outfit with enough chemicals to clean 18 cylinders costs but fifteen dollars. The recharge, called Oxygas, is sold in 4 ounce tin containers when bought in lots of six. Each can furnishes enough oxygen to clean 6 cylinders.

Shock Absorbing Cantilever Spring—A new method of springing has been introduced by the Garden City Spring Works, Chicago, under the name of the Shock Absorbing Cantilever spring, Fig. 6, which consists of a cantilever spring and a double coil spring. The rear end of the cantilever is attached in the usual manner as is the fulcrum point, but the front rests upon double coil springs inserted in a bracket. The bracket thrusts downward and this is met with a counter thrust upward and in this way, it is said, frame rail twist is eliminated. The saving in weight due to this construction is another point in its favor and tests by the maker have shown it gives excellent results in checking rebound. When installed on a Ford car the system is slightly changed. In this a steel casting is made to fit the cross member of the frame. The casting has attached to it, at two of its projections, coils spring as shown. The other projections take the cantilever springs. It is said the weight of car bears upon the two coil springs, and the results claimed are easier riding with the elimination of recoil and greater safety in turning. The Ford installation sells for $10.

J. & B. Fuel Saver—The J. & B. Fuel Saver, Fig. 7, is a device designed to automatically control a supplementary air supply with a view to effecting gasoline economy with which other benefits are entailed. It is tubular in shape and is threaded to an angle cock which fits into the intake manifold above the carbureter. At the other end is a hexagon screened nut through which the air is drawn. The operation of the two controlling valves visible through the glass tube is as follows: With the motor running slowly the vacuum in the intake manifold is very high, or, in other words, the suction, because of the throttle being almost closed, is then more intense, and, this being so, the valve with the flat top is drawn to its seat, thus entirely cutting off the supplementary air supply. The closure of this valve is to a degree aided by the pointed valve, which is opposed to it. As the throttle is opened and the motor speed increases so the vacuum in the intake manifold becomes lower and thereby the spring tension which is always being exerted overcomes the suction in the manifold and opens the flat valve wider as the decreasing vacuum allows it to overcome the resistance of the pointed valve, thus allowing a variable supply of air to pass relative to the motor speed. The spring tension exerted in the flat valve is much greater than in the pointed one, and it is because of this and the varying suction in the intake manifold that they open and close in a graduated and practical manner—that is, to be full open at high speed and gradually coming to a positive closure as speed decreases or while coasting along or waiting in traffic. The travel of the flat valve can be restricted and consequently the air supply also by threading the valve with a screw driver in against the short pin which is visible in the center on the right, so making the device standard and adaptable to all motors. The device is nickel plated and sells for $7.

Gemmer Portable Air Compressor—A handy air compressor for garages is the portable model A manufactured by the Gemmer-Detroit Starter Co., Detroit, Mich. It consists of a two-cylinder pump mounted on a 14 by 20-inch steel tank which in turn is placed on 4-inch rubber-tired, swiveled wheels. The pump is driven by a 1-3-horsepower electric motor which is equipped with the necessary cord and socket. A pressure gauge and 14 feet of hose complete the outfit. It takes 25 minutes to fill the tank with air at 175 pounds pressure.

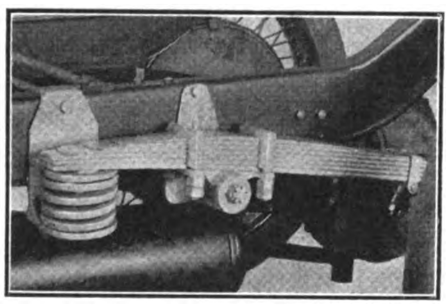


Fig. 6—Shock absorbing cantilever spring

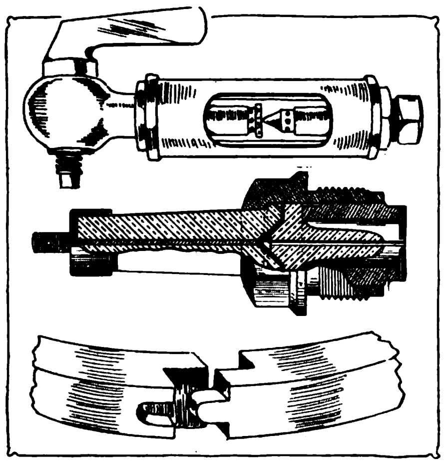


Fig. 7—Top—J. & B. fuel saver
Fig. 8—Middle—Sprung patent spark plug
Fig. 9—Lower—Leektite piston ring

Fig. 10—Everlastingly good terminals

Another type especially designed for sale to the private car owner and for emergency use in garages comprises a two-cylinder pump, connected to a 1-4-horsepower electric motor.

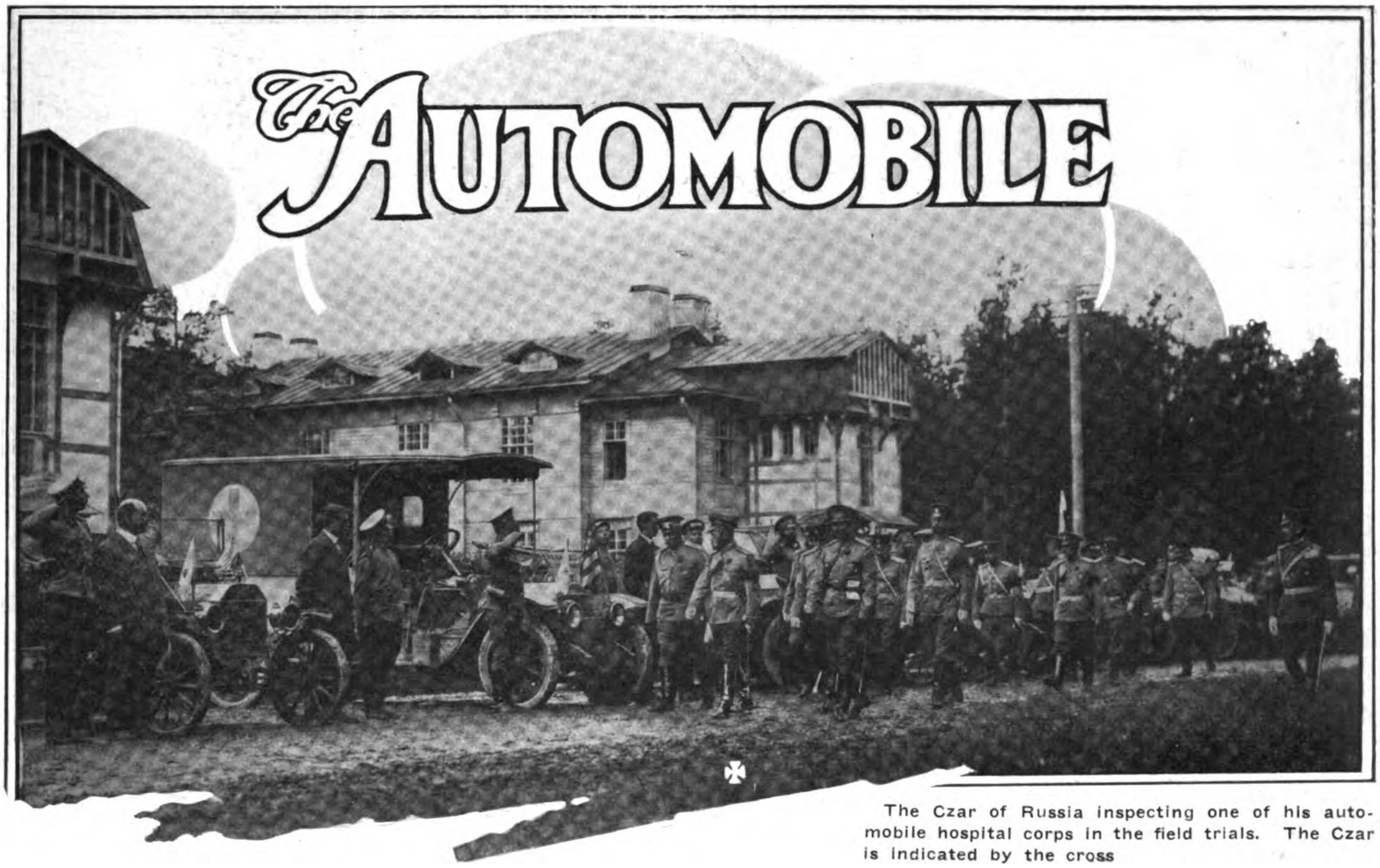
Sprung Patent Spark Plug—A spark plug, Fig. 8, is about to be put on the market which is notable for the reason that the lower half of insulating material and the central electrode are readily detachable from the rest of the plug, so that when the plug becomes fouled or the points burned out, a new unit may be substituted and the plug made as good as new. Another feature is that the plug can be provided with any number of sparking points to suit it for different types of engines. The inventor is A. Sprung, 126 W. 118th street, New York City.

Leektite Piston Ring—By the use of a special joint and a careful process of manufacture the End-Oxy Appliance Co., claims to have a superior piston ring, which is called the Leektite, Fig. 9. The joint is a combination type which is clearly shown in the illustration. The Leektite ring is made of a special grade of gray cast iron, which, after a rough machining, is laid aside for a period to allow thorough seasoning or equalization of the strains set up in the metal during the casting. The ring blanks are then put trough a series of careful machining operations that produces a ring of exact size and shape.

It is stated that the special form of joint used presents a perfectly sealed opening when placed in a cylinder 3-64 inch oversize. The list price for motors of 3.5 to 5-inch bore is $1.50.

Everlastingly Good Terminals—The Emil Grossman Mfg. Co., Brooklyn, N. Y., is offering an assortment of battery terminals, Fig. 10, in a box 10 inches square, that is intended to simplify and facilitate the sale of these articles. There are separate compartments for the various types of terminals and there is a place for everything. The result is a display that looks much neater than an assortment of odd sized boxes. The price is $5.

THE AUTOMOBILE



The Czar of Russia inspecting one of his automobile hospital corps in the field trials. The Czar is indicated by the cross

Russia — An Opportunity

Czar's Empire Is Immense Market for American Cars —Government Favors Imports—Few Russian Cars

By the Late E. P. Batzell

EDITOR'S NOTE.—*Owing to the fact that this article was prepared some time ago by Mr. Batzell, it must be taken as a description of conditions in Russia at the outbreak of the great European war. This war, however, has probably not greatly altered the complexion of affairs in this respect.*

RUSSIA has immense opportunity in store for the general automobile business and other business lines more or less connected with it. The selling and maintenance of cars have the better outlook with them, from the view of profits, than the other activities in this field, notably that of manufacturing whole cars.

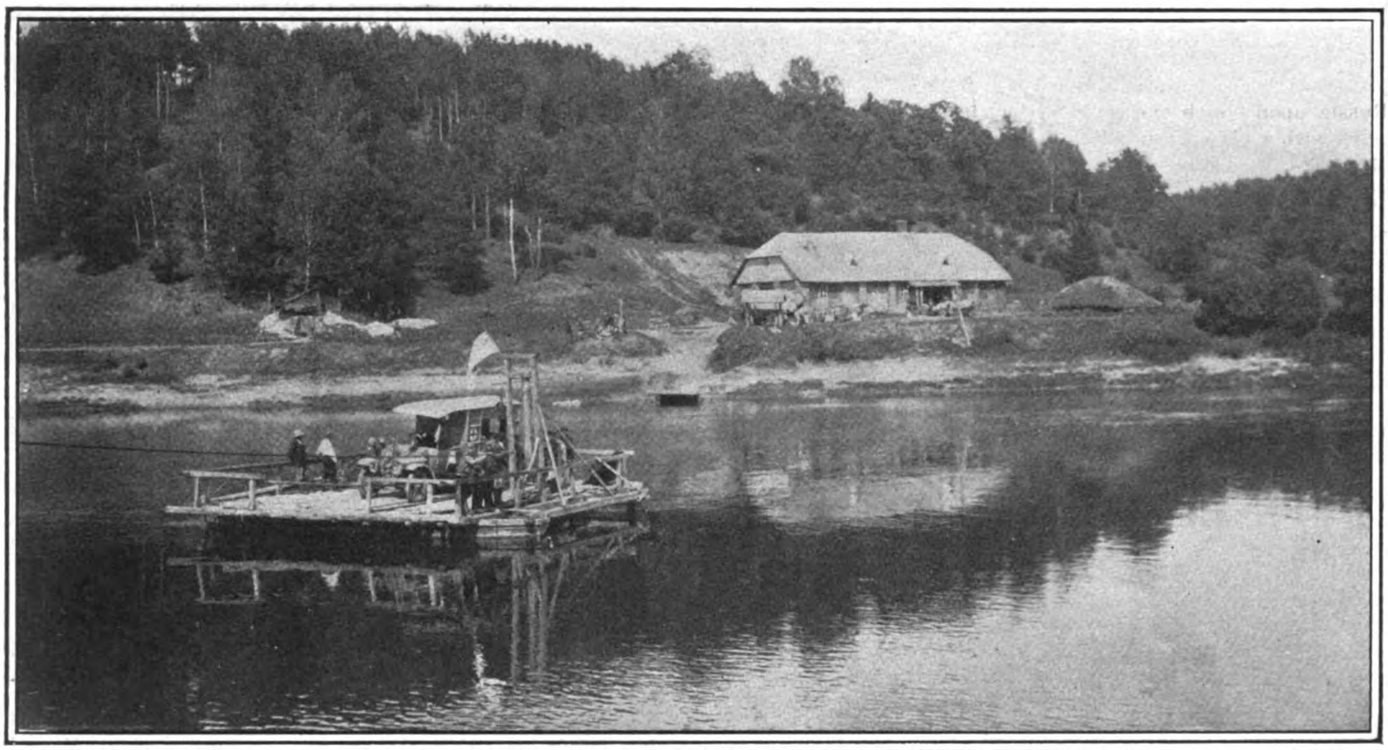
In Russia manufacture is far behind in ability to create strong competition for the imported product on account of the small quantity of cars which can be built with the available facilities. Although the number of establishments actively engaged in building cars is gradually increasing, certain European companies are beginning to open branch plants. Nevertheless it remains very doubtful that the home-built cars ever could form a large proportion of the number of automobiles annually absorbed.

Some very good cars have been and are being built, but only in small numbers of any specific type, each establishment in this line putting out so many different types that this in proportion to the total early output eliminates the possibility of economical quantity production.

The facilities of the factories apparently are directed to satisfy the varying requirements of prospective buyers by building cars for all tastes, almost on the to-order basis. Such a situation is characteristic of all Europe, but it becomes more apparent in Russia because the individual output of the Russian factories is very small, even in proportion to other European countries.

The condition of the general automobile market is to blame for this, because the parties at the head of the concerns fully realize the station occupied and are making efforts to change from their methods of building automobiles to suit the orders which they are apt to get regardless of the requirements in the latter. Instead of hunting buyers with every possible taste, they are endeavoring to concentrate their efforts upon a few models manufactured as economically as possible, for which they may have only certain classes of buyers.

The biggest automobile factory in Russia is the Russo-Baltic. Reducing its number of models and increasing production on a manufacturing principle, this factory expects

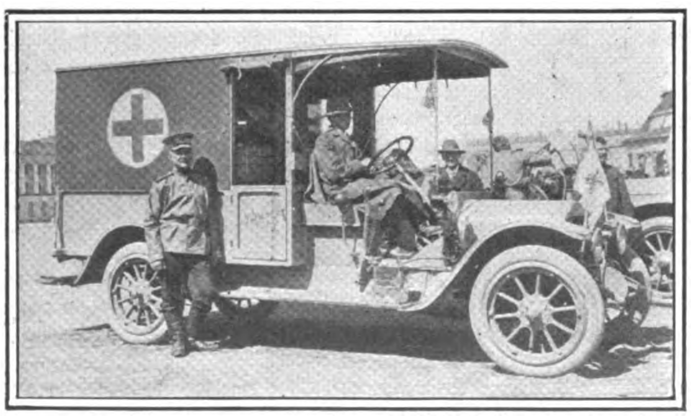


Ferrying one of the White Red Cross ambulances across a river in the Russian army trials

to bring its output from 300 to 1,000 cars per annum. It is well provided to enable it to put through its intentions, as it increases and betters its equipment constantly. It produces good cars, not inferior to the European standard of quality, and has a good reputation. It needs a real sales organization, however. This factory stands on a good road to economical, strictly quantity production, but the influence of the Russian government on a concern so well specialized in this line as the Russo-Baltic is will never allow that. Government orders and subsidies cannot be refused and, on the contrary, they must be solicited, which generally means that the factory must do a large amount of special work in its various departments, thus interfering with the correctly planned production of the regular articles. The situation increases the cost of these regular models, but there are many profits connected with it which more than offset that, really leaving the manufacturer to look upon a government order as a highly profitable business.

Government a Big Buyer

The Russian government is to be considered the biggest individual buyer of automobiles in prospect for the near future and for a long time to come. It is gradually acquiring passenger and commercial vehicles for all kinds of service, and it is also a large prospect for such allied products to the automobile industry as motors for aeronautics, for marine purposes, etc. No doubt so well equipped an automobile factory as the Russo-Baltic will enter similar branch fields sooner or later. The government might offer assistance and subsidies for this purpose, as an inducement for the factory to take up allied lines, the need of which is in view. Naturally, subsidies will be offered on the production of vehicles of special character, for military or civil purposes, together with a high purchase price for them.



White ambulance of the hospital corps as it started in the trials

Those are reasons why a big factory generally in Europe, and particularly in Russia, cannot develop strictly by its own tendency, but falls under the influence of certain factors foreign to it, chiefly in the form of the country's government.

Cars Are Well Built

Such outside influence interferes with the regular manufacturing of articles in quantity, but, on the other hand, the interconnected considerations of business character make one accept it. As mentioned, notwithstanding the harm done in some particulars, there are large profits attached to such orders, both in a direct and indirect way. Executing orders for the government has a big all-around trade value, not merely as an advertisement assisting sales to private parties. At the same time it interferes with the proper development of the regular automobile specialty in the factory, making it more difficult for the latter to catch up with its competitors, especially as long as there is but a slight duty on the imported product.

The Russian-built car was said to be the equal of the up-to-date European, or, rather, of the German-French types. This refers to the construction, the luxury, appearance, etc., whereas they are somewhat cheaper in price and at the same time they are better adapted to the prevailing road conditions in Russia.

They are not so fast as the European cars in general, perhaps on account of their greater weight or lower gear ratio, which is the more probable, as they leave nothing to be desired in regard to pulling ability. It is notable how some duly-recorded performances have been made with cars weighing a great deal more in proportion to the average for that type and motor power. Taking into consideration that at the present there is no road in Russia upon which one could drive with a very large factor of safety at over 50 miles per hour, higher speed being possible only on streets or on special tracks, the present Russian car can give complete satisfaction with all the service reasonably to be expected from it.

White tank wagon as it arrived at Koona in the Russian army trials

Referring to the materials entering into the construction of cars, all the better grades of steel used for the more important parts can be obtained only by importing them.

There is hardly a foundry in Russia which would commercially produce complicated castings like those for the cylinders. But in this respect it is not difficult to catch up with the rest of the world, because there are some very good foundries which thus far have specialized on large parts only, but which could be doing good work for automobile purposes after devoting some little effort to it. Apparently this was unnecessary, as the limited number of cars built could be furnished with many imported rough or finished parts, the available quantity being too small for warranting the creation of a special home industry. This covers merely iron or steel castings, as brass and aluminum are readily obtained there.

Good pressed steel parts and drop forgings are imported, principally on account of the material employed for them, but minor parts of the same kind and inferior material are made at home, sometimes using foreign material.

All the finer accessories are naturally obtained in France and partly in Germany. The motor car bodies are very well executed in Russia, equally to the high-grade European standards of quality and style, better than the European work of minor grade. The coach building art generally is well advanced in Russia, but lack of facilities and initiative have interfered with its taking a merited standing in the world's market.

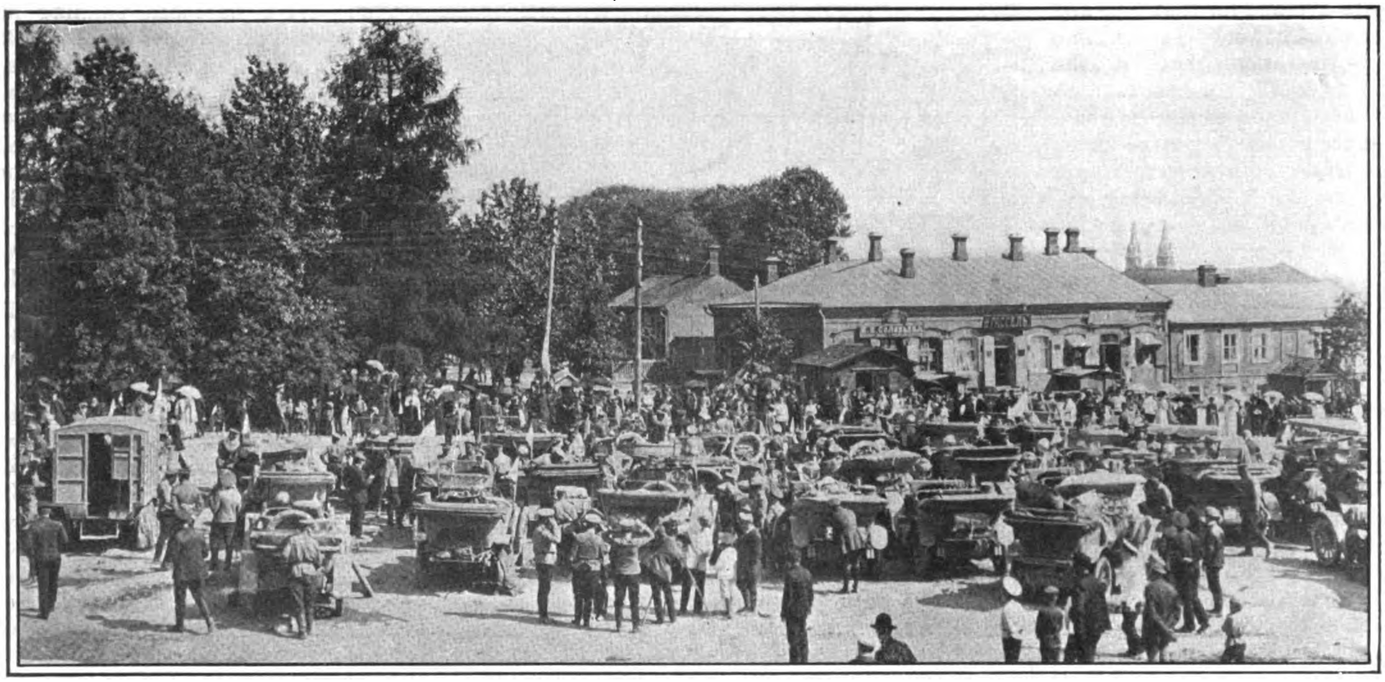
The building of cars is largely done with the help of experienced workingmen imported from other countries. This importation of foreign help is being gradually reduced, approaching that state when there are but a few experts of West European training in each department for the work really requiring specialists. The rest are native workmen. One is practically forced to get capable workmen from outside of the country in the event of an increase of production at the plant, as the available native resources are far from adequate to fulfill the need for experienced help created with any such considerable change from the normally established state of affairs. This is self-evident, when one considers the few automobile concerns which could educate and furnish a reserve of proper help for future needs. Moreover, the number of workingmen employed in any plant is kept much more steady the year around than in the United States, as one does not lay off so frequently as here. Consequently there is much less shifting around and going from one concern to another, leaving hardly anybody to select from when a specialized concern, like the one building automobiles in Russia, suddenly finds itself short in expert help.

Government Encourages Importation

Conditions similar to the related ones are largely responsible in preventing the Russian automobile industry from gaining a good standing in relation to the importation of automobiles. However, the existing policy of the government is to further with great efforts the introduction into the country of the automobile in general without connecting that with protection of this home industry at the same time, which may be expected only at later date when Russia becomes more independent and more supplied with this needed article. Until then the home industry will have to show itself capable to take care in a responsible manner of a great portion of the yearly requirements for automobiles of the various types. Judging from the present standing of this industry and from its prospective development in the near future nothing like the above can be reasonably expected parallel with the growing development of the importation of cars, and thus Russia is left as a great field for the disposal of all kinds of automobiles from the whole world without fear of home competition.

The truth of this prospect is hardly to be doubted, but the

Dragging one of the cars in the Russian army trials up a hill. Note the absence of roads



One of the luncheon stops during the field trials of the Russian army automobiles

rate at which the Russian automobile market will develop in the near future is governed by many circumstances, some of which can be foreseen and some of which can not. The Russian government is a large and steady buyer with great requirements for different passenger, commercial and special types of cars, although the quantities of these purchases grow only gradually, leaving time to get familiar and to try out the bought product. Nevertheless the private public as individuals or as corporations will absorb by far the largest number of vehicles, and it really represents the most attractive side to do business with pursuing merely the object of direct and quick profits.

Interest Is Growing in Automobiling

In Russia the automobile owners, the prospective buyers and the general public are occupying the stage at present, as was characteristic of the United States a few years ago, say 6 or 7. They all are very much interested in automobiles and automobiling; that is, their attention is easily directed toward the latter, but only in a superficial way. At the time quoted here in the United States there were a great many parties who are automobile owners now and who under the circumstances of that time did not think that such a thing could possibly take place because they thought they could not afford a car although they would have liked very much to be able to do so. Gradually people with much smaller means started to buy cars than bought them a few years ago.

Similarly, there is a very large class of Russian medium rich and rich people who are fond of automobiling, but who do not deem themselves to be able to afford to own a car. They take a ride occasionally in a friend's car or in a hired one. They keep in touch lightly with the automobile field by glancing over magazines, etc., but at the same time they do not care to go into a study of technical or commercial details of the cars and of their use, because they cannot assimilate the thought that a large number of them really will buy and use automobiles within the next few years.

All over the world the first stages of the advent of automobiles were connected with abuse of the early and inexperienced automobile owners, especially in regard to their money. It has taken years to educate the American public at large so far that it cannot be cheated easily, that it possesses a certain ability to personally judge more or less correctly things in connection with the upkeep and repair of an automobile. The pleasures of automobiling are enjoyed without the necessity for the continuous services and advice of chauffeurs and other experts. Such ability largely to take care of one's own needs in connection with automobiles has to be looked upon as the prime factor which facilitates the present widespread use of the automobiles in various lines of life and business in the United States. The same factor based on existing conditions in Russia and on the possible progress of the near future cannot promote such a rapid progress there as is witnessed here because the level of public progress in the matters of automobile use and utility is much lower and advances but slowly. This progress is, however, not far behind the western European, the governing conditions being very much alike in all countries there. As yet it is impossible to look upon an automobile otherwise than as an article for the amusement of the richest classes, because the owner is obliged to keep a chauffeur, pay high rates for any repair work or general maintenance and at the same time he has such a slight understanding of all matters pertaining to the keeping and running of his car that any dishonesty he is apt to meet with in this connection is bound to triumph over him.

Maintenance Is High

Even with the low rates for help in Europe, the yearly expenses arising with the maintenance of cars in good order, with the chauffeur and with an average amount of driving, are liable to reach one-half or more of the original purchase price of the car.

Education in automobile matters is what the public interested in them needs the most to become real enthusiasts. A short term of automobile ownership ought to suffice to make the owner so far advanced and proficient that the chauffeur would be reduced from his standing of authoritative expert to merely a servant for driving the car, hauling it around to the house and doing the rest of the common work required. That refers to families who keep but one car, whereas those who can afford to have a number of them of course can have chauffeurs as distinctively specialized as they are now. As a rule, the enthusiastic Russian automobile owners do not hesitate to do some work on the car themselves and, in fact, they know how to see pleasure in this work at times. It is the consciousness of one's incompetence which makes a suffering party out of the average car owner, the more so as they are apparently not trying hard enough to acquire the necessary knowledge.

Owners Must Employ Chauffeurs

It was mentioned that the owners of cars *must* employ chauffeurs, which circumstance somewhat aggravates that situation and interferes with a gradual elimination of it. The chauffeur is as much a necessity there when one has a car as a servant is for the household, however small the latter.

In Russia every city family has at least one servant, even the poorly provided ones, as it is utterly impossible for decent families to get along without them. Naturally then, having a chauffeur to rely upon, should anything happen to the car or should one run across any emergency, the car owner himself is not pressed to gain knowledge and experience so long as he stands all the costs submitted. A novice motorist is especially under the influence of his chauffeur, which prompts the latter to derive some personal benefits, although not always without causing a loss to his employer at the same time. One considers often the chauffeur's advice when selecting a car to be purchased; he buys the materials needed for the car, etc. The owner is left to some extent at his mercy, and certainly the conviction that this is the inevitable state of affairs spreads among the ranks of the would-be automobile buyers who become scared away from the idea of owning a machine which would have to serve particularly well to the benefit of some one else and not for theirs.

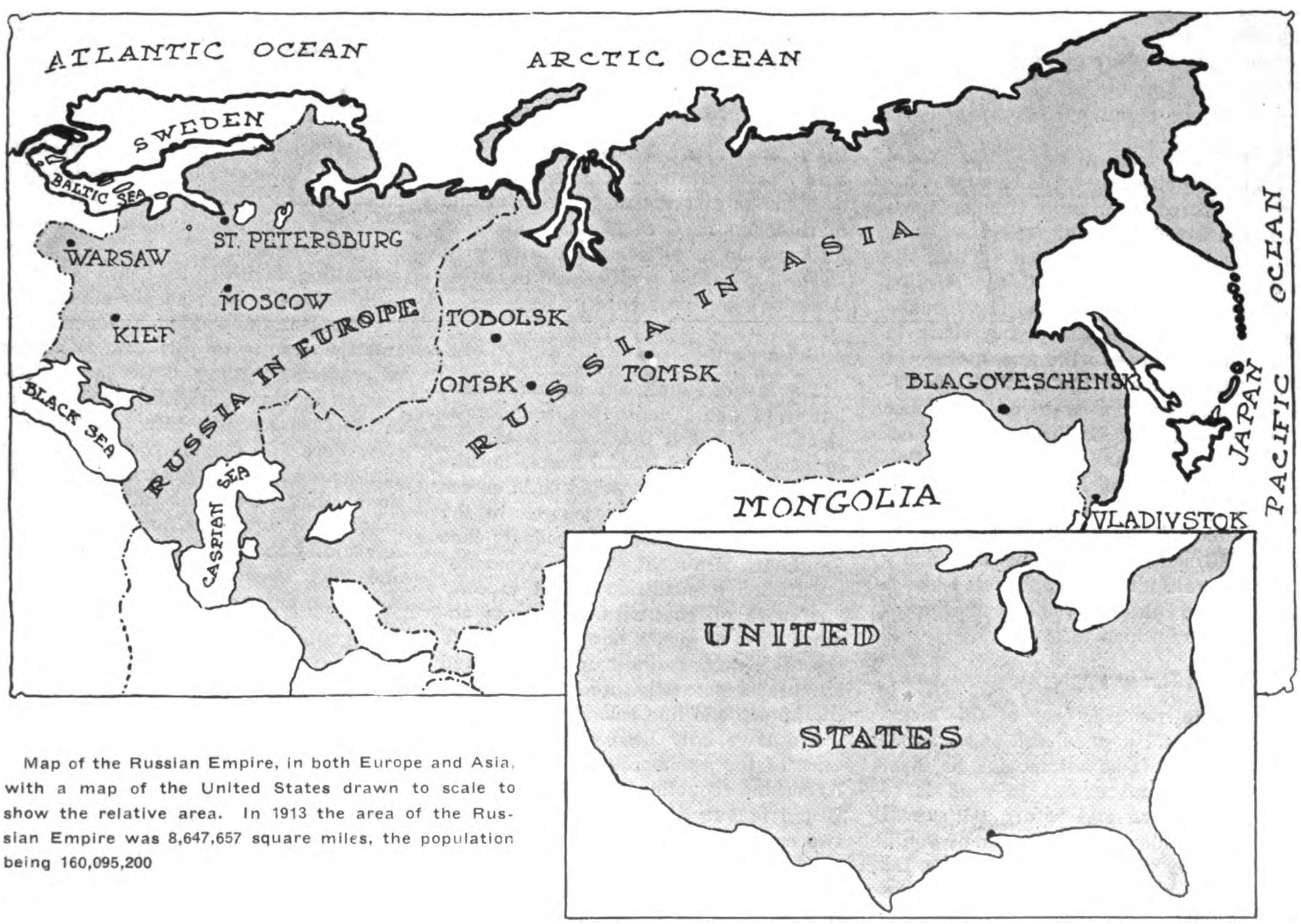
Easy Cheating Anticipated

The writer feels correct in stating, that at present there would have been many more automobiles owned by private parties in Russia for their personal use, if there would be no prospect of easily possible cheating anticipated. Many would have preferred to pay big prices for work and materials really honestly worth it, than to spend less and still be a recipient of articles not up to the value paid for. Similarly, one would rather have an expensive but honest chauffeur, than one with a smaller salary, who will look for compensation on the side. Consequently it seems that to increase the volume of the Russian automobile market, first of all one should lift the standard of the public knowledge and understanding of that field, so as to enable it to handle the whole matter with intelligence. Only then will a great part of the public expect and derive real pleasure from motoring and understand the commercial advantage of cars in many lines of their possible application. One would be free from the conviction, that when going on a trip it is necessary to be prepared to pay a sum largely left to someone else to determine, whereby you are unable to judge anything about this amount. This is almost like letting a man help himself from one's pocket in that the amount he receives depends only on his courteousness.

Dealer Furnishes Chauffeur

It is a correct policy, as adopted by some automobile selling houses, to furnish the chauffeur at least for a certain time to their customers, until the latter become more or less familiar with their machine so that they cannot blame the agents should anything sudden happen, which a new customer would easily look upon as caused by a defect of the machine, whereas it may be not that but the inexpert handling. No doubt that a guarantee covering the maximum rate of cost of upkeep would be very attractive to customers, if such a guarantee could be realized properly, without harming the business of the dealer.

(To be continued).



Map of the Russian Empire, in both Europe and Asia, with a map of the United States drawn to scale to show the relative area. In 1913 the area of the Russian Empire was 8,647,657 square miles, the population being 160,095,200

War Stagnates European Trade

Only Buyers Are War Departments and Only Demand Is for Trucks—Most Factories Are Closed—Hostilities Began in Slack Season

By Special Cable from J. S. Critchley

President of the Institution of Automobile Engineers

LONDON, Eng., Aug. 17—Special Cable—Trade in automobiles, except in vehicles for war purposes, is completely stagnant. It is impossible to state whether the Continental factories are actually doing work, but it is known that very many are closed due to being in the war area or all the labor being drawn to the army. The F N works at Liege, Belgium, are closed, while all the other works in that area, makers of pleasure cars, are simply doing as little as possible and it is doubtful if any progress will be attempted in connection with next season's models. It seems that the war has come at the time when trade is always slack and no attempt will be made to get in supplies until the outlook is more settled. No component parts can be brought into this country from the countries at war, but this only affects the makers of commercial vehicles which are of course in demand. Supplies of most parts can, however, be supplied by the British firms with the exception of cast sheet wheels and magnetos.

To sum up the situation, the only purchasers of automobiles are the various war departments. Most of the purchases are in heavy vehicles. Therefore other makers are practically closing down and not troubling about the supplies. There is a demand only for commercial vehicles to replace those taken for war purposes. All the stocks are depleted and the outputs have been sold for long periods ahead.—J. SIDNEY CRITCHLEY.

South America the Golden Opportunity

By J. Edward Schipper

NEVER was an opportunity more propitiously made than that offered by present circumstances for the development of American trade throughout South America. First, the fair-minded attitude of the United States toward the neighboring republic of Mexico during the trying times in the latter, and the willingness to accept the good offices of the A. B. C. mediators established a state of confidence in the people of this country to a degree higher than ever existed. Following this establishment of confidence there comes the European war which at a single stroke severs the huge southern continent from the source of many of its manufactured supplies and leaves the United States as the logical alternative toward which to turn.

Finance Affected

But the manufacturer of this country cannot fill a vessel full of his product, whether it be automobiles or farm machinery, and expect to send it to South America and return with solid cash. The blow to the finance of South America by the European war was too severe for an instant recovery and the time is not ripe for quick cash deals in those countries. South America has been clearing through English and German banks and the declaration of the moratorium in Great Britain and the interruption of all communication with Berlin has been a severe check to Latin-America's business enterprises.

A Brisk Gain

The law of supply and demand alone, however, would cause the commercial relations between the South American countries and the United States to take on a briskness which would be in excess of anything that has occurred in the past. There are certain products that South America must receive in constant quantities, a condition which is common with all countries. There is another class of goods, however, in which the trade must be built up and fostered by careful promotion and to this class the automobile line belongs.

We have only been getting 10 per cent. of the automobile business in the Argentine republic. Our percentage in Brazil is but little better. Yet these two countries are heavy purchasers of cars and the field is hardly touched. It is also a marked fact that the cars purchased have been of fairly high price and not the cheaper variety, showing that the low-priced car field, which must necessarily exist in every country, has not as yet been opened up to even a small degree.

Banking facilities in South America have naturally been keenly affected by the shock of the sudden European war and the results of this cannot as yet be predicted. Many of the largest exporters in New York City believe that in the future it will be a race between New York and London for the banking supremacy in Latin-America. The National City bank has already established two branches, one in Buenos Ayres and the other in Rio de Janeiro and has opened a complete South American department.

Big Business Soon

There is a strong feeling in the minds of many who have made a study of conditions in South America that the time will not be ripe for big business until the financial atmosphere has had time to clear and that this will take from 2 to 3 months. The American Trade Tour Co. which had chartered the steamship *Kroonland* with the idea of making a special voyage to

South American ports for the purpose of exhibiting and introducing American goods into these countries has become firmly convinced that the original date of sailing, October 14, would find the new territory unprepared for the commercial invasion and has postponed the sailing of the vessel until after the first of the year.

Thus, while the market is there beyond a doubt, still it is a market that must be developed. Credit will have to be given and counter-products bought in this country to give a firm basis of trade. The opportunity is golden but it is a market which must not be rushed but carefully nurtured.

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U. S. Has Advantage in South America

NEW YORK CITY, Aug. 12—American automobile manufacturers now have the advantage over the European makers in respect to the South American trade. The United States has the chance of its history to dominate in the exportations to the lower continent. Honesty is necessary in all negotiations as there have been evidences of highly developed "Yankee thrift" and "get-rich-quick" sales methods in the past and the Latin Americans are now suspicious of some of the products from the United States.

Argentine Consulate Talks

These points were accentuated in an interview given to a representative of THE AUTOMOBILE today by Ricardo C. Tort, chancellor of the Consulate General of the Argentine Republic.

Said Senor Tort:

"In 1912 the total imports of automobiles in Argentina were 4,281 cars, of which 1,651 were bought from France, 708 from the United States, 627 from Germany, 451 from England, 422 from Italy and 295 from Belgium.

"Since then the imports have increased as financial conditions have improved. The war is a heavy strain on the country now, of course, and it has been necessary to declare a moratarium. Still Argentina is no worse off than other countries.

Profits Were Exorbitant

"It is probable that American imports, prior to the war, were not increasing so satisfactorily inasmuch as a bad feeling was developing toward American cars.

"Cars that sell for $1,000 and under with all equipment in the United States were priced at $2,500 and $3,000 without equipment in Argentina. This is not due to the heavy cost of shipment, which is light. And the duty is only 10 per cent.

"As soon as the Argentine people found out that they were paying the same price for cheap American cars as was quoted them for Panhard-Levasseurs and Isotta-Frischinis and Mercedes, naturally they would not buy the American cars so readily.

Argentine Not Mechanical

"The Argentine people are not mechanically inclined in the slightest degree. Therefore, all have chauffeurs to whom the operation and maintenance of the cars are exclusively left. Practically all of these chauffeurs are Germans, French and Italians, the last two principally. It is natural that when an owner leaves the purchase of a car to his chauffeur, the chauffeur will prefer to buy a car from his own country.

"A further consideration is the fact that practically all of the foreign manufactories keep large stocks of repair parts in Argentina and there is no delay in obtaining supplies. Most of the American makers keep no such supplies and, therefore, when a part breaks there is a delay of months until the part is obtained from the United States.

Chauffeurs' Salaries

"An average chauffeur in Argentina is paid from 200 to 250 pesos a month —from $100 to $125. There are some that get more, and many less. All of them make extras as they take advantage of the mechanical ignorance of their employers and take every chance to have the cars sent to the repair shops, from which they receive tips.

"Because of the revelations that prices for American cars are out of reason and that cheap cars—that seem just as shiny and complete to an Argentine man as the expensive European cars—are being unloaded on them as good grades, the American cars have become somewhat of a joke. They call them 'coffee pots.'

"Out of the 1,651 cars imported into Argentine from France in 1912, I guess that 1,200 of them are Panhard-Levassors. All of them probably are giving good service and their popularity is growing.

America's Chances Good

"The American automobile makers can sell good cars in Argentine. There also is a market for the medium and cheap priced cars, if they advertise them honestly. I don't know if there will be any heavy buying for awhile. I imagine that the people will be conservative with their investments for the time being.

"But the present condition cannot help but profit the American manufacturers."

Willys Sees Big Trade Opportunity

TOLEDO, O., Aug. 14—The European war will act as a positive boost to American business in general and the automobile industry in particular, in the opinion of John N. Willys, president of the Willys-Overland Co. and second largest manufacturer of automobiles in the world, who expresses his views in a cablegram from London, Eng. For 2 months Mr. Willys has been making a study of conditions in Europe at close range and is thoroughly in touch with the situation:

"The English are not slow to see the great opportunities for trade extension given to the United States by recent events," writes Mr. Willys. "Sir George Parish, England's foremost financial writer, declares that the war will bring great wealth to American industries and an economic benefit to the people of the United States.

"The call for army reserves throughout Europe has completely demoralized the industries on this side of the Atlantic. Many of the largest automobile factories have practically been unmanned. Only a very small number of automobiles will be built in Europe until there is a cessation of hostilities.

"In the meanwhile the entire field will be open to the American motor car manufacturers. There may be some difficulty in shipping cars to European ports as they may be declared contraband goods, but the rest of the civilized world will be free from European competition and is America's for the taking. And once the people who have heretofore bought automobiles of foreign manufacture discover the superiority of American cars, Europe will never regain the field she has lost."

Joy Sends "Cheer Up" Telegram Broadcast

DETROIT, MICH., Aug. 14—President Henry B. Joy, of the Packard Motor Car Co., who was appointed a director in the Federal Reserve Bank, of Chicago, is confident that notwithstanding the European war and the momentary disturbance this condition caused throughout the United States, the future looks bright here in America and that there is no need of worry as to business. As an evidence of his conviction in the matter President Joy sent the following telegram to every Packard dealer in the United States:

"Business and banking conditions improved wonderfully since Wednesday. Reported normal again here by Detroit bankers. We feel no apprehension as to future business conditions. The war scare is largely over. International ocean traffic will be improved daily. Nations which have been consumers of Europe's vast exports must now naturally become patrons of America. Post this on your bulletin board."

—

LONDON, ENG., Aug. 17—The war department of Austria has bought all the tires from the Goodyear stock in Vienna, according to the London manager.

The Transcontinental Saxon's Trip

Far from a Joy Ride—Lincoln Highway Progress Remarkable, But Roads Are Still Poor in Many Sections

By M. A. Croker and Fred Wilkins
Pilots of the Coast-to-Coast Saxon

ANYONE who thinks of the Lincoln Highway as a finely-paved road stretching from one edge of the nation to the other and offering ideal conditions for touring all the way, has a mistaken impression.

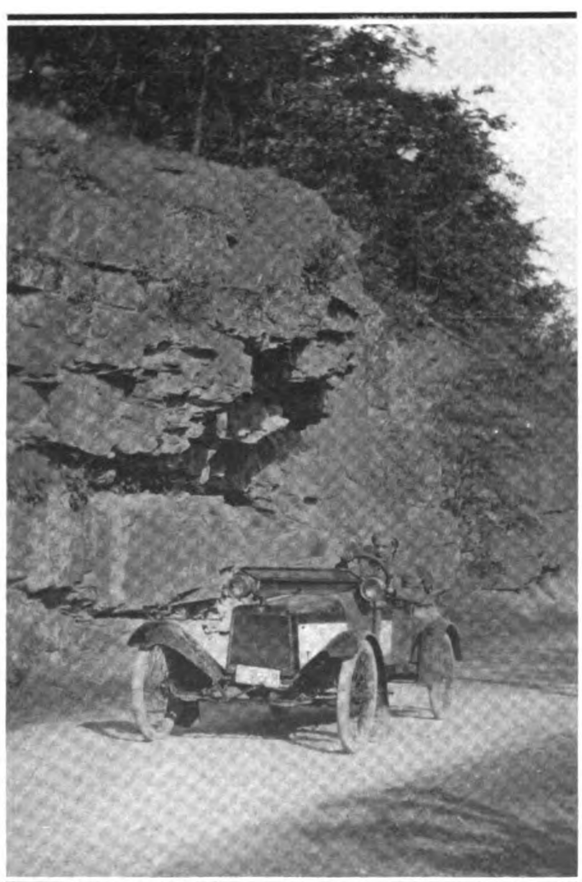
Some day driving over it from coast to coast will be in the nature of a joy ride. The wonders that have been wrought by its sponsors indicate that. But great roads are not built in a day or a month or a year. Considering the comparatively brief time since the Highway was first projected, the progress has been truly remarkable.

By next year even more mighty things will be accomplished, and it is our opinion that fully 2,500 motorists will journey to the Exposition on the coast by motor car instead of using the railroad as many of them undoubtedly would do but for the Lincoln Highway.

At the same time, as we stated at the outset, to cross the continent over the Lincoln Highway in its present state is far from being a joy ride, and we ought to know, for we made the trip in a Saxon car, setting out from New York on June 4 and arriving in San Francisco on July 4. This car was the first ever to go the full distance of the Highway on a continuous trip and the first small car ever to cross the continent over any road whatever.

In our opinion this trip did much to show the progress that has been made in the art of building automobiles. It showed that the transcontinental journey is not for large or even medium sized cars alone, but is possible easily for light cars. It serves to correct an impression that the small car is practical only for city driving. For, as will be seen from the experiences we met with, a small car may not only get over boulevarded roads, but may climb the steepest hills, plow through the deepest mud and sand and go over the roughest roads—often even better than large cars. This is interesting incidentally from the fact that we all recall how only a few years ago, even owners of the heaviest cars would hardly have dared to attempt such an arduous journey as this.

It is worthy of mention, too, that the Saxon which made this trip was not a new car, but the same vehicle which previously ran 135 miles a day in a test lasting 30 days. This test—4,050 miles—was equivalent to the service a car gets in a year in the hands of the average car owner.



Lincoln Highway Saxon amid picturesque surroundings in Western Illinois near the Mississippi

The Lincoln Highway when completed will be 3,389 miles long. Detours, however, due to repairs on the road, washouts and several trips off the main route and back again at the request of dealers who planned receptions—these brought our total mileage up to 3,873 miles. We were on the road 30 days, the actual running time was 278 hours, and the average distance was 129.1 miles a day. The highest day's run was 186 miles. The car showed unusual economy, averaging 30 miles to the gallon of gasoline.

We found interest in the Lincoln Highway and in this run at a high pitch all along the way. Motorists were convinced that this way, when completed, is going to be a boon to humanity. At many towns escort parties came out to meet us and then chased back ahead of us to tell the people in their communities the car was coming.

Road Well Marked

As for the Lincoln Highway marking it was excellent along the road, but we found some difficulty at times getting out of the larger cities because there was no way of telling which road would put us on the Highway. To add to our difficulties we were forced to contend with many road boosting enthusiasts who sought to have us use the roads they were boosting in preference to the Lincoln Highway.

With further reference to the excellent Lincoln Highway marking, even in the sparsely populated regions of the far west where one meets with no signs of habitation, the Lincoln Highway Association has marked the road by means of small pipes stuck in the ground at the side of the road.

Hotel accommodations are far improved over what they have been. The hotels everywhere appeared anxious for the trade of automobilists, many of them having garages in connection. They were always ready to give the best of service—in contrast to their apathy toward motorists only a few years back.

Details of the Trip

When we started from New York for the coast on June 4th, after dipping the rear wheels of the Transcontinental Saxon in the waters of the Atlantic Ocean, we were, of course, confident that the car would reach the Pacific on July 4th—on schedule time.

However, that does not mean that the 3,873 mile trip—that was the actual distance covered by the Saxon—was a pleasure jaunt all the way. No coast-to-coast run is. Neither does it mean that we were always certain of reaching our destination on time. For there is an element of uncertainty due to bad weather, washouts, cloudbursts, the making of new roads which necessitate detours, and all the other factors beyond control of a car or its drivers.

The little Saxon climbing a steep grade in Iowa. Some of the stiffest climbs on the route were encountered in this locality

From the time we passed beyond the Alleghanies and easily negotiated all the long grades—many of them 10 per cent.—our confidence increased. For it was in the crossing of the Alleghanies that the car first proved its dependability by requiring not one additional drop of water in the radiator. It took every hill easily and surely.

Then came the tests through the sands of Ohio and Indiana. These did not balk the coast-to-coast car, although in spots the roads would have stalled many a heavier car.

Really Bad Roads

It was west of Dixon, Illinois, that we began to realize what really bad roads meant. Here we ran into a rainstorm which lasted two days and transformed the roads into an almost indescribable condition. We had to contend with these roads all through western Illinois and eastern Iowa. Just plain mud would not have been so bad, but it was not just plain mud. It was gumbo, and only one who has actually driven through gumbo during or after a heavy rain can appreciate what it is, how it clings to the wheel like glue, is thrown in masses and packs in so thick between the wheels and fenders that it has to be shoveled out. All this is apart from the fact that in driving over such roads low speed has to be used constantly.

To add to the difficulties we struck a new graded road beyond Cedar Rapids, where the gumbo had been taken from the sides and piled up at the crown of the road. Thus, in order to keep on the road, there was no alternative except to drive right through these piles of gumbo which often came up above the front axle. Even at that, there was the danger at times of running into a ditch, particularly if an attempt was made to travel along on high because of the slippery surface of the rain-soaked roads.

In venturing beyond Cedar Rapids we ran across seven cars that were forced to turn back and two that were stuck in the mud. We had to go into a ditch to get by these cars. Beyond that we saw no signs of man, vehicle or beast on the roads, and 30 miles west of Cedar Rapids we, ourselves, became convinced, after the Saxon had gone farther through these awful conditions than any other vehicle, that the roads were impassable. It was then that we turned back and stayed in Cedar Rapids until the rain had abated. No one ventured out during this time.

Gumbo mud does not change back into a favorable road for touring in an instant. Consequently, when we sallied forth from Cedar Rapids the second time we had to continue over more bad roads into Boone, Iowa—roads that had been put in this condition by the rains and had not been packed down.

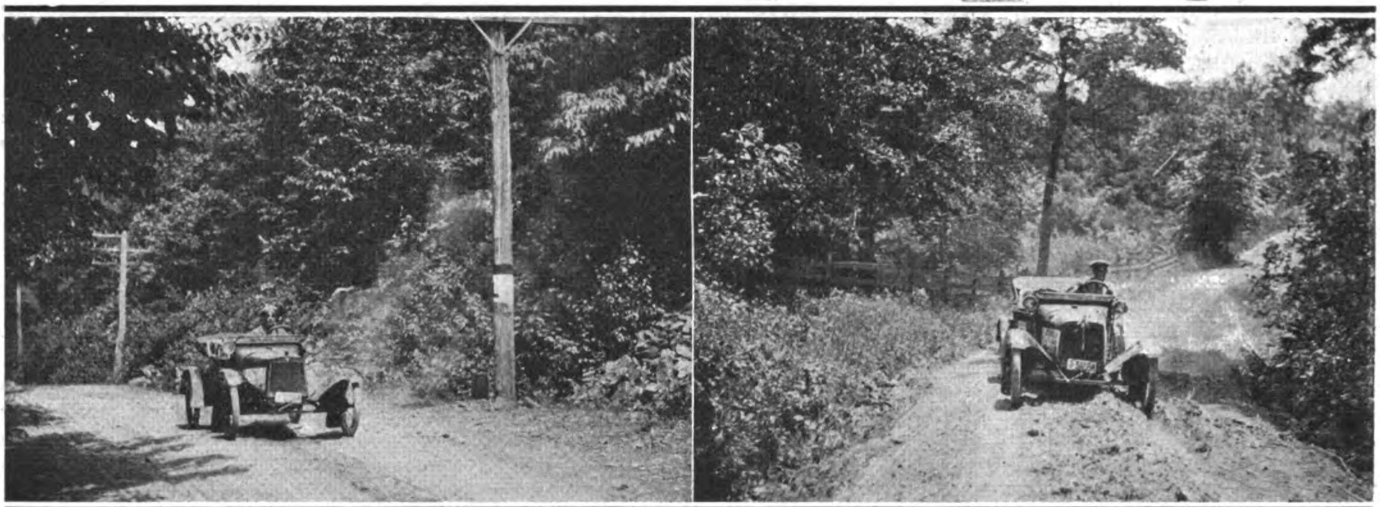
Here we started to hit the hills and we kept on finding it necessary to take hills frequently all the rest of the way to San Francisco.

At Omaha we met with a typically enthusiastic reception. The car was put in the show windows and attracted a lot of attention from passersby and those who went in to look at it.

In our run from Omaha to Grand Island—especially that section between Columbus, Nebraska, and G and Island—we encountered a cloudburst that washed out roads and had a similar effect on bridges. We found the Wood River swollen. The conditions we experienced may be imagined when it is added that the Lincoln Highway is crossed by the Wood River seventeen times. At one point things were so bad there was nothing to do but make a detour in order to progress.

From Grand Island to Gothenburg we struck fairly good

Right—Rough going in Western Nebraska. Some of the Nebraska roads are very good, though most of these are in the eastern part of the state. Left—The washout illustrated was encountered by the coast-to-coast Saxon on the road near Gibbons, Ia. It was the result of 2 days' continuous rain



Left—The Transcontinental Saxon among the hills near Council Bluffs, Ia. Right—A bad spot near Clinton, Ia., through which the Lincoln Highway Saxon pulled in its transcontinental run

roads until another detour was necessitated because of floods caused by the North Platte River and by the work being done in other vicinities in grading the roads. At Gibbons, Neb., the car made its way through roads that were veritable rivers, the water coming up to the radiator.

Beyond this point weather conditions changed. So did road conditions, but we cannot say that they were improved. Running into North Platte we encountered 22 miles of solid sand through which the Saxon blazed a trail—where there were no roads and where the only guide was a railroad track by the side of which we drove.

At Kearney, Neb. we passed a famous half-way post. It had required but 12 days of running time with an average of 10 hours each day to reach this point.

A By-Trip to Denver

Guided by nothing but wagon tracks, we drove from Grand Island to Cheyenne, where we arrived the next day at noon. A great reception was awaiting in Denver so we ran over there, a distance of 110 miles, which was made in 5 1-2 hours through the rain. From there, we retraced our steps back to Cheyenne and continued westward through Wyoming to Laramie and Wamsutter.

Going through Wyoming in one respect at least is like traveling across gumbo roads in Iowa. That is to say, one has actually to make the journey in order to appreciate fully just what the conditions are. The roads, so-called, are simply a succession of deep ruts with high centers, with the frequent occurrence of steep-sided gulleys. To cross these gulleys it is necessary to get a good running start, for the climb out of each gulley is made with the car in an almost vertical position. We found the state of Wyoming the least improved as to roads of any of the states we went through. It is going to be a big job to transform these primitive roads into good nes.

From Laramie to Elk Mountain, a distance of 86 miles, we opened and closed twenty-one gates on ranches through which we passed. There were no roads through this stretch. The steepest mountain climb up to this point was encountered near Elk Mountain. This summit rises to an elevation of 8,247 feet.

We had our first taste of desert country after leaving the town of Granger, Wyoming, which is on the edge of the Red Desert. Here the only excuse for a road was an old abandoned railroad grade which was extremely rocky and rough. By 2 o'clock in the afternoon, however, we had reached Evanston, Wyo., a distance of 127 miles, and just beyond this point we crossed the line into Utah, reaching Salt Lake City over more rough roads by way of Echo and Parley Canyon.

Some day perhaps this part of the country may be traversed without running into forbidding weather and road conditions. Up to now, however, it seems that each year the oldest residents rise up and state that never before in their memory have there been such cloudbursts, etc.

Slippery Alkali Mud

Naturally, we were not surprised that it had fallen to our lot to meet with adverse conditions. Just out of Salt Lake City we got acquainted with one of the worst rainstorms within the memory of man and were warned not to attempt to cross the Salt Lake desert at that time or within 24 hours after. We soon understood why this warning had been handed to us. For it was here that we got to learn what it means for any tourist to try and negotiate alkali mud during or just after a storm. This stuff is much different from gumbo, but we cannot say that it is any more welcome. It does not cling to the wheels and wrap itself around as gumbo does, but in another way it makes the going just as difficult. It is almost impossible to get traction in alkali mud. This stuff presents a shifting bottom. The car seems never able to get its wheels firmly planted.

After alkali mud becomes dry and hard it makes the best kind of a road, just as it is the worst kind of a road during or just after a rainstorm.

The elements continued to be against us, despite the fact that the alkali roads when dried were fairly good. The sun's rays now began to beat down and our trip across the desert was made with the thermometer from 120 to 130 degrees all the time. Generally there was not a breath of air stirring and when a wind did spring up it was one of those hot desert breezes that are just as bad as none at all. We must confess that we, the drivers, envied the car its ability to keep cool under these conditions. Every time we examined the radiator we found it not heated, even in the face of the trials placed upon it. Not once did we run out of water for the radiator, though at times we were 100 to 150 miles from habitation. As for gasoline, we always found the tank well enough filled to run from one supply station to another, despite the fact that these were often far separated. No reserve supply of gasoline was carried.

The Lincoln Highway skirts around the southern end of Salt Lake, which is on the edge of the Great Salt Lake desert. It also passes around several mountains. We made our way from Salt Lake City to Kanaka ranch, thence for 78 miles through the wilderness to Kearney's ranch.

From here we struck out for Eureka, Nev., a distance of 115 miles, where we checked in at 5 o'clock in the afternoon. We found the roads good between Ibapal and Eureka, but from Eureka on to Austin we had to cross Shelburn Pass, one of the highest summits in Nevada. Not only does Shelburn Pass provide a real test for the mountain-climbing ability of any car, but it is rocky in addition and consequently tries out thoroughly the frame, springs, axles, and other parts. This condition continued nearly all the way into Austin.

Turning Road Builders

Next we came face to face with the fact that getting a car from coast to coast involves more than the simple function of driving. The added duty of blazing a trail—of turning road builders—was forced upon us. For it was often necessary for us to climb out of the car and remove boulders of various sizes that otherwise would impede progress. Everybody who goes over this course has to do the very same thing, because boulders are always being tumbled down from the mountain sides.

Of all the summits in Nevada, the New Pass Mountain near Austin is considered the most difficult. This is a newly discovered mountain and to ascend it requires a 9-mile steady uphill climb, with the grade ranging between 10 and 24 per cent.—never less than 10 per cent. In crossing from one foothill to another we frequently came upon gullies that had once been river beds and since were dried up.

It was through this region that we came across a man who subsequently became a dealer. He had been figuring on handling our car, and upon hearing that the coast-to-coast machine was headed his way, he determined to see whether it could negotiate New Pass Mountain before closing the deal that was pending. The car performed the feat and the contract was closed.

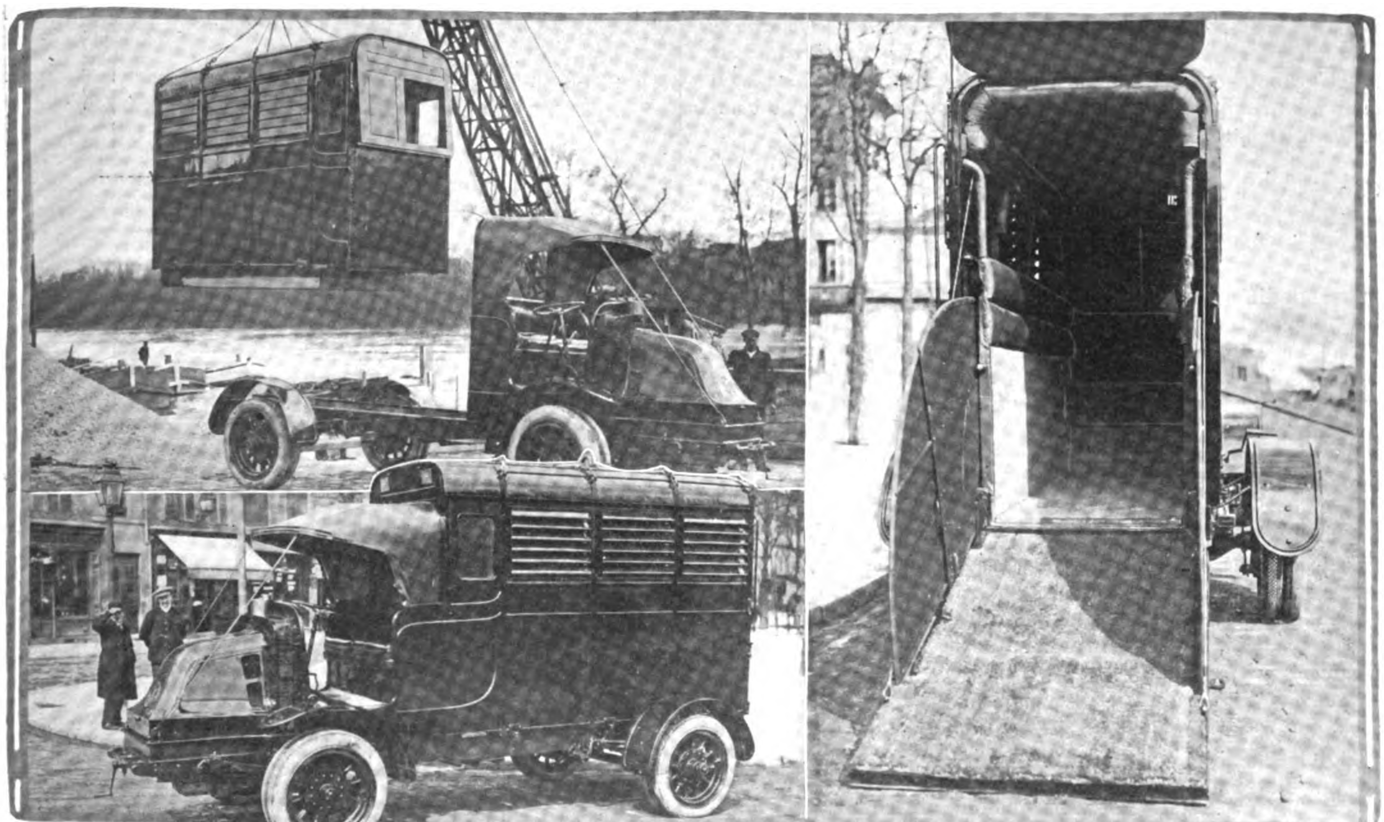
Two routes lead from Reno to Sacramento. The north route by way of the Truckee dam being closed to traffic because of snow slides, we went by the Southern route which led through Carson City and Placerville. After leaving Carson City we passed into King's Canyon, where there loomed up before us a summit of 6,940 feet—a continuous grade 6 1-2 miles in length with beautiful Lake Tahoe at the top. This was followed shortly after by the crossing of the Great Divide near Sacramento, and another sharp climb of 5,000 feet in four and one-half miles.

On the Home Stretch

We were now on the last leg of our 3,873 mile trip. But our troubles were not entirely over. For to offset the pleasure of driving through wonderful California we had to contend with the possibility of disaster, from the fact that we traveled many a mile at perilous, dizzy heights with only from one to three feet of road clearance. This was a time for the most careful driving, and a time when the car itself was placed on its mettle.

Finally, with this situation past, we put on a final burst of speed and with a run of 182 miles entered San Francisco on Independence Day, proceeded to the ocean's edge, drove the front wheels of the car into the Pacific, just as the rear wheels had been dipped into the Atlantic on June 4, and emptied into the Pacific a canteen of water carried all the way from the Atlantic.

A Novel Method for the Careful Transportation of Race Horses



BEING frequently obliged to send race horses from the training stables in France to the various race courses in England, Edmond Blanc, of Paris, France, has abandoned the railway in favor of a special motor service. Although the journey is not much more than 300 miles, of which 40 are by sea, it was found that the race horses sent by train invariably reached the course in poor condition. Under the motor service the horse is put in a special box at the training stables, the journey is made to Boulogne by road, at this port the horse box is lifted off the chassis and deposited on the deck of the steamer. On arrival at Folkestone the box is mounted on a similar chassis kept in readiness and the journey resumed by road direct to the course on which the horse is to run. The actual time spent from training stable to race course is less than by rail, and as the horse is not disturbed throughout the journey it arrives in good condition. This motor van is an ordinary Latil front drive chassis mounted on twin pneumatic tires.

Semi-Floating Axle Easy on Bearings

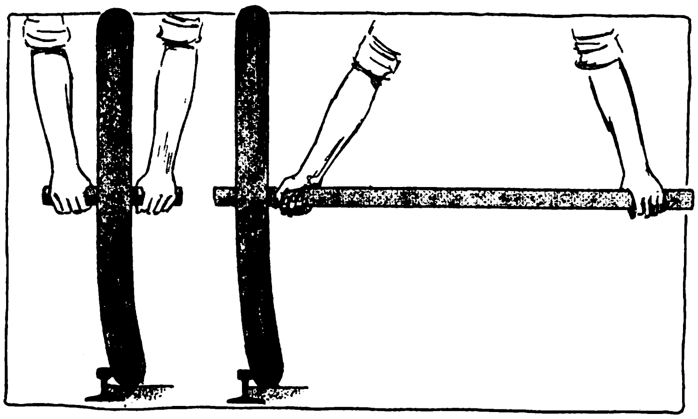


Fig. 1—Illustration to show the difference between the full and semi-floating axles when skidding. The latter has the mechanical advantage

When Skidding, Bearing Overload May Be 475 Per Cent With Full-Floating Axle — Stresses Due To Skidding Are More Important Than Those Due to Rolling

By Arthur M. Laycock, Chief Engineer, The Sheldon Axle Co.

EDITOR'S NOTE—In response to a letter signed by F. N. S., New Matamoras, O., asking THE AUTOMOBILE *to publish a discussion of the relative merits of the semi-floating and floating types of axles, requests were sent to several of the representative car and axle manufacturers asking them to give their views.*

Below is the reply of the Sheldon Axle Co., Wilkes-Barre, Pa., prepared by Arthur M. Laycock, chief engineer, dealing exhaustively with the subject. While the curves and diagrams may look forbidding to the average reader, it will be found that, although the subject is a technical one, it is so admirably presented that anyone should be able to comprehend it and derive benefit from it.

Replies from the Weston-Mott Co. and the Packard Motor Car Co. were presented in THE AUTOMOBILE *for July* 30 *and a paper from the Pierce-Arrow Motor Car Co. appeared in the issue for July* 23.

THE difference in stresses in the semi- and full-floating types is simply illustrated in Fig. 1. It would be absurd for anyone to attempt to hold a wheel straight up when rolling against a street car track, for instance, in the manner shown by the left illustration. The right one shows the only proper way to counteract these forces.

In other words, the bearing pressures, when skidding, are much less when the semi-floating axle is used; or, with the same factor of safety, smaller bearings may be used.

At the present time there are unquestionably many mistaken ideas concerning relative merits of the floating versus semi-floating construction as applied to the automobile, but it is rather difficult to convey to the reader an intelligent expression of these designs without resorting to higher mathematics.

Some of the illustrations, given herewith, are very simple in order to drive home the outstanding superiority of the semi-floating construction, particularly so when one takes as a base the forces acting on the side of the wheel instead of the straight static loads. One cannot attach too much importance to the advisability of working from this base.

It is utterly impossible to expect any trouble on general design from straight rolling loads, no matter how much they are overloaded, but the moment the wheel strikes a large cobblestone a glancing blow, brushes against the curb roughly, or even only side-skids on a good asphalt road, the pressures on the bearings and tubes are tremendously augmented.

Take a 5-ton truck with 25 per cent. overload on a country road where the ruts are rather deep, and observe the way

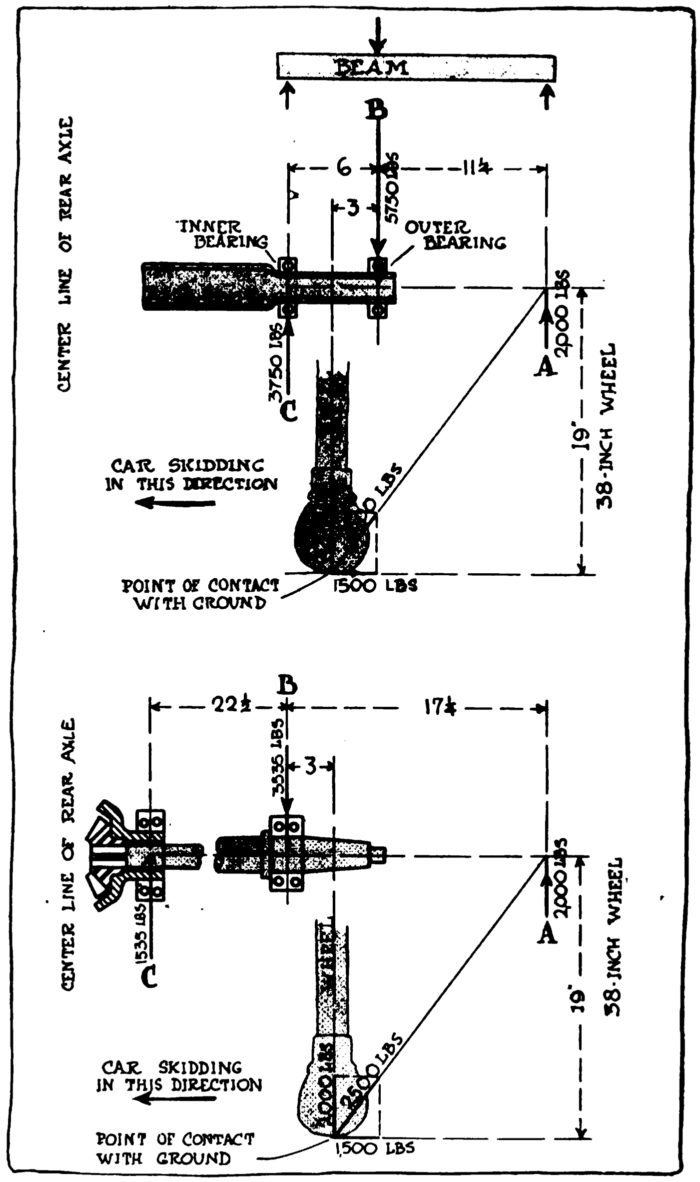


Fig. 2—Graphical method of determining the axle bearing stresses on semi and full-floating axles when skidding. It is assumed that the wheel load in both cases is 2,000 pounds. The wheels are 38 inches in diameter and the sketches of both axles are to scale. The full-floating axle is shown above, and the semi-floating below. A study of the text will show that the skidding of the wheel to the left, in the case of the full-floating axle, produces an upward stress of 3,750 pounds on the inner bearing C and one of 5,750 pounds at the outer bearing B. For simplicity it might be considered that these pressures were obtained by applying a force of 2,000 pounds at A, which is 11¼ inches from B. The accuracy of this assumption is proved by the graphical solution. In other words, the stresses at this point are similar to those acting on the beam at the very top.

the rear end will slew around from one rut to another. In some instances the whole dead weight is stopped in its side swing with the side of the rut. One can only imagine what enormous stresses are set up in these parts, even when only running from 12 to 15 miles per hour.

We will take the other extremes—the same 5-ton machine operating in the down-town districts where it is subjected frequently to turning corners at fair speed and skidding against the street car tracks and curbstones. It has been proven conclusively that these same machines have much more bearing and axle troubles than the ones that have to run on long straightaway runs to outlying districts, taking the same chassis and running under almost identical conditions, with this exception.

The writer has in mind a fleet of large trucks operating in Chicago at the present time, and this certainly proves beyond any shadow of a doubt that these forces are the only ones to take into consideration and not the static load action in a vertical direction on the axles.

Fig. 3 shows a very simple graphical method of comparing the two constructions.

It might be well to note in the first place that this is approximately a 1-ton rear axle with 2,000 pounds on the spoke line and that the full-floating design has a very liberal center-to-center distance for a 1-ton truck, which, of course, shows up this construction very much more favorably than if the center-to-center distance had been closer as in a good many existing designs.

Graphic Comparison of Stresses

The strains on the bearings when a car is skidding, compared graphically in Fig. 2, demonstrate that under the loading assumed, the outer bearing of the full floating type is subjected to a maximum load of 5,750 pounds while the corresponding bearing of the semi-floating type must carry a load of 3,535 pounds. At the same time the load on the inner bearing of the floating axle is 3,750 pounds, while the inner bearing of the semi-floating type carries a load of 1,535 pounds.

These results are arrived at by assuming that the weight resting on the 38-inch wheel is 2,000 pounds, as indicated, that the coefficient of friction between the tire and the road is 75 per cent. and that therefore if the car skids there will be a side thrust of .75 times 2,000 or 1,500 pounds. Therefore there are two forces acting at the rim of the wheel where it comes into contact with the ground. Assuming that the car is skidding to the left, then the thrust due to this is represented by a 1,500-lb. force in the opposite direction and then there is the upward reaction due to the weight. It is these two forces that must be resisted by the axle tubing.

Drawing a parallelogram of forces at the point of contact, the resultant or equivalent force acting at this point is seen to be 2,500 pounds and in the direction shown. The loads on the axle bearings can then be determined by projecting the resultant to the center line of the axle A extended, and reconstructing the parallelogram of forces it is seen that a 2,000-pound force applied at A, which is 11 1-4 inches from the center line of the wheel, will produce exactly the same strain as the 2,500-pound force applied at the point of contact of the wheel with the ground.

In order to find, in a simple manner, the stresses in the bearings at B and C, we may consider that we have a beam, Fig. 2, with loads placed at A, B and C. The load at A is 2,000 pounds, as already determined. Then the load on the inner bearing, considering that the bearing is pivoted at B, is

$$\frac{11\ 1\text{-}4 \times 2{,}000}{6} = 3{,}750 \text{ pounds}$$

To understand the above operation does not require a knowledge of mathematics. It is evident that with a load of 2,000 pounds 11 1-4 inches from the pivotal point or fulcrum, the bending moment is 2,000 x 11 1-4 and that a certain weight must be found on the other side to balance this, at a point 6 inches from this fulcrum. By the above simple calculation, it is found that this weight or force is 3,750 pounds.

Still keeping in mind that, to all intents and purposes, that we are dealing with a beam, we find that we have forces at A and C acting upward and that the one at B acts downward. If the axle is to maintain its equilibrium, the upward and downward forces must equal each other. Therefore, the force at B must be the sum of those at A and C, or 5,750 pounds.

Now, it is interesting to note that this pressure is as great as 5,750 pounds while a choice of bearing is undoubtedly made for 1,000 pounds, seeing that the vertical load on the spoke is 2,000 pounds for the two bearings, or you will notice under these conditions the outer bearing has an overload of 475 per cent.

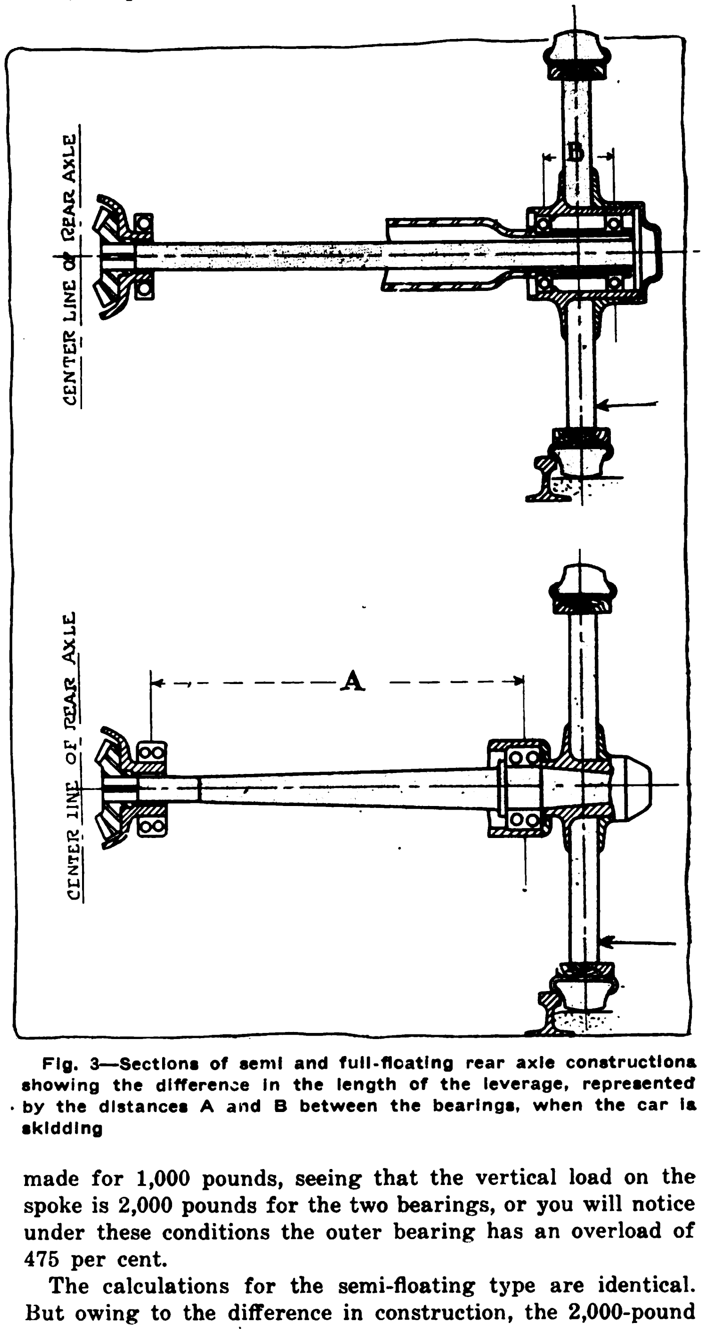


Fig. 3—Sections of semi and full-floating rear axle constructions showing the difference in the length of the leverage, represented by the distances A and B between the bearings, when the car is skidding

The calculations for the semi-floating type are identical. But owing to the difference in construction, the 2,000-pound force at A is 17 1-4 inches from the center line of the wheel. Further it will be noted that the bearing C is located at the differential instead of in the wheel hub. B is in exactly the same position, namely, 3 inches to the left of the center line of the wheel.

The load on the differential bearing is

$$\frac{2{,}000 \times 17\ 1\text{-}4}{22\ 1\text{-}2} = 1{,}535 \text{ pounds}$$

The load at B is the sum of the other two, or 3,535 pounds.

You will notice a very radical difference between this construction and the upper one inasmuch as the reactions are

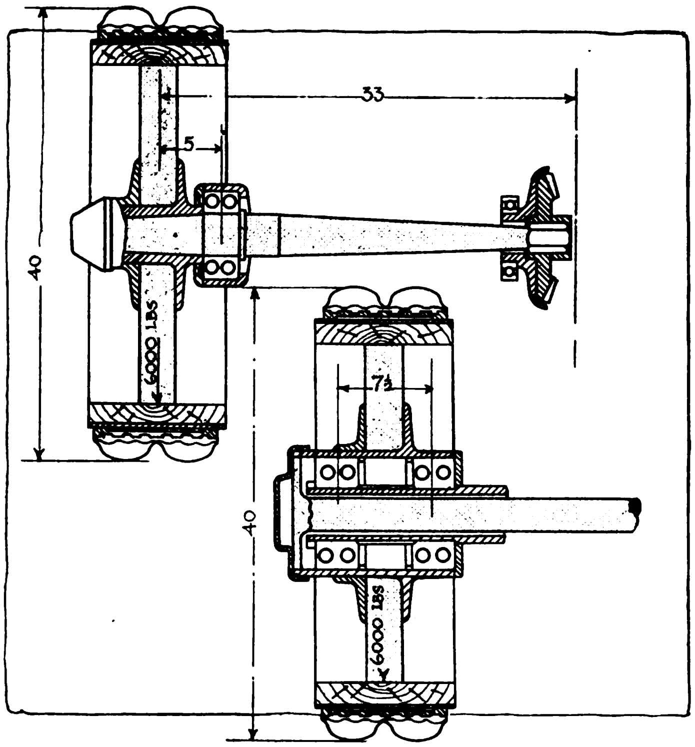


Fig. 4—Comparison of semi-floating and full-floating types from the viewpoint of bearing cost, both constructions having the same factor of safety. The dynamic load on the upper, which is a semi-floating construction, is 10,360, while the capacity of this bearing at 200 revolutions per minute is 17,000, that is, it is 64¼ per cent. stronger than actually required. The cost of these bearings is $19.50. In the full-floating type, which is the lower, the capacity of the bearing to have a factor of safety of 64¼ per cent. would need to be 15.910 times 64¼ plus 15,910, which equals 26,100 pounds. The cost of these bearings would be $76

taken on 22 1-2-inch centers against 6 inches on the floating type.

It is well to also notice that a choice of bearing would be made here for 2,000 pounds, which, of course, would give one a very much larger bearing.

Taking the bearing at its rated capacity, this bearing under these extreme conditions is only overloaded 76 per cent. against 475 per cent. on the floating, while the illustration as shown on Fig. 3 shows a fair balance in design for each construction, but with this great difference that the upper illustration can never withstand the same side pressures that the lower one can.

Building a full-floating type axle with the same factor of safety on the bearings as in the semi-floating, it would have to be in about the same scale as shown on Fig. 4.

You will notice in this diagram—which is self-explanatory—that the bearing cost is quite an item and one of the principal reasons the semi-floating has not had a larger following is from the fact that our leading axle manufacturers usually sell bearings as well.

Skidding Five Times Static Load

A good general idea as to the maximum loads on the bearings when side skidding, as compared to the static, can be obtained from the following example: The maximum load on a certain hub is 5,860 pounds. This, of course, is carried on two bearings—the inner and outer. This gives 2,930 pounds on each bearing, while, when side skidding, the outer one is subjected to a load of 15,085 pounds and the inner one to 15,910 pounds. This is approximately five times the static load.

Of course, these figures neglect sprocket pull, spoke and rim location and can only be used in a general way.

There are axles at the present time on the market with almost half the center-to-center distance of this particular one, and, instead of being five times the static, they approach ten times the static.

Turning now to Fig. 5, you will note that this particular driveshaft is well taken care of on the spoke line. It is purposely weakened at the inner end so that in case of failure you can always be brought home on the wheels. The semi-floating construction, as shown, may suffer in the same way, as the double side chain drive, when an axle breaks the truck is absolutely disabled and not able to get home. In designing an axle in this manner, the writer has never known an axle to break under the wheel. The particular shaft as shown on Fig. 6 is now used on a 3-ton worm-drive axle, and made from the very best steel procurable, and will unquestionably carry the loads it is designed for.

The stress as shown here is derived from a 50 per cent. overload with 80 per cent. on the rear, and even under these conditions, it will be impossible to break the axle on the spoke line.

Some of the fastest cars in the world have held tenaciously to this construction. Take, for instance, the Blitzen-Benz, and where the greatest possible strength for the least weight is desired one must of necessity take this construction, while one of our most popular 1 1-2-ton live axle drive trucks has given an excellent account of itself in real rough work. One of the most expensive cars built, the Pierce-Arrow, has used this constantly, even for the earliest designs. Taking the other extreme, the Ford, it would be impossible to design a rear axle construction stronger than this one for the same weight and price. These people must have had an early appreciation of the robust strength of this design.

It might be well to mention the three-quarter-floating, where the static load is taken on the tube and drive is taken through the shaft. This, of course, is in a class between the semi- and full-floating type. The popular erroneous idea with reference to the three-quarter-floating is in regard to the driveshaft being subjected to purely torsional strains, but it can be easily shown that the driveshaft is taking the combined bending and torsional strains as in the semi-float-

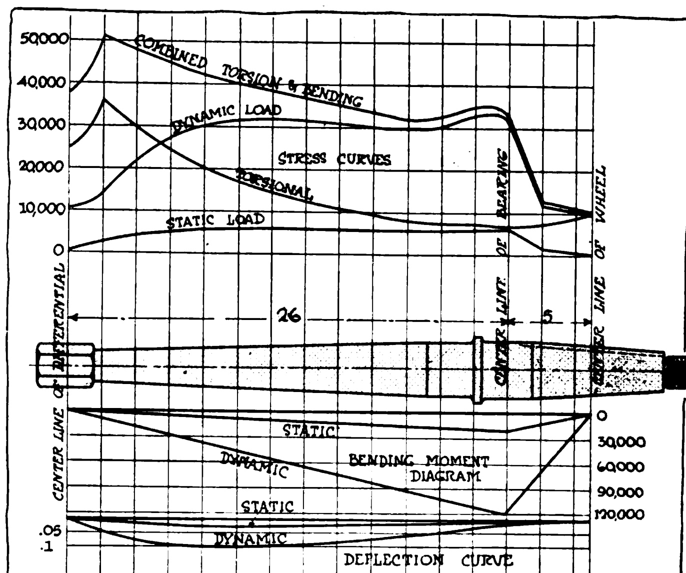


Fig. 5—Upper—Diagram showing combined bending and torsional strains at various points on an axle shaft when using a 40-inch wheel. It will be noted that there are four curves, the top one, which is marked combined torsion and bending, is a combination of the other three obtained by adding the ordinates. For instance, the static load at the extreme left ordinate is 1,000 pounds, the dynamic load is slightly over 11,000 pounds and the torsional load is about 25,000. Adding these three together the combined load at this point on the axle is about 37,000 pounds, which is correct. The static load is that bending moment which is produced by the weight on that wheel, the dynamic load that produced by skidding and the torsional load that caused by the twisting of the start when power is being transmitted

Fig. 6—Middle—Bending moment diagram. Lower—Deflection curves for bending moment diagram above

ing construction, and the only advantage the three-quarter would have over the semi-floating would be that you can take out the driveshafts without jacking up the car as in the floating type, but with this very great difference that the whole load is supported on one bearing momentarily, and if the car is standing on uneven ground the pressure on the end of the tube and bearing might be so great as to permanently injure it. Figuring that the driveshaft is a critical part of the construction, and taking into consideration that in order to have it safe it must have a very large diameter, when these dimensions are realized one has to add to this already liberal size twice the thickness of the tube plus the clearance, one can imagine the very large size of bearing that this particular construction entails, which, while it might be taken from the lighter series, entails such heavy housings, etc., as to make it undesirable from this view-point.

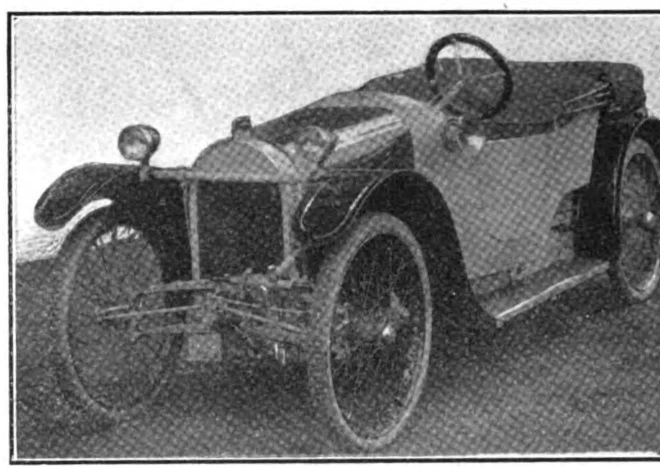
The writer has been repeatedly told that it has a further advantage of being able to get home on the one bearing in case of driveshaft failure. When this occurs on rough roads, it is an experience never to be forgotten, as it usually ends disastrously not only for the bearings but for the axle tube as well. The absence of support throws such a pinching action on the bearing that it is not long before it collapses entirely and brings the closure down on the tube, cutting off the tube and finally dropping the whole load.

The only disadvantage of the semi-floating construction is the inability to take the driveshaft out without jacking up the car. In some of the earlier types of axles it was exceedingly difficult to take them apart on account of first having to split the rear axle in order to release the inner end. Modern construction, of course, makes it comparatively easy to take out the differential when the side shafts are withdrawn, and all that is necessary on a nicely designed semi-floating construction axle is to jack up the rear end, undo two bolts on each hub, take out the differential; and the driveshafts can be taken out quite easily, but, due to the great factor of safety that a properly designed semi-floating construction insures, the axle is one of the last things to give trouble.

The writer has had considerable experience with this form of drive, and wherever the combined bending and torsion have been properly taken care of, he has yet to see a single failure at the wheel end, and in these days of lightweight construction, we prophesy that it will have a much larger following than in the past.

New Imp Has Four-Cylinder Water-Cooled Motor

IMP the Second is the name of the 1915 cyclecar announced by the W. H. McIntyre Co., Auburn, Ind. The new model of the Imp is quite a different car from the original Imp of 1914. It has a four-cylinder water-cooled motor instead of the two-cylinder V-type engine used in the earlier model. The friction drive is retained, but instead of final drive by V-belts a single roller chain is used, driving a live rear axle. The new Imp, instead of being a tandem seater, is now side-by-side, and in general appearance is like a standard roadster. It is stated that weight has been reduced considerably and many refinements incorporated. The motor has a bore and stroke of 2¾ by 4 inches with cylinders of the L-head type cast in block, and mounted on an aluminum crankcase. The motor is thermo-syphon cooled, and is oiled by splash assisted by a plunger pump. Both intake and exhaust manifold are cast integrally. Magneto ignition has been discarded and a unisparker substituted.



New Model Imp with water-cooled motor and chain drive

Gearless Differential Used

The rear axle incorporates a gearless differential whose main feature is said to be that it prevents skidding. The new Imp has left drive and is equipped with wire wheels, and 28 by 2 1-2-inch tires. The rack-and-pinion steering, double transverse semi-elliptic front springs and cantilever rear springs are retained.

The new side-by-side roadster body has artificial leather upholstering and the seat is 37 inches wide and 16 inches deep with a high back to make for comfortable riding. The fuel tank of the new Imp has a capacity of 5 gallons, and is located in the cowl. The Imp prices for 1915 are as follows: $395 including horn and electric light, $420 with top, curtains and folding windshield, and $495 completely equipped, including electric cranker and generator.

All models are thoroughly tested before they are packed for shipment.

C. A. C. Roadster Will Do Fifty

Fifty miles per hour is claimed for the C. A. C. roadster, a sporty-looking machine, with bucket seats resting on the floor, oval tank in the rear and raked steering column. It is manufactured by the Coey Motor Co., Chicago, Ill., and sells for $425. The motor is a four-cylinder, four-cycle, water-cooled type, with a bore of 2.75 inches and a stroke of 4 inches. A Berling magneto is fitted and thermo-syphon cooling is used. Power is transmitted to a three-speed gearbox by a cone clutch. These members are combined into one unit suspended at three points.

The frame is made of pressed steel with half-elliptic springs at the front and three-quarter elliptics at the rear. Double-acting brakes are fitted to the rear wheel drums. The steering is a rack-and-pinion type paced on the left. Center control is used. The equipment includes two large gas lamps and one oil tail lamp. A top is fitted for $25 additional.

Sporty looking C. A. C. roadster with four-cylinder water-cooled motor

Proper Temperature Is the Real Essential in Vulcanization

The Automobile Engineers' Forum

Source of Heat Is Immaterial, Says Vulcanizer Maker, Who Scores Theory That Moisture Enters Into Process—Automatic Temperature Control a Necessity To Prevent Burning of the Rubber—Regulation by Thermostat

WAUPUN, WIS.—Editor THE AUTOMOBILE:—Many car users seem to have the impression that the source of heat used in vulcanizers has something to do with the process of vulcanizing, in other words, that the nature of the heat, whether steam or electric, possesses some factors that share in the vulcanizing process.

Many statements have been circulated to the effect that steam is the only successful vulcanizing medium. They probably originated from the fact that tire manufacturers find steam to be the only convenient means of heating their huge vulcanizing devices to a uniform temperature. The idea has been fostered by a class of repair men who feared for their profits should the simplicity of the vulcanizing process become generally known.

As manufacturers of a complete line of portable vulcanizers for every requirement—some heated by electricity, others by steam, still others by radiation from a gasoline, or alcohol lamp, we feel that we can speak with the authority of absolute knowledge.

No Moisture Touches Tire

The supposed infallibility of steam vulcanizers has been attributed to the fact that they supplied a moist heat. The absurdity of this theory is apparent when it is considered that in no portable steam vulcanizer does any moisture come into contact with the tire. If it did the repair would very likely be spoiled. So at least an eighth of an inch of solid metal is between the steam and the tire. No scientific instrument is delicate enough to detect whether the surface of any vulcanizer is heated by steam or by some other source of heat.

Proper Temperature the Real Factor

The real essential to perfect vulcanization is the supplying of heat *at the proper temperature.* Automatic maintenance of the vulcanizing temperature is absolutely essential unless the operator of the vulcanizer wants to watch his vulcanizer and regulate its temperature by hand. Without an automatic temperature control there is nothing to prevent the temperature of confined steam from becoming high enough to burn rubber. If the steam is not confined it cannot become hot enough to vulcanize. Vulcanization occurs too slowly to be practicable at temperatures below 250 degrees Fahrenheit. Unconfined steam cannot be hotter than the boiling point of water, 212 degrees Fahrenheit.

The best results in vulcanizing are obtained only when the temperature is automatically maintained at a uniform degree throughout the time of curing.

Regulation by Thermostat

This automatic regulation of temperature is easily obtained by the use of a thermostat. Two strips of metal such as brass and steel are riveted together making a solid bar. When heat is applied the brass expands faster than the steel so that the bar bends. The amount of bend is proportionate to the temperature. The bar of thermostat is fastened to the vulcanizing surface in such a way that its bending either operates a damper in the flue of the steam vulcanizer, or regulates the amount of current flowing in an electric vulcanizer. Thus the temperature is automatically held exactly at the degree most suitable for vulcanizing without the operator having to give any thought to it.

No Learning Required

Anyone can use a vulcanizer of this sort without having to learn the vulcanizing business because nothing is left to his care except removing the vulcanizer from the tire when the repair has been finished.—C. A. SHALER CO.

Favors Single-Wire System To Prevent Cross-Connections

NEW YORK CITY—Editor THE AUTOMOBILE:—We are exceedingly in favor of the single-wire system, inasmuch as from very careful experimenting and research work we find it to be a much simpler and more reliable system than either the two or three-wire system. Also, it makes it practically impossible for the average layman to make any cross-connections.

This is one of the most important points which is borne in mind in the design of our single-wire fittings. A single-wire system, when properly installed, makes a neat appearance and looks very simple and from every point of view is more reliable than the multiple systems.—V. W. KLIESRATH, Chief Engineer, Bosch Magneto Co.

Uses Parabolic Lens of Golden Tint for Headlights

DAYTON, O.—Editor THE AUTOMOBILE—We believe it will be of interest to you to know that we have overcome the complaint of dazzling headlights for automobiles, and the large business which we have secured is sufficient proof that we have solved this problem.

Instead of using a special dimming device for reducing the glare, a special reflector is used in the construction of our automobile headlights. This reflector is a parabolic lens mirror of a golden tint made from the highest grade of optical glass. The glass parabola is coated with a pure silver backing, and this is covered with a protecting layer of metallic copper. An aluminum finish is given to the copper to prevent tarnishing.

Glaring White Element Eliminated

This yellow tinted mirror overcomes the blinding glare so apparent where a silver reflector is used. The glaring white element is entirely absent, as the golden tint absorbs the ultra-violet rays to a great extent. This reduces the glare, at the same time furnishing a light which will penetrate fog and dust to a greater extent than the rays of light from a silver reflector.

The rays of light are just as powerful as from any other lamp. The light so nearly duplicates daylight that objects along the road are not distorted, neither are holes or rough places in the road magnified.—THE APPLE ELECTRIC CO.

Favors Extreme Simplicity in Design for Service and Economy

ROCHESTER, N. Y.—Editor THE AUTOMOBILE:—The Society of Automobile Engineers, at their recent convention at Cape May, N. J., considered the subject of the Ideal Car of sufficient interest and importance to have papers prepared and read regarding it. Since then we have heard very little about it, though the fact that this eminent body had discussed the pros and cons of the car of the future would seem to indicate that at least a few of our many enthusiastic automobilists would have some opinions on the subject to offer.

When THE AUTOMOBILE conducted a department entitled The Ideal Car, a year or two ago, I was one of its readers who ventured to contribute my conception of the subject. And since that time the developments of engineering practice, design and construction have only served to strengthen my belief that the ideal car is one which will give a maximum of service with a minimum of trouble, care and expense.

Building the Car Simple

For the past 7 years I have been an automobile owner and my experience has been that the more parts and attachments a car has the more things there are to get out of order, and, consequently, the higher is the proportion of probability that when you take the car out something will go wrong, either on the road or soon after the return from the trip.

In view of this, as our modern cars became more complicated and I found that most of my spare time was being consumed in taking care of any number of more or less superfluous devices, which were described in the catalogues as luxuries, I determined to emancipate myself from these cares of complication and, accordingly, purchased a stripped chassis of well-known make with none of the fashionable excrescences which I wished to avoid. I fitted up this chassis with the simple necessities and discarded everything possible without impairing comfort and serviceability and the result is that I have a car with which I can travel for weeks at a time without any other care than keeping up lubrication, cooling water and fuel supplies.—A. L. BOOTH, M. E.

Recent Court Decisions—Wagon on Highway

By George F. Kaiser

NEW YORK COURT says that when a teamster stops his wagon diagonally across the highway, leaving insufficient space for an automobile to pass in the rear of the wagon, when the car is in plain sight, he is guilty of negligence, and the employer must stand for any damages which result to the automobile by reason of the same.

An automobile was coasting on a down grade at a speed of about 20 miles an hour. About 330 feet from a depression at the side of the road, a teamster came along the lane toward the highway. As the team reached the highway, the motorist blew his horn, and the teamster looked up and then stopped his wagon diagonally across the road, leaving insufficient room for the motorist to pass. The motorist attempted to throw his gear into the reverse, but was unable to do so because the gear caught. He then attempted to pass in front of the horses, but the automobile fell into the depression, and the car finally struck a telephone pole.

The car was damaged, and the motorist sued the wagon owner, and recovered a judgment to the sum of $200.15. The owner of the wagon appealed the case, but the higher court said that the judgment in favor of the motorist was proper, as the negligence was all on the part of the driver of the wagon, and because of this negligence the accident occurred.—*Manion vs. Loomis Sanatorium*, 162 N. Y. Appel. Div. N. Y. 421.

Motorist vs. Motorist for Collision

In an action in the Rhode Island Court, where one motorist sued another motorist for damage caused by a collision when they were both going in the same direction on a broad highway, the Court said that the questions which determined the liability of the respective motorists were: "Did the plaintiff (the injured motorist) at the time and place of the collision leave room enough at his left for the defendant to pass him in safety and without striking his machine?" and "Did he block the road ahead of the other car before the other party attempted to pass him?"

In this case one motorist sued another for damage caused by a collision. Both cars were going at a moderate speed in the same direction along a highway which was 25 feet wide and on which no other vehicles were at the time. It seems that some time previous to the accident words had passed between the respective drivers of the cars because of the fact that the car ahead slowed up suddenly at a railroad crossing without giving any warning and the rear car nearly crashed into it.

The Court found that the party against whom the suit was brought was not liable as the one bringing the suit failed to prove the law of Massachusetts, which provides that one car shall pass another on the left and shall not turn until there is ample room to clear the car which has been passed. On the failure to prove this law the common law was held to be in force, under which one vehicle was not obliged to turn off for another coming from behind if there was sufficient room for the other car to pass on either side with safety.—*O'Donnell vs. Johnson*, 90 *Atlantic* (*R. I.*), 165.

Policeman Loses Case

New York Court says that when a police officer is riding in an automobile in the course of his duty, and is injured by reason of one of the wheels collapsing, he must nevertheless prove negligence on the part of the city or chauffeur before he can recover damages.

In this case, while a policeman who had been assigned to the Department of Finance, was accompanying a paymaster in the Croton Aqueduct, he was injured by reason of one of the wheels collapsing on striking a large stone. The car turned over, and the policeman and another man were killed.

His administratrix brought an action to recover for his death, and although the trial court gave judgment in her favor in the sum of $7,000, the higher court decided when the city appealed, the court made a mistake in not putting the burden of proof of negligence on the administratrix, and further before her recovery could be had against the City it was necessary to show that the chauffeur was in an intoxicated condition, or was driving the car recklessly or in an improper manner.—*McCormack vs. City of New York*, 162 Appel. Div. N. Y. 539.

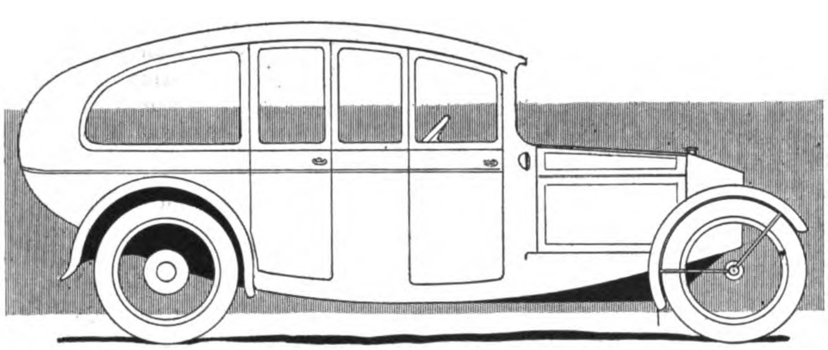


Fig 1—Ideal limousine where underslung floor 10 inches from the ground is used to make the car extremely low

The Rostrum

Two-Cycle Motors Favored In Large Installations

EDITOR THE AUTOMOBILE:—I notice in the Rostrum this week E. R. Crilley, "Thinks Two-Cycle Motors are Passé." I would suggest that the correspondent get in touch with a well-equipped public library and take a few notes before he condemns a principle he evidently does not understand. I would suggest that he study *Engineering* and *The Engineer* of London, *The Gas Engine*, Cincinnati, Ohio, and note where the two-cycle engine is being used in preference to the 1876 principle.

Following are extracts to prove my claim:

Engineering, London, April 24, 1914, The development of High Power Marine Engines. In considering the future possibilities, *only* the two-stroke cycle will be dealt with, as the power of the four-cycle engine is limited by the difficulties of dealing with the exhaust. The weight and space occupied by the two-cycle engine is not great. To obtain the maximum actual mean effective pressure per revolution, the two-cycle engine will be adopted.

The Gas Engine, Cincinnati, January, 1914, page 47, Krupp builds six-cylinder, two-cycle engines for submarines, 900 horsepower. *The Gas Engine*, February, 1914, page 74, Development of the submarine, with the French and German submarines in which the two-stroke engines have been most common, compressors are of course used.

The Gas Engine, August, 1914, page 505: A larger two-stroke cycle engine than this has been built however. This is a six-cylinder engine of 4,000 horsepower built by Sulzer Brothers, a single acting two-stroke cylinder has been built for experimental purposes for which 1,500 to 1,800 horsepower was obtained without serious difficulty.

Finally, Mr. Knight had to take his American design to England to be appreciated. Europe won the first four prizes at the International races at Indianapolis. They have some new valve gears that are positive in action. I will venture to predict the fashion may get a jar due to progressive work along two-cycle lines where some of the leading concerns are busy trying to eliminate inherent defect in the 1876 principle.

Cleveland, O. LABOR OMNIA VINCIT.

How to Install a Unisparker

Editor THE AUTOMOBILE:—1—Kindly explain and show by diagram the manner of installing an Atwater-Kent Unisparker on a Model F Buick Car.

2—The non-distribution type igniter produces a spark in both cylinders at the same time and, as I understand it, the current flows from one coil to both cylinders, dividing, as it were, into two streams. Is this so, and is not the spark weakened?

3—Would better ignition on my car be secured if I used a spark plug with a long lower end? The wall of cylinder at spark plug hole is 1 3-8 inches deep and with an ordinary plug the electrodes reach down only about 5-8 inch. It seems to me that if the electrodes reached through the hole the lower end of plug would be kept more free from soot.

4—In assembling my car I found two marks on the camshaft gearing and it was impossible for me to know which one to go by. The difference amounts to one tooth or, if a mark on the angle of the crankshaft is taken into account, two teeth. Explain how the gears must be set.

5—I have battery ignition on my car. Would it be good practice to connect an electric horn to the set of batteries used for ignition?

Iowa Park, Texas. HORSELESS.

—1—The Atwater-Kent Unisparker is attached to the timer shaft after removing the commutator. The loose gear is then placed in the bracket, Fig. 3. The bracket is put on the bronze bushing which forms the bearing for the timer shaft, making the inside of the bracket even with the face of the bushing and the loose gear on the timer shaft. Then clamp the bracket by securely tightening the two set screws. Finally adjust the loose gear to run smoothly with the other one. Drill and pin the loose gear to the timer shaft.

The timing of the Unisparker is accomplished by bringing the piston in one of the cylinders to top dead center on the compression stroke. Turn the motor over until the mark on the flywheel indicates that the pistons are on dead center and then determine which cylinder is on its firing stroke by noting which cylinder has both valves closed.

Then, with the spark lever retarded, set the breaker mechanism so that the contacts breaking the circuit to the spark plug in this cylinder are just ready to separate. The timing adjustment is obtained by loosening the screw on the collar of the Unisparker.

The only other adjustment is the width of gap at the contact points. The space should be between 1-32 and 1-64 inch, depending upon the strength of the batteries, spark heat required, etc. The spark can be made hotter by decreasing this distance and current economized by increasing the distance. Once or twice a season these contacts should be examined and if rough should be smoothed off by means of a fine file or a piece of

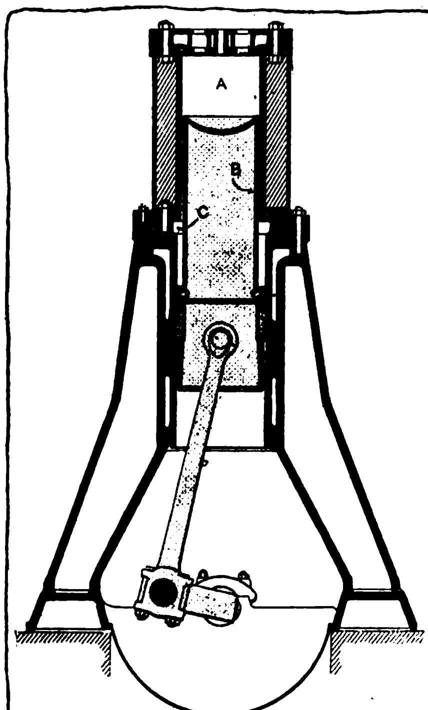


Fig. 2—Motor with uncooled cylinder. The upper part of the piston does not touch the hot cylinder. Note packing at C

emery cloth on a flat stick. The proper adjustment when starting with new dry cells is about 1-32 inch and if a storage battery is used this may be reduced a trifle. At intervals of 600 or 800 miles these contacts should be closed from a quarter to a half a turn, or until regular firing is again obtained. Do not atempt under any circumstances to adjust the tension of the springs.

2—Where the current is not distributed but is allowed to flow to both spark plugs each time that a spark is needed in one, naturally, twice as much current must be used as in a system using a distributer.

3—Some improvement in the operation of the motor will be noted if longer spark plugs are used. You should be able to obtain these spark plugs from any supply dealer.

4—You had better check up the timing by means of the marks on the flywheel. There are two marks quite close together on the flywheel rim. The first one, considering the direction of rotation of the motor, is for exhaust closing, and the second, for intake opening.

5—You do not state whether your battery ignition is of the storage or dry-cell type. If it is the latter, it would be safer to have an extra set of cells for the horn so that there will be no danger of weakening the cells that you are depending on for your ignition.

Reader Designs Novel Limousine

Editor THE AUTOMOBILE:—It seems to me that there is not enough originality to our body design. Nearly every touring car is like every other one and the same applies to closed machines. Furthermore, a body should be practical as well as good looking yet there are many that do not satisfy more than one of these requirements.

A closed body design that departs from standard practice to a large extent is shown in Fig. 1 yet it has many good points and it carries out the streamline idea with more unity than any other design I have seen.

A high V-pointed radiator is used in connection with a sloping hood. The front of the roof slants over to meet the end of the hood, the width of the glass panel only being about 18 inches. Thus the hood makes an almost unbroken line with the roof.

The ideal chassis for such a body should have a four-cylinder motor, with cylinders 4.5 by 6 inches, of medium speed. A cone clutch and three-speed gearset should also be used.

Nor is the roof of the body so low that the passengers are likely to strike their heads, because the floor of the car is underslung from the frame so that it is only 10 inches from the ground—the same as the clearance under the axles and the flywheel. In the ordinary limousine the floor is 20 inches above the ground, so 10 inches is gained in this manner, in other words the car can be made 10 inches lower.

The streamline effect is further accentuated by carrying the sides of the body down to hide the frame members and by fitting bicycle-type fenders that hug the wheels as closely as possible. The doors have invisible edges.

A small objection to this type of body, of course, is the fact that the flooring must be arched over the gearbox and driveshaft but this is of small moment.

Utica, N. Y. F. L. ADAMS.

A Motor Without Cooling

Editor THE AUTOMOBILE:—Do you know whether anyone has ever tried to design a motor without provision for cooling the cylinders. It seems to me that it would be possible to construct a long piston, the lower part of which would be used as a guide, and would not come into direct contact with the hot gases and the upper part would be of slightly smaller diameter so that it would not come into contact with the uncooled walls of the cylinder yet the space between this part and the piston would be so small that no hot gases would pass down to the lower part of the piston, which would be a running fit.

Brockton, Mass. H. E. B.

—This was suggested several years ago by a Frenchman, by the name of Gardee, and while it is not adapted to automobile work it might prove satisfactory for stationary engine service.

As will be seen by the section of the motor shown in Fig. 2, the lower part of the piston works at low temperatures because between the hot part of the motor A and the lubricated piston there is an annular body of gas B which prevents the heat from being transmitted.

It will be noted that such a motor would be too high for automobile work and that the reciprocating parts would be too heavy for the speed required by present-day practice.

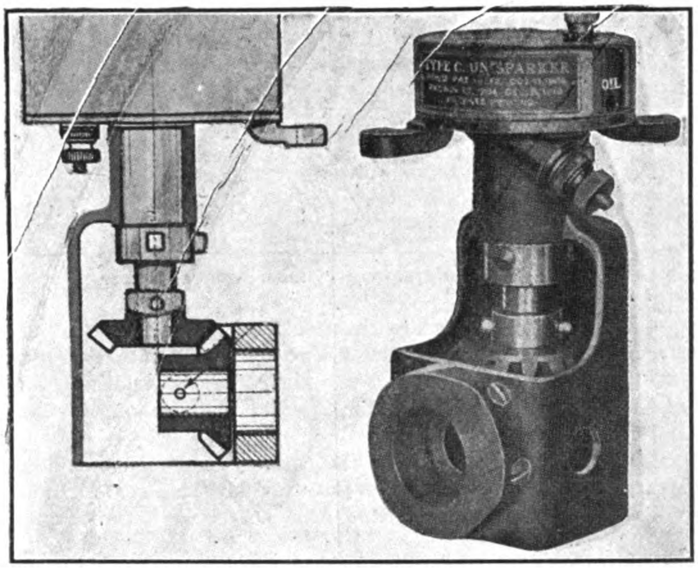


Fig. 3—Atwater-Kent Unisparker for model F Buick

Information Concerning Buick C 37

Editor THE AUTOMOBILE:—Kindly give me the following information concerning the Buick 1915, model C 37:

1—Maximum number of revolutions per minute.

2—Gear ratio on high gear.

3—Maximum speed.

4—Weight fully equipped.

5—Also how can demountable rims be kept from rusting?

Christiansburg, Va. T. H. WADE.

—1—The maximum revolutions per minute of the motor is 1,900.

2—The gear ratio on direct drive is 4 to 1.

3—The maximum speed is 50 miles per hour.

4—The weight is 2,950.

5—Demountable rims may be kept from rusting by painting with a good flexible enamel. Clean the rims thoroughly first, and then paint them. Rusting of the rim where it comes into contact with the bead of the tire can be prevented by painting the rim before the tire is put on, with flake graphite mixed up with enough gasoline to make it fluid.

No Companies Selling on Installments

Editor THE AUTOMOBILE:—What automobile company is it that sells its cars on the installment plan, to both the agent and final purchaser? I did not know until a few days ago, that any company was offering such a proposition, but an agent here showed me part of a letter from some company—he would not show me the name—offering to do this.

Windsor, Mo. GEO. P. JAMES.

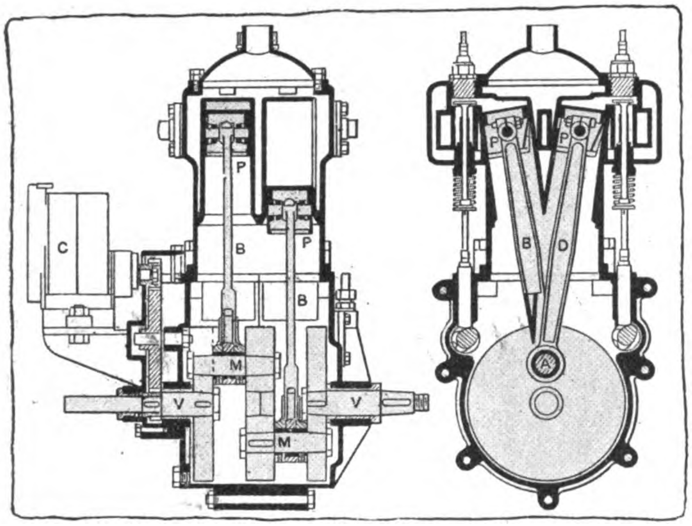


Fig. 4—Two views of four-cylinder V-block motor

—We know of no concern that makes a specialty of selling cars on the installment plan. Undoubtedly some concerns have allowed dealers to pay for their cars in installments where it was desired to offer special inducements to the dealers to take the cars.

Here and there throughout the country dealers are selling cars on the installment plan but this is a matter for the individual dealer to decide and does not concern the manufacturer.

The fact that the dealer you speak of would not let you see the letter would seem to indicate that the understanding was confidential and that the manufacturer was not making similar terms to other dealers.

Explanation of Four-Cylinder V Block

Editor THE AUTOMOBILE:—The other day I was examining a motor which seemed to be of the two-cylinder type with the cylinders cast in a block. I was under the impression that it was an extraordinarily large diametered motor and on inquiring found that it was a four-cylinder motor with the cylinders alongside of each other. Will you kindly show me by means of a diagram how these cylinders are placed?

Hoboken, N. J. CHAS. STEARNS.

—The motor described by you is shown in section in Fig. 4. It is seen that the cylinders are inclined to form a V-shape with each pair of connecting-rods working on the same crank. There are three flywheels within the motor which are connected to the cranks and crankshaft in the manner shown in the longitudinal section through the motor.

Description of Oakland Ignition

Editor THE AUTOMOBILE:—Will you please give me a description of the ignition system used on the Oakland six 48? In the instruction book furnished by the Delco company, I did not quite understand how the current passes to the distributer, from the dry cells, and from the generator.

Buffalo, New York. HENRY J. SLEZAK.

—The Delco ignition system, Fig. 6, used on the Oakland 48, consists of a dual automatic distributer and timer which is carried on the left side of the motor near the front, and a coil for transforming the low-tension current into high-tension.

When ignition current is supplied from the lighting circuit the current passes from the storage battery or the generator, depending on which is furnishing the current, through the switch, and on out through wire A to the low-tension winding of the coil, from whence it passes to the timer and from there to the frame where it is grounded.

The high-tension current generated in the coil runs to the distributer where it is switched to the spark plugs in different cylinders in turn. This current is produced by the magnetic reaction due to the sudden subsidence of current in the primary.

It will be noted that there is a resistance unit just above the timer on the diagram. This is for the purpose of protecting the circuit. Under ordinary conditions the wire remains cool and offers little resistance to the passage of current, but if for any reason the primary circuit should remain closed for any length of time this wire will become heated, its resistance will increase and in this way will reduce the amount of current flowing. In other words this resistance coil becomes heated and reduces the flow of current before the current can injure any other part of the circuit.

Directly above the resistance unit is a condenser.

When the dry cells are used for ignition the operation is the same except that a device called an ignition relay, Fig. 6, is added to the circuit. This device economizes current by breaking the circuit immediately after it has been completed by the time contacts. Thus the circuit is closed a much shorter time than is the case when the circuit is broken by the timer contacts themselves.

How to Install an Ammeter

Editor THE AUTOMOBILE:—Will you please describe a method of attaching an ammeter on a 1914 Buick, Model 25, equipped with the Delco starting and lighting system?

How many miles per hour does this car have to travel to begin charging the storage battery?

Keokuk, Ia. EDWARD MOORE.

—Although you have not stated it, you probably desire to measure the rate of charge and discharge of the battery, and not the consumption of the lights when the generator is supplying the current, etc. The connections are very simple as it is only necessary to place the ammeter in series with either one of the cables running to the storage battery. Cut the cable in two at whichever side is more convenient and attach the ends of the wire to the terminals on the ammeter.

Relative Positions of Armature to Pistons

Editor THE AUTOMOBILE:—As a subscriber to your magazine I take the liberty of asking some information on the correct relative armature positions when compared to the positions of the connecting-rod and timer for different positions of the spark. That is, for a retarded or advanced spark. Can you enlighten me?

Macon, Ga. H. E. LORD.

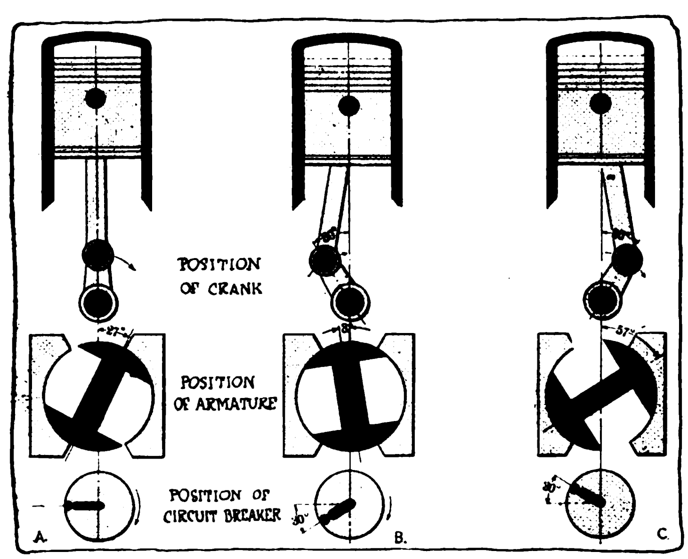


Fig. 5—Diagram showing position of armature for different crank pistons

—The relative positions of the piston and connecting-rod to the armature and the contact-breaker can best be shown by means of a diagram. Such a diagram is given in Fig. 5. The direction of rotation is clockwise, and the maximum spark advance and retardation have been taken as 30 degrees. The position of the armature is so designed that the maximum current will be obtained under the greatest number of conditions of spark advance or retardation.

Differential Gears Hum on Turns

Editor THE AUTOMOBILE:—I have a 1910 car that is in good repair with the exception that the rear axle makes a noise. The noise is not so bad except when I turn a corner. About one year ago I returned the drive shafts and differential to the maker and had a new housing and gears put in. Since then I have put in a new bevel gear driving pinion. If I screw the pinion up as tight as I think it ought to go, it binds.

2—Does it make any difference how many teeth are in a bevel gear in relation to the gear it works in?

Pittsburgh, Pa. R. A. JENKS.

—1—This condition is due to the shifting of the large differential gear so that it moves away from and toward the driving pinion. The cause of this is usually a loose truss rod which permits the housing halves to separate. The left half of the housing should be removed and the bolts reset and tightened and then the truss rod taken up as far as possible to form a rigid construction. If you are not familiar with the work do not attempt it, and under no circumstances should you try to readjust the gears to compensate for the loose rod.

2—The relation of the number of teeth on the driving pinion to the number on the large gear gives the ratio between the number of revolutions the motor makes as compared with the number the wheels make when the car is traveling on high gear. Any change in either the pinion or bevel gear, alters the ratio.

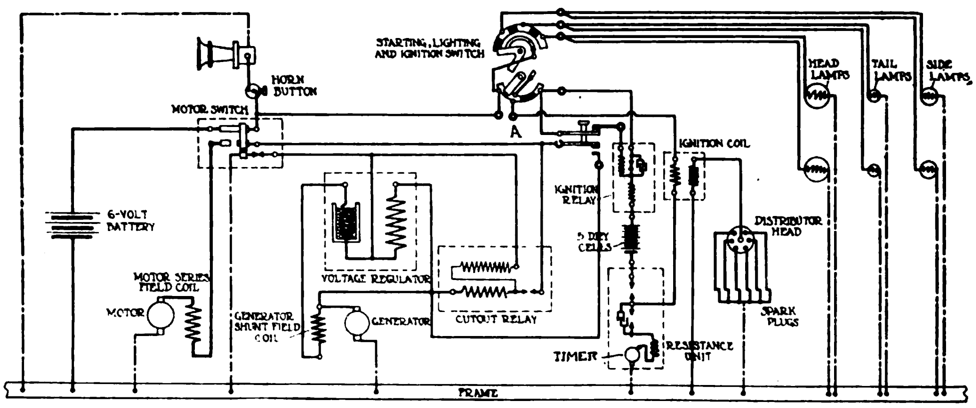


Fig. 6—Delco system used on Oakland six showing method of distributing current to spark plugs

Speed Changes on Electric Cars

Editor THE AUTOMOBILE:—1—Do not the Stearns, Columbia, Palmer-Singer and Moline cars use rotary valve motors?

2—Has a three-point suspension motor any advantages over any other?

3—Has the automobile made the fastest speed made by any vehicle? What is the fastest mile ever traveled, and by whom?

4—Has an electric car any gears or only one speed?

5—How many revolutions per minute will a 36-inch rear wheel make when the car is going 45 miles per hour?

6—What is the S. A. E. rating of a 6-inch, four-cylinder motor?

7—Is the facing used on the clutch of the 1912 Overland made of leather?

8—Could the 1912 Overland, which has a Kenwood oiler, be changed to have a splash system of lubrication without excessive cost?

Conneaut, O. F. A. WAHL.

—1—None of the cars you mention use rotary-valve motors. The Stearns, Columbia and Moline have the Knight sleeve valves. The Palmer-Singer has no rotary valve. The Speedwell is the only car using a rotary valve engine.

2—Adherents of three-point suspension for the motor believe that hanging the engine on three points prevents strains in the engine base and crankshaft due to twists which occur in the frame due to the unevenness of the roads.

3—The fastest mile ever traveled, of which there is an official record, is Bob Burman's mile in the Blitzen Benz, made at Daytona, Fla., April 24, 1911, at a speed of 141.73 miles per hour. Duray, in the 300-horsepower Fiat, traveled a kilometer at the speed of 142.9 miles per hour at Ostend, December 16, 1913, but the official record was not procured for the European regulations called for the distance being covered in both directions. This is the fastest speed ever made in a motor-propelled vehicle.

4—Electric cars in general do not have a speed change similar to that in the gasoline car. They have a number of speed changes, from three to seven, which are obtained by varying the connections between the battery and the motor and inserting resistances in the motor winding, in exactly the same way as it is accomplished in the electric street car.

5—Four hundred and twenty revolutions per minute.

6—The horsepower is 57.7.

7—Yes.

8—It is not believed that the advantages of the change would pay for the cost.

Questions Concerning Cadillac

Editor THE AUTOMOBILE:—To what extent did the Cadillac experiment with the six-cylinder motor?

2—What was the first car to use the two-speed rear axle, and who uses them today?

3—Who makes the front and rear axles, radiator, body, wheels, rims, and lamps of the Cadillac, and who makes their frame?

4—Does the Cadillac cast its own motors? If not, who does?

5—Does the Cadillac have a magneto?

6—Who was the first company to use a starter?

Washington, N. J. H. R. BROWN.

—1—A recent statement by the Cadillac company shows they have built experimental six motors in various forms and have tested them in every way known to them.

2—The first car in America to equip with a two-speed rear axle is the Austin. This car and the Cadillac are the only cars so equipped at present.

3 and 4—All of the Cadillac parts except the equipment such as rims, lamps and wheels are either made and assembled by the Cadillac company or partly made or assembled elsewhere. The lamps are of Gray & Davis make, the wheels, Schwartz, and the rims, Kelsey-Booth. The motors are made entirely in the Cadillac shops.

5—No. The Delco combined lighting, starting and ignition system is used.

6—The Winton company is given credit for having been the first to regularly equip with a starter, although experimental models were used before this.

Lead Advantageous in Refining Steel

Uniformity of Heat Permits of Same Degree of Hardening at All Spots, Preventing Internal Strains

"Lead, free from sulphur and other chemical impurities, is of great advantage in hardening steel on account of the uniformity of its heat"—A. L. Riker, Chief Engineer of the Locomobile Co. of America

LEAD as used for hardening and heat treating baths, or what is commercially known as refined lead, is free from sulphur and otherwise chemically pure. This is an absolute requirement for, if the lead contained even a small percentage of sulphur it would result in the pitting of the work on account of the affinity of sulphur for iron.

The use of the lead bath for hardening is, on account of the uniformity of heat, of great advantage in hardening according to those who have employed it, because it enables the work to be hardened all over and not in spots; thereby preventing strains in the metal, and by preventing air from coming in contact with the heated pieces, prevents oxidation, which is a common fault with open fire methods.

The lead bath is of marked advantage for the hardening and tempering of small work, and is of special advantage in hardening the ends of tools, etc., where heating the whole piece would be unnecessary and would even in some instances, spoil the work.

From the standpoint of rapidity the oil method is claimed by its users to be three times as efficient as the open fire, but all pieces except small work should be pre-heated before being placed in the lead bath, otherwise rapid heating would tend to cause the metal to crack.

For Steel Above .7 Per Cent. Carbon

The general range of tool steel contains from .7 per cent. to 1.4 per cent. carbon. The lower figure is used for the easily-weldable steels such as are used in drop forging dies, etc. and the upper figure represents the other extreme such as steels for razors and other hard cutting tools. In referring to the heat treatment it will be understood that the high carbon steels are meant, that is, steels which are sufficiently high in carbon composition not to require the addition of any carbon in hardening them and which are therefore known as self-hardening steels.

When a steel of this class is heated to a high temperature and then plunged into a cooling bath, a change in the internal structure of the metal takes place. The steel as a result becomes hard and brittle. The temperature to which it is necessary to heat the steel to get this hardening effect is what is known as the critical temperature of the metal. At or above this temperature an internal change takes place in that the carbon and iron contents of the steel enter into a new relationship with one another and a hard constitutent known as austenite is formed. Austenite is a solid solution of carbon in iron and in it the carbon may be present up to 2 per cent. The nearer the carbon approaches the 2 per cent. limit, the harder the austenite and the harder the steel. When the steel is cooled rapidly, the austenite for all practical purposes is considered to remain unchanged and thus to give the steel its required hardness.

If the steel is cooled slowly the austenite disappears and in its place there results a mechanical mixture of pure iron and a chemical compound of iron and carbon. The result of this disappearance of austenite is a soft steel.

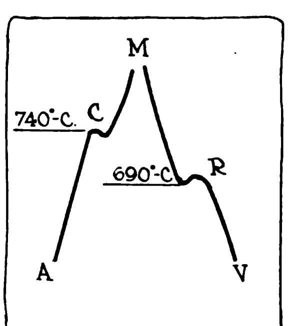
The hardness of steel is thus seen to depend on two factors, first on the amount of carbon there is in it and second upon the rapidity with which it is cooled which determines the amount of austenite actually left unchanged in the steel. If cooling could be instantaneous, then the theoretical result of an unchanged amount of austenite after cooling would be true and the nearer the approach to the instantaneous cooling the less the change in the austenite.

Temperature Rises Regularly

When raw steel is heated uniformly, that is when the amount of heat added is uniform per unit of time the increase in temperature of the steel proceeds regularly up to a certain point in the manner shown in the accompanying illustration. The regular rise in temperature takes place from A to C. At the latter point an absorption of heat takes place which causes a slight fall off in the temperature of the metal. This point which is at about 740 degrees Centigrade with a .9 per cent. carbon steel is known as the calescence point. After this point is passed if the heat is still applied at the same rate the rise in the temperature again becomes steady although not as rapid as at first. The absorption of heat is due to the energy required in forming the austenite. It is therefore necessary in hardening steel to heat it above the point of calescence.

If the steel is allowed to cool regularly, by the abstraction of definite amounts of heat per unit of time the heat will drop uniformly as shown in the curve from M to R and then at a temperature of about 690 degrees Centigrade, a retardation of cooling will be noted, in fact a slight rise in temperature will occur. This point which is known as the recalescence point, is where internal changes which result in the giving out of heat take place. From R to V on the curve the cooling is again uniform.

Should the steel be heated above the calescence point and



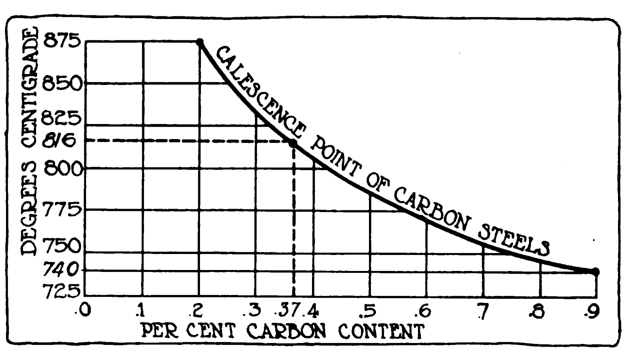


Fig. 1—Left—Rise and fall of temperature of steel heated uniformly. C, calescence point; R, recalescence point. Fig. 2—Right—Approximate curve of calescence points of carbon steels

then the temperature allowed to drop until it had passed below the recalescence point, the characteristics of the steel would not be found to have varied to any extent. The change that takes place at calescence is reversed at the recalescence. If, on the other hand, the steel is cooled suddenly before the temperature has dropped below the point of recalescence, the changes which took place at the point of calescence, notably that of the formation of the austenite, are rendered permanent as far as all practical considerations obtain.

Practical Hardening of Steel

When steel is hardened in a practical way it is necessary to subject it to a temperature somewhat above the calescence point for safety's sake in order that the operator can be sure that the internal changes he desires have taken place. The point of calescence varies with steels of different carbon content and an approximate curve of this carbon variation in steels of from .2 to .9 per cent. carbon is shown in Fig. 2.

After the heating has been completed it must be remembered that the plunge has to be made quickly before the temperature drops below that of recalescence. It must also be remembered that the hardness of the steel will depend on the quickness with which the temperature is brought from above to below the recalescence point. Rapidity is necessary to obtain great hardness and uniformity in cooling rate is necessary to obtain uniformity in hardness.

The rapidity and uniformity of cooling are affected by the following properties of the bath: conductivity, specific heat, density, latent heat of volatization, all of which factors should be high and boiling point, viscosity and initial temperature which should be low. It must be remembered, however that cooling cannot be done too rapidly in many cases on account of the dangers of cracking.

The tempering process which follows the hardening has two primary purposes, the first is to reduce the hardness to the desired point and the second is to remove the internal strains which may have been produced by the sudden chilling of the metal in the hardening work. The tempering process consists of re-heating and then re-cooling but to what temperature the heating is done and at what rate the cooling takes place in securing the desired reduction of austenite depends on the nature of the work and the ideas of the operator.

Lead Best in Hardening

It is in the hardening work that lead meets its best use. It brings the metal above the calescent point quickly, thus saving time. The perfect exclusion of air from the article to be hardened so that no oxidation or burning out of surface carbon can occur is another advantage. The lead bath gives an even heat throughout the article and it is comparatively simple to keep the temperature regulated. The National Lead Co. is making a special lead for this work and guarantees its purity to be 99.9947 per cent. This purity is of the utmost importance or the value of the lead bath is destroyed.

The following is given by the above mentioned company as a typical analysis of refined lead for hardening:

	Per Cent.		Per Cent.
Silver	.0006	Manganese	None
Antimony	.0030	Arsenic	Trace
Tin	None	Sulphur	None
Bismuth	Trace	Phosphorus	None
Copper	.0002		
Cadmium	None	Total impurities	.0053
Iron	.0015	Lead (by difference)	99.9947
Zinc	None		
Nickel and Cobalt	None		100.0000

Good Roads in Egypt Make Demand for Cars

NEW YORK CITY, Aug. 15—The possibilities of Egypt as a motor car market are well set forth in the following extract taken from the *Egyptian Mail* of June 26, 1914:

"Two years ago Egypt was almost as roadless as Albania is today. There were a few roads around Cairo, and you could reach the Pyramids on a first-class macadam road. There were a few other roads to Heliopolis, Zeitoun, and another to Ameadi. Alexandria was worse off.

"It was surprising that motor cars should have any vogue under such conditions, yet there was a good demand for them in Cairo and there always were plenty to be seen in Alexandria.

Last 2 Years' Progress

"The last 2 years have witnessed remarkable changes in Egypt in many respects, but in none more than in the matter of roads. Lord Kitchener saw the need for better roads and was not 6 months in the country before work was being pushed on the road between Cairo and Alexandria. A government department was created exclusively to look after roads, and today there are some hundreds of kilometers of good roads in the Nile delta, along which it is possible to motor in comfort. Every year this road department has been increasing the scope of its activities.

Hard Earth Roads

"The roads are not macadamized, except occasionally in the proximity of big towns, but are made of earth rolled down to form a hard surface. It is not a method calculated to stand heavy traffic, but they are good for speeds from 30 to 40 miles per hour. In one place along the Nile a charming macadamized road has been built, and it is now possible to motor many miles on a macadamized road along the banks of the picturesque Mahmudia Canal.

"This country-wide road activity means an increase in demand for motors, and for a market with widely varying requirements. Cairo and Alexandria will continue to demand cars for town work pure and simple. Most of the best makes of English and French cars are used for this purpose, though it is rare to see anything over 20 horsepower. With native Egyptians the limousine is the most popular type, as it suits the harem better than any other. Open cars preferred range from 12 to 16 horsepower and for this type the demand is greatest. A car of this nature can be used in Cairo and Alexandria as well as anywhere in the provinces. This, too, is the kind of car purchased by the government.

"Then, again, there is a great demand for the small two-seater, the number of bachelors in Egypt being proportionately high amongst the European communities. This class prefer the two-seater.

Want Light Touring Cars

"The motor manufacturer who wishes to push his cars in this country should turn out a strong and light touring car ranging from 12 to 20 horsepower. A car of this kind suitable for the English market with very little alteration, such as the lengthening of springs, a specially large and airy hood and strung rather higher from the ground than an English touring model should do very well."

The Engineering Digest

How to Get a Uniform Light from Lamps with Parabolic Reflectors by Suitable Adjustments

MANUFACTURERS of headlights are expected to provide a combination of light source and reflector which can be adjusted to give a suitable illumination. In some cases a lens forms part of the equipment, but it makes the lamp heavier and costlier and for ordinary traveling purposes the reflector alone will concentrate the light sufficiently without getting undesirable effects in the bargain. The adjustment left to the purchaser of the headlight should be nothing more than moving the light source a little in or out with relation to the focus of the reflector. And in practice nothing more is usually expected of him. But it happens that the best obtainable adjustment, in a case of a poorly designed lamp, is not a satisfactory adjustment, giving rings, streaks or spots of stronger and weaker illumination, trying on the eyes and interfering with sharp discernment of objects. It is the art of the lamp designer to avoid these effects, while getting a maximum of illumination where it is wanted with a minimum of encumbrance and cost.

The principles governing this phase of the headlight subject are explained in a simple manner by Robida and make it clear why, for example, a lamp of moderate power and correctly constructed may give more comfort for night-driving than a more powerful lamp less scientifically designed.

It is the property of a parabolic mirror to reflect all light rays coming from the focus in a direction parallel with its axis, so that all these light rays form a solid cylinder. Thrown upon a screen or wall at right angles with the axis these rays consequently illuminate a circle of the same diameter as the face of the reflector.

When the light source is moved forward, as from the focus F to the point E in Fig. 1, the reflected rays will converge toward a certain point in the axis, and at this point E′ there will thus be produced an image of the light source. If not intercepted on an opaque substance at this point, they cross and continue in space, forming a light cone which appears to come from the location of E′.

In reality it is not strictly accurate that all the rays converge to exactly the same point in the axis, but they do converge to a very short line, forming part of the axis, and this small inaccuracy can be neglected, as it remains true that a lamp with its light source in front of the focus causes the rays to converge almost to a point where an image almost as brilliant as the light source itself is produced, and every grain of dust, every insect and every globule of vapor, in the case of a mist, which passes by this point is illuminated in a violent and disconcerting manner. If the point of convergence is far enough ahead — the light source being close to the focus, yet ahead of it—the image of the light may even be reflected back into the eyes of the driver from any brilliant object, such as some part of an automobile coming in the opposite direction, and the glare may blind him.

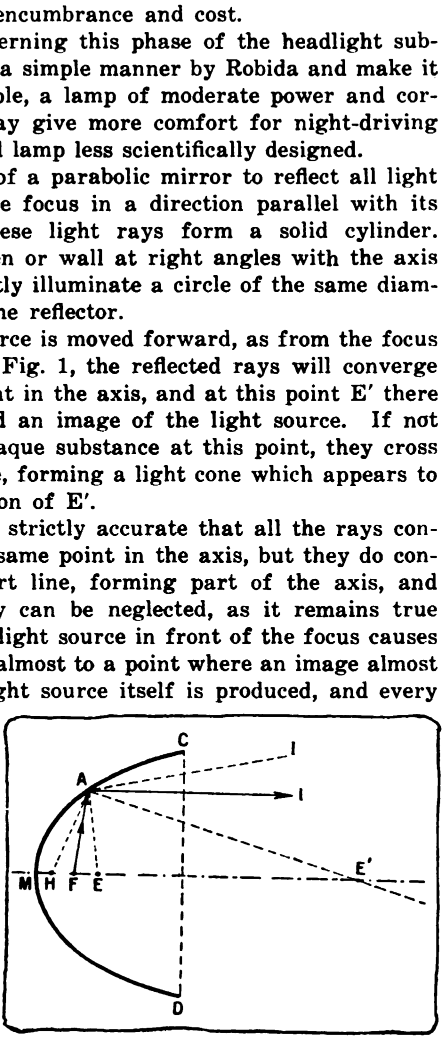


Fig. 1—Showing theory of parabolic reflector

The first principle for the design of a headlight, in which only the action of a reflector is depended upon for the desired light effects, is therefore that the light sources must be placed behind the focus of the parabola, as at H in Fig. 1. The reflected rays will then always diverge from the axis, like the line AI, being the reflection of the ray HA, and no image of the light source will be formed in front of the lamp.

The light sources which can be used in practice are not concentrated at a mathematical point, however, and for this reason some complications arise. In fact the filaments in incandescent lamps, whether they are shaped as coils, spirals or in zig-zag formation, have rather large dimensions, compared with the distance of the parabolic focus from the nearest point of the mirror. Fig. 2 illustrates the irregularities arising from this cause.

KH is the filament which is placed slightly behind the focus F. From each point of the filament rays issue which are reflected in the form of a cone, and the cones formed from points near K are more irregular than those formed from points nearer the axis of the mirror. In combination all the cones formed from individual points of the light source constitute a cone more irregular than any one of them, and the angle of divergence of this light cone issuing from the lamp as a whole depends upon the two factors: (1) the divergence of each elementary cone and (2) the divergence of the elementary cones among themselves. The latter element depends solely upon the size and shape of the light source, and cannot therefore be reduced below a certain practical minimum in each case.

Attempting a Searchlight Effect

If now it is considered desirable to obtain a light cone which does not spread much and, with this end in view, one makes arrangement to have the divergence of the elementary cones smaller than the divergence which can be realized for the light cone in its totality—as may be done by placing the light source very close to the focus, behind it—the elementary cones become separated at a certain distance ahead where the boundary lines of the slightly divergent elementary cones cross the more divergent boundary lines of the cones sent out from those points of the light source which are removed from the axis. If all the light is caught on a white wall there is in fact noticed upon the latter a large distorted image of the light source represented in the variations of light values on different portions of the wall, and in practice this discontinuity of the illumination at a certain distance ahead of the car shortens the actual reach of the headlight by creating confusion.

To avoid this effect it is necessary to place the light source so far back of the focus that the divergence of the light from any one point covers the divergence due to distance from the axis of some portions of the light source. The method of proceeding to obtain a suitable adjustment of a lamp which is designed well enough to admit of such an adjustment being made (that is, in which the dimensions of the light source and those of the reflector, as well as the angle of the parabola are so selected as to admit of the desired results), may be outlined as follows:

It is best to light the headlight in the daytime so as to avoid fatiguing the eyes. The lamp is then moved forward or backward until by looking into the reflector at a distance of several yards the whole face of it seems to be one mass of light. The filament is then very close to the focus, and no image of the light source is visible. If the filament is moved from this position well toward the back of the reflector, an actual image is soon seen to form far back of the mirror, apparently, and the latter no longer seems uniformly lighted.

Method of Adjusting

With the filament close to the focus the light is now projected upon a white wall. A more or less irregular illuminated spot is seen. The science of lamp makers consists largely in making the irregularities in the distribution of light over this area as inconspicuous as possible by the means before mentioned. Still they will be noticed to some degree with the adjustment as stated.

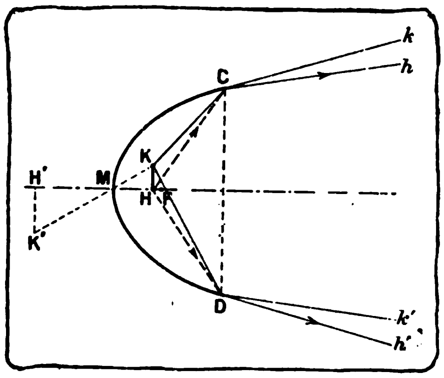


Fig. 2—Showing conflict of light rays from filament HK of relatively large dimensions. H' K' its magnified image.

But if the filament is moved backward a little—not as far back as to cause an image of the filament to be seen apparently at a distance behind the mirror, as before referred to—the irregularities on the wall disappear gradually and the light becomes more and more uniformly distributed. At first the illuminated area barely increases in size by this adjustment, because the elementary light cones are less divergent individually than in their relations to one another, but when the filament reaches a certain point in this backward movement of it, the divergence of the rays from each point in the light source finally becomes as great as the divergence due to the size of the filament, and from that moment, if the backward movement were continued the illuminated spot on the wall would grow rapidly in area while the light value at any one point of it would diminish. At this position the adjustment should therefore be stopped.

This is not the mode of adjustment giving the greatest penetration along the axis of the reflector, as the light cone is made divergent on purpose, but it gives the greatest regularity of the light throughout the area which receives light at all. And this is the preferable system, because it permits one to see objects at both sides of the road, puts less strain upon the automatic adjustment of the eyes to different degrees of illumination, enables one to discover more readily a vehicle coming out from a side road and makes it easier to pass by vehicles coming from the opposite direction.

If an adjustment such as described leads to a spread of the light which is really too great it is usually better to choose a smaller incandescent filament than to concentrate the light by a different adjustment. Both methods will give a less divergent cone of light, but the weaker lamp will give more acceptable results if the light from it is more uniform by reason of being more suitable for the shape and dimensions of the reflector.—From *Omnia*, July 23. (Author neglects the effect of using two headlights.—ED.)

New Type of Automatic Carbureter Easily Adjusted

IT MAY be doubtful if the carbureter represented in three sectional views in Fig. 3 is fully equal in its present form—especially with regard to its responsiveness to acceleration and retardation and in fuel economy—to the many excellent carbureters produced lately in all of the four principal countries of the automobile industry, Germany, France, England and the United States, but it is different from any other and may suggest new ideas along the line of progress.

The sections are taken along the planes AA, BB and CC. Owing to the peculiar, spiral shape of the air channel, the device has been called the *Turbinen-Vergaser*, or turbine carbureter. This shape and the lateral entrance for the additional air are supposed to contribute to the formation of a uniform gas mixture. The level of the fuel, which is indicated by a dotted line, is only very slightly below the mouth of the two jets *b* and *f*, and these are at the same level as the lower edge of the throttle valve. The small jet *f* is closed by means of a ball *a* unless the throttle is almost closed, when a small pin *c* upon the edge of the valve pushes the ball to one side and releases the flow of fuel through *f*. The air needed for starting and still-running is adduced through the opening *m*. When the throttle is opened more, *f* is obstructed by the ball going back into the position in which it is held more and more accurately over the mouth of *f*, until the pin upon the valve finally is withdrawn completely and allows the ball to shut *f* entirely. "With increasing motor speed the main jet *b* now begins at once to work," says the German describer at this point, falling into the common error of neglecting to state how the motor reaches the increased speed by the action of the throttle valve upon the carbureter. It is not plain that the acceleration is in fact accomplished by any other means than ceasing to obstruct the air passage and relying upon the motor speed to be kept up by the momentum of the flywheel and of the vehicle until the larger flow of air has taken effect upon the main jet—which is the method now largely discarded as precarious in other modern carbureters, giving fitful and unreliable accelerations. The describer says however that there is created at once "by the increasing motor speed" a correspondingly increased suction by which the hinged cover *h*, which is held down over the air port by means of a weight which can be secured at different points upon a lever arm, is raised and admits a current of air to enter transversely of the fuel current from jet *b*. The system of an adjustable weight to hold the airhole cover down lends itself to a facile regulation of the gas mixture

The sectional view along the plane BB, to the right in Fig. 3, shows the adjustment screws by which the amount of fuel passing through the two jets may be regulated. The channels through the jets are large, so as to be adaptable to different motor sizes by this adjustment only. Jet *b* has a lateral bore to the air current.—*Der Motorwagen*, July 20.

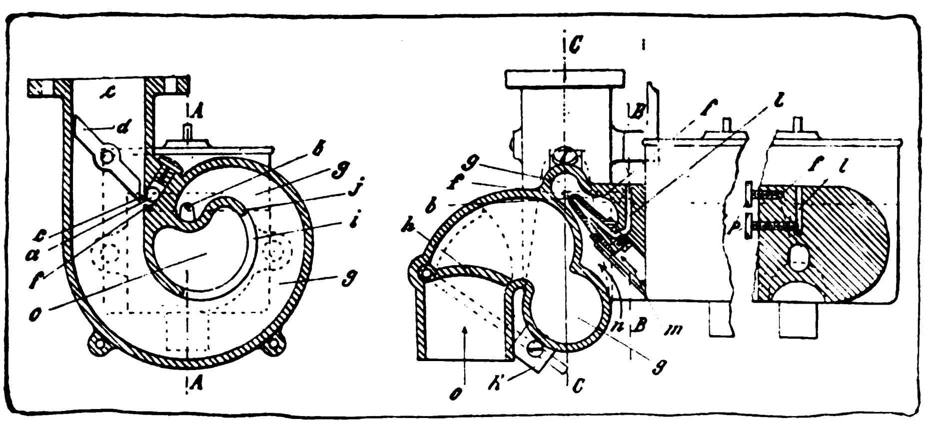


Fig. 3—Three sectional views of "turbine" carbureter; h' the adjustable weight

New Rotary Motor Has Axial Cylinders

Macomber Air-Cooled Rotary Motor Simple and Free from Vibration—Manifold Used as Muffler—Built for Cyclecars and Large Cars

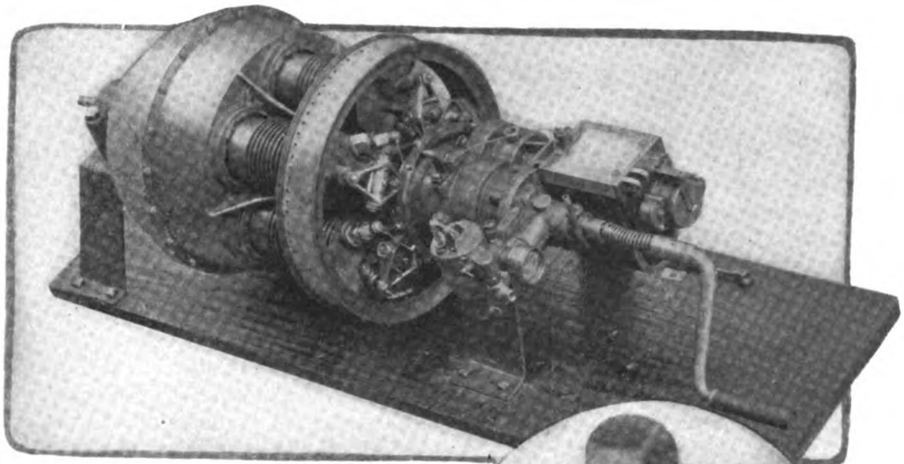


Fig. 2—Macomber motor, showing arrangement of cylinders and valve mechanism. Note ring type, exhaust manifold with holes to expel the burnt gases

Fig. 3—The cyclecar motor

CONOMY, simplicity and freedom from vibration are the salient features of a new air-cooled, rotary motor, Figs. 1, 2 and 3, manufactured by the Macomber Motors Co., Los Angeles, Cal. This motor differs from the ordinary construction in that it has its cylinders arranged parallel to the axis of rotation instead of radially. It is built in five and six-cylinder sizes, the former being an 11-horsepower design for cyclecars and the latter a 50-horsepower machine for larger cars. The two designs are practically identical except in size and, therefore, only the smaller one will be described in detail.

Referring to Fig. 1, it will be noted that the part of the mechanism that remains stationary is blacked in. No crankshaft is employed, but the connecting-rods are attached to a plate that is set at an angle of about 25 degrees to the axis of the crankshaft. The connecting-rods are fastened to this plate by means of ball and socket joints and similar joints connect them to the pistons.

Reciprocation of the pistons is accomplished by the rotation of this plate. When the motor is running this plate is carried around with the cylinders and any given point on it moves the length of the stroke in one-half a revolution.

Overhead Valves Employed

Overhead valves are used, the intake valves being on the inside and taking the charge from a centrally located manifold. The exhaust gases pass directly from the valves to a circular exhaust header, Fig. 2, the outer circumference of which has a series of small holes from which the gas makes its way to the atmosphere.

A single rocker serves to operate the intake and exhaust valves to each cylinder; this is distinctly shown in Fig. 2. It will also be noted that the rocker arms are a heavy yoked construction.

A camshaft is not used, the valves being opened and closed by the movement of the inner ends of the rocker arms in a cam-like groove. The rocker ends are provided with rollers to reduce wear. Rocking one of the arms in one direction opens the intake valve and in the other the exhaust valve.

The starting crank is attached to the valve end of the motor. The carbureter is situated at one side and the magneto at the other.

The oiling is by a combination splash and circulating system. Gravity carries the oil from an automatic oiler on

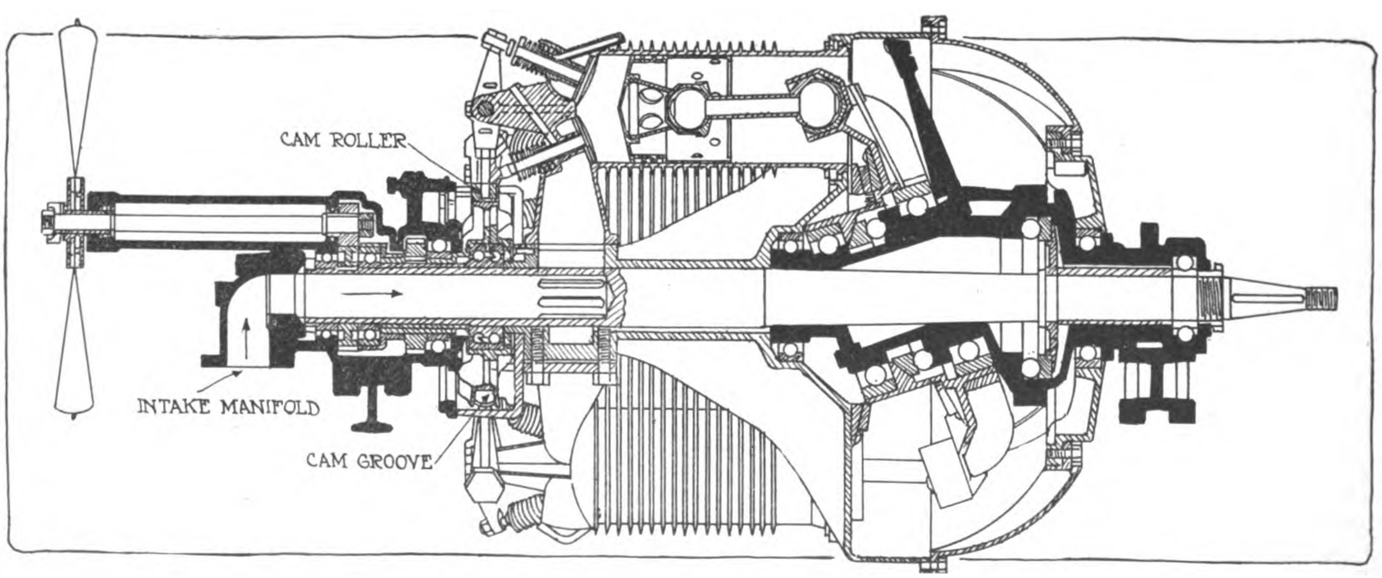


Fig. 1—The black portion indicates the stationary part of the mechanism. The intake is in the center

the outside of the motor to the center and centrifugal force throws it around the interior.

The large motor has six cylinders, 4.25 by 5.5 inches, and has a maximum speed of 1,500 revolutions per minute. The valves have a diameter of 2 1-16 inch and a lift of 5-16, and are made of nickel steel. The valve timing is as follows: Intake opens 10 degrees after upper dead center and closes 20 degrees after the end of the stroke; exhaust valve opens 45 degrees before lower dead center and closes 5 degrees after upper dead center.

On the 11-horsepower motor the bore is 2.375 inches and the stroke 3 inches. The diameter over all is 12 inches, and the length 24 inches.

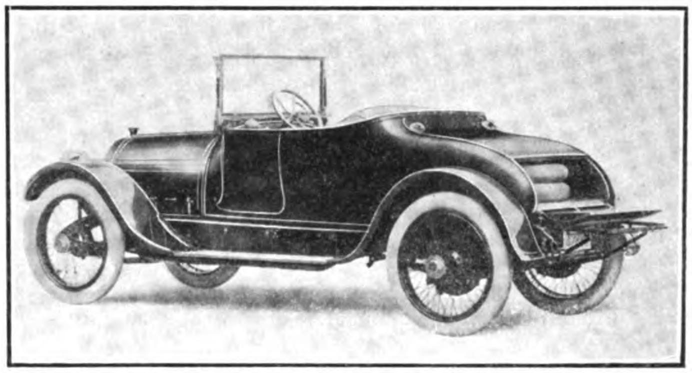
It is stated that these motors are remarkably free from vibration and that the economy is high, the smaller motor being capable of driving a machine over 60 miles on a gallon of gasoline, while the larger one will do 30.

Worthy of special note is the fact that while the ordinary motor with radial cylinders suffers from over-lubrication due to the oil being forced up into the combustion chamber by centrifugal force, this motor by the parallel arrangement of its cylinders has no such difficulty.

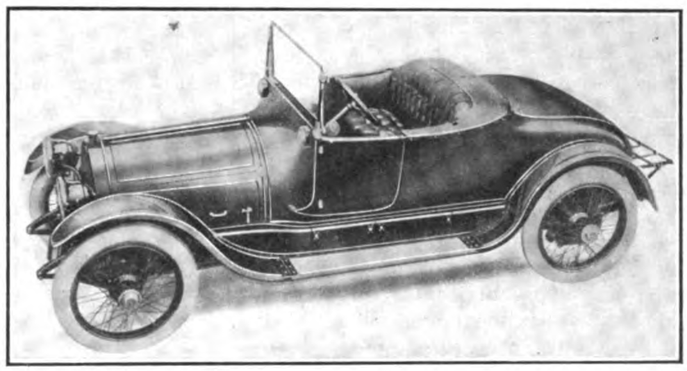
1915 Stevens Runabout Has Disappearing Top

New Cars Appear in One Model—Slight Power Increase—Cars Characterized by Graceful Bodies—Spare Tires Concealed on Runabout

STEVENS-DURYEA cars for 1915 follow very closely the general lines of the present product, although designated by only one model number, there are really two chassis, and in both of these there has been an increase of 1-16 inch in bore of the engine, so that the engine on the roadster chassis is now 4 3-8 by 5 1-2, and that on the touring chassis is 4 7-16 by 5 1-2. The roadster wheelbase is 131 inches and the touring wheelbase 138 inches, which is the same as that of the 1914 product. In other respects the chassis are the same as that of the earlier models, except that left drive is employed instead of the right drive, and that electric starting is fitted as stock equipment. The feature of the new line is a new roadster, which is arranged so that the top disappears completely inside of the body. The neat, attractive appearance resulting may be seen in the lower illustration at the right of the page.



Three-quarter rear view of new Stevens-Duryea runabout with disappearing top and compartment at the rear for spare tires



View of new Stevens runabout showing the method of covering the opening into which the top disappears

Disappearing Top

Continuous streamlines, characteristic of Stevens-Duryea bodies, have been carried out in this new type, the deck sloping gracefully from the back of the seat and rounded at the rear. The gasoline tank is entirely inclosed, and provision also is made for carrying two tires mounted on rims, or one wire wheel mounted and extra tire, under the deck, completely inclosed and out of view. The top is supported by mechanical means by neat but rigid joints, which cause it always to follow a certain path in folding into and being withdrawn from the body; it is self-supporting and when up requires no braces of any kind, being rigidly fastened to the windshield supports in the same manner as in the Stevens-Duryea touring cars. When the top is folded the concealing compartment is completely covered by the upholstery. The opening is also covered by the upholstery when the top is in use, thus making a neat, finished appearance, in either position, as well as affording full protection to the top from dust and dirt when concealed.

New Auxiliary Seat

A new type of auxiliary seat is employed in the seven-passenger touring cars. Each seat has one upholstered arm on the inner side, the upholstered arm rail providing a rest on the outer side. The construction allows for folding backwards and sidewise against the side of the tonneau, or when in this position can be tipped forward in front of the entrance, thus removing these extra seats entirely out of the way of passengers occupying the rear seat and obscuring them from view of those outside of the car.

In addition to the complete line of open and inclosed cars as marketed by the Stevens-Duryea company during the season of 1914, the company is offering a seven-passenger landaulet, built on 139-inch wheelbase chassis.

In the electric ignition system the Stevens-Duryea company has retained the two independent Bosch high-tension magneto and battery systems of ignition with synchronous coil, high-tension timer distributer and instrument-board switch. Two sets of spark plugs are furnished which, with the independent systems of ignition, eliminate chances of trouble in this connection.

Unit Power Plant Continued

Stevens-Duryea unit power plant, suspended at three points, continues to be a feature of these cars as it has been for many years. The disk clutch, progressive three-speed gearset, floating axle and 37 by 4 1-2-inch tires are continued.

M. A. M. Has Efficient Traffic Dept.

Audits and Corrects Freight Bills of Members, Saving Material Sums—Consults with Shippers and Railroad Representatives

By Alfred P. Sloan, Jr.,

Secretary and Assistant Manager

A FEW years ago, realizing the large amount of unnecessary drain upon manufacturers—a drain that was going into the coffers of railroads, not because of dishonest intent, but rather due to existing conditions—a traffic service was inaugurated by the Motor and Accessory Manufacturers Assn., which numbers in its membership 262 of the leading American makers of automobile parts and accessories and represents a combined capital of $440,000,000. Since that time this department has been developed to a really remarkable degree of efficiency, and through its co-operative workings thousands of dollars have been saved for members of the association who have made use of this department. Indeed, many of the members have found that the amount of refunds from railroads on incorrect freight bills, after having been audited and claims registered by the Traffic Department, have more than paid for the annual fee for membership in the association. When one stops to consider that one member recovered the sum of $870.72 on his claims of a few months, it will be seen at once that the above statement is not exaggeration.

Auditing Freight Bills

The matter of auditing freight bills, while an essential one, is only one of the important branches of the work of the Traffic Department. Any member of the association may send all of his freight bills to the department regardless of the number of bills or the amounts involved, and each separate shipment will be carefully checked by the experts employed by the department to ascertain if the road or steamboat line has made an overcharge. The law requires that the correct published rate be applied on all shipments even though railroads have by error quoted other figures. Naturally in the course of the really intricate matter of routing shipments from point to point over several different roads, the human equation enters into the case. No matter how experienced the one in charge of the shipping department may be, his knowledge of freight rates is bound to be limited and certainly the knowledge obtained in a cooperative way by the Traffic Department through having handled to date more than 100,000 freight bills, dealing with every section of the country, is superior to any one man's knowledge.

Some idea of the scope of the work of this department and how it is appreciated by members is made evident by a few comparative statistics. The first year it was in operation, 1911-1912, there were forty-three members who made use of the department. During the fiscal year July 1st, 1913, to June 30, 1914, the department was used by 136 members a total of 803 times. During that period 51,690 freight bills were audited. Out of the number of freight bills audited a very material percentage were found in error and warranting traffic claims being entered. Incidentally, it may be mentioned that the Traffic Department enters these claims with the railroads and upon collection turns the amount over to the members. Recognition of the value of Traffic Department is shown by the fact that in the year 1913 there was an increase of more than 60 per cent. over 1912 in the number of times the department was used by members, and the number of claims was exactly doubled.

Checking results from a dollars-and-cents standpoint, the total amount of claims entered the past year was $2,973.13, and with thirty-three members involved meant an average refund of $90, just $40 more than the annual membership fee. Of the above-mentioned sum of $2,973.13 for claims entered up to the close of the fiscal year, $2,230.82 of this amount had been paid, which figures demonstrate the fact that claims entered by the Traffic Department are not mere idle claims, but result in material return.

The Traffic Department of the Motor and Accessory Manufacturers is under the direct supervision of J. S. Marvin, who is general Traffic Manager of the National Automobile Chamber of Commerce and is unquestionably one of the best informed men in his line in the country.

Consulting on Shippers' Rights

But aside from the auditing of freight bills the most important feature of the department of far-reaching benefit, one which is not explainable in dollars and cents, is the matter of consultation on shippers' rights in traffic matters of any character. If a member wishes to be advised how his particular article or commodity should be packed, described or billed to secure the benefit of the lowest transportation charge, he can secure information resulting in great saving and this saving is impossible to estimate. Such entries may result in the department securing a reclassification of the article in event that there appears to be an opportunity, and here again an immense saving for the manufacturer results. The extent of this branch of the work is indicated by the fact that during the past year 3,500 bulletins dealing with fifty-two subjects relating to the Traffic Department have been issued to members, while the previous year nearly 6,000 bulletins dealt with sixty-eight subjects. These related to specific subjects or points involved in shipping, and although it has been shown in a general way from the start how members may use the department, it has taken time for members to realize the cooperative service that can be rendered. Bulletins show the actual occurrences, rulings and points decided.

In Touch with Railroads

At all the meetings of the various railroad rate-making committees the Traffic Department is represented and is advised in advance of the subjects to be considered at these meetings. To illustrate: among the items recently considered by railroads regarding which the department has been able to render assistance, are automobile engine and gear parts, radiators, speed indicators and attachments, bodies, ball bearings, horns, tires, lubricators, grease cups, mufflers, camshafts, etc. If ratings or shipping requirements are to be taken up, the manufacturers of the machines or parts involved can be informed and their interests represented. Changes made in the published rate tariffs and classifications which affect transportation charges are kept before the membership so that the shipping departments of the factories may take advantage of the most favorable rates.

Ruetschi Gearset Keeps Perpetual Mesh

Employs Combination of Planetary and Sliding Principles—Impossible To Clash Gears

A THREE-SPEED gearbox designed to furnish non-clashing changes to any speed has been brought out by the Motor Engineering Co., Cleveland, O. It secures the direct driving features through a combination of the planetary and sliding gearset principles. The advantages claimed for this system of gearing, which is the invention of Arnold Ruetschi, of Cleveland, is that it is impossible to clash the gears when changing from one speed to another and no gear changing is necessary on a hill because the gear can be selected before it is needed and when it is required a movement of the foot in depressing or releasing the clutch pedal throws the desired gear into operation.

Has Two Principal Elements

A sectional view of the gearbox is given in the accompanying illustration. As the gearbox stands it is in neutral position, and as will be seen is composed of two principal elements; namely, the gearbox proper which is bolted to the engine crankcase as in any unit system, and the rotating housing which carries two countershafts one of which is shown in the sectional illustration. In the drawing the exterior housing is denoted by A, the rotating housing by D and the countershaft C.

When in high speed the rotating housing B rotates solidly with the entire drive giving the direct high speed, but in first and second speeds and reverse this movable housing is stationary. The method of locking the housing against revolving is by means of the clutch D. When this engages with the solid anchored frame A, it is incapable of revolving. On the other hand, when the clutch is engaged with the motor member it is rotated by the motor and revolves as a unit.

Casing Revolves as Unit

In high, low and reverse speeds the gear clutch E is in mesh with the internal gear F, and in intermediate speed the gear clutch E is in mesh with the internal gear G. High speed may be also attained with the gear clutch E in mesh with G because the entire revolving casing is moving as a unit and the position of E is immaterial.

Tracing the drive through the gearbox, it will be seen that on high speed it is transmitted to the clutch member D, which is free of the anchored member A, passing through the solid casing B and thence to the rear axle. That is, the entire gearbox moves as a solid part of the shaft and there is no motion in the gears and countershafts.

When in intermediate speed the drive passes through the main shaft H and thence by means of the shaft clutch E to the gear G. This in turn meshes with the gear J on the countershaft C, giving a planetary motion to the gear on the countershaft which follows around carrying with it the rotating housing which transmits the drive.

During this time the clutch D has been moved backward into engagement with the stationary clutch on the housing A which brings the rotating gear case to rest. The low speed is then secured through the two countershafts, C. After bringing the gearcase to rest the drive is no longer planetary but becomes the same as in the sliding gear transmission. This gives only a straight torsion on the driven shaft.

To change from intermediate to high speed the clutch pedal which controls the clutch D is released and the clutch is brought into engagement with the flywheel member, thus locking the whole unit together, giving high speed.

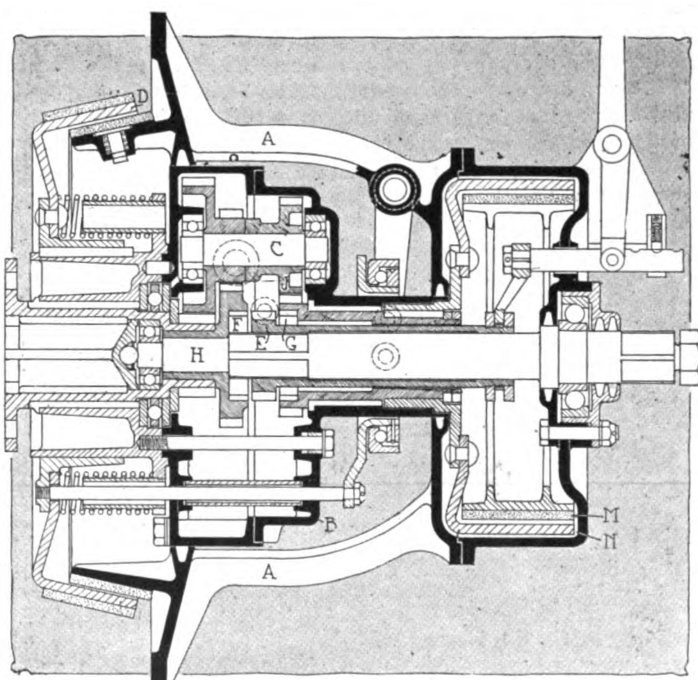
Reverse is obtained by having clutch D in neutral position and applying the brake M on the drum N which brings to rest the idler gear G. The countershafts C then revolve backwards with a planetary motion, carrying the idler gear F along with them at a reduction given by the gear ratio.

When traveling along on high speed if it is desired to be ready to shift into second it is only necessary to mesh the gear E with G and leave it in that position until ready to make the change. Then, no matter at what speed the car is traveling, the change can be made by simply depressing the clutch pedal which will lock the rotative housing, bringing it gradually to rest with a smooth cone clutch action. As soon as the housing has become secured owing to the pressure on the clutch the second speed comes into the action. In this manner there is no meshing of revolving gears as the gears are set before the change is made. The same principle is involved in using the low speed except that the gear E is meshed with F instead of G.

Ball Bearings Used

Entire gearbox is carried on ball bearings and weighs for a 12-18 horsepower unit complete with pedals, clutches, levers and brake, 50 pounds. The gear ratio supplied on low speed to the gearbox alone is 4 to 1. On the second speed 2.25 to 1, and on direct drive with all gears locked it is 1 to 1. The reverse ratio is 3.8 to 1. The gearbox is applicable to any size of car and is claimed to be of particular advantage to trucks where a large amount of shifting can be done without clashing the gears.

By the liberal use of aluminum the gearcase can be made of exceptionally light construction. It is exceedingly flexible and if desired reverse could be thrown in while the car is traveling ahead at high speed.



Section through the Ruetschi gearbox. The drive is taken either through the clutch at D, which in turn rotates the casing B and transmits the drive solidly to the rear axle, or the drive is taken through the gears F, E or G with the clutch D held firmly by engagement wtih the solid member A. The advantage claimed for this system of gearing is that it is impossible to clash the gears when changing from one speed to another and that no gear changing is necessary on a hill because the gear can be selected before it is needed and then brought into use by pressure on the clutch pedal

1915 Hupmobile Has Left Drive

Car Is Entirely Re-Designed—Wheelbase 13 Inches Longer—Motor Is Larger—Streamline Body

UNDER the name of Model K the Hupp Motor Car Co., of Detroit, Mich., has brought out an entirely re-designed car for the 1915 season. It is a larger and more powerful car than the Hupmobile of last year and there is hardly a feature throughout its construction that is unaltered.

Left Drive and Center Control

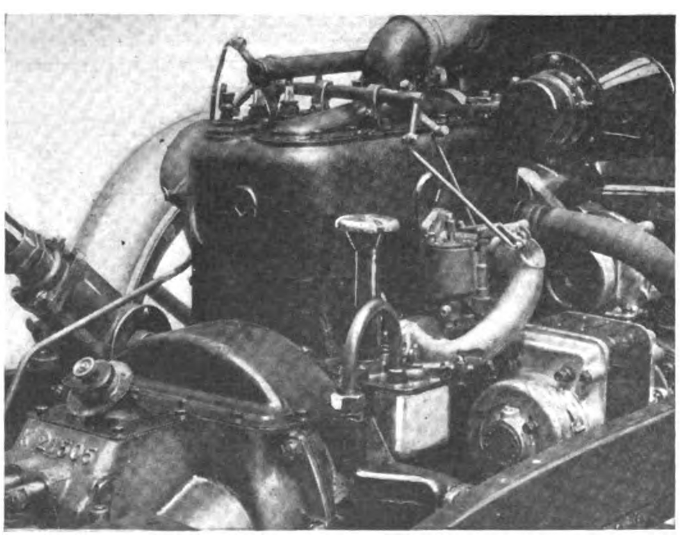
To take care of the larger power plant and bigger body the wheelbase has been changed from 106 inches to 119 inches, and in making this chassis change several features that were formerly peculiar to Hupp practice have been radically reconstructed. Left drive with center control is one of these innovations and another which marks a difference between the car of today and the previous ones of Hupp design is the use of semi-elliptic underslung rear springs in place of the former cross rear springs. In changing the suspension the entire framework of the chassis is new and this in turn has been the cause of alterations in the linkages, brakes and control members.

Some Hupmobile Refinements

Larger Body of Streamline Type	Horizontal Type Carbureter
Wheelbase Increased Thirteen Inches	Hexagonal Cell Radiator
Left Drive with Center Control	Motor Bore Increased 1-8-inch
Semi-Elliptic Springs in Rear	Automatic Spark Advance System
Single Unit Electrical System	Unusually Complete Equipment

Three-quarter front view of 1915 Hupmobile roadster

While many of the fundamental features of the motor design remain the same, the bore has been increased 1-8 inch. The water jackets are larger and the valve diameters have been increased. The connecting-rods are longer, all the bearings larger, with wider ports and an entire change in the manifold design. The carbureting system is also new in that it now preheats the air by means of exhaust heat. While the Zenith carbureter is still employed, it is now the horizontal type instead of the vertical and is now a 1.25-inch size in place of the 1-inch formerly used.



Right rear of Hupmobile motor, showing Westinghouse single unit lighting and starting equipment and also new Zenith carbureter. Note linkage over cylinders for flap air valve on carbureter

Single Unit Electrical System

The electrical equipment of the car has also been entirely re-designed. As in its predecessor, the new car employs the Westinghouse electric lighting and starting system, but instead of using the double unit system the cranking motor and the lighting generator are now combined into a single unit. Instead of using magneto ignition, an Atwater Kent distributer driven from a vertical shaft and supplied with automatic advance has been fitted. With the application of the new distributer many other exterior fittings of the motor have been altered. There is a new fan bracket which maintains a continuous tension on the fan belt by means of a coil spring.

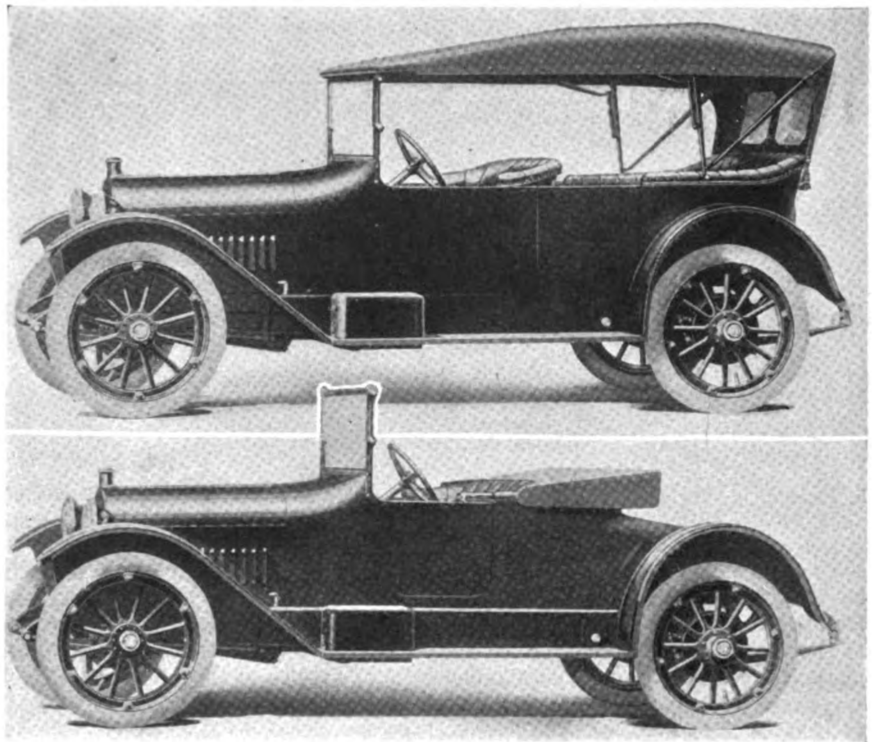
Gearbox Is More Accessible

In rearranging the motor, the drive of the camshaft has been moved from the rear to the forward end. The oil filler has been moved back to accommodate the new position of the carbureter and, while the oiling system itself has not been altered so far as the motor is concerned, it no longer takes care of the gearbox. The object has been to rearrange it so that heavier oil can be employed for a gear lubricant. Instead of the gearbox being a unit with the crankcase it is now bolted on separately, making a more accessible job as far as reaching the gears in the gearbox is concerned. Large cover plates are now placed over the gearbox and clutch housing and the oil filler opening projects through the floorboards of the car so that the driver may refill the gearbox without lifting these boards, but by merely picking up the cover of the floorboards.

The clutch is the same in principle as in the last model, but has been turned completely around, the purpose being to put the thrust drag on the gearbox rather than on the motor when slipping the clutch. The diameter of the clutch remains the same at 13 inches but the number of plates in the clutch has been increased by four. There are now thirteen. Just back of the clutch there is a new chassis frame member extending transversely, which acts as a stiffener and which carries the pedal shaft for the brakes and clutch.

Two Universals Instead of One

While the shaft system of drive is practically the same, there are now two universal joints, one at either end of the shaft, whereas in a former model there was but one. The rear universal which has been added is a cross type. The propeller shaft is now tubular and the lubricant from the forward universal is allowed to run back through the hollow shaft to the rear universal. There are now no radius rods or torque members, both the drive and torque being taken through the new springs.



Above—1915 Hupmobile touring car. Note absence of side lights. Note also one-man top and ventilating windshield. Lower—New Hupmobile roadster showing streamline design. Note underslung semi-elliptic rear springs

The entire rear axle is new. In former Hupp cars when it was desired to reach the differential it was necessary to remove the bolts from the vertically split housing and to take the entire housing apart. There is now an exceptionally large circular cover plate which when removed exposes the entire differential and drive mechanism. The ratio of the final drive has also been altered and is now 4.25 to 1. The front axle is also entirely new and is now the Elliot type with a knuckle which is designed to give a castor effect to the front wheels.

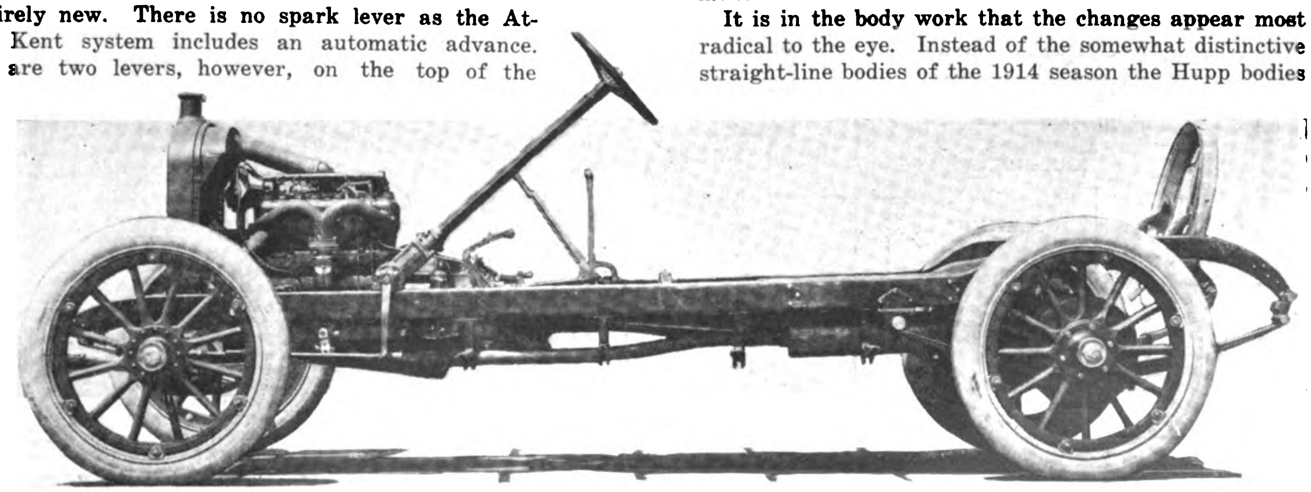
In altering the spring design an exceptional amount of attention has been given to the placing of grease cups on all spring connections. There is also an inter-leaf oiling scheme which is new. In the extremity of each leaf there is a spoon-shaped depression which is packed with graphite. This scheme has been originated by the Detroit Steel Products Co. and by its use the lubricant need be inserted between the spring leaves but once in a season.

The same steering gear is used as in the previous model but the steering wheel is now 18 inches, whereas it was formerly 17 inches. The arrangement of levers on the top of the steering wheel and the linkage in transmitting the motion to the throttle and air control of the carbureter is entirely new. There is no spark lever as the Atwater Kent system includes an automatic advance. There are two levers, however, on the top of the steering post. One of these is the ordinary hand throttle lever and the other operates in conjunction with a flap air valve on the new Zenith carbureter. When moved over in one direction it cuts off the entire air supply of the carbureter, furnishing the rich mixture required for easy starting. When moved to the other extremity it opens to the outside air, permitting of extra air for high-speed work.

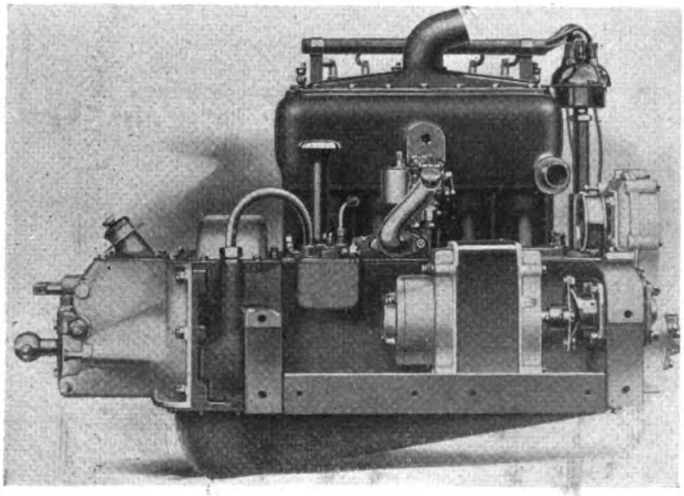
The wheels are larger than they were last year. The tires are now 34 by 4 inches, whereas on the preceding model they were 33 by 4. The tire carriers are the same on the touring car, but on the roadster they are now carried under the rear deck.

Various little details increasing the comfort in the operation of the car have been made a subject of study. An example of this is in the pedals, which are now adjustable and which are provided with exceptionally large foot pads. There is now also a side support for the foot in operating the accelerator pedal. Owing to the reversal of the clutch the pedal operation is fully 50 per cent. easier than it was in the former model.

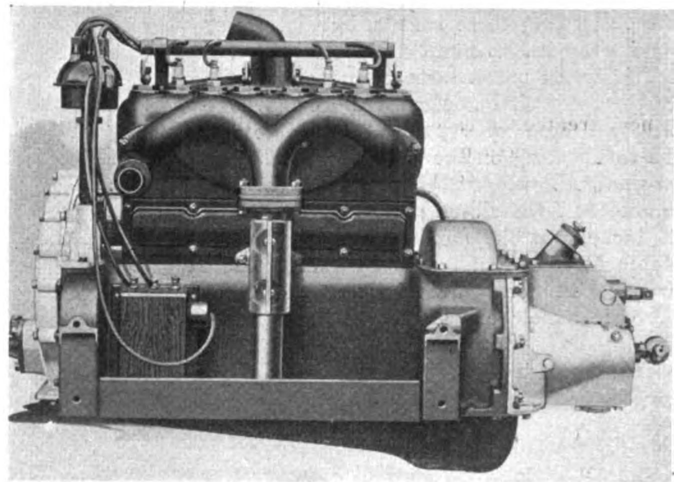
It is in the body work that the changes appear most radical to the eye. Instead of the somewhat distinctive straight-line bodies of the 1914 season the Hupp bodies



Side elevation of 1915 Hupmobile chassis, showing left drive and center control, and also new tire carrier at rear



Intake side of 1915 Hupmobile motor. Note mounting of Westinghouse unit and horizontal type Zenith carbureter



Exhaust side of new Hupmobile motor, showing mounting of Atwater Kent system with automatic advance

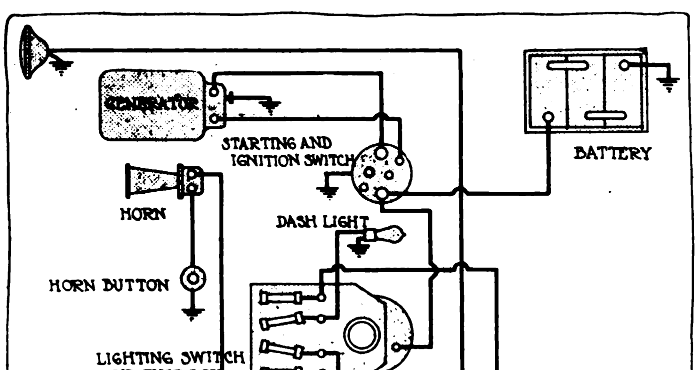
are now a full molded streamline construction. The sloping hood and cowl form a continuous curve which is not terminated at any point on the body but which is swept directly to the rear end of the car. A new radiator which makes a more fitting entrance of the streamline form and which at the same time gives a gain in capacity of 2.5 gallons, by the use of hexagonal in place of square cells, has been fitted.

Two standard types of body will be furnished, the roadster and touring car. The price of each is $1,200, fully equipped. The standard colors are blue-black bodies with maroon running gear and nickel trimmed. The cars come fully equipped with a new design of one man top, and a new type of rain vision windshield.

Motor Is More Powerful

The power plant of the Hupmobile is a four-cylinder, 3.375 by 5.5-inch motor, with the cylinders cast in a single block. The increase in piston displacement on this new motor has been from 182.5 cubic inches to 196.8. The cylinders are still offset .625 inch. This motor has a compression of 75 pounds gauge. Pistons are gray iron and carry three diagonally split rings. The piston pins are of steel hardened and ground and clamped in the connecting rods, turning in the bearings formed by the piston bosses. The bearing surface provided here is .875 inch in diameter and .175 inch in length. The piston pins are hollow.

Connecting-rods are drop forged, heat-treated, acid open-hearth steel. The bearing caps are fastened by 4.375-inch nickel-steel bolts, secured by cotter pins. The crankshaft is a 40-50 carbon open-hearth steel. All the bearing surfaces are ground and the three bearings are of generous length.



Wiring diagram of the electrical system on the 1915 Hupmobile

The front bearing is 2.5 inches long and 1 9-16-inch diameter, the center bearing 2 inches long by 1.625 inches diameter and the rear 3 inches long by 1 11-16 inches diameter. All the crankshaft bearings carry phosphor bronze bushings lined with babbitt, machined and reamed in place with a final hand fitting. The bearing bushings are split and can be adjusted by removing the pan on the bottom of the crankcase. The crankcase is a modified barrel type.

Adjustable Silent Chain

The camshaft is driven by Coventry silent chain at the front end of the motor. It can be adjusted for tension without removing the chain cover. The camshaft is also carried on three phosphor bronze bearings, the front bearing being 2 1-16 inches in length and diameter, the center bearing 1.375 inches long and 2 inches diameter and the rear bearing 1.375 inches long and 1 15-16 inches in diameter. The valves have a clear diameter of 1.15 inches. They have 45-degree seats and are forged in one piece from tool steel that will remain hard at red heat. The Hupp engineers claim that this type of valve will seldom if ever require regrinding. In place of the cover plates which were formerly used over the valves there are now screw plugs. The followers which are actuated by the cam are mushrooms. The chamber which contains the valve springs is inclosed within an oil-tight cover so that the contact between the valves and the tappets takes place within an oil bath.

The oil is circulated by the flywheel. The flywheel rim is close to the bottom of the oil pan at its deeper part and the oil that adheres to the flywheel is carried around with it and thrown with considerable pressure, due to the centrifugal force of the flywheel, into a tube from which it is carried to the different working parts of the motor. The face of the flywheel in the new motor is very much wider than that of the previous model and hence a larger volume of oil is forced through a pipe of the same diameter, increasing the pressure and giving much better lubrication at high motor speed. This year the oil leads to the cylinders have been done away with, as experiments have shown that sufficient oil from the cylinders is thrown from the crank-end bearings in the form of mist.

Clutch Action Is Reversed

As mentioned, the clutch acts in the exact opposite direction from that used on the former model. That is, the friction on the clutch thrust is taken by a bearing in the gearbox instead of the motor. The thirteen disks are of hardened saw steel 13 inches outside diameter and 1-16 inch thick.

Outside of separating the gearbox from the engine, it remains the same as in the previous car. It is a selective sliding type furnishing three forward speeds. The gears are 6-8 pitch with .75-inch face. The small gears are electric nickel-steel and the large gears acid open-hearth. The gears are heat-treated or case-hardened, according to the requirements of their carbon content. The bearings of the gearbox are annular balls and the front bearing, which is made of extra large diameter, not only carries the gear load but also is the bearing that takes the thrust of the clutch. This is a new feature in this model. The diameter of the gear shafts is 1.25 inches and they operate on four integral keys. The jackshaft is 1.25 inches in diameter. Shifting is accomplished by shifter forks operating on sliding shafts. This year the Hupp gears are run in heavy grease, whereas in all former cars they were oiled by a cylinder lubricant.

Rear Axle Construction Accessible

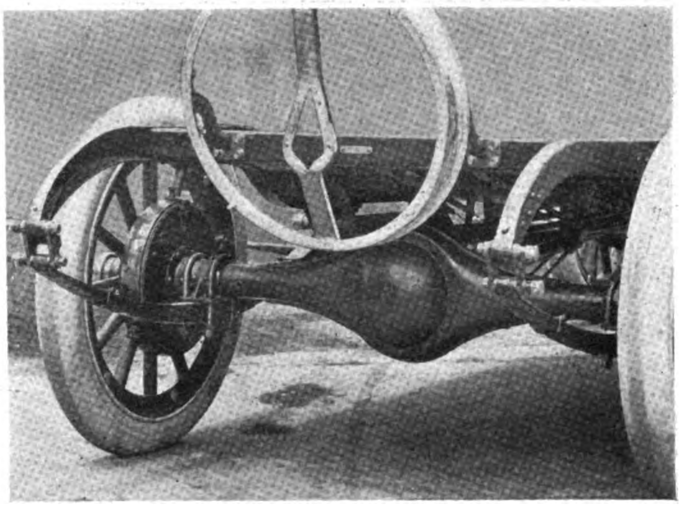
The rear axle is a floating design. Either of the axle shafts may be withdrawn from the housing without jacking up the wheel. The casing is of pressed steel with the gears and differential mounted in a malleable iron carrier. The differential is a bevel type running on annular ball bearings. It has four pinions. The gears are 6 pitch with .75-inch face. In adjusting any of the mechanism of the rear axle an accessible arrangement has been provided by means of which either the entire differential, together with the bevel pinion and gear or the large gear in the differential may be removed as a unit.

In re-designing the axle a new exterior appearance is given by the use of hub caps instead of the flat plate on the previous model, especially in combination with larger wheels and the altered rear spring design. Artillery type wheels are used with twelve 1.5-inch spokes.

The front springs are 37 by 1.75 inches, which is 3 inches longer than in the former Hupmobile and the new semi-elliptic rear springs are 52 by 2 inches in length and are shackled to an up-swept portion of the main frame.

Equipment Is Unusually Complete

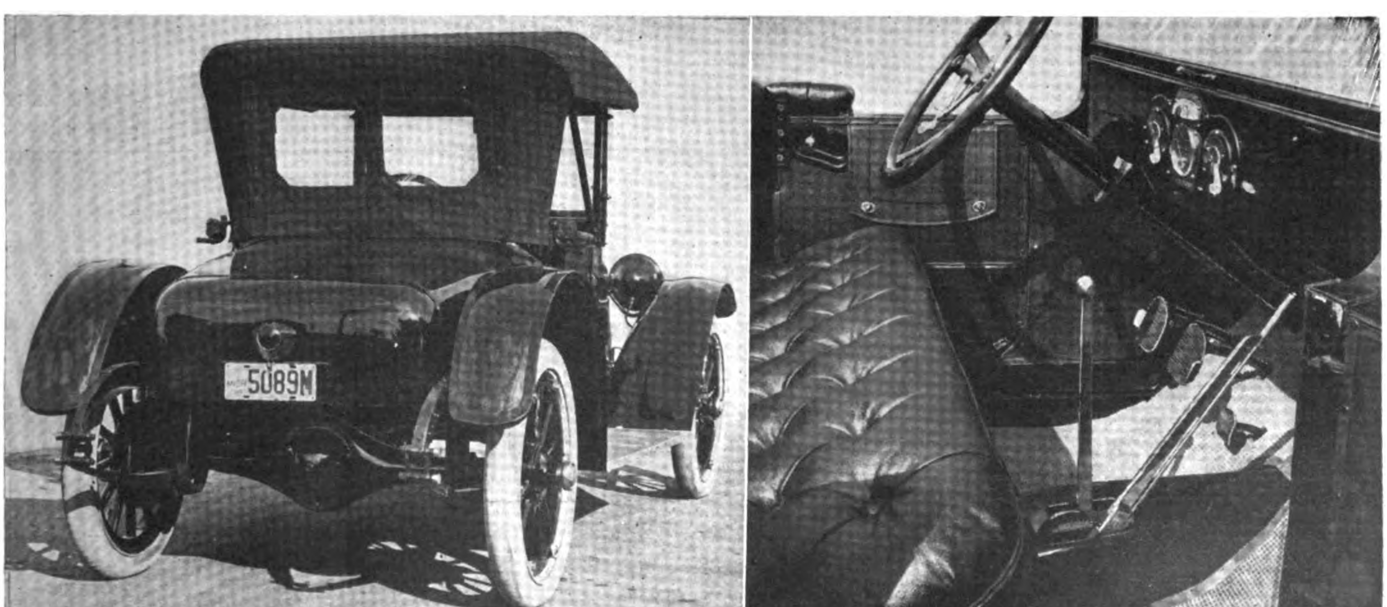
The equipment of the car is exceptionally complete this season, and in lighting and starting has been re-designed. It is the Westinghouse 12-volt type, 12 volts being used both for starting and in each of the lamps. Non-glaring headlights, in which the upper part of the front lens is corrugated, are now employed. The tail light has another exclusive feature in that it illuminates the road directly behind the car.



Rear construction of new Hupmobile, showing underslung semi-elliptic rear springs and bracket tire carrier

The electric starter is at the front right end of the motor and is connected directly by silent chain, giving a ratio of 2.64 to 1 to the crankshaft. Turning a switch lever on the dash starts the engine and at the same time closes the ignition circuit. As soon as the speed increases to a point where the car would be traveling 9 miles an hour on high gear, the electrical unit becomes a generator and starts charging the battery. At about 18 miles per hour the maximum charging rate of 8 amperes at 14 volts is reached. The motor can never stall for, should it cease to operate, merely depressing the clutch pedal will cause it to be started again. The timer for the Atwater Kent system is driven by spiral gears from the front end of the camshaft. The current is taken from the storage battery and operates at 12 volts.

The Westinghouse system is now included as stock equipment on all cars. There are also the headlight dimmers, license brackets, rain vision windshield, silk mohair top, speedometer, robe rail, foot rail and cocoa mat included with the car. The rims are demountable and one extra rim and tire carrier is furnished. The weight of the touring car when fully equipped and with the tanks empty is 2,650 pounds.



Left—Rear view of new Hupmobile roadster, showing tail light and license bracket mounted in the center. Right—Dash view, showing instrument board. Left—Lighting switch; center, speedometer; right, starting and ignition switch. All switches are controlled by Yale lock. Note pads on pedals

The AUTOMOBILE

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A Rift in the Stormcloud

ENGLISH manufacturers are finding the supplies from Europe for building automobiles cut off and already they have started conserving stocks of parts for commercial vehicles that may be needed in the war. They find that the great factories of Belgium that have been supplying forgings, castings, axles, gearsets and numerous other parts, are closed because of the war.

This is America's opportunity. England can secure from this country many of these parts that she has hitherto looked to Belgium, France and Germany for. The possibility of this demand is the one rift in the overcast skies that have so suddenly clouded the automobile world. Motor cars are being needed for the war and will continue to be needed. The government has taken over some of the largest German factories. The Belgian government took over one or two of its largest car factories the moment war was declared. The same is true in France. There is little hope for America to sell supplies and completed parts to Germany, Belgium or France, but the opportunity for doing business in England is brighter. It is worth a good honest effort. Business done with England now under the stress of war conditions may well, and honorably, furnish an introduction for the American products which will redound to the permanent advantage of our industry.

Eight Cylinders

IT is more than possible that a new factor has entered into what has become known as The War of the Cylinders in that the eight-cylinder motor, which up to the present has been largely confined to the output of one manufacturer so far as automobiles are concerned, will make its appearance on the American market next year.

For several years one of the leading French builders, De Dion-Bouton, has built eight-cylinder machines, and now this concern builds them in many different models. These machines are not untried creations, but rather designs that have been worked out for many years and have stood up, have proven themselves to be equal to the requirements.

The eight-cylinder motor looks like an enormity when contrasted with the six. The increase of two cylinders seems a big addition, but when the six is placed alongside the eight with its cylinders mounted V fashion in two sets of four, the eight really impresses the motor student. It is shorter than the six and has a crankshaft that rivals the four-cylinder one in simplicity. It is shorter than the six; in fact, due to the V mounting of the cylinders in the eight and to coupling two connecting rods to each throw, the motor is little longer than a four. The short crankshaft eliminates the whipping tendency met with in the long crankshafts in several of the six-cylinder designs.

The eight-cylinder motor with its cylinders cast in two L-head groups of four each makes a simple manufacturing job in that one camshaft mounted in the angle between the cylinder groups in the top of the crankcase serves for both intake and exhaust valves for the eight cylinders. The intake piping is considerably simplified as the carbureter is positioned midway between the two cylinder groups.

Judging from the performances of eight-cylinders now on the market the gasoline consumption is most satisfactory. In fact, eight-cylinder motors with an official rating between 20 and 25 horsepower have averaged from 20 to 22 miles to the gallon in regular country touring.

Whether the struggle for supremacy which has been waged for years between the four and the six will now be transferred to the eight, or if all three types of motors will continue in the arena, is a question that only time will solve. The aggression with which the eight is taken up will prove a potent factor. Today the public will not launch the arguments against the eight that were pressed against the four and the six, namely more cylinders, more valves, more spark plugs and more parts to go wrong. The complications offered by the two additional cylinders cannot be seriously considered. True, there will be some problems of value accessibility to deal with. The construction of the lower end of the connecting rod will call for attention, but if the eight can prove its claim to greater flexibility than the six, if its inherent merits of shorter crankshaft, more compact design, etc., carry that weight which they apparently should, then it will not be surprising if 3 or 4 years hence we find ourselves approaching a period of eight-cylinder popularity.

Motor Industry Supports 22 Per Cent. of Michigan's Population

90,673 Workers Employed in State's Automobile Factories and Stores, 71,104 Being the Number Detroit Keeps Busy

DETROIT, MICH., Aug. 13—The automobile industry ranks first as far as the total number of employes is concerned in the state of Michigan from statistics gathered from the annual report of the Department of Labor of Michigan for the year 1913. These records were obtained at different seasons of the year, some in May, some in August and some in November; for example, Chalmers, taken July 29, 1913; Packard, October 22, and Timken-Detroit, May 8.

Out of a total of 407,552 employes working in 11,823 factories, plants, shops, stores or other places of business employing wage-earners, 90,673, or 22.2 per cent. are employed in 582 concerns, manufacturers or retail stores, having some relation to the general automobile business. This total of 582 represents only 5.7 per cent. of all the business concerns visited by the labor officials.

From among the 90,673 men and women, boys and girls, earning their living in the automobile industry, 71,104 were employed in the city of Detroit, or 78.4 per cent.; and among them 37,662 or 41.6 per cent. were working in twenty-seven automobile manufacturing plants in Detroit.

Forty-two Car Makers in State

The number of automobile makers in the state, according to the annual report was only forty-two in 1913, or twenty-four less than in 1912. This does not mean that twenty-four concerns went out of business, but while some of them did, the majority were either absorbed by other companies or ceased making cars and continued in some other line.

While the general average of daily wages paid in 1911 was $2.23 for each of the 359,752 employes concerned in the record, it increased to $2.31 in 1912 and concerned 404,480 workers, and was $2.41 in 1913 for each of 407,552 employes, which means a net gain of 18 cents.

The average daily wages of the factory men increased 10 cents over the average of 1912 and 15 cents over that of 1911.

Factory women's increase was only 1 cent over 1912 and 9 cents over 1911. The average daily wages of girls shows an increase of 3 cents over 1912 and 1911, whereas, the wages of boys decreased 1 cent over 1912, but were still 17 cents higher than in 1911.

The superintendents' wages decreased 1 cent as compared with 1912, but were still 7 cents higher than in 1911. Foremen's wages increased 2 cents over 1912 and 21 cents over 1911.

	1913	1912	1911
Total number of establishments canvassed	11,823	10,589	9,456
Total number of all employes	407,552	404,480	359,752
Total number of men	302,802	304,738	269,492
Total number of women	49,604	48,475	44,398
Total number of boys between 14 and 16	2,026	2,457	1,995
Total number of girls between 14 and 16	1,285	1,502	1,456
Total number of superintendents	12,746	11,353	10,056
Total number of foremen	13,065	11,917	11,284
Total number of men at office work	15,199	14,407	12,692
Total number of women at office work	10,825	9,631	8,449
Aggregate daily wages paid all employes	$957,088	$913,376	$784,108
Average daily wages paid all employes	2.41	2.31	2.23
Average daily wages of factory men	2.47	2.37	2.32
Average daily wages of factory women	1.33	1.32	1.24
Average daily wages of boys	1.08	1.09	.91
Average daily wages of girls	.91	.88	.88
Average daily wages of superintendents	5.32	5.33	5.25
Average daily wages of foremen	3.77	3.73	3.56
Average number of hours male workers per day	9.6		
Av. number of hours female workers per day	8.7		
Average number of days worked per month	26.0	26.7	25.5
Average number of months worked per year	11.7	11.6	11.6
Total number of all employes connected with automobile industry in State	90,673	89,413	75,839
Total number of all employes in automobile plants in State	47,474	50,827	41,839
Number of automobile manufacturers in State	42	66	58
Total number of employes in automobile plants in Detroit	37,662	37,590	31.500
Number of automobile manufacturers in Detroit	27	34	30
Total number of employes in Detroit automobile and parts manufacturing plants	71,104	65,169	54,198

NUMBER OF EMPLOYEES IN DETROIT AUTOMOBILE PLANTS.

Name of Concern—Location.	When started in business	Total number of all employes 1913	1912	1911
Abbott Motor Co., Detroit	1910	178	465	446
Anderson Electric Car Co., Detroit	1895	696	589	408
Briggs-Detroiter Co., Detroit	1912	100	173	..
Cadillac Motor Car Co., Detroit	1905	2,892	4,878	5,426
Chalmers Motor Co., Detroit	1907	2,345	2,844	2,372
Century Electric Car Co., Detroit	1911	15	....	....
Commerce Motor Car Co., Detroit	1909	32	..	..
Federal Motor Truck Co., Detroit	1910	184	101	55
Ford Motor Co., Detroit	1903	14,100	7,317	3,593
Grinnell Electric Car Co., Detroit	1911	55	50	59
*Herreshoff Motor Co., Detroit	1909	78	79	43
Hudson Motor Car Co., Detroit	1908	813	1,391	760
Hupp Motor Car Co., Detroit	1908	1,017	806	599
Keeton Motor Co. / American Voiturette Co., Detroit.	1913	72	..	..
King Motor Car Co., Detroit	1911	114	110	42
Krit Motor Car Co., Detroit	1906	147	383	347
Lozier Motor Co., Detroit	1904	472	687	653
Maxwell Motor Co., Detroit	1906	585	2,753	..
Packard Motor Car Co., Detroit	1899	4,524	6,603	6,410
Paige-Detroit Motor Car Co., Detroit	1909	513	143	106
Regal Motor Car Co., Detroit	1907	822	333	399
R. C. H. Corporation, Detroit	1911	521	..	..
Studebaker Corp., Detroit	1908	6,970	3,471	6,581
Standard Motor Truck Co., Detroit	1911	40	7	27
Universal Motor Truck Co., Detroit	1909	326	155	..
Wagenhals Motor Co., Detroit	1911	21	6	..
Wahl Motor Co., Detroit	1912	29	7	..

*Now out of business.

EMPLOYEES IN AUTOMOBILE PLANTS OUTSIDE OF DETROIT.

Name of Concern—Location.	When started in business	Total number of employees 1913	1912	1911
Buick Motor Co., Flint	1906	4,700	5,411	4,584
Durant-Dort Carriage Co., Flint	1882	343	272	387
W. A. Patterson, Flint	1878	282	133	282
Alma Motor Truck Co., Alma	1913	27	..	..
Olds Motor Works, Lansing	1880	648	1,033	937
Reo Motor Car Co., Lansing	1904	1,700	1,675	519
Reo Motor Truck Co., Lansing	1910	165	160	22
Imperial Automobile Co., Jackson	1907	131	249	92
Jackson Automobile Co., Jackson	1902	252	629	557
Austin Automobile Co., Grand Rapids	1901	18	23	37
Couple-Gear Freight Wheel Co., Grand Rapids	1905	55	46	56
Cartercar Co., Pontiac	1907	287	433	253
General Motors Truck Co., Pontiac	1907	342	370	..
Oakland Motor Car Co., Pontiac	1908	734	922	849
Havers Motor Car Co., Port Huron	1910	56	87	32

TOTAL NUMBER OF EMPLOYEES IN MICHIGAN AUTOMOBILE PARTS AND ACCESSORIES MANUFACTURING PLANTS.

Name of Concern—Location.	When started in business	Total number of employees 1913	1912	1911
Michigan Motor Casting Co., Flint	1906	248	327	182
Auto Body Co., Lansing	1901	241	187	162
W. K. Prudden Co., Lansing	1903	706	420	410
Hayes-Ionia Co., Ionia	1910	319	320	218
Hayes Wheel Co., Jackson	1908	410	467	375
Keeler Brass Co., Grand Rapids	1900	263	213	181
Jackson-Church-Wilcox Co., Saginaw	1907	251	295	212
Weston-Mott Co., Flint	1905	1,180	2,151	1,205
Continental Motor Mfg. Co., Muskegon	1904	437	1,162	842
O. J. Beaudett Co., Pontiac	1890	814	518	386
Jackson Cushion Spring Co., Jackson	1900	237	195	138
Frost Gear & Machine Co., Jackson	1907	200	155	120
Briscoe Mfg. Co., Detroit	1897	440	768	767
Chicago Pneumatic Tool Co., Detroit	1902	509	373	361
Continental Motor Mfg. Co., Detroit	1904	971	741	598
Detroit Auto Specialty Co., Detroit	1903	234	136	70
Detroit Forging Co., Detroit	1900	267	211	171
Detroit Gear & Machine Co., Detroit	1910	212	120	130
Detroit Motor Casting Co., Detroit	1905	97	130	78
Detroit Pressed Steel Co., Detroit	1910	258	113	70
Detroit Steel Products Co., Detroit	1906	475	458	279
Fisher Body Co., Detroit	1908	1,529	1,272	1,302
Fisher Closed Body Co., Detroit	1910	562	263	..
Gemmer Mfg. Co., Detroit	1907	257	387	318
Dodge Bros., Detroit	1903	2,574	1,872	1,313
Hayes Mfg. Co., Detroit	1903	226	761	572
Herbert Mfg. Co., Detroit	1899	438	732	349
Long Mfg. Co., Detroit	1909	112	176	148
McCord Mfg. Co., Detroit	1897	557	899	576
Metal Products Co., Detroit	1909	497	559	381
Michigan Malleable Iron Co., Detroit	1899	956	880	473
U. S. Tire Co., Detroit	1883	3,095	2,266	1,615
Northway Motor & Mfg. Co., Detroit	1905	578	1,431	1,001
Rands Mfg. Co., Detroit	1901	263	174	195
Timken-Detroit Axle Co., Detroit	1909	1,582	1,119	1,007
C. R. Wilson Body Co., Detroit	1899	[illegible],145	836	730

Record Exports in Last Fiscal Year

30,136 Cars Worth $27,797,642 and $4,159,454 Worth of Tires Show 13-Fold Growth in 10 Years

WASHINGTON, D. C., Aug. 15—The secretary of commerce today announced that exports of motor cars from the United States in the fiscal year ended June 30, 1914, were the largest on record. Their total, including shipments to Alaska, Hawaii, and Porto Rico amounted to $40,136,565, as against $39,325,000 in 1913, the former high record year. The year's total included 30,136 complete cars, valued at $27,797,642; tires, $4,159,454; motor car engines, $1,391,893 and miscellaneous parts, not specified, $6,787,575.

With the sole exception of 1908, every year during the past decade has shown an advance in the value of American motor cars sold to foreign countries. In the fiscal year 1904, according to the bureau of statistics, the value of motor cars exported was $1,895,605; in 1909, $5,387,021, and in 1914, exclusive of parts and shipments to our own non-contiguous territories, $26,574,574, having quintupled in 5 years and increased thirteen-fold in a decade.

Europe Bought Nearly Half

Europe bought nearly one-half of our entire sales of motor cars to foreign countries last year, although some shipments are for reshipment to other parts of the world. To the United Kingdom the exports amounted to 7,222 cars, valued at $5,853,127; to Germany, 1,435, valued at $1,059,249; to France, 1,429, valued at $1,224,130; and to other countries of Europe, 3,271, valued at $2,580,428. Canada and Australia also are important markets, the former having taken 4,624 cars, valued at $5,919,776 and the latter, including other British Oceania, 4,244, valued at $3,695,595. To South America as a whole we sold last year 1,985 motor cars, valued at $1,939,212, and to Mexico, 167, valued at $256,675.

The growth in exports of motor cars has been accomplished by a corresponding decline in imports of like articles, the total having fallen from 1,624, valued at $2,905,391, in 1909, to 300 cars, valued at $620,493, in 1914, a new low record for the decade. Of the year's imports, 134 were from France, 40 from the United Kingdom, 55 from Italy and 21 from Germany.

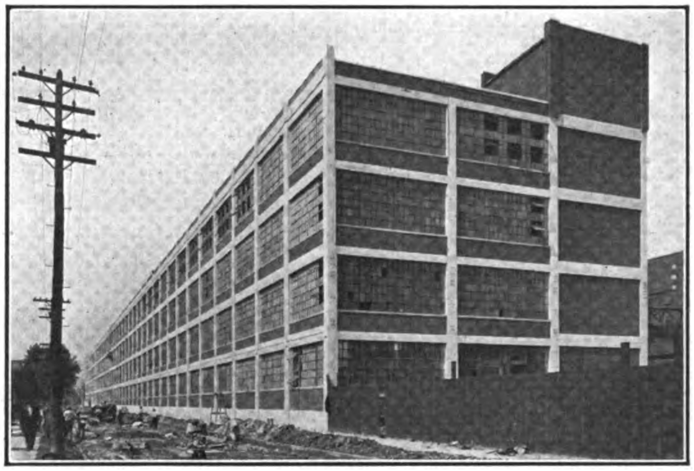
German Motor Exports Shrunk Before War

DETROIT, MICH., Aug. 17—From the official records of the German government it is shown that the German exports of automobiles, motor cycles, parts and accessories during the first 5 months of 1914, ending with May, show a total decrease of $3,016,000 as compared with the corresponding periods of 1913. In other words, while the German manufacturers sold outside of the Fatherland $11,443,750 worth of motor cars, motor cycles, parts and accessories from January 1 to May 30, 1913, this year, during those 5 months, they sold all told only $8,427,750 worth of the same goods.

The detailed reports as to the exports to each foreign country are not at hand, only the totals. Thus it is seen that up to the end of May, 1914, a total of 3,227 pleasure vehicles having a total value of $6,158,250, or an average value of $1,908 each, were exported. In 1913 the exported cars numbered 3,630 having a value of $8,381,500 or $2,309 each. Thus for this year 403 less pleasure cars were exported, which meant a difference of $2,223,250 to the manufacturers while the 1914 car's average value was $401 less than that of 1913.

The number of commercial cars—trucks and delivery vehicles—exported during the first 5 months of 1904 was 294 as compared with 468 in 1913. Their value was $904,500, as compared with $1,564,250 in 1913. The price was $3,076 per truck this year and $3,342 last year. The sales were 174 trucks less in 1914 than 1913 and in dollars it represented a loss of $659,750.

Up to the end of May, 1914, the German manufacturers had exported 1,428 motorcycles valued at $304,000, or an average of $212 each, while in 1913 they had sold 1,972



New assembling plant added to Dodge factory

motorcycles, of a value of $393,500, or $299 each. The decrease this year was thus 544 motorcycles and $89,500.

The export of automobile parts during the first five months of 1914 amounted to $861,500, or $144,500 less than in 1913.

Automobile and motorcycle motors to the value of $199,500 were exported this year up to the end of May, and this represented an increase of $101,000 over the first five months of 1913.

The total value of pleasure vehicles and commercial cars exported during the first 5 months of 1914 was $7,062,750, while in 1913 this item totalled $9,945,750, or nearly $2,900,000 more for the first five months of 1913.

Big Dodge Addition About Finished

DETROIT, MICH., Aug. 17—Dodge Bros. announce the practical completion of the assembling plant which has been added to the factory. This building is 876 feet in length and 70 feet in width and four stories in height and is constructed to withstand a floor strain of 350 pounds to the square foot. With the addition of this building the floor space of the factory which is to be devoted to the manufacture of the Dodge Brothers' car is 18 3-4 acres.

More Cowles Patents for Packard

DETROIT, MICH., Aug. 17—In accordance with its policy of continually strengthening its patent position, the Packard Motor Car Co. has followed up its purchase of several years ago of the Cowles motor vehicle patent applications and is now having issued to it a number of divisional patents based upon the original patent No. 1,050,810, the application for which was filed on September 6, 1901.

The latest of these to issue is that relating to the truss rod construction, taking into consideration torsion tube design and trunnion springs. This is dated August 11, 1914, and its patent number is 1,107,042. There are two others of these divisional patents which have been issued, and more to be granted in the near future. Still others are likely to be held up at the patent office for a few months longer in accordance with usual patent office procedure. The other two issued are: the main patent, No. 1,050,810, dated January 21, 1913, and relating principally to an improved steering wheel hub and means for mounting the same, and 1,103,567, dated July 14, 1914, and relating to the running gear and steering mechanism.

It must be understood that all of these divisional patents are based upon the one main patent applied for on September 6, 1901, and granted under patent No. 1,050,810. The patent office permits of such divisions under main patents, and the Packard company is taking advantage of this ruling for its strengthening.

Edward P. Cowles is the originator of the ideas involved in the Cowles patents, and holds the unique distinction of being the designer of the first automobile invented by J. W. Packard, while he was in the latter's employ at Warren, O., in 1896. Two years later, in 1898, Mr. Cowles began work on the plans for a motor vehicle of his own invention, and shortly afterward the specifications were completed and proceedings instituted for patents. All these rights have since been assigned to the Packard Company.

The Patent Department of the Packard Company, of which Milton Tibbetts, Packard patent counsel is the head, attaches considerable significance to these Cowles patents for obvious reasons. The divisional patents growing out of the broad claims of the main original patent relate to such features as an improvement in rear axle construction, interchangeable wheels, spring construction, frame construction, body design, steering connections, rear signal device, mounting of the motor, shock absorbers, and so on.

Patent No. 1,107,042 has seventeen claims which deal broadly with the construction of the car. The particular points which are brought out in the patent are the flexible connection of the sprung portion of the car to the unsprung portion and the method of transmitting the torque strains flexibly through the torque members.

Patent No. 1,050,810 has eight claims relating to the connection between the axle and the front wheels. It covers particularly the trunnion method of connecting the wheel hub to the axle. The construction particularly mentioned is a combination of a forked trunnion support in which the trunnion has its arms extended so that the jaws are above and below the inner hub member, and arms which connect the wheel bearings to the vertical trunnion.

Patent No. 1,103,567 relates to the connection of the steering gear to the front wheel spindle. The particular point covered is that the tread of the wheel at the point of contact with the ground is vertically in line with the large bearing mounted at the base of the spindle. In other words, this specifically deals wtih the pivot point of the wheel being vertically in line with its axle support, thus providing the easy steering feature generally sought in front axle design.

More Cars Sold for Australian Market

DETROIT, MICH., Aug. 10—F. Z. Eager, an American automobile importer established in Australia, was here recently and placed orders for about 1,000 cars, or 50 per cent. more than last year.

"An American car costing $1,000 here is listed at $2,000 when it finally gets on the show room in Australia," said Mr. Eager. "Duty and other customs charges bring the car up to $1,250, and after the freight to the Australian port is added, with the incidental expenses, the car will stand at $1,500. Then other charges are to be added, and the dealer's percentage or commission, so that the car must be sold at $2,000.

"Even so, the sale of American medium-priced cars is steadily increasing, as they have proven through tests, trials, hill-climbs, etc., that they are best suited for the Australian roads. These are in many parts of Australia about what they are in South America and Africa, that is, they are called roads, but actually nothing like a road exists. The variety of roads is such that it is the best testing ground nature affords. And the very reason why the American cars are now so well liked is because the people now know that the American roads are very bad, and also require cars that will stand the biggest stress than can be found.

"The rich Australians purchase the high-priced cars made in Europe, but not so much because they consider them so much more worthy, but because it is the style. The wealthy man or woman who has not his or her big European car is quite an exception."

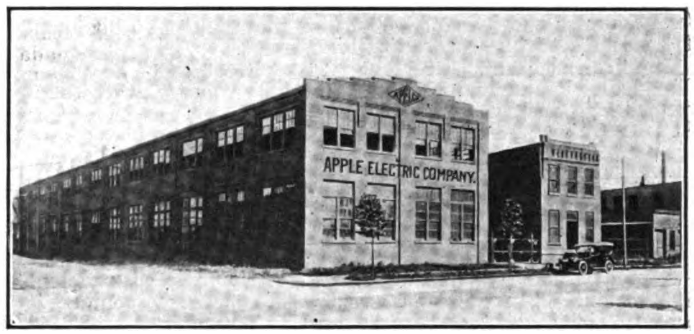
Splitdorf-Apple Plants All in Newark

NEWARK, N. J., Aug. 17—With the purchase of 5 acres of land, buildings giving 70,000 square feet of floor space and an office building all ready for occupancy, the Apple Electric Co. is preparing to move its headquarters for the manufacture of automobile and motor boat starting and lighting outfits and batteries from Dayton, O., to Newark, N. J. The move will not be immediate, however. The Apple company products will continue to be manufactured at Dayton until the new plant has demonstrated its efficiency to turn out the work in volume and up to the Apple standard of quality in every respect. This plan was decided upon to eliminate all chance of the slightest hitch in making deliveries.

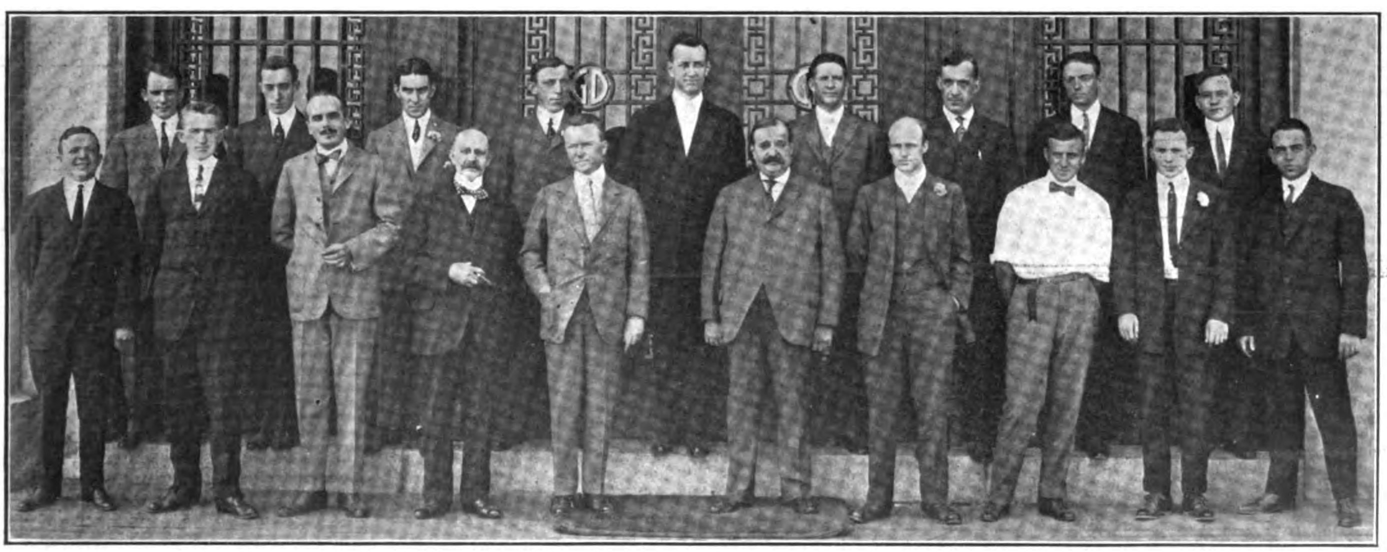
The important move follows the drawing together of the manufacturing and selling policies of the Splitdorf Electrical Company with those of the Apple interests, and the controlling of the Apple output by the dominant Splitdorf sales organization. The Splitdorf executive offices and manufacturing plant have been located in Newark for two years, and, with mutual interests at stake, a greater degree of co-operation from closer association is anticipated.

The new Apple factory will be the buildings formerly occupied by the Lansden Electric Co., and the surrounding ground purchased by the Apple company gives ample room for almost unlimited extension should occasion arise.

MILWAUKEE, WIS., Aug. 18—The Federal Rubber Mfg. Co., Milwaukee, will celebrate "Federal Day" on next Saturday, August 22, by entertaining its 2,500 employees and their families at an all-day picnic at Waukesha beach, Pewaukee lake.



New Apple Electric Co.'s factory in Newark



Group of the Gray & Davis salesmen and officers at the convention held at the factory August 3-8. Top Row—Left to right—G. C. Marr, purchasing agent; E. G. Acker, production manager; J. H. Maxwell, secretary; O. W. Cook, assistant factory supt.; C. M. Tichenor, chief mech. engineer; E. R. Hodges, R. W. Carr, K. Greenleaf, C. Z. Sedgley, sales engineers. Bottom Row—Left to right—A. G. Haskell and G. L. Gaskell, sales engineers; C. O. Sacks, advertising manager; E. E. Schwarzkopf, sales manager; Wm. Gray, president; W. H. Gray, general manager; E. F. Wackwitz, sales engineer; W. B. Moses, electrical engineer; R. Hoyt Moses and A. Driver, sales engineers. Three of the salesmen who attended the convention and also Mr. Picard, manager of the Ford sales department, were not at the factory when the photograph was taken. The next convention will be held early in January

Goodyear Returns to Old List Tire Prices

Is Only Company To Do So—Top Market Prices of Crude Rubber Prevail —Some Increases

NEW YORK CITY, Aug. 19—The Goodyear Tire & Rubber Co., Akron, O., has returned to the list prices in force before the war scare and has instructed all its branches accordingly. None of the other companies has announced a reduction in prices.

Last week the principal tire companies, with a few exceptions, had advanced prices from 12 1-2 to 20 per cent. Some of the smaller companies had not announced changes. This week practically all have reached the higher level, but none have advanced beyond the first increases.

The crude rubber situation, according to F. R. Henderson, of the rubber importing firm of Henderson & Korn, is practically unchanged. The high price of $1.10 for plantation and $1.12 for Para still holds without an advance, and there is no more rubber in America now than there was a week ago. Neither is it likely that there will be any more for some time.

Press cables from Europe during the past week have indicated that shipping might be resumed within a short time. Without being pessimistic Henderson stated that the "short time" might be months. Private cables from London to the Company state that the "resumption of shipping at first opportunity may mean many months." This is regarded as significant, inasmuch as it is the scarcity of ships and not of rubber which has caused the shortage in America.

Ajax-Grieb, Kelly-Springfield and Michelin, which did not raise last week, are still holding to their old prices. As officers of the two former stated, they will not raise until the manufacturing cost actually increases.

Empire, Federal, Firestone, Fisk, Goodrich, Diamond, Goodyear, Pennsylvania, Republic and United States advanced last week 12 1-2 and 20 per cent. Later advances are: Lee, 12 1-2 per cent.; McGraw, 15; Racine, 15; and of the importers, Englebert, 10 per cent. Gaulois is awaiting advices from the factory in France before it alters prices.

A comparison of the new and old prices in a 34 by 4 size of those which have followed the raise is: Lee Regulars—Plain, $19.10, $25.85; non-skid, $33.10, $37.25. Lee Puncture-Proofs—Plain, $38.25, $43.05; non-skid, $47, $52.90. Lee red tubes, $5.75, $6.45.

McGraw—Plain, $24.35, $28; non-skid, $26.05, $29.95; red tubes, $5.45, $6.25; gray tubes, $4.90, $5.65.

Racine—Plain, $26.80, $30.80; non-skid, $33.50, $38.50; red tubes, $6, $7.20; gray tubes, $5.40, $6.50.

The 12 1-2 per cent. advance in Pennsylvania does not include tubes or Vacuum Cup tires which, the company having a good stock, were increased but 5 per cent. The red 34 by 4 tube went from $7 to $7.35 and the gray from $5.30 to $5.95. The vacuum cup in the same size was increased from $41.95 to $44.05. Smooth treads were increased from $28.30 to $31.85.

The Englebert increase was thus: Plain, $32.20, $35.50; rubber non-skid, $36.80, $40.50; steel-studded, $41, $45. Tubes unchanged.

Market Reports for the Week

A further reduction in prices occurred this week in the markets. Tin, this week, was very erratic with violent fluctuations. Starting the week at $64 per 100 pounds, it rose to $65 and gradually dropped to $40 and then closed at $49. At the latter part of the week there were quick sales of small lots. More tin is expected from London but the situation from the Straits Settlements is not so clear. The cargoes afloat for this country at the moment are 920 tons, of which 240 tons are due before the end of the month. There is a small demand from domestic customers in copper. The sales are confined to August and September shipment. Up-River Para has dropped $0.30, closing at $0.90. A syndicate is reported to have bought up the bulk of the supply in London with the intention of shipping it to this country. Also there is a prospect of an increase in the supply of Brazilian rubber.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.15	.15	.13	.13	.12	.12	—.03
Beams & Channels, 100 lbs.........	1.31	1.31	1.31	1.31	1.31	1.31	......
Bessemer Steel, ton	20.00	20.00	20.00	20.00	19.00	19.00	—1.00
Copper, Elec., lb..	.12⅜	.12	.12	.12	.12⅛	.12⅛	—.00¼
Copper, Lake, lb..	.12½	.12½	.12½	.12½	.12⅜	.12⅜	—.00⅛
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	......
Fish Oil, Menhadden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime...	.93	.93	.93	.93	.93	.93	......
Lead, 100 lbs.....	3.85	3.85	3.85	3.85	3.85	3.85	......
Linseed Oil.......	.60	.60	.60	.60	.60	.60	......
Open-Hearth Steel, ton	20.00	20.00	20.00	20.00	19.00	19.00	—1.00
Petroleum, bbl., Kans., crude....	.75	.75	.75	75	.75	.75	......
Petroleum, bbl., Pa., crude	1.55	1.55	1.55	1.55	1.50	1.50	— .05
Rapeseed Oil, refined	.59	.59	.82	.82	.82	.82	+ .23
Rubber, Fine Up-River, Para.....	1.20	1.15	1.15	1.10	1.08	.90	— .30
Sulphuric Acid, 60 Baume.......	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.......	64.00	65.00	55.00	47.00	40.00	49.00	—15.00
Tire Scrap........	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	......

Swartz Carburetor Co. Organized

COLUMBUS, O., Aug. 17—The Swartz Carburetor Co., which was incorporated recently with an authorized capital of $50,000, has been organized by the election of the following officers: M. A. Corbett, president; Thomas A. Swartz, vice-president; R. J. Corbett, secretary; and F. E. Stevens, treasurer. The company will make a carbureter invented by Thomas A. Swartz which is claimed to give greater mileage and also to be more flexible than existing carbureters. The factory will be located in Columbus.

Saxon Co. Takes Over N. Y. City Branch

NEW YORK CITY, Aug. 18—The Saxon Motor Co., Detroit, Mich., has taken over the business of its New York City agent, L. A. Van Patten, Inc., 251 West Fifty-seventh street, making it a factory branch. The company expects to use the branch in developing the foreign trade as well as that in the New York territory. It has leased an upper floor of the building at Fifty-fourth street and Broadway, where the A. Elliott Ranney was located, for a service department. It is to be known as the Saxon Motor Co., of New York.

The company is contemplating changes in the perfection of the new dealer organization in Boston, California, Dallas and Denver. It has just arranged with the Liniger Implement Co. to replace the Stefart Too-Zer Co., Omaha, Neb., in the selling of Saxon cars. The Bond Motor Co. replaces the Saxon agency in Kansas City, Mo. The Essex Motor Car Co. now has the Newark, N. J. agency.

Philadelphia Oakland Branch Entertains

PHILADELPHIA, PA., Aug. 14—More than fifty dealers from Eastern Pennsylvania, Southern New Jersey, Maryland, Delaware and Virginia assembled here yesterday as the guests of Ted Johnston, manager of the local factory branch of the Oakland Motor Co., 227-229 North Broad street. A thorough inspection of the branch, its equipment and facilities, and of the new model Oaklands was followed by a dinner at the headquarters of the Philadelphia Automobile Trade Association.

Next Tuesday the Maxwell Motor Co., Inc., will give a reception and luncheon to the Maxwell dealers in the Philadelphia territory. During the luncheon, "From Molten Steel to the Automobile" will be shown in motion pictures.

Frisco Trade Unites Against Price Cutting

SAN FRANCISCO, CAL., Aug. 10—After hearing R. H. Daniels, head of the service bureau of the Goodyear Tire & Rubber Co., Akron, O., in a talk on upholding the prices on tires and other rubber goods and accessories made by the tire concerns and directly interesting the automobile supply and accessories dealers, about 120 decided unanimously to form the Motor Car and Accessories Trade Assn., the officers of which will be elected within a short time.

President J. A. Marsh, of the Motor Car Dealers Assn., presided, and spoke in favor of the co-operation, not only of the supply and accessories dealers, but also of the motor car agents, as the whole trade was interested in the matter, and should help in eliminating the price cutting policy. "Trade will be better for all concerned," said Mr. Marsh, "and it will help the legitimate concerns."

Dealers in Stockton, Oakland, and other cities in this territory have already started organizations for the same purpose, and district attorney H. L. Hynes, Alameda county, was quoted as holding that such organizations do not violate the Cartwright anti-trust law. The United States District Attorney was also reported to have given his opinion that such trade organizations do not conflict with the federal law and that they were state issues.

Hays Buys Michigan Buggy for $45,000

KALAMAZOO, MICH., Aug. 17—Judge Sessions, of the Federal Court, Grand Rapids, Mich., has decided that the bid of $45,000 made by former Mayor Charles B. Hays, of this city, for the plant of the bankrupt Michigan Buggy Co., should be confirmed, and thus the sale of that property, which has given way to many bids which had been refused because they had not reached the sum estimated as minimum by the Court becomes history.

Mr. Hays bought the plant purely as an investment, and does not intend to enter the manufacturing field.

DETROIT, MICH., Aug. 11—Shipments of the 1915 Hupmobile models were started today. During the next ten days only thirty-five cars will be the daily output, but after that time the output will be doubled.

Receiver for Savage Co.; Officers in Jail

DETROIT, MICH., Aug. 14—James J. Larmour has been appointed receiver for the creditors of the Savage Motor Car Co., whose officers are held in the county jail, Detroit, having been placed under arrest August 10 by government inspectors for using the United States mails to defraud. After a preliminary hearing, E. E. Taylor, Robert W. Fishback and Delbert H. Cummings, the three officials of the company were about to be set at liberty under $7,500 bail bonds being furnished by each, when new complainants appeared, and after hearing them Acting United States Commissioner Elmer W. Voorheis required a further bail bond of $5,000, so that each of the accused was to provide $12,500 in order to gain temporarily his liberty. Attorney C. E. Wilcox, who appeared for creditors, had prepared an involuntary bankruptcy petition and prevented the accused from drawing money from the Federal State Bank, where the company's funds were deposited.

No further action will be taken by assistant district attorney Benedict Lee until the bankruptcy proceedings in the United States court will have been disposed of. It is not yet known where the accused will be tried, as warrants have been issued against them both in Cincinnati, O., and in Detroit, and it will probably be in the city where a true bill is first returned.

Details concerning the financial standing of the Savage company are not available now. Reports have been published in daily papers, but Receiver Larmour stated that they were all imaginary.

Dodge Bros. Sue to Protect Name

DETROIT, MICH., Aug. 17—Dodge Bros. have filed a suit in the Circuit Court of Michigan against the Dodge Motor Car Co. to restrain the latter from using the name Dodge on its product, in its advertisements, in fact in any matter concerning their business.

It is claimed by Dodge Bros. that the officers and stockholders of the Dodge Motor Car Co.—Alvin M. Dodge, J. Moyer Leman, E. O. Millay, Edwin Herzog and George E. Sheldrich—are trying to profit by the name of Dodge Bros., which has existed for the last twelve years in Detroit, and whose business is so well established and known throughout the country.

Mr. J. Moyer Leman, of the Dodge Motor Car Co., when asked to-day concerning the Dodge Bros. suit, said: "All we know about this suit is what we have read in the daily papers. No papers have been served on us as yet, and if they are we certainly will fight the case to the limit."

Delay for Oldfield Patents Bill

WASHINGTON, D. C., Aug. 15—Of great importance to the motor car and accessory trade of the country is the action of the House committee on patents in reporting favorably the Oldfield bill to codify, revise and amend the laws relating to patents. While the committee has acted favorably on the bill, it is understood no action will be taken at this session. Probably during the short session, which begins in December, the bill will be pushed through by its author. In order that those vitally interested in the changes proposed will know just exactly what the bill provides, the text of the bill, as reported to the House of Representatives, is herewith presented in part:

Section 4884 is to be amended so that every patent shall contain a short description of the invention to indicate its nature. And a copy of the specifications, claims and drawings shall be attached to the application. It shall contain a grant to the patentee, his heirs or assigns of the exclusive right to make, use or vend the invention throughout the United States for a term of 17 years.

Two years will be allowed for the work of obtaining the patent after the application is first filed. It is stated that every patent shall be limited to expire 19 years from the date of filing in this country, but this is exclusive of the time actually consumed by the Patent Office or the courts in considering the application.

Sec. 2—Section 4899 of the Revised Statutes shall be amended so that no person selling a patented article shall have a greater right to prescribe the conditions limiting its subsequent disposition than if the device were not patented.

Every person who purchases, of the inventor or constructs any newly invented machine prior to the application of the inventor for a patent or who sells or uses one so constructed, shall have the right to use and to vend to others to be used, the specific thing so made or purchased without liability.

No purchaser, lessee, or licensee of a patented article shall be liable to an action for infringement of the patent because of any breach of the contract of sale, lease or manufacture.

In Section 3 it is set forth that the district court wherein the owner of the patent may be found shall have the right to compel the granting of a license according to the circumstances stated in the bill.

Steel Orders Are in Bigger Volume

NEW YORK CITY, Aug. 14—The United States Steel Corp. has made its monthly report of unfilled orders, making the best showing in 3 months. Unfilled orders on the books at the end of July were 4,158,000 tons, in round numbers, an increase of 125,700 over the total at the end of June.

Automobile concerns are having difficulty getting supplies of a special nature. Sixty cars of glass bought in Belgium by Detroit automobile makers for windshields are held up.

Detroit Curb Pumping Stations Must Go

DETROIT, MICH., Aug. 16—The Commissioner of Public Works of the city of Detroit, has advised every gasoline stand and station within the city limits that they will have to remove by October 16 their curb or sidewalk pumping outfit.

It is the contention of the commissioner that inasmuch as the Supreme Court of Michigan recently rendered a decision in favor of the city that fruit stands must be removed, and that the city has the right to remove any obstruction on its sidewalks and curbs, that gasoline curb supplying stations are obstructions and must consequently be removed.

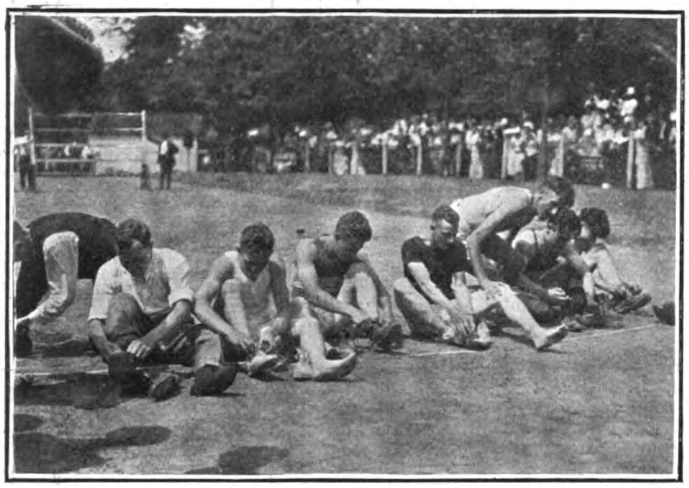
Gasoline Storage Near Residence a Nuisance

DETROIT, MICH., Aug. 17—A decision was rendered some time ago in the Circuit Court of Kent County, Mich., which may have a far-reaching effect inasmuch as the court held that the storage of a large quantity of gasoline within a few feet of a residence is a private nuisance.

The case was the one of Arthur W. Whittemore, who owns and occupies a house and lot adjacent to the Baxter Laundry Co., in Grand Rapids, Mich. The Baxter Company, which does a dry cleaning business, uses about 15,000 gallons of gasoline per year and prior to the filing of the bill in the case, had placed in its yards two large steel tanks of the capacity of 10,000 gallons each and had commenced excavating for the purpose of having these tanks placed in the ground in the northwest corner of its premises, which was the farthest possible point on its premises from its buildings and immediately adjoining Whittemore's property, the nearest tank being about eleven feet from his property. Whittemore filed a complaint for a temporary injunction, claiming that the storage of the gasoline so near to his property would be a private nuisance.

In the lower court it was held that it was a private nuisance. The Baxter company appealed to the higher court, which upheld the lower court's verdict.

NEW YORK CITY, Aug. 18—G. L. Holmes has retired as general manager of the automobile accessory department of the H. W. Johns-Manville Co., this city. E. A. Cassidy will take his place, his former position being sales manager of the department. H. H. Knepper, who has been assisting Stephen Douglas, manager of the Detroit office, has also resigned.




Two pictures of the obstacle race at the annual outing of Packard employees held at Bob-Lo, Mich., August 10, at which a total of about 6,000 of the company's working force took part. Three of the largest Detroit River steamers were used to transport the happy crowd. The features of the day were the various athletic contests, such as inter-department relay races, dashes and obstacle races, fat man races, races for small boys and for women. One of the events which was most successful, and a novelty, was a pie-eating race for small boys. There were also swimming races and other events held in the water. On account of the heavy rain the baseball and soccer games could not be held in the open and were replaced by the followers of Terpsichore in the dancing pavilion

N. Y. Fire Marshal Develops "Gasoline Peril"

NEW YORK CITY, Aug. 17—State Fire Marshal Thomas J. Ahearn, of New York, has unearthed a "gasoline peril"; and in unearthing it he has developed a "garage regulation peril" which is faced with awe and real dread by the garagemen of the state.

After figuring out that gasoline properly mixed with air and compressed "is equal to 83 2-3 pounds of dynamite" he has promulgated a set of garage regulations which, if enforced, will cost the garages of the Empire State thousands of dollars and perhaps put some of them out of business.

The move has attracted the attention of trade organizations, and the Automobile Dealers' Association of New York, has already begun an investigation of this latest official hobby of regulation.

Some of the regulations are particularly drastic. One forbids the maintaining of a repair-shop in a garage. No more pits are to be allowed. Gasoline tanks may not be maintained under sidewalks, but must be buried 3 feet underground elsewhere and proper piping carried to the garage or curb.

Torches, forges, fire, flame or any electrical apparatus capable of emitting a spark are banned. Heating shall be by steam or hot water. No building or part thereof shall be converted into a garage or used as a garage unless it is fireproof.

These are a few of the rules and regulations. There is, of course, provision for the ubiquitous permit and inspection by 1,700 deputies. The regulations go into effect December 1, 1914, and a "reasonable time" will be allowed for the altering of existing structures.

New Westcott for $1,150

RICHMOND, IND., Aug. 17—The price of the series B Westcott has been reduced to $1,150 for 1915. The car is equipped with a Northway motor, the Atwater Kent ignition system and the Jones electric starting and lighting system. The Westcott Motor Car Co. states that an increase in business is expected during the coming season.

Tribute for Charity in Kansas City Fuel War

KANSAS CITY, MO., Aug. 17—Five charities of this city are to benefit by the latest move in the gasoline price-cutting campaign now raging between the Standard Oil Company and the independent refineries. The Rockefeller corporation has announced that it will give one-half cent to charity for each gallon of gasoline sold at its filling station here in August. The money will amount to between $2,000 and $3,000, it is understood, and will be divided among the Associated Charities, The Jewish Educational Institute, Mercy Hospital, the Orphan Boys' Home, and Swope Settlement.

The last reduction here brought gasoline from 10.8 cents to 10.3 cents a gallon. The charity-sharing plan will not be extended to other cities, it was declared here. So far, the independent refiners have made no similar move.

Permanent Motor Pavilion at Indiana Fair?

INDIANAPOLIS, IND., Aug. 17—There is a movement on foot for a permanent building at the Indiana State Fairgrounds to house motor car exhibitions, which would be held annually during the fair. It is regarded as likely that the Indiana legislature, next January, will be asked to allow a substantial appropriation for the purpose.

During the fair beginning September 7, the Indianapolis Automobile Trade Association will give a display of motor cars, parts and accessories. This will be held in a large tent and all of the space was taken several weeks ago.

Safety-First M. C. Co., a New Michigan Concern

SOUTH BEND, IND., Aug. 17—The Safety-First Motor Car Co., Kalamazoo, Mich., capitalized at $10,000, has filed articles of association with the secretary of state and is making plans for the manufacture of motor cars and trucks on a patent secured by Frank Dentler, of Vicksburg, Mich. The offices of the new concern are located at 210 Kalamazoo National Bank building, Kalamazoo. The officers of the company are: F. A. Young, president; W. P. Haines, vice-president; and George J. Haines, secretary and treasurer. It is the plan of the company to manufacture auto trucks, and automobiles and gasoline engines.

L-P-C Designer Attending Army Trucks

RACINE, WIS., Aug. 17—Wm. Mitchell Lewis of the L-P-C Motor Co., maker of the Lewis six has issued the following statement:

"M. Petard, our designer and chief engineer, being a native Son of France and a Captain in the Reserve Engineering Corps, has been ordered to report for duty; the Lewis Six, which M. Petard was testing out in the Alps, has been commandeered as the personal car of the Colonel of his regiment and the French yellow body has been painted a battleship grey.

"Petard was responsible for a large part of the engineering work on the motor trucks and tractors used by the French Army and it can readily be seen that his services to his country will be of tremendous importance. We had expected M. Petard to return to this country in September, but the duration of the war, if France is actively engaged, will represent the period of his absence. While we would like to have him with us, his work as designer and chief engineer has anticipated our requirements up to January 1, 1917, and all refinements to be incorporated in the Lewis Six for that period have already been thoroughly tested out."

"All Out for Elgin Races" with 32 Entries

Twenty-seven Cars Named for C. A. C. Trophy Next Friday—All for Free-for-All Saturday

CHICAGO, Aug. 17—Showing that the interest in racing is keener than ever and that the European war is not having any effect on the sport in this country, the Chicago Automobile Club to-day announced a record-breaking entry list for the fifth annual Elgin road races, which will be run off next Friday and Saturday.

Thirty-two cars for a total of fifty-nine entries are declared for the 2 days. On the first day, when the Chicago Automobile Club trophy will be contested for by cars of 450 cubic inches and under, twenty-seven are nominated, while in the free-for-all for the Elgin National trophy on the second day the full complement of thirty-one cars is billed to start. All cars are nominated for both days except the Lozier, Chadwick, one of the Whites, one of the Duesenbergs, a Rae and Burman special.

It is a most representative field, too, made up for the most part of private entries. The Stutz, Mercer and Maxwell really are the only factories directly represented. Others are backed by private owners, and Chicago is particularly strong in this respect, with nominations from Charles E. Erbstein, E. C. Patterson and Frederick Robinson. Frank Fox, of Indianapolis, is another of those who back racing cars for the love of the sport and not because of trade inclinations.

The thirty-two cars represent sixteen different entrants. Six foreign machines—three Peugeots, two Sunbeams and a Mercedes—are in the lot, while the White is a newcomer so far as Elgin is concerned. The complete entry list is as follows:

CAR	ENTRANT	DRIVER
Peugeot	E. J. Schroeder	Not named
Stutz	Stutz Motor Car Co	B. Oldfield
Stutz	Stutz Motor Car Co	G. Anderson
Sunbeam	W. Ziegler, Jr	H. Grant
Sunbeam	W. Ziegler, Jr	G. Morris
Peugeot	L. C. Erbes	R. Burman
Marmon	C. E. Erbstein	L. Heinemann
Stutz	W. Ziegler, Jr	F. H. Dearborn
Mercedes	E. C. Patterson	R. de Palma
Duesenberg	F. Duesenberg	E. Rickenbacher
Braender Bulldog	W. Chandler	W. Chandler
Duesenberg	Fred Duesenberg	Tom Alley
Pahys	F. Robinson	M. Roberts
Mercer	Mercer Automobile Co	S. Wishart
Mercer	Mercer Automobile Co	E. Pullen
Mercer	Ed Schillo	C. Luttrell
Gray Fox	Frank Fox	H. Wilcox
Peugeot	Peugeot Import Co	R. Mulford
Lozier	R. H. Knowles	L. Fontaine
Marmon	C. E. Erbstein	M. Stringer
Marmon	Moross Amusement Co	W. D'Alene
Maxwell	Moross Amusement Co	T. Tetzlaff
Maxwell	Moross Amusement Co	W. Carlson
Maxwell	Moross Amusement Co	Not named
Rae	Elmer Rae	Fritz Walker
Chadwick	Auto Service Corp	J. C. Hoskins
Duesenberg	F. E. Duesenberg	E. O'Donnell
Great Western	James Forsey	W. Tidmarsh
White	R. A. Bennett	W. J. Shrunk
White	R. A. Bennett	Eli Caillouette
Keeton		Callaghan
Burman Special		

Of these, it is known that the E. J. Schroeder Peugeot will not start. Schroeder was the first to enter and he was counting on de Palma driving for him. Then de Palma signed with Patterson, after which Schroeder abandoned all idea of coming to Elgin. No work has been done on the car since Indianapolis.

The Rae really is an old Mercedes rebuilt. It is of the vintage of 1903 and has been modernized by "Mercedes Fritz" Walker, who will drive the car himself. The Pahys is new, built by Frederick Robinson, a theatrical man who formerly was a locomotive engineer and who has introduced in it some of his own ideas.

The Elgin meet this year will differ from its predecessors in that the Pendleton system of scoring will be used, whereby the position of each car at each mile post will be posted. This has been used at Santa Monica for several years with great success. Then the system of starting two cars at a time, as in the French Grand Prix, will be used, which should add greatly to the interest in the races. The course is the same as before, and in each race the distance will be the same—301.65 miles. The prize fund totals $6,000, with $2,000 for first, $700 for second and $300 for third, with $200 purses for the fastest lap each day given by Harry Vissering, president of the Chicago Automobile Club, and Martin J. Kavanaugh.

On August 18, Spencer Wishart set a lap record while practising for the national road races. He circled the 8 1-2-mile course in 6 minutes 24 3-5 seconds, a rate of 79.8 miles an hour. The previous record was held by Tetzlaff who made it in 6:26.

Official practice started this morning with nearly every entrant at the course. The men will be given 2 hours each day. No practice will be allowed on Thursday. The races start at 11 o'clock each day.

White Dealers and Owners on Big Tour

CLEVELAND, O., Aug. 18—A tour which has all the elements of the old, familiar sociability run is being held this week and next by S. W. Forrester, the White dealer in Manhattan, Kan. The town has only 6000 inhabitants, but Forrester has found a good list of entrants in his tour.

The hundred or more motorists in about 25 cars started from Manhattan August 17 and were to reach Denver, Col., August 19. After four days of touring in the latter state the "motorcade" will return to Manhattan over the Santa Fe trail, arriving home August 27.

Forrester calls it the "Colorado White Tour." He began several weeks ago enlisting interest by a series of form letters, inviting White owners to participate. His letters were strongly and well worded, picturing the delights of Colorado and the joys to be found in the numerous camp-fire stops that will be made.

The pilot of the tour is Dr. Willhoit, of Manhattan, in a White 40 roadster. After touring Colorado 4 days and driving to Pueblo, the return trip will be made via La Junta and Lamar, the night stop being Garden City, Kan., a run of 231 miles. The next day's trip will include Dodge City, Great Bend and Lyons, ending at McPherson. August 27 the party will pass through Herrington and Junction City on the final run of 101 miles home.

Nearly every type of White gasoline car is represented. The first White sold in Kansas was entered by its Manhattan owner and is carrying a load of newspapermen. The vehicle has been running at least six years. To carry baggage and spare tires a White 1,500-pound delivery truck is accompanying the tourists. There is nothing to prevent a tourist's stopping at a hotel if he so desires, but the outdoor life has been made a feature of the run and roadside equipment is provided.

OAKLEY, KAN., Aug. 18—At the end of the first day all of the machines on the Colorado White Tour arrived in Hays, Kan., after a run of 184 miles from Manhattan on schedule and without any engine trouble whatever. There was a little tire trouble owing to the excessive heat in Kansas, but only a little time was taken out for the changes.

Seventeen White cars are in the tour at this time and a number will join before the tour reaches Denver. The roads in Kansas are ideal for touring. After passing Salina in the Golden Belt Route the roads are as hard as macadam, and recent rains have laid the dust.

Tetzlaff's Benz Goes ½ Mile in 12 3/5 Seconds

NEW YORK CITY, Aug. 18—On August 12 Teddy Tetzlaff drove the Blitzen Benz one-half mile straight away on the salt beds west of Salt Lake City in 12 3-5 seconds. The test was made to determine the speed qualities of the course. The salt beds are about 40 miles long and 20 miles wide. The surface is water level and does not vary one-half inch in 10 miles. The beds are much harder than ice and dynamite is used to blow holes in order to sink the telephone and telegraph poles across it. It is possible to survey a circular track of any distance up to 30 miles, either in a perfect circle or an oval shape.

Tetzlaff's record is not official because it was not sanctioned by the A. A. A.

Disbrow Lowers Mile and 2-Mile Track Records

NEW YORK CITY, Aug. 12—Louis Disbrow, in the Simplex Zip, on August 8 made a mile on a circular dirt track in St. Louis, Mo., in 45 1-5 seconds, one-fifth of a second below the world's record made by Oldfield at Bakersfield, Cal., April 27, 1913, in a Christie car. The 2-mile record on a dirt track, also made by Oldfield at Cleveland, O., on September 14, 1912, of 1:35 46-100, was also lowered by Disbrow, who negotiated the distance in 1:32 3-5.

These records have not as yet been accepted by the A. A. A., as the timing apparatus used at the meet has not been passed by the association. It will, however, test the apparatus at the coming Brighton Beach race on September 7. If it is passed by the contest board, these two records will stand as official.

NEW Cyclecar Firm for Wilmington.—The Cycle Car Co., Wilmington, Del., a corporation chartered under the laws of Delaware, is now in active business and expects to have its product ready for delivery to agents soon. The firm manufactures a cyclecar. The firm was incorporated by Marvel, Marvel & Wolcott, and T. C. Bradford, a well-known automobilist of Wilmington, is the salesmanager. The machines are to be manufactured there, which will be a distributing center for several states around. A complete electric equipment will be provided, with electric lights flashing both strong and dim. The gears are three speeds forward and one reverse. The rate of fuel consumption is estimated at between 30 and 40 miles per gallon, and the speed ranges from 3 to 55 miles per hour. The gasoline tank will be located under the cowl dash, with a capacity of eight gallons. Wheels are the Houk wire type. The four-cylinder motor generates from 16 to 20 horsepower. The shops are located at 224 French street. Already many inquiries have been made regarding the machine, and even orders, some from foreign countries, placed. The industry bids fair to be a complete success, and the advantages offered by the city of Wilmington as a distributing center are many.

Breen Co. to Add—The Breen Motor Co., Winnipeg, Man., plans to build an addition to its plant at Broadway and Sherbrooke street.

Portland Co. to Add—The Fiske Rubber Co., Portland, Ore., will begin work shortly on the construction of a three-story factory at Tenth and Burnside streets.

American Co. Buys Land—The American Motor Co. bought a 90 by 240-foot lot at Clearfield and Seventeenth streets, Philadelphia, Pa. It is said that a plant will be erected on the site.

Factory for Mount Vernon—Plans for a factory building on Pearl street, Mount Vernon, N. Y., to cost $20,000, are being completed by the Benford Mfg. Co., maker of spark plugs.

Midgley Installing Machinery — The Midgley Tire & Rubber Co., Lancaster, O., is installing machinery in its plant, and will commence operating at an early date. It is reported that additional power plant equipment will be required later on.

Umpton Co. Expanding — Umpton Automobile Co., Bristol, Ind., automobile springs, is looking over the field in La Porte, Ind., with a view of expanding its business and will try to interest the people in the company's stock; it proposes to also manufacture a light five-passenger car.

Independent Tire Again Busy—The Independent Tire Co., Guelph, Ont., has been taken over by a new board of directors, including President Reiner, of Wellesley; Frank Campbell, of Mitchell, and Mr. Dunn, of Strathroy. They open again with fifty hands and hope to double that number shortly.

Selling Pope Plant's Machinery—Colonel George Pope, receiver of the Pope Manufacturing Co., is selling off the machinery in small lots. The sale of several parcels was authorized recently by the judges of the superior court. The factory is to close down August 20, when all operations will stop.

Southern Co. Purchases Land — The Southern Automobile Co. has bought 10 acres of land in St. Bernard parish, New Orleans, La., from A. P. Perrin and will start the erection of what is to be the first automobile manufacturing plant in the South. The plant is to be completed the latter part of November.

Stearns Will Add Two Plants—The F. B. Stearns Co., manufacturer of automobiles, is having plans prepared for the erection of two factories in East Cleveland, O. One will be four stories, 70 by 157 feet; the other a five-story, 70 by 155 feet reinforced-concrete structure. The estimated cost of the buildings is $20,000.

Pierce Speed Controller Increases—The Pierce Speed Controller Co., Anderson, Ind., recently greatly increased its working force, having received some large orders from several concerns connected with the automobile business. One of the largest orders received was for 6,000 governors from the Continental Motor Mfg. Co., Detroit.

Plans Company Reorganization—Plans are being made at Coshocton, O., for a reorganization of the S. & M. Tire & Rubber Co., of that city. It is expected that the interests in the company held by Canton and Akron men will be taken over by Coshocton capital. A new plant is being equipped for the company and operations are to be started there soon.

New Automobile Industry—Prather Bros., Georgetown, Ky., have bought a large dwelling house there and will convert it into a demountable wheel factory. The Prathers have recently invented and patented an automobile wheel. They have sold 200 of their wheels to an automobile factory in Cincinnati.

Grant Plant Inspected—Recently the Grant Motor Co. invited the business men of Findlay, O., to visit its plant. A large number responded to the invitation, and under the direction of officers of the automobile company a thorough inspection of the premises was made and the various stages in the construction of a motor car explained to the visitors.

Eureka Co. Moves—The Eureka Auto Parts Mfg. Co., St. Louis, Mo., has moved into larger quarters at 1915 Pine street. The company, which manufactures the Eureka Diamond Honeycomb radiators and special coolers for the U. S. government, for use on tractors in the Panama Canal zone, has recently placed on the market a new V-shaped radiator for Ford cars.

Woodward Pump Co. Organized—The Woodward Pump Co., Detroit, Mich., has been organized here. Abishal Woodward is president; Edward L. Ackerman, vice-president; Clarence E. Blaesser, treasurer; Chester T. Fezzy, assistant-treasurer and Cornelius B. Woodward, secretary. Temporarily the offices are at 222 Third street. Pending the erection of a plant, the Joseph N. Smith Co., 22 Porter street, will make the pumps which are known under the trade name of "Impulsive Tire Pump."

The Automobile Calendar

Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug.	Denver, Col., 650-mile Run, Colorado Springs to Salt Lake City.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7	Brighton Beach, N. Y., Track Meet, New York Motor Dealers' Contest Assn.
Sept. 7	Denver, Col., Track Race, Overland Park Track, Denver Motor Club.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 9-11	Convention Paving Brick Mfrs. Assn., Cleveland, O.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Automobile Show.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in  the Industry

Motor Men in New Roles

TWO New Russell Appointments— It has just been announced that J. A. Martin, for the past 4 years manager of the Vancouver branch of the Russell Motor Car Co., Toronto, Ont., has been appointed salesmanager for Canada. When the Vancouver branch was organized Mr. Martin was chosen for the work of introducing the Russell car on the Pacific coast. He has been especially successful in opening up new ground and prefers the more strenuous work of organizing new territory. J. R. Marlow has been appointed manager of the Montreal branch. Mr. Marlow has been salesmanager of the Russell company until recently. During the past month Mr. Marlow went to Montreal to take charge of the business there for a short time. Both appointments date from August 1.

Holmes, Alma Salesmanager—M. J. Holmes has been appointed salesmanager of the Alma Motor Truck Co., Alma, Mich., builder of the Republic trucks.

Van Horne Studebaker Manager—The commercial vehicle department of the Studebaker Corp., Detroit, Mich., is now under the management of Charles Van Horne.

Howard Hupp Assistant Manager — W. C. Howard, who has been a traveling salesman for the Hupp Motor Car Co., Detroit, Mich., has been appointed to the position of assistant sales manager.

Walton Heads Champion Co.—A. R. Walton, formerly with the St. Louis Car Co., St. Louis, Mo., is at the head of the Champion Motor Car Co., 5200 N. Second street, which is building a four-cylinder car costing $800.

Myers Quits Stutz Job—W. D. Myers, for the past 3 years salesmanager of the Stutz Motor Car Co., Indianapolis, Ind., has resigned his position. It is expected that he will enter the retail end of the motor car business.

Cohen Joins Marmon—J. Groves Cohen, formerly with U. S. Motors and Locomobile, has joined the sales department of Nordyke & Marmon Co., Indianapolis, Ind., and will travel the South in the interest of the Marmon.

Brown Makes Change—H. W. Brown, formerly district representative of the Lozier Motor Co., Detroit, and for 3 years salesmanager for Don Lee, San Francisco, has become a member of the Frank Roueche Co., of Salt Lake City, Utah.

Stephenson Joins McFarlan—R. E. Stephenson has been appointed district representative for the McFarlan car and will make his headquarters in Indianapolis, Ind. Mr. Stephenson has been in the retail automobile business in Muncie, Ind., for several years past.

Buck Goes to Hupp—Charles E. Buck, formerly with the advertising department of the Peninsular Engraving Co., and also Detroit representative of the J. Walter Thompson Co., has been appointed assistant advertising manager of the Hupp Motor Car Co., Detroit, Mich.

Curtis Crow District Manager—L. H. Curtis, of Crisfield, Md., has been appointed by the Crow Motor Car Co., as district manager of the Crow-Elk-Hart line in the Philadelphia territory. The company's plant at Elkhart, Ind., is busily engaged in turning out its new 1915 models.

Root Succeeds Ashley—H. G. Root, Springfield, O., has purchased the stock held by H. L. Ashley, secretary-treasurer and general manager of the Westcott Motor Car Co., Richmond, Ind., and succeeds him September 1. Mr. Root has been engaged for many years in the automobile supply business in this city.

Kelly Now Studebaker Distributor—H. E. Kelly, of Oklahoma City, Okla., who for the past 4 years has been state representative of the Studebaker Corp. in Oklahoma, has resigned his position and organized the Kelly Motor Co., which will open offices in that city for the distribution of the Studebaker cars.

Dixon Resigns — A. Dixon, for several years past salesmanager of the McFarlan Motor Co., Connersville, Ind., has resigned to accept the position of district manager for the Krit Motor Car Co, and will make his headquarters at Omaha, Neb. Mr. Dixon will have charge of a wide territory covering several states, for the Krit company.

Light, Dixon Detroit Head—Oliver Light has been appointed general manager of the offices which the Joseph Dixon Crucible Co., Jersey City, N. J., has opened in Detroit and which are temporarily with the Boyer-Cambell Co., Congress and Brush streets. The Detroit management will look after the interests of the New Jersey company in the states of Michigan, Indiana and Ohio.

Scheu Resigns from Euclid—E. A. Scheu, president and general manager of the Euclid Motor Car Co., New York City, has tendered his resignation and severed all connections with the company. He disposed of his stock holdings and will have no interest whatsoever in the future of the company. Mr. Scheu intends to take a short vacation, and has made no announcement regarding his future plans.

Boldman, Standard Salesmanager—E. D. Boldman, during the last 6 years identified with different commercial vehicle manufacturers as their distributor in the East, has been appointed salesmanager for the eastern district, consisting of the states of Massachusetts, Rhode Island and Connecticut, for the Standard Motor Truck Co., Detroit, which has decided to appoint other district managers in different sections of the country.

Garage and Dealers' Field

Will Handle National—The Schreiber-Boorse Motor Car Co., Milwaukee, Wis., for the past 7 years distributor for the Locomobile, has closed a contract with the National Motor Vehicle Co., Indianapolis, Ind., to handle the National car in eastern Wisconsin.

Regal Added to Cartercar in Wisconsin—D. Wittenberg, owner of the Cartercar-Wisconsin Co., 2713 Grand avenue, Milwaukee, state agent for the Cartercar, has taken the agency for the Regal and to handle this department has organized a new corporation, the Regal Motor Co., with $5,000 capital.

Good Studebaker Sales Recorded — During the week ending June 20, R. L. Sutherland, Studebaker district representative for Indiana, reports that sixty-one Studebaker cars were sold out of Indianapolis, while during the following week the sales totaled close to sixty cars.

Reopell Buys Out Partner—A. V. Reopell has bought out his partner, W. L. Bunker, in what was formerly the Bunker & Reopell Co., Springfield, Mass., which had the agency for the Chevrolet cars. Mr. Reopell will continue the business. During the past season the former firm sold 54 Chevrolet cars in this city and vicinity.

Brown Tube's Winnipeg Office — The Brown Scientific Tube Co., the head office being at Longacre Building, Broadway, New York City, will open offices in Winnipeg at an early date. Senator Davis has control of the selling rights for Manitoba and Saskatchewan, and has appointed Mr. Murray as manager of the Winnipeg branch.

Ford Service in Madison, Wis.—A four-story Ford service building will be erected in Madison, Wis., state capital, by L. F. Schoelkopf, one of the first dealers in Madison and Ford agent for 7 years. Plans are being prepared for a fireproof building, 50 by 132 feet in size, four stories high, and when completed the Schoelkopf garage will be moved from 116 South Pinckney street to East Washington avenue.

Repairs Insisted Upon — The New Haven motorists have hit upon a good plan to insist on repairs being made in the city streets. Now when they see spots that are neglected, and which have been allowed to ravel away without any effort on the part of city officials to make repairs, the motorists get the local papers to take pictures and print stories showing the neglect, and this acts as a magical wand in changing conditions, for the officials do not relish public criticism backed up by photographic proofs.

New Reo Agents Appointed—The Capital Motor Car Co., Columbus, O., has been organized by Ira P. Madden and Ralph Atkinson, who are respectively president and general manager of the company, which has located at 168 North Fourth street, and which has the agency for the Reo cars for twelve counties, including Franklin county. The Reo Sales Co. and the Jeffery Distributing Co. have been organized in Salina, Kans., and Earl Hudkins is manager of both companies, which have the agency for the Reo and Jeffery cars.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

Canada

WINNIPEG—Canadian Bull Tractor Co.; capital, $1,000,000: to manufacture motor rucks. Incorporators: W. H. McWilliams, A. R. Argraft, J. S. Loudon, W. J. Cummings, Roy M. Wolbin, Walter Pace, L. A. Canon and H. P. Williams.

Illinois

CHICAGO—Service Motor Supply Co.; capital, $5,000; to deal in motor cars. Incorporators: Arthur J. J. Welsh, Gus. C. Aucutt, Samuel H. Silverman and H. F. Walbaum.

CHICAGO—North Side Buick Sales Co.; capital, $8,000; to deal in motor cars, accessories, etc. Incorporators: Henry Weil, Herman J. Rosenberg and Harry J. Lurie.

Indiana

ANDERSON—Simplex Sales Co.; capital, $12,000; to deal in motor cars. Incorporators: William H. Nelson, Eldred H. Wilford and Hattie A. Wheelock.

Iowa

WATERLOO—Dart Motor Truck Co.; under Delaware laws; capital, $600,000.

Kentucky

COVINGTON—Kenton Motors Co.; capital, $10,000. Incorporators: E. J. Rouse, L. E. Booth and M. R. Etheredge.

Louisiana

NEW ORLEANS—Eureka Water Motor Co.; capital, $10,000; to manufacture motors. Incorporators: J. B. Rochelle, E. J. Ernst and N. B. Ernst.

Missouri

LAWRENCEVILLE—Maxwell Motor Car Co.; capital, $200,000; to manufacture, buy, sell and repair motor cars. Incorporators: Andrew L. Maxwell, Casper L. Lewis and Noah M. Tehill.

New Jersey

PASSAIC—Passaic Auto Co.; capital, $1,000; to deal in motor cars. Incorporators: Chester R. Bates, M. K. Raymond and Chester L. Holloway, all of Passaic.

New Mexico

ROSWELL—Roswell Auto Co.; capital $50,000; general motor vehicle business. Incorporators: C. M. Farnsworth, C. C. Cagle and C. M. Sheperd, all of Roswell.

New York

DUNKIRK—Dunkirk Corporation; capital, $30,000; to manufacture mufflers, motors, engines, etc. Incorporators: E. Caldwell, E. K. Buttolph and R. J. Gross.

EDDYVILLE—Sanders Wilson Barnaby Co.; capital, $25,000; to deal in motor cars, etc. Incorporators: K. T. Barnaby, Newark, N. J., and others.

NEW YORK—Ventre & Ostruk; capital, $10,000; general motor car business. Incorporators, Henri Ventre, 250 West 54th street; Paul Ostruk, 1296 Avenue A; Joseph Schlesinger, 424 East 54th street.

YONKERS—Foster Motor Sales Co.; capital, $3,000. Incorporators: George B. Foster, Mary E. Foster and J. Bertram Foster, all of 84 Ludlow street.

Ohio

COLUMBUS—Capital Motor Car Co.; capital, $10,000; general motor vehicle business. Incorporators: Ira Madden, R. P. Atkinson and C. A. Yes.

Pennsylvania

PHILADELPHIA—Interstate Sales Co.; capital, $25,000; to manufacture and deal in motor cars, etc. Incorporators: W. C. Arnold, Lansdowne; H. G. Lansinger, Philadelphia; J. M. Satterfield, Dover.

Tennessee

NASHVILLE—Union Motor Co.; capital, $15,000; general motor vehicle business. Incorporators: E. Fisher Coles, Harding E. Jackson, R. C. Jones, Albert A. S. Britt and R. B. C. Howell.

Texas

HOUSTON—Emmert Machine & Auto Co.; capital, $5,000. Incorporators: Gus Emmert, Emil Emmert and C. G. Watson.

Wisconsin

MILWAUKEE—Regal Motor Co.; capital, $5,000; to deal in motor cars and accessories. Incorporators: D. Wittenberg, H. E. Legg and N. M. Wittenberg.

GARAGES AND ACCESSORIES

Connecticut

HARTFORD—Allen Bros. Garage; capital, $50,000.

California

SAN DIEGO—Owl Taxicab Co.; capital, $50,000. Incorporators: Herbert C. Guild, Horton L. Titus and E. L. Davin.

SAN FRANCISCO—Grand Pacific Garage Co.; capital, $20,000; to operate a garage. Incorporators: J. S. Adler, D. S. Cohn, J. J. Marx and H. Marx.

Delaware

DOVER—American Motor Utilities Co.; capital, $500,000; to manufacture Compton pneumatic starters and automatic control devices. Incorporators: J. McLaren, F. B. Knowlton and S. V. Dowling, all of New York City.

DOVER—International Motor Clubs Association; capital, $250,000; to furnish property protection to motorists. Incorporators: C. H. Butler, M. M. Hirons and L. B. Phillips, all of Dover.

Illinois

CHICAGO—United Electric Car Owners' Garages; capital, $50,000; to deal in motor cars, tires, etc., and operate garages. Incorporators: Sylvester C. Abbott, Dwight S. Bobb and E. P. Rumrill.

Indiana

EVANSVILLE—Benninghof-Nolan Co.; capital, $100,000; to deal in motor car supplies. Incorporators: Henry P. Benninghof, John J. Nolan and Val F. Nolan.

Kentucky

LOUISVILLE—Peerless Tire & Rubber Co.; capital, $10,000. Incorporators: A. F. Wolke, C. H. Wolke and Keith L. Bullitt.

Michigan

DETROIT—K.C.B. Co.; capital, $200,000; to manufacture a carbureter for heavy fuel. Incorporators: J. H. Chambers, C. H. Bennett and A. A. Leslie.

DETROIT—Michigan Lubricator Co.; capital, $200,000; to manufacture lubricators and other devices. Incorporators: John B. Corliss, John B. Corliss, Jr., and Cullen D. Corliss.

Missouri

ST. JOSEPH—National Spring Wheel Co.; capital, $100,000; to manufacture metal wheels for motor cars. Incorporators: W. L. Mann, W. P. Justice and E. J. Kearby.

North Carolina

WILMINGTON—Lassiter-McDuffie Co.; capital, $25,000. Incorporators: Clyde Lassiter, Neal O. McDuffie and Edwin T. Burton.

New Jersey

SOUTH ORANGE—Robinson Seitz Tire Co.; capital, $5,000; motor car tires. Incorporators: G. W. Robinson, A. M. Seitz and Frank Robinson, all of South Orange.

New York

BROOKLYN—Ellenbeck Tire & Supply Co.; capital, $5,000; to manufacture, deal in and repair tires, sundries, etc. Incorporators: William Ellenbeck, Jr., 44 Hancock street; Elmer H. Wilkinson and Elmer E. Wilkinson, both of 161 Underhill avenue.

ESOPUS—Kronenbergs & 77th Street Garage; capital, $1,000. Incorporators: Harris Weinstein, 92 Christie street, New York; Bertha Kronenberg and Bertha Kronenberg, both of 113 East 77th street, New York.

NEW ROCHELLE—C.B.A. Sales Co.; capital, $3,000; general garage business. Incorporators: Sidney H. Kent and William H. Schumacher, both of New Rochelle; M. J. Murphy, Brooklyn.

NEW YORK—Canada Carbide Sales Co.; capital, $10,000. Incorporators: Henry J. Fuller, Dongan Hills, S. I.; Douglas W. Dunn, Orange, N. J.; Walter L. Bush, West Brighton, N. Y.

NEW YORK—Pickens Auto Cloth Co.; capital, $1,000. Incorporators: Sale A. Pickens, 117 East 17th street; James W. Pickens, 5 West 65th street; Benjamin Simon, 17 East 101st street.

UTICA—Utica Garage Co.; capital, $1,500; to operate a garage. Incorporators: Paul Bartmer, 25 Plant street; Park T. Higgs, 1052 Elm street; Benjamin H. Dwinnel, Osborne avenue, New Hartford, N. Y.

Ohio

COLUMBUS—Ogden Fibre, Gear & Tire Co.; capital, $1,000; to manufacture and sell motor parts. Incorporators: D. Ogden, E. Ogden and Hubert S. Ogden.

Oklahoma

ENID—Oklahoma Auto Bus Co.; capital, $1,000. Incorporators: F. J. Gentry, Pond Creek; C. E. Pendleton and L. G. Pendleton, both of Enid.

Wisconsin

MILWAUKEE—The L-Arrow Auto Livery Co.; capital, $10,000; to operate a taxicab and motor livery service. Incorporators: Charles H. Ewe, William F. Albers and Charles W. Modersolm.

Changes of Name and Capital

Indiana

INDIANAPOLIS—National Motor Vehicle Co., from $250,000 to $600,000.

Ohio

CINCINNATI—United States Motor Truck Co., from $25,000 to $300,000.

CLEVELAND—Winton Motor Carriage Co. to Winton Motor Car Co.

Kentucky

COVINGTON—United States Motor Truck Co., from $250,000 to $300,000.

Automobile Agencies Recently Established

PASSENGER CARS

Arizona

Phoenix	Metz	Cole Motor Co.

Arkansas

Pine Bluff	Studebaker	L. B. Bracken & C. H. Montague

California

Los Angeles	Premier	Smith Brothers
Oakland	Maxwell	The Peacock Motor Co

Canada

Calgary, Alta	Haynes	H. T. Sheffield
Calgary, Alta	Maxwell	Thos. E. Jackson
Edmonton, Alta	Baby Rex	Rex Motors of Canada, Ltd.
Edmonton, Alta	Paige-Detr	Dominion Motors, Ltd.
Medicine Hat, Alta	Franklin	Diehl Motor Car Co.
Victoria, B. C	Lozier	J. Cameron
Gananoque, Ont	Maxwell	W. G. Gibson
Hamilton, Ont	Cole	The Patterson Auto Sales Co.
Hamilton, Ont	Haynes	Jack C. Elliott
London, Ont	Chandler	The Central Garage
Niagara Falls, Ont	Marathon	Crane Bros.
Ottawa, Ont	Brockville Atlas	Hull & Ottawa Garage Co.
Paris, Ont	Saxon	A. C. Lee
Sarnia, Ont	Franklin	Hitchcock & Richardson
Toronto, Ont	Chandler	Brintnell Motors, Ltd.
Toronto, Ont	Napier	The British Canadian Import Co.
Magog, Que	Maxwell	W. T. Peters
Estevan, Sask	Maxwell	Frederichson & Green
Moose Jaw, Sask	Maxwell	Henry B. Annabel

Colorado

Denver	Chalmers	Western Motor Car Co.

District of Columbia

Washington	Metz	Cartercar Sales Co.
Washington	Mitchell	Mitchell Sales Co.
Washington	Reo	Smith-Trew Motor Co.

Florida

Gainesville	Cole	Gainesville Motor Car Co.
Tampa	Cole	West Coast Automobile Co.

Illinois

Centralia	Cole	Centralia Garage & Vulcanizing Co.
Joliet	Cole	H. B. Sahler

Indiana

Bloomington	Cole	College Avenue Garage
Evansville	Ford	Korb & Co.
Ft. Wayne	Cole	Ft. Wayne Iron Store Co
Hillsboro	Cole	Byron Heesler
Huntington	Cole	John E. Miller
Kokomo	Cole	C. F. Seaward & Son
Martinsville	Cole	Martinsville Auto Co
Michigan City	Cole	W. J. Grieger
Needham	Cole	L. M. Megee

Iowa

Council Bluffs	Cole	C. H. Robertson
Eldora	Cole	Emeny Auto Co.
Iowa City	Cole	H. A. Knease & Sons
Muscatine	Cole	Danham & Smalley Motor Co.
Ottumwa	Cole	Johnson Motor Car Co.

Kansas

Chanute	Cole	E. W. Weiner
Halls Summit	Cole	H. W. McFadden, Jr.
Iola	Cole	J. G. Mittelback
Ottawa	Cole	Troup Brothers
Sabetha	Cole	Mishler Bros.
Strong City	Cole	Dr. J. Hinden
Topeka	Cole	George R. Evans
Yates City	Cole	Stoll Bros.

Accessories for the Automobilist

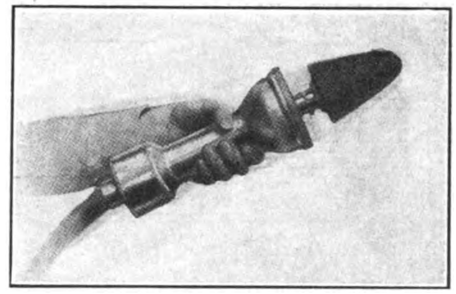


Fig. 5—Wizard car washer with a revolving brush propelled by the outflowing water

STEWART Hand Operated Horn—Five dollars is the price of a new hand operated horn, Fig. 1, just announced by the Stewart-Warner Speedometer Corp., Chicago, Ill.

The feature is the special double bracket for attaching it to the car. This supports the horn both in the middle and also at the rear end, so that any pressure on the sounding plunger is distributed between these two points, and therefore no looseness can develop.

This bracket, instead of being fastened directly to the car is mounted on an additional bracket, which is attached to the top rail of the car and conforms to the direction and design of the top rail. The two brackets are fastened by a swivel joint and thus can be turned in any direction desired.

Comfort Shock Absorbers—Front and rear shock absorbers for Ford cars are manufactured by the Comfort Shock Absorber Co., Hempstead, L. I. One of these is illustrated in Fig. 2. It will be noted that the device is designed for attachment to the spring ends and that two springs concentrically placed are employed in each unit. The advantage of this is that a better action is secured. Ordinarily the inner spring supports the load, but when the load increases the second spring comes into action.

A 30-days' free trial is offered and the guarantee is for life. The price per pair is $7.00 and four list at $12.50.

Tite-Wad Self-Locking Nut—The Empire Automatic Equipment Co., Syracuse, N. Y., is manufacturing the locknut illustrated in Fig. 3.

It is made in two parts only, the inner and outer sleeve, and by the peculiar spiral joint between these two members there is a cam-like action, the outer sleeve turning on the inner one, and locking the nut to the threads by friction.

National Standard Jacks—The Standard line of jacks, Fig. 4, manufactured by The National Standard Co., Niles, Mich., comprises all types. They are made for several lifting capacities and purposes, and lift either by ratchet mechanism or by screw arrangement. The latest type to be placed on the market by the Niles concern is the Standard tire saver and garage jack which is made primarily for quick action, and is preferably sold in sets of four so that the car may be completely lifted from the floor at its four corners, thus prolonging the life of the tires when the car is to stand for any length of time. Oily floors are in this way relieved of their menace.

The new National jack is made of malleable castings and the foot of the frame is of generous proportions to give needed support against tipping over. The lifting bar is enclosed and cannot fall apart when moved. Another point is that the teeth are placed close together, permitting of a wide range of action. The top of the lifting bar is swiveled, allowing for its being turned to any desired position. The jack may be readily adjusted to fit any size wheel from 30 to 42 inches in diameter.

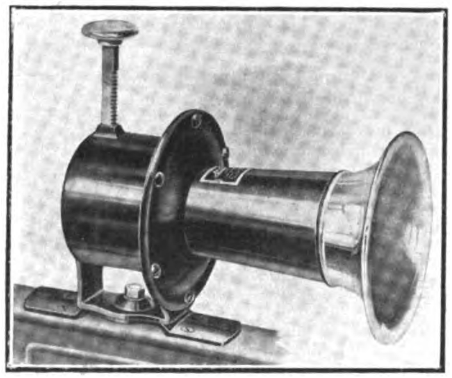


Fig. 1—New Stewart hand-operated horn

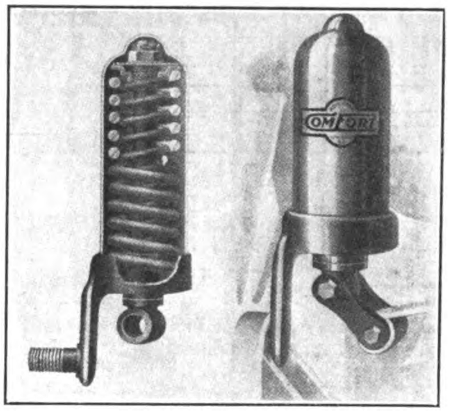


Fig. 2—Comfort shock absorbers for Fords

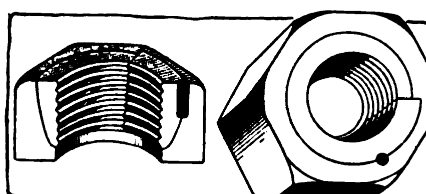


Fig. 3—Tite-Wad self-locking nut

The price for a set of four is $5.50.

The other jacks of Standard make range in lifting capacity from 1,500 to 2,000 pounds, and are thus adaptable to any car. One very good model, for instance, is the No. 1 Standard which is a 1-ton jack of the enclosed ratchet type and which has a height, with bar down, of 11 1-2 inches. With the lifting bar raised, this dimension is 18 inches. It weighs 9 1-2 pounds and lists at $4. This is suitable for the heaviest cars. The Baby Standard at $3 lifts 1,500 pounds, weighs 6 1-2 pounds and has a height with the bar down of 10 1-2 inches. Then there are several other styles.

For use with Fords or other light cars, a screw-type jack has been added to the line. This device, selling at $1, weighs 4 pounds and has a 6-inch lift.

The National company also makes a metal handle for jacks where it is necessary to lift large, heavy cars. These serve a double purpose, as they have a tire removing tool on one end. The length of these handles is regularly 15 inches, but for use with cars having a considerable overhang at the rear axle, they may be had 18 inches in length.

Wizard Car Washer—An improvement over the ordinary method of sponging cars in washing is claimed by the Century Foundry Co., Syracuse, N. Y., who has brought out a washer consisting of a combined nozzle and brush, Fig. 5. There are two brushes, both closely and smoothly shaved, one round like a sponge for use on flat surfaces, the other pointed for corners.

The feature of the new device is that it revolves at a speed of from 1,500 to 2,000 revolutions per minute, thus removing the mud and dirt instantly from

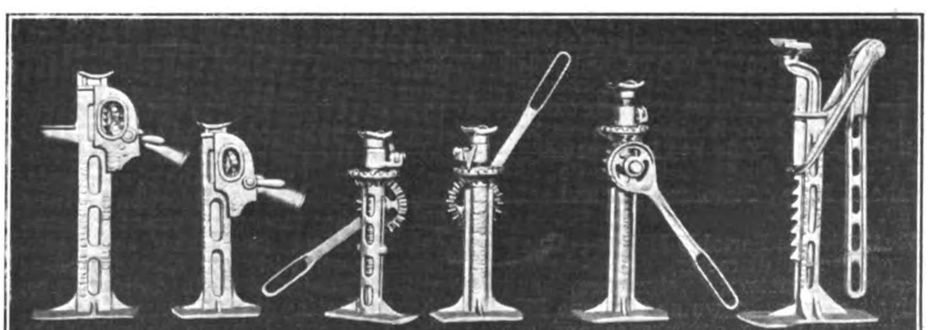


Fig. 4—National standard jacks of various types. The one at the extreme left is sold in sets of four and is to be used for saving the tires when the car is standing

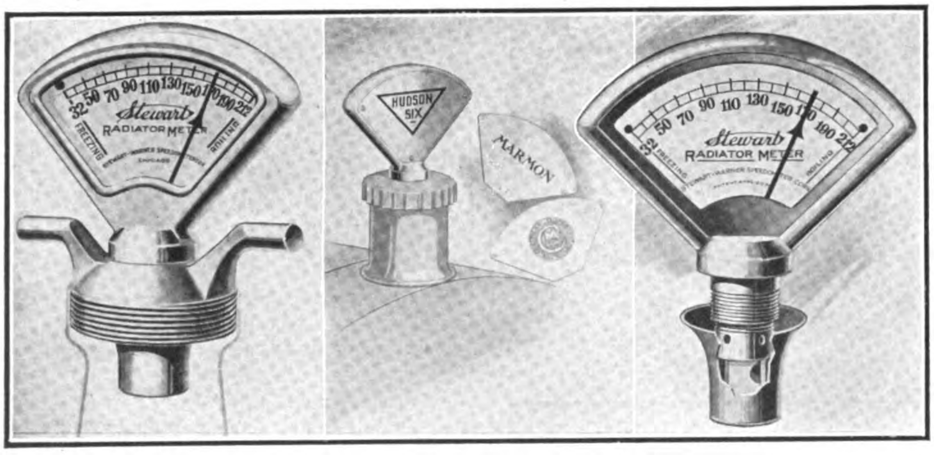


Fig. 6—Stewart radiator meters showing method of attaching the nameplate of the car to the back of the device. At the left is the combined radiator cap and meter for Fords

the most highly polished vehicle and yet it is claimed that no injury to the varnish is done for the reason that the brush runs inside a film of water which is thrown from the exhaust of the motor that propels the brush.

Stewart Radiator Meter—The special thermometer, Fig. 6, brought out for registering radiator temperatures a few months ago has recently been improved by adding a replica of the name-plate of the car to the reverse side. In addition a combined radiator meter and filler cap is now manufactured for Ford cars.

It is manufactured by the Stewart-Warner Speedometer Corp., Chicago, Ill.

Shanhouse Motorsuit—Many motor car owners will appreciate the garage suit made by W. Shanhouse & Sons, Rockford, Ill., and retailing at $2. This suit is similar to those used by racing car drivers while they are working about their cars. The suit is made of strong tan-colored material and covers the entire body.

Bryant Gearshift Lock—Fig. 7 shows a lock designed to prevent the theft of the car by locking the change gear lever in place. It consists of a pair of forks that slip down into the shifting slots and thus prevent the lever from being moved from neutral. The upper part of the mechanism, which contains the lock is clamped to the change lever and the lower part which carries the fork telescopes into it.

The clip which holds the upper half in place is bolted from the inside before the parts are telescoped together. The body is locked to the lever by a small ridge across the back wall of the body, which beds into a 1-8 groove, filed across the lever and the two parts are locked together by brass pins which are driven in and cannot be removed except by drilling. The locking of the car is the work of a moment. Simply kick or push down the stem and the forks of the lower end are forced into the gate on each side of the lever, and hold it rigidly in neutral until the proper Yale key is inserted.

It is made by the Bryant Sales Co., 422 Cuyahoga Bldg., Cleveland, O., and sells for $3.

Westinghouse Portable Meters—A new line of 5-inch diameter, direct-current portable ammeters, voltmeters, and millivolt meters, known as the type PW, has just made its appearance and are shown in Fig. 8.

These instruments are direct reading and suitable for battery testing, signal

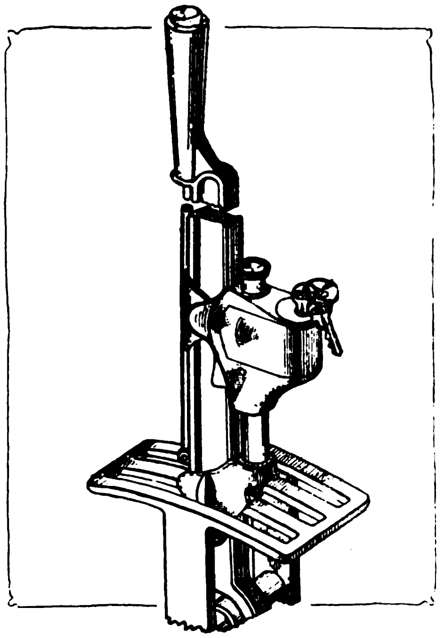


Fig. 7—Bryant gearshift lock to prevent theft of the car

work, and all purposes where an instrument of pocket size is desirable. They are particularly adapted to testing electric lighting and starting equipments of automobiles. They operate on the D'Arsonval principle, having a moving coil and a permanent magnet, which renders them free from residual errors.

The complete movement is mounted as a unit. A unique feature is the arrangement of the moving element which can be readily removed by taking off the cover and removing the two screws on the side pole-piece support. The entire moving element and the bearings can then be lifted out as a unit and can be replaced in exact position. This makes repairing possible without disturbing the alignment of the magnetic circuit.

Owing to the use of an aluminum pointer, a light counter-weight is sufficient, resulting in a light-weight movement and small wear on the pivot jewels. Their high torque in proportion to their light weight moving element insures great accuracy, considering their size. The meter will withstand shocks, such as it will be subjected to in ordinary use, without affecting the accuracy.

The light metal frame on which the moving coil is wound moves through the air-gap of the strong magnet and makes the reading inherently dead-beat. This very important feature enables readings to be taken quickly, and prevents violent fluctuations from injuring the pointer or the moving element.

The scale is made of metal and subtends an arc of 90 degrees, giving large open divisions which are uniform throughout.

The full length of the pointer shows on the dial, thus making the meter easy to read. Each meter is mounted in a morocco leather-covered wood case with the heavy bevelled glass over dials.

A new feature has been used on the meter terminals. The terminal stud has a V-shaped groove (see Figs. 3 and 4) into which the wire lead is inserted. The thumb nut then screws down on the lead, gripping it in close contact between the thumb nut and the two sides of the groove. This feature has not heretofore been used on meters of American make, it is stated.

These meters are manufactured by the Westinghouse Electric & Manufacturing Company.

Ford Sedan Body—A closed body, Fig. 9 of the sedan type is manufactured by the Storm Buggy Co., 129 East Center street, Fostoria, O., for Ford automobiles. It is designed to carry four or five people comfortably. Wide window spaces are a feature. The windows may be raised or lowered at will in the doors and back, and the front opens for ventilation and rain vision. It is stated that the body is cool in summer, due to the provision for ventilation, and yet is warm in winter and dry in rainy weather. The upholstering is deep, and is made of whipcord, curled hair and comfortable pillow springs. The rear and side windows are fitted with silk curtains.

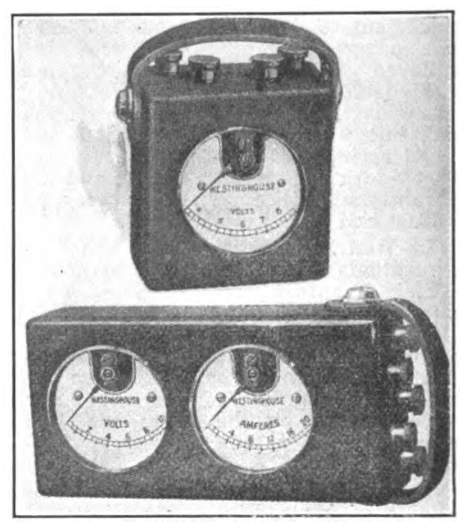


Fig. 8—Westinghouse portable meters. Top shows the voltmeter, while below is a combination of the volt and ammeter

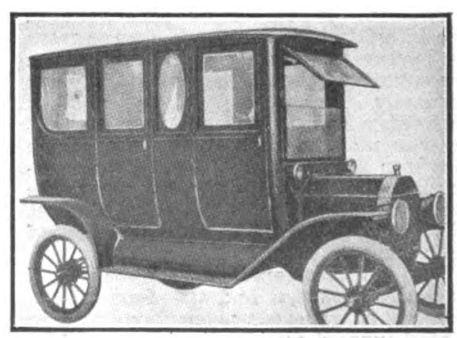


Fig. 9—Ford sedan body

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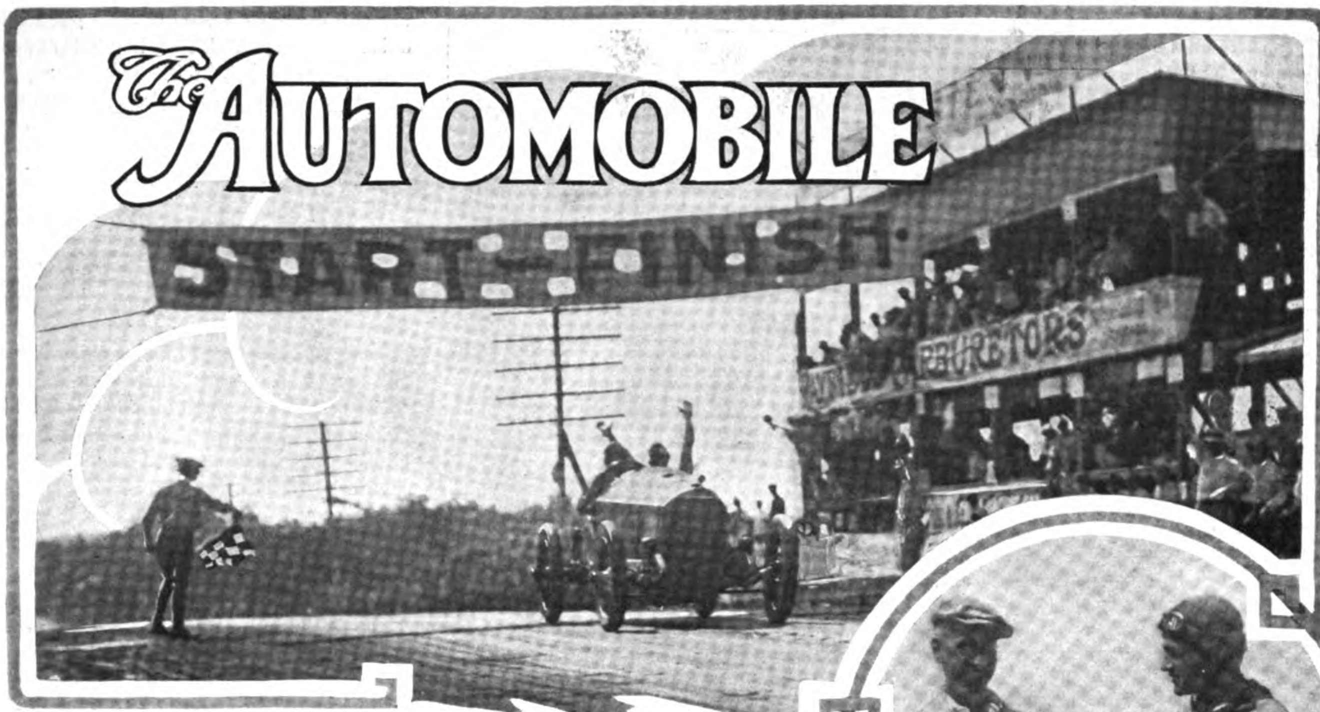
The Automobile



Ralph De Palma receiving the flag at the finish of the Elgin National Trophy Race. Right—E. C. Patterson, of Chicago, entrant of De Palma, congratulating him on his victory

De Palma in Mercedes Wins Both Races At Elgin—Records Broken

Elgin National Trophy

Car	Driver	Time	M.P.H.
Mercedes	De Palma	4:06:18	73.53
Mercer	Pullen	4:07:28	73.17
Stutz	Oldfield	4:24:02	68.59
Sunbeam	Maurice	4:31:09	66.78
Burman Sp.	Hearne	4:35:47	65.79

Chicago Automobile Club Cup

Car	Driver	Time	M.P.H.
Mercedes	De Palma	4:05:01	73.91
Stutz	Anderson	4:05:45	73.69
Peugeot	Mulford	4:08:16	72.94
Stutz	Oldfield	4:15:23	70.91
Braender B'dg	Chandler	4:22:58	69.88
Marmon	Heineman	4:33:18	66.26
Stutz	Dearborn	4:37:29	65.23
Gray Fox	Wilcox	4:37:43	65.18

Stutz Second on Friday, Mercer on Saturday — Wishart Killed on Saturday — Tires Make Wonderful Showing

CHICAGO, ILL., Aug. 24—Snatched from the jaws of war, the German Mercedes which Louis Wagner drove to second place in the French Grand Prix of 1914 was piloted to victory by Ralph De Palma, entered by E. C. Patterson of the Chicago Automobile Club, in the fifth annual road races at Elgin, Friday and Saturday of last week, winning the Chicago Automobile Club Cup and the Elgin National Trophy. The races were conducted by the Chicago Automobile Club and the Elgin Automobile Road Race Assn.

Records for the Course Broken

Previous records for the course were broken in both events, and on Friday it looked for a time as if a new world's record would be made, for Spencer Wishart was sending his Mercer around the course at 80 miles an hour with only eleven laps to go when a leaky gasoline tank brought him to a stop. De Palma's average for the Chicago Automobile Club Cup Race on Friday was 73.91 miles per hour for the 301.84 miles,

Anderson in Stutz finishing Friday's race just 44 seconds back of DePalma

as compared with Anderson's record of 71.5 miles per hour. On Saturday in the race for the Elgin National Trophy, he practically duplicated his performance of Friday by averaging 73.53 miles per hour for the same distance. The difference in time between Friday's and Saturday's races was only 1 minute and 17 seconds, both for the same distance.

But the brilliancy of this great road carnival is dimmed somewhat by the death of Spencer Wishart of the Mercer team, one of America's greatest drivers, who was killed in yesterday's race for the Elgin National Trophy at a time when it looked as if he would break his spell of bad luck.

A Crash at 100 Miles per Hour

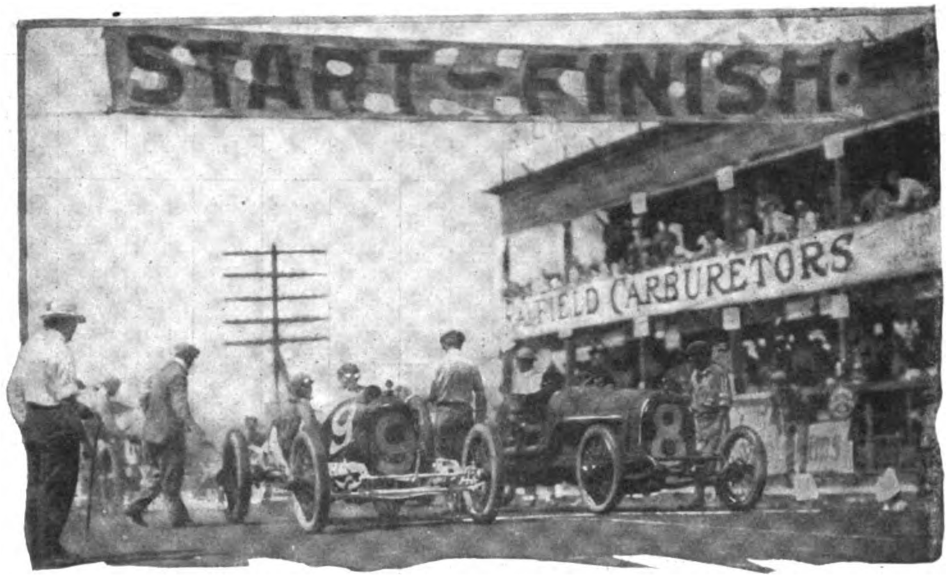
Beaten the first day when his gasoline tank sprung a leak, Wishart started out Saturday to redeem himself. Always a front-runner, he soon opened a gap on the field which looked to be a safe one. He finished the thirteenth lap and started down the backstretch at a furious pace. A mile from McLean's turn at the northeast corner of the course, he overtook Henning in No. 26 Mercer. Immediately ahead of him was a culvert in a bend of the road and Wishart realized apparently that he would have to get there first.

Traveling at 100 miles an hour, he caught Henning, but in attempting to pass a rear hub cap hooked the front wheel of Henning's car. Wishart's Mercer immediately shot across the road in front of Henning, hit a post, ripped out 50 feet of fence, hit a tree and ricocheted to one side, turning over once, and finally turning turtle within 20 feet of the farmhouse. Wishart was still in the seat, but the car turning turtle threw him under the machine. The car had brushed into a crowd of spectators and injured

TIME BY LAPS OF THE TWENTY-SIX DRIVERS WHO STRUG

No.	Car	Driver	Lap Time	1 8 Miles 2030 Ft.	2 16 Miles 4060 Ft.	3 25 Miles 810 Ft.	4 33 Miles 2840 Ft.	5 41 Miles 4870 Ft.	6 50 Miles 1620 Ft.	7 58 Miles 3650 Ft.	8 67 Miles 400 Ft.	9 75 Miles 2430 Ft.	10 83 Miles 4460 Ft.	11 92 Miles 1210 Ft.	12 100 Miles 3240 Ft.	13 108 Miles 5270 Ft.	14 117 Miles 2020 Ft.	15 125 Miles 4050 Ft.	16 134 Miles 800 Ft.	17 142 Miles 2830 Ft.
10	Mercedes......	R. De Palma...	Elaps.	6:44	14:13	21:12	30:06	37:05	44:00	50:46	57:32	1:04:23	1:11:19	1:18:03	1:24:49	1:31:33	1:38:25	1:45:16	1:52:01	2:00:02
			Lap...		7:29	6:59	8:54	6:59	6:55	6:46	6:46	6:51	6:55	6:44	6:46	6:44	6:52	6:51	6:45	8:01
8	Mercer........	E. Pullen......	Elaps.	7:00	15:07	21:03	27:56	34:47	41:43	48:31	55:22	1:02:11	1:09:05	1:16:54	1:22:47	1:29:39	1:36:30	1:43:19	1:50:10	1:57:11
			Lap...		7:07	6:56	6:53	6:51	6:56	6:48	6:51	6:49	6:54	6:49	6:53	6:52	6:51	6:49	6:51	7:01
11	Stutz.........	B. Oldfield.....	Elaps.	7:06	13:57	20:58	27:54	34:47	41:38	48:31	55:19	1:02:08	1:09:02	1:15:57	1:22:45	1:30:02	1:39:57	1:47:10	1:54:17	2:01:31
			Lap...		6:51	7:01	6:56	6:53	6:51	6:53	6:48	6:49	6:54	6:55	6:48	7:17	9:55	7:13	7:07	7:14
29	Sunbeam......	G. Maurice.....	Elaps.	7:46	15:01	22:22	30:09	37:29	44:46	52:08	59:25	1:06:42	1:14:04	1:21:21	1:28:36	1:35:54	1:43:18	1:50:59	1:58:05	2:12:33
			Lap...		7:15	7:21	7:47	7:20	7:17	7:22	7:17	7:17	7:22	7:17	7:15	7:18	7:14	7:41	7:06	14:28
5	Burman Sp....	Ed. Hearne....	Elaps.	7:27	14:55	22:30	30:06	37:31	45:02	52:32	59:58	1:07:25	1:14:55	1:22:28	1:30:00	1:37:40	1:45:15	1:52:55	2:00:32	2:03:18
			Lap...		7:28	7:35	7:36	7:25	7:31	7:30	7:26	7:27	7:30	7:33	7:32	7:40	7:35	7:40	7:37	7:46
6	Peugeot.......	R. Burman....	Elaps.	6:43	13:55	20:28	27:05	33:46	40:24	47:06	53:51	1:00:37	1:07:23	1:14:00	1:20:43	1:27:30	1:34:21	1:41:09	1:47:54	1:54:42
			Lap...		7:12	7:33	6:37	6:41	6:38	6:42	6:45	6:46	6:46	6:37	6:43	6:47	6:51	6:48	6:45	6:48
23	Maxwell......	W. Carlson....	Elaps.	9:35	25:32	32:31	39:27	46:21	53:09	1:00:08	1:07:04	1:13:57	1:20:47	1:36:49	1:45:38	1:57:47	2:05:14	2:14:42	2:22:20	2:29:49
			Lap...		15:57	6:59	6:56	6:54	6:48	6:59	6:56	6:53	6:50	16:02	8:49	12:09	8:27	9:28	7:38	7:29
12	Duesenberg...	Tom Alley.....	Elaps.	7:05	14:19	21:15	28:14	35:06	41:57	48:41	55:25	1:02:01	1:08:43	1:15:26	1:22:12	1:28:56	1:35:41	1:42:20	1:49:11	1:55:58
			Lap...		7:14	6:56	6:59	6:52	6:51	6:44	6:44	6:36	6:42	6:43	6:46	6:44	6:45	6:39	6:51	6:47
26	Mercer........	Henning.......	Elaps.	7:45	15:18	22:54	30:24	37:56	45:30	52:59	1:00:25	1:07:54	1:15:21	1:22:46	1:51:32	1:59:12	2:06:48	2:14:35	2:22:10	2:39:36
			Lap...		7:33	7:36	7:30	7:32	7:34	7:29	7:26	7:29	7:27	7:25	28:46	7:40	7:36	7:47	7:35	7:26
14	Sunbeam......	H. Grant......	Elaps.	7:42	14:40	21:36	28:30	35:35	42:35	49:30	56:37	1:03:41	1:10:41	1:17:49	1:24:50	1:32:07	1:39:09	1:46:10	1:53:15	2:00:21
			Lap...		6:58	6:46	6:54	7:05	7:00	7:04	6:58	7:04	7:00	7:08	7:01	8:07	7:02	7:01	7:05	7:06
1	Stutz.........	F. H. Dearborn	Elaps.	7:33	14:56	22:22	29:47	40:07	48:16	55:44	1:03:08	1:10:31	1:17:55	1:25:17	1:32:39	1:40:06	1:47:30	1:54:51	2:02:12	2:09:36
			Lap...		7:23	7:16	7:25	10:20	7:09	7:28	7:24	7:23	7:24	7:22	7:22	7:27	7:24	7:21	7:21	7:24
27	Gray Fox.....	H. Wilcox.....	Elaps.	6:55	13:43	20:34	27:21	34:04	40:60	47:34	54:18	1:01:17	1:11:59	1:18:47	1:25:31	1:32:20	1:39:11	1:46:10	1:53:33	2:05:27
			Lap...		6:48	6:51	6:47	6:43	6:46	6:44	6:44	6:59	10:42	6:48	6:44	6:49	6:41	6:59	7:23	11:54
30	Marmon......	L. Heineman...	Elaps.	7:45	14:56	22:02	29:08	36:13	43:24	50:29	58:05	1:08:21	1:15:39	1:22:42	1:29:44	1:36:47	1:43:45	1:50:41	2:08:10	2:18:28
			Lap...		7:11	7:06	7:06	7:05	7:11	7:05	7:36	9:16	7:18	7:03	7:02	7:03	6:58	6:56	7:29	10:18
22	Stutz.........	G. Anderson...	Elaps.	7:00	13:42	20:26	27:32	37:31	44:19	51:22	1:01:20	1:08:12	1:14:57	1:21:41	1:28:29	1:35:13	1:41:58	1:48:41	1:55:32	2:02:16
			Lap...		6:42	6:44	7:06	9:59	6:48	7:03	9:58	6:52	6:44	6:44	6:48	6:44	6:45	6:49	6:51	6:44
19	Mercer........	S. Wishart......	Elaps.	6:31	12:52	19:27	25:54	32:21	38:57	45:31	52:04	58:34	1:05:03	1:11:30	1:17:54	1:24:31	Out—	o v e r	t u r n	ed
			Lap...		6:21	6:35	6:27	6:27	6:36	6:34	6:33	6:30	6:29	6:27	6:24	6:27				
4	Maxwell......	Tetslaff.......	Elaps.	7:14	15:07	22:10	29:19	36:54	43:54	51:15	58:26	1:05:41	1:13:15	1:23:46	Out—	engine tr	ouble			
			Lap...		7:53	7:03	7:09	7:35	7:00	7:11	7:11	7:15	7:34	10:31						
2	Lozier........	L. Fontaine....	Elaps.	7:24	14:50	21:52	29:01	40:04	47:19	54:44	1:04:29	1:11:48	Out—	broken	wheel					
			Lap...		7:26	7:02	7:09	11:03	7:15	7:25	9:45	7:19								
31	Braender-Bulldog	W. Chandler...	Elaps.	7:24	14:36	21:33	32:06	38:56	52:02	1:15:13	Out—	caught	fire							
			Lap...		7:12	6:57	8:33	6:50	13:06	23:11										
28	Chadwick.....	Burt..........	Elaps.	8:10	17:06	25:16	33:45	44:14	1:07:57	1:18:07	Out—	engine tr	ouble							
			Lap...		8:56	8:10	7:29	10:29	23:43	10:10										
9	Duesenberg....	E. Rickenbacher	Elaps.	7:04	13:56	21:00	28:00	34:56	41:53	Out—	motor tr	ouble								
			Lap...		6:52	7:04	7:00	6:56	6:47											
24	Maxwell......	Tom Orr.......	Elaps.	9:40	19:54	37:01	44:46	1:02:31	1:10:23	Out—f	aulty m	otor								
			Lap...		10:14	17:07	9:45	7:45	7:52											
21	Pahys.........	M. Roberts....	Elaps.	7:49	15:18	25:01	37:07	Out—	faulty m	otor										
			Lap...		7:29	9:43	12:06													
32	Kecton........	J. C. Callaghan.	Elaps.	8:54	17:20	25:37	34:02	Out—	because	of fault	y brakes									
			Lap...		8:26	8:17	8:25													
18	Marmon......	W. D'Alene....	Elaps.	7:50	16:10	23:24	Out—	broken	frame an	d radiato	r									
			Lap...		8:20	7:14														
25	White.........	E. Cailloutte...	Elaps.	8:29	19:54	Out—	engine	trouble												
			Lap...		10:25															
15	Great Western.	W. Tidmarsh...	Elaps.	Out—	broken	conne	cting r	od												
			Lap...																	

five of them. But the racing men were the greatest sufferers. His chest crushed, a leg broken, and injured internally, Wishart and his mechanic were rushed to the St. Joseph's hospital in Elgin but Wishart lived only long enough for Mrs. Wishart to reach his bedside. Jack Genter, the mechanic, was badly injured. He died on Wednesday morning, after having been despaired of by the physicians in charge.



Start of Saturday's race, showing how cars were started in pairs

Two-Car Start Works Well

From a racing viewpoint, though, the meet was a great success. On both days the attendance was a record breaker; the largest field of entries ever secured for an American road race started; the weather was of the best and the promoters will be able to show a fair profit.

The meet was remarkable for the introduction of the two-car start as used in the French Grand Prix and the Pendleton scoreboard made its eastern début. Both worked to perfection. Because of having twenty-eight starters the second day and twenty on the first day, the two-car start was a necessity. Starter Wagner sent the contestants away in pairs without a hitch, a broad white line from the tape to Hornbeek's turn making two lanes. Each car had to stay in its own lane for the first lap until the turn was reached, after which it was free to choose its way during the rest of the race, the idea being to insure a safe and orderly start.

The Pendleton scoreboard, designed by E. H. Pendleton of Los Angeles, Cal., recorded the exact position of each car at each mile of the course and as soon as a car finished a lap, the lap number also was posted. This information was secured by means of a telephone system around the course, one at each mile. Girl operators were used, each telephoning when a car passed her station. There was no hitch on either day.

GLED FOR THE ELGIN NATIONAL TROPHY—FREE FOR ALL

18 150 Miles 4860 Ft.	19 159 Miles 1610 Ft.	20 167 Miles 3640 Ft.	21 176 Miles 390 Ft.	22 184 Miles 2420 Ft.	23 192 Miles 4450 Ft.	24 201 Miles 1200 Ft.	25 209 Miles 3230 Ft.	26 217 Miles 5260 Ft.	27 226 Miles 2010 Ft.	28 234 Miles 4040 Ft.	29 243 Miles 790 Ft.	30 251 Miles 2820 Ft.	31 259 Miles 4850 Ft.	32 268 Miles 1600 Ft.	33 276 Miles 3630 Ft.	34 285 Miles 380 Ft.	35 293 Miles 2410 Ft.	36 301 Miles 4440 Ft.	Position at Finish	Miles per Hour
2:06:48	2:13:34	2:20:16	2:26:59	2:33:42	2:40:20	2:47:10	2:53:48	3:00:26	3:07:06	3:13:49	3:20:21	3:26:51	3:33:27	3:39:57	3:46:30	3:52:58	3:59:35	4:06:18	1	73.53
6:46	6:46	6:42	6:43	6:43	6:38	6:40	6:38	6:38	6:40	6:43	6:32	6:30	6:36	6:30	6:33	6:28	6:37	6:43		
2:04:04	2:11:00	2:17:59	2:24:54	2:31:52	2:38:45	2:45:42	2:52:35	2:59:28	2:06:19	3:13:05	3:19:50	3:26:36	3:33:22	3:40:10	3:46:55	3:53:45	4:00:31	4:07:28	2	73.17
6:53	6:56	6:59	6:55	6:58	6:53	6:57	7:53	6:53	6:51	6:46	6:45	6:46	6:46	6:48	6:45	6:50	6:46	6:57		
2:09:12	2:18:07	2:25:11	2:32:16	2:39:16	2:46:25	2:53:58	3:02:36	3:09:47	2:17:56	3:24:05	3:31:44	3:40:03	3:47:14	3:54:26	4:01:42	4:09:46	4:16:59	4:24:02	3	68.59
7:41	8:55	7:04	7:05	7:00	7:09	7:33	8:38	7:11	7:07	7:09	7:39	8:19	7:11	7:12	7:16	8:04	7:13	7:03		
2:20:05	2:27:29	2:34:46	2:42:03	2:49:27	2:56:39	3:03:56	3:11:08	3:18:23	3:25:46	3:32:52	3:39:56	3:47:10	3:54:31	4:01:58	4:09:15	4:16:36	4:23:58	4:31:09	4	66.78
7:32	7:24	7:17	7:17	7:24	7:12	7:17	7:12	7:15	7:23	7:06	7:04	7:14	7:21	7:27	7:17	7:21	7:22	7:11		
2:16:11	2:23:52	2:31:30	2:41:28	2:49:03	2:56:40	3:04:14	3:11:49	3:19:27	3:26:59	3:34:28	3:42:52	3:51:18	3:58:44	4:06:17	4:13:43	4:21:03	4:28:31	4:35:47	5	65.79
7:53	7:41	7:38	9:58	7:35	7:37	7:34	7:35	7:38	7:32	7:29	8:24	8:26	7:26	7:33	7:26	7:25	7:23	7:16		
2:01:34	2:08:27	2:15:22	2:22:31	2:29:31	2:36:32	2:43:34	2:50:32	2:57:24	3:04:29	3:11:25	3:18:25	3:25:17	3:32:23	3:41:48	3:49:32	3:57:07	Out—	engine tr	ouble	
6:52	6:53	6:55	7:09	7:00	7:01	7:02	6:58	6:52	7:05	6:56	7:00	6:52	7:06	9:25	7:44	7:35				
2:37:20	2:44:42	2:52:05	2:59:42	3:08:59	3:18:02	3:25:22	3:33:14	3:44:34	3:51:01	3:58:34	4:06:06	4:13:36	4:21:03	4:28:35	4:36:23	Running	when fla	gged		
7:31	7:22	7:23	7:37	9:17	9:03	7:20	7:52	11:20	6:27	7:33	7:32	7:30	7:27	7:32	7:48					
2:02:39	2:09:20	2:15:56	2:23:34	2:30:30	2:37:18	2:44:00	2:50:38	2:57:16	3:03:51	3:10:40	3:17:24	3:24:04	3:30:44	3:37:31	Out—	broken d	riveshaft			
6:41	6:41	6:38	7:36	6:56	6:48	6:42	6:38	6:38	6:35	6:49	6:44	6:40	6:40	6:47						
2:37:05	2:44:53	2:52:17	2:59:55	3:07:32	3:15:12	3:22:47	3:30:20	3:37:51	3:45:31	3:53:08	4:00:45	4:08:21	4:15:59	4:25:27	Running	when fla	gged			
7:29	7:48	7:24	7:38	7:37	7:40	7:35	7:35	7:31	7:40	7:37	7:37	7:36	7:38	9:28						
2:07:30	2:14:47	2:21:56	2:39:40	2:46:57	Out—	engine tr	ouble													
7:09	7:17	7:09	7:44	7:17																
2:17:13	2:25:57	2:33:34	2:41:14	2:49:54	Out—	engine tr	ouble													
7:37	8:34	7:37	8:40	8:14																
2:12:57	2:20:03	2:27:19	2:39:40	Out—	engine tr	ouble														
7:30	7:06	7:16	12:21																	
2:25:30	2:32:39	2:45:37	Out—	disabled	brakes															
7:02	7:09	12:58																		
2:08:58	2:15:42	Out—	radiator	trouble																
6:42	6:44																			

RECORD BY LAPS OF THE CARS THAT COMPETED FOR THE CHI

No.	Car	Driver	Lap Time	1 8 Miles 2030 Ft.	2 16 Miles 4060 Ft.	3 25 Miles 810 Ft.	4 33 Miles 2840 Ft.	5 41 Miles 4870 Ft.	6 50 Miles 1620 Ft.	7 58 Miles 3650 Ft.	8 67 Miles 400 Ft.	9 75 Miles 2430 Ft.	10 83 Miles 4460 Ft.	11 92 Miles 1210 Ft.	12 100 Miles 3240 Ft.	13 108 Miles 5270 Ft.	14 117 Miles 2020 Ft.	15 125 Miles 2050 Ft.	16 134 Miles 800 Ft.	17 142 Miles 2830 Ft.
10	Mercedes......	R. DePalma...	Elaps.	6:42	13:15	19:44	26:18	33:02	39:40	46:13	52:51	59:33	1:06:12	1:12:53	1:19:36	1:26:14	1:32:59	1:39:37	1:46:19	1:54:10
			Lap...	6:42	6:83	6:29	6:34	6:44	6:38	6:33	6:38	6:42	6:39	6:41	6:43	6:38	6:45	6:38	6:42	7:51
22	Stuts.........	G. Anderson...	Elaps.	6:52	13:31	20:14	29:55	36:38	43:19	50:02	56:35	1:03:11	1:09:45	1:16:23	1:22:50	1:29:24	1:36:01	1:42:41	1:49:21	1:56:03
			Lap...		6:39	6:33	9:41	6:43	6:41	6:43	6:33	6:36	6:34	6:38	6:27	6:34	6:37	6:40	6:40	6:42
6	Peugeot.......	R. Mulford....	Elaps.	6:27	13:11	23:15	30:50	37:28	44:19	51:06	57:51	1:04:24	1:11:06	1:17:33	1:24:05	1:30:35	1:36:59	1:43:25	1:50:02	1:59:02
			Lap...		6:44	10:04	7:35	6:38	6:51	6:47	6:45	6:33	6:42	6:27	6:32	6:30	6:24	6:26	6:37	9:00
11	Stuts.........	B. Oldfield.....	Elaps.	7:12	14:12	21:12	28:25	35:36	42:47	49:51	56:59	1:04:10	1:11:17	1:18:18	1:25:19	1:32:23	1:39:27	1:46:25	1:53:25	2:00:18
			Lap...		7:00	7:00	7:13	7:11	7:11	7:04	7:08	7:10	7:07	7:01	7:01	7:04	7:04	6:58	7:00	6:53
31	Braender-Bulldog.....	W. Chandler...	Elaps.	7:23	14:18	21:42	30:51	37:40	44:28	51:20	58:17	1:05:04	1:11:58	1:18:40	1:25:30	1:32:20	1:39:04	1:45:47	1:52:32	1:59:11
			Lap..		6:55	7:24	9:09	6:49	6:48	6:52	6:57	6:47	6:54	6:42	6:50	6:50	7:16	6:43	6:45	6:39
30	Marmon......	L. Heinemann..	Elaps.	7:15	14:10	22:16	27:02	35:47	42:30	52:54	59:40	1:06:32	1:13:23	1:20:47	1:32:10	1:38:45	1:45:30	1:52:44	2:02:33	2:09:43
			Lap..		6:55	8:06	6:46	6:45	6:43	10:24	6:46	6:52	6:51	7:24	11:23	6:35	6:45	7:14	9:49	7:10
1	Stuts.........	F. H. Dearborn	Elaps.	8:10	15:12	22:40	30:07	37:30	44:59	52:25	59:47	1:07:11	1:14:45	1:22:08	1:29:38	1:37:05	1:44:26	1:51:45	1:59:42	2:15:44
			Lap...		7:02	7:18	7:27	7:23	7:29	7:26	7:22	7:24	7:34	7:23	7:30	7:27	7:21	7:19	7:57	16:02
27	Gray Fox.....	H. Wilcox.....	Elaps..	7:06	13:51	20:37	27:25	34:16	41:02	48:01	54:47	1:01:40	1:08:29	1:15:18	1:21:58	1:28:37	1:35:21	1:42:20	1:49:18	1:55:56
			Lap...		6:45	6:46	6:48	6:51	6:46	6:59	6:46	6:53	6:49	6:49	6:40	6:39	6:44	6:59	6:58	6:38
17	White........	W. J. Schrunk .	Elaps.	19:04	28:12	43:34	52:45	1:01:27	1:10:04	1:19:15	1:27:42	1:36:29	1:48:36	1:57:25	2:07:20	2:14:54	2:23:38	2:32:14	2:40:52	2:49:27
			Lap...		9:08	15:22	9:11	8:42	8:37	9:11	8:27	8:47	12:07	8:49	9:55	7:34	8:44	8:36	8:38	8:35
19	Mercer........	S. Wishart.....	Elaps.	6:31	12:42	18:55	25:08	31:23	37:40	43:55	50:14	56:29	1:02:49	1:09:07	1:15:23	1:21:40	1:27:56	1:34:11	1:40:29	1:46:49
			Lap...		6:11	6:13	6:13	6:15	6:17	6:15	6:19	6:15	6:20	6:18	6:16	6:17	6:16	6:15	6:18	6:20
21	Pahys.........	M. Roberts....	Elaps.	7:37	14:44	21:59	29:32	41:46	49:35	1:02:52	1:10:28	1:19:45	1:27:23	1:34:57	1:42:32	1:50:07	1:57:46	2:05:10	2:13:04	2:20:41
			Lap...		7:07	7:15	7:33	12:14	7:49	13:17	7:36	9:17	7:38	7:34	7:35	7:35	7:39	7:24	7:54	7:37
26	Mercer........	Henning.......	Elaps.	7:39	15:08	22:45	30:22	37:51	45:18	52:47	1:01:24	1:09:10	1:16:37	1:24:07	1:31:37	1:39:26	1:46:55	1:53:44	2:01:45	2:09:10
			Lap...		7:29	7:37	7:37	7:29	7:27	7:29	8:37	7:46	7:27	7:30	7:30	7:49	7:29	6:49	8:01	:725
12	Duesenberg....	Tom Alley.....	Elaps.	8:43	15:36	22:19	29:03	35:57	42:38	49:20	56:03	1:03:15	1:10:01	1:16:48	1:23:37	1:33:13	Out—	broken	gearset	
			Lap...		6:53	6:43	6:44	6:54	6:41	6:42	6:43	7:12	6:46	6:47	6:49	9:36				
24	Maxwell.......	W. Carlson....	Elaps.	7:43	15:12	22:44	30:11	37:26	45:25	58:02	1:05:23	1:12:59	1:20:55	1:28:16	1:36:45	1:54:10	Out—	broken	internall	y
			Lap...		7:29	7:32	7:27	7:15	7:59	12:37	7:21	7:36	7:56	7:21	8:29	7:25				
29	Sunbeam......	G. Maurice....	Elaps.	8:00	15:46	23:36	31:20	38:59	46:27	54:15	1:01:59	1:27:35	1:35:46	1:43:20	Ignition	trouble				
			Lap...		7:46	7:50	7:44	7:39	7:28	7:48	7:44	25:36	8:11	7:34						
8	Mercer........	E. Pullen......	Elaps.	7:10	14:01	20:48	27:35	34:23	41:05	47:54	54:39	1:01:28	1:08:22	Out—t	r a n sm	ission	trouble			
			Lap...		6:51	6:47	6:57	5:48	6:42	6:49	6:45	6:49	6:54							
4	Maxwell.......	Tetslaff.......	Elaps.	7:37	15:07	22:26	29:33	36:44	43:52	51:02	58:18	1:05:49	Out—	broken	axle					
			Lap...		7:30	7:19	7:07	7:11	7:08	7:50	7:16	7:21								
9	Duesenberg....	E. Rickenbacher	Elaps.	7:11	15:27	Out	—b r o	ken gear	shift leve	r										
			Lap...		8:16															
14	Sunbeam......	H. Grant......	Elaps.	8:03	15:47	Out	—b r o	ken oil	line											
			Lap...		7:44															

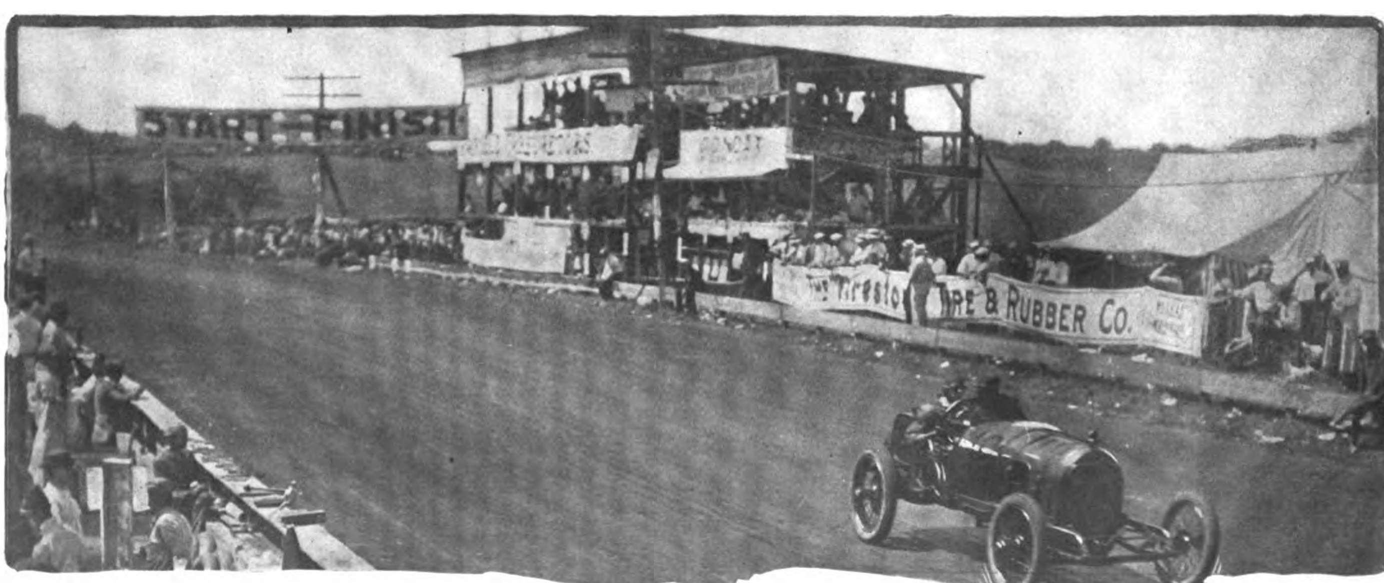
Wishart Takes the Lead

The first day's race for the Chicago Automobile Club trophy was for cars of 450 inches piston displacement and under. It brought to the tape twenty cars, Burman's Peugeot, Stringer's Marmon, D'Alene's Marmon, Callaghan's Keeton and No. 23 Maxwell being scratched. In this event Wishart was the dominating factor for twenty-five of the thirty-six laps. Gaining the front almost at the start, he had opened a gap of 9 minutes 40 seconds at the twenty-fifth lap when the vibration broke the support of the gasoline tank. His mechanic tried to hold the tank in place, but after a couple of laps Wishart gave up and retired.

This left it clear sailing for De Palma in the Mercedes and Anderson in the Stutz who settled down to a battle royal for the rest of the journey. It was a desperate fight, the lead fluctuating often. At the end, though, De Palma had the edge by 44 seconds but the last lap saw interest keyed up to the last notch, De Palma gaining the laurel wreath. The victor made only three stops. One was for supplies, a second was to change a tire in the backstretch and the third was to take on a new tire at the pits.

Anderson's Spares Caused His Defeat

Anderson's defeat was largely caused by delay in the backstretch when he stopped several minutes to pick up his two spare tires which broke loose from their moorings. Anderson feared that he would be disqualified unless he carried the spares, whereas this is not in the rules. Had he left the tires by the roadside and picked up new ones at the pits it might have been a different story.



Spencer Wishart in Mercer in Saturday's race finishing the thirteenth lap, when he was leading in the race just before his fatal accident

CAGO AUTOMOBILE TROPHY—UNDER 450 INCHES DISPLACEMENT

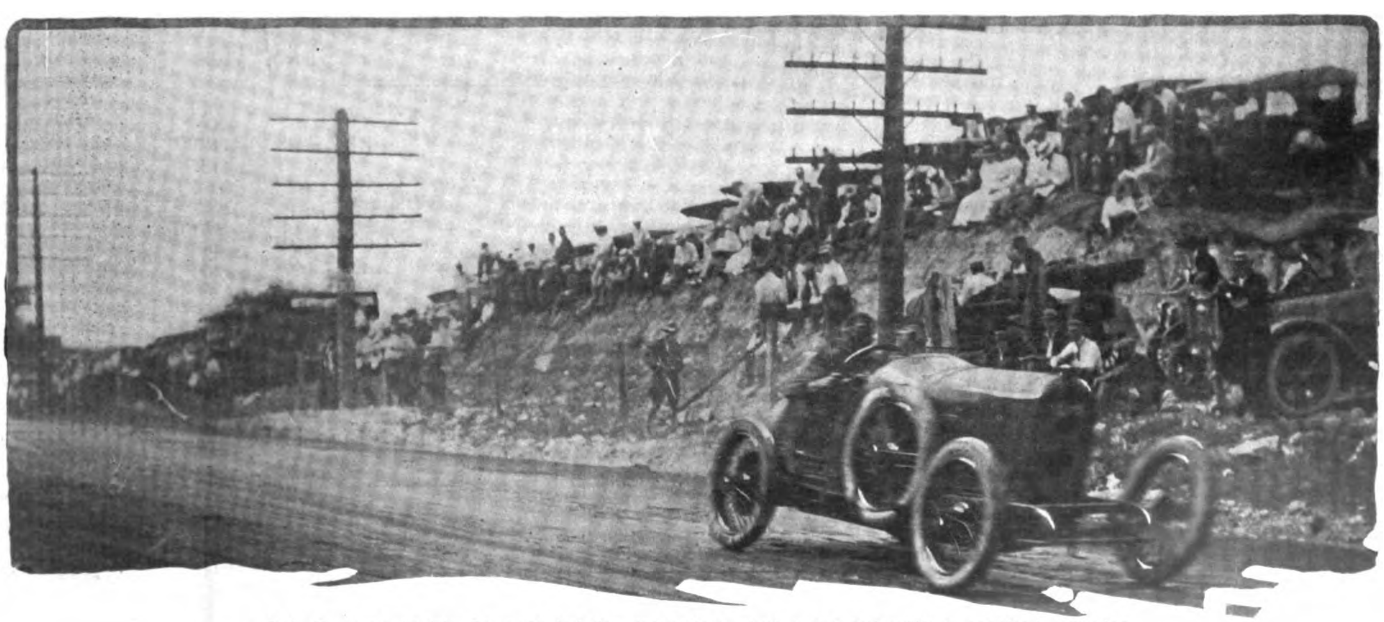
18 150 Miles 4860 Ft.	19 159 Miles 1610 Ft.	20 167 Miles 3640 Ft.	21 176 Miles 390 Ft.	22 184 Miles 2420 Ft.	23 192 Miles 4450 Ft.	24 201 Miles 1200 Ft.	25 209 Miles 3230 Ft.	26 217 Miles 5260 Ft.	27 226 Miles 2010 Ft.	28 234 Miles 4040 Ft.	29 243 Miles 790 Ft.	30 251 Miles 2820 Ft.	31 259 Miles 4850 Ft.	32 268 Miles 1600 Ft.	33 276 Miles 3630 Ft.	34 285 Miles 380 Ft.	35 293 Miles 2410 Ft.	36 301 Miles 4440 Ft.	Position at Finish	Miles per Hour.
2:00:44	2:07:22	2:13:56	2:20:37	2:27:23	2:34:14	2:40:56	2:50:57	2:57:50	3:04:35	3:11:10	3:18:20	3:24:51	3:31:37	3:38:16	3:44:55	3:51:32	3:58:16	4:05:01	1	73.91
6:34	6:38	6:34	6:41	6:46	6:51	6:42	10:01	6:53	6:45	6:35	7:10	6:31	6:46	6:39	6:39	6:37	6:44	6:45		
2:02:36	2:09:26	2:17:31	2:24:08	2:30:45	2:37:20	2:43:55	2:50:32	2:57:11	3:03:50	3:10:34	3:17:16	3:24:28	3:32:21	3:39:08	3:45:47	3:52:28	3:59:08	4:05:45	2	73.69
6:33	6:50	8:05	6:37	6:37	6:35	6:35	6:37	6:39	6:39	6:44	6:42	7:12	7:53	6:47	6:39	6:41	6:40	6:37		
2:06:34	2:13:09	2:20:57	2:27:38	2:34:23	2:41:24	2:48:15	2:54:48	3:01:18	3:08:13	3:16:08	3:22:49	3:29:21	3:35:59	3:42:36	3:49:09	3:55:40	4:02:05	4:08:16	3	72.94
7:32	6:35	7:48	6:41	6:45	7:01	6:51	6:33	6:30	6:55	7:55	6:41	6:32	6:38	6:37	6:33	6:31	6:25	6:11		
2:07:17	2:14:30	2:23:37	2:30:29	2:37:40	2:44:36	2:51:37	2:58:36	3:05:33	3:12:29	3:19:21	3:26:15	3:33:16	3:40:18	3:47:15	3:50:09	4:01:09	4:08:06	4:15:23	4	70.91
7:59	7:13	9:07	6:52	7:11	6:56	7:01	6:59	6:57	6:56	6:52	6:54	7:01	7:02	6:57	6:54	7:00	6:57	7:17		
2:05:58	2:16:56	2:24:05	2:32:51	2:43:19	2:50:20	3:57:17	3:04:18	3:11:12	3:18:19	3:25:15	3:32:19	3:44:38	3:52:04	3:59:06	4:06:18	4:13:25	4:20:54	4:22:58	5	68.86
6:47	10:58	7:09	8:46	11:28	7:01	6:57	7:01	6:54	7:17	6:56	7:04	12:19	7:26	7:02	7:12	7:07	7:29	7:04		
2:17:56	2:25:32	2:33:05	2:40:32	2:47:55	2:55:18	3:02:34	3:09:58	3:17:13	3:24:33	3:31:51	3:39:10	3:51:01	3:58:58	4:05:47	4:12:32	4:19:18	4:26:18	4:33:18	6	66.26
8:13	7:36	7:33	7:27	7:23	7:23	7:16	7:24	7:15	7:20	7:18	7:19	11:51	7:57	6:49	6:45	6:46	7:00	7:00		
2:23:07	2:30:32	2:37:55	2:45:20	2:52:48	3:00:14	3:07:35	3:14:56	3:22:18	3:29:38	3:37:02	3:44:25	3:51:44	3:59:11	4:08:12	4:15:33	4:22:53	4:30:12	4:37:29	7	65.23
7:23	7:26	7:23	7:25	7:28	7:26	7:21	7:21	7:22	7:20	7:24	7:23	7:19	7:27	9:01	7:21	7:20	7:19	7:17		
2:05:49	2:17:59	2:24:48	2:31:44	2:38:42	2:46:52	2:53:49	3:00:42	3:07:54	3:15:21	3:32:17	3:40:15	3:47:21	3:54:34	4:01:43	4:09:14	4:21:50	4:29:19	4:37:43	8	65 18
9:53	12:10	6:59	6:56	6:58	8:10	7:57	6:53	7:12	7:27	6:56	7:58	7:16	7:13	7:09	7:31	12:36	7:29	7:24		
3:04:41	3:13:14	3:21:42	3:30:04	3:38:16	3:46:23	3:56:24	4:04:41	4:12:58	4:21:14	4:40:11	Out—	gearshift	lever mis	sing						
15:14	8:33	8:28	8:22	8:12	8:07	9:01	8:17	8:17	8:16	8:57										
1:53:02	2:01:14	2:07:34	2:13:50	2:20:08	2:26:28	2:34:26	2:40:56	3:07:57	3:14:15	Out—	broken g	asoline t	ank							
6:13	8:12	6:20	6:16	6:18	6:20	7:38	6:30	7:01	6:18											
2:28:12	2:35:43	2:43:13	2:50:44	2:58:12	3:05:40	3:14:27	Out—	broken g	asoline t	ank										
7:31	7:31	7:30	7:31	7:38	7:28	8:47														
2:18:01	2:25:57	2:33:27	2:41:07	Out—	broken	water m	anifold													
8:51	7:56	7:30	7:40																	

In this race seven were allowed to finish. Behind De Palma and Anderson came Mulford in the Boillot Peugeot, which ran into third place, less than 3 minutes behind the winner. Mulford had to nurse the car, for he finished with a cracked frame, evidently the result of the accident to Boillot at Indianapolis. Oldfield in a Stutz was fourth, Chandler in the Braender Bulldog fifth, Heinemann in a Marmon sixth and Dearborn in a Stutz seventh.

Although beaten by De Palma and the Mercedes, still the Stutz car has much to be proud of, for it made an enviable record. All three Stutz cars finished and the hood never was lifted on one of them. Anderson changed only one tire, while Oldfield and Dearborn, the latter driving the private entry of William Ziegler, went through without a single change of tire equipment.

Saturday's Race a Wonderful Battle

The race for the Elgin National Trophy the second day might well be classed as one of America's greatest road battles. In the first place it brought out the largest field that ever lined up before Starter Fred Wagner, and although it was slower throughout than the previous day's battle, still this was more than made up by the see-sawing of the leaders. As usual, Wishart went out in front but this time he did not open so big a gap, while thundering at his heels were Pullen in the Mercer, Burman in the Peugeot, Alley in the Duesenberg and De Palma in the Mercedes. The winner of Friday's race was back in the ruck for a considerable distance and it was the elimination of those in front of him that gave him his opportunity to become the winner of the 2 days' racing.

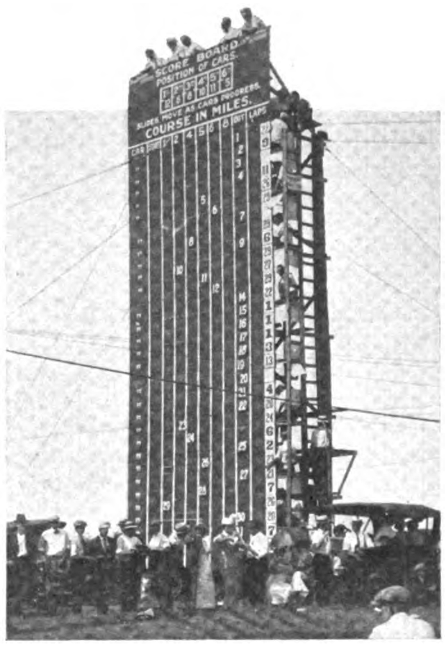


Bob Burman in his Peugeot led for many laps, but went out with a cracked cylinder

One of the eight telephone stations around the course which sent news of passing cars to the scoreboard

Wishart's accident gave those immediately behind him their chance and, following the fatal thirteenth lap, Burman in the Peugeot went into the lead. When Burman started in the morning he did not expect to be able to go more than a few laps because of the weak condition of the cylinder which cracked at Sioux City. But it held up surprisingly well and as long as it was in commission Burman was a factor. He blazed the way for the others for many laps, with Tom Alley in the Duesenberg and Pullen in the Mercer barking at his heels. Alley was particularly aggressive and brought his car up to within a few seconds of the Peugeot. Then Rickenbacher, who had been eliminated earlier, slid into the seat and he drove so furiously that he was the leader following a stop at the pits for supplies by Burman. A little later, though, a broken driveshaft stopped him and this left the way clear for DePalma, who with Pullen, had passed Burman when the latter stopped at the pits.

It was a ding-dong battle at this stage of the race. Any one of four cars could win. Burman, though, quit with only a lap and a half to go when the weak cylinder went wrong.



Pendleton scoreboard at grandstand. White numbers at right show number of laps each car made. Other numbers show the different cars and the eight vertical columns show their position around the course

Pullen's Sensational Fight

For the second time at the meet DePalma went into the last lap with only a slight advantage. Pullen, who went through the entire race without a stop, was dogging his heels, ready to take advantage of any slip and had a fighting chance all the way to the last lap. DePalma, however, maintained his advantage and went over the line with a margin of 1 minute and 10 seconds over Pullen. The performance of the latter driver was remarkable indeed. In a much smaller car than Wishart's he always was a factor and went through the entire race without a stop.

Third in this race was the veteran Barney Oldfield who was fourth in Friday's race and who was remarkably consistent in both events. Gaston Maurice in the Sunbeam ran fourth. Eddie Hearne in the Burman Special was the last to get the checkered flag, being placed fifth. Also running at the finish were Carlson in the Maxwell and Henning in the Mercer.

Summary of Results of For

Race	Car
1910	
Elgin National	Lozier
Illinois Cup	National
Kane County Cup	Marmon
Fox River Cup	Benz
1911	
Elgin National	National
Illinois Cup	National
1912	
Free-for-All	Mercedes
Elgin National	Mercedes
Illinois Cup	Stutz
Aurora Cup	Mercer
Jencks Cup	Mason
1913	
Chicago A. C.	Mercer
Elgin National	Stutz

DePalma has driven in four of the five Elgin meets, starting first in 1911, when he drove a Simplex, failing to finish.

The fastest lap the first day was 6:11, a mark at which two tied—Wishart and Mulford. Hung up for this was a $200 purse given by Martin J. Kavanaugh of the Chicago Automobile Club. On the second day Wishart carried off the honor with 6:20 3-5, made on his second lap.

DePalma Wins $4,400

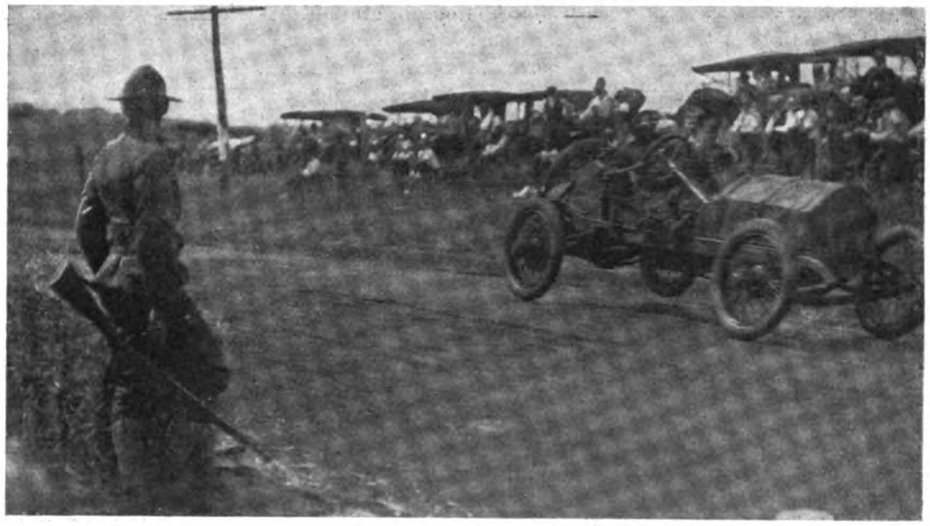
DePalma won $4,400 in all, $2,000 for each first and $400 from the Rudge-Whitworth company for using its wire wheels. Pullen gets $800, which includes the Rudge-Whitworth $100 for second place. Anderson lands $700 for second the first day; Mulford, third the first day, picks up $300 for first and divides the Kavanaugh prize. Oldfield won $300 for being third the second day. Wishart's winnings included the $200 for Saturday's fastest lap, given by Harry Vissoring, president of the Chicago Automobile Club.

Their Fastest Laps on Friday

Car	Driver	Lap	Time
Mercer	Wishart	2	6:11
Peugeot	Mulford	36	6:11
Stutz	Anderson	12	6:27
Mercedes	DePalma	3	6:29
Marmon	L. Heinemann	13	6:35
Gray Fox	Wilcox	17	6:38
Braender B'lld'g	Chandler	17	6:39
Duesenberg	Tom Alley	6	6:41
Mercer	Pullen	6	6:42
Stutz	Oldfield	21 & 28	6:52
Stutz	Dearborn	2	7:02
Maxwell	Tetzlaff	6	7:08
Duesenberg	Rickenbacher	1	7:11
Maxwell	Carlson	5	7:15
Mercer	Luttrell	17	7:25
Sunbeam	Maurice	7	7:28
White	Shrunk	13	7:34
Sunbeam	Grant	2	7:44

mer Elgin Road Races

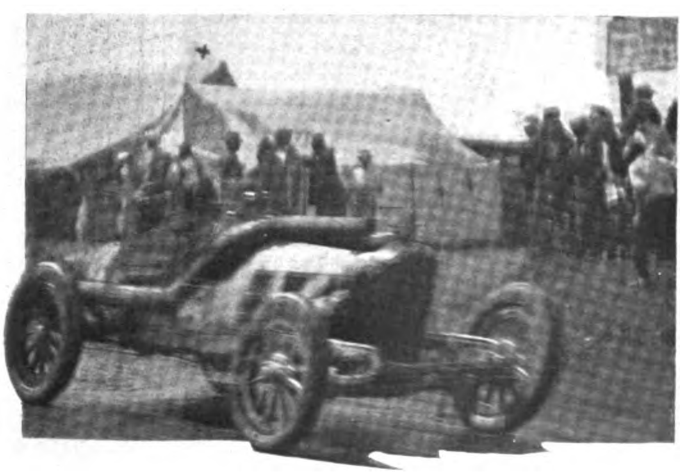
Driver	Miles	Speed
Mulford	305	62.5
Livingston	203	60.6
Buck	169	55.1
Hearne	135	54.1
Zengel	305	66.45
Herr	203	65.63
DePalma	305	68.9
DePalma	254	68.4
Merz	203	65.6
Hughes	152	60.57
Endicott	101	60.57
DePalma	305	66.8
Anderson	305	71.5



Henning in Mercer with which Wishart's car locked wheels on Saturday resulting in the accident. Note the militia guard

Their Fastest Laps on Saturday

Car	Driver	Lap	Time
Mercer	Wishart	2	6:20 3-5
Mercedes	DePalma	10 & 34	6:28
Duesenberg	Tom Alley	27	6:34
Puegeot	R. Burman	4 & 11	6:37
Gray Fox	Wilcox	14	6:41
Stutz	Anderson	2 & 18	6:42
Mercer	Pullen	29 & 33	6:45
Sunbeam	Grant	3	6:46
Duesenberg	Rickenbacher	6	6:47
Stutz	Oldfield	8 & 12	6:48
Maxwell	Carlson	6	6:48
Braender B'lld'g	Chandler	5	6:50
Marmon	Heinemann	15	6:56
Maxwell	Tetzlaff	6	7:00
Lozier	Fontaine	3	7:02
Sunbeam	Maurice	29	7:04
Stutz	Dearborn	6	7:09
Marmon	D'Alene	3	7:14
Burman Sp.	Hearne	35	7:23
Mercer	Henning	20	7:24
Pahys	M. Roberts	2	7:29
Chadwick	Burt	4	7:29
Maxwell	Tom Orr	5	7:45
Keeton	Callaghan	3	8:17
White	Cailloutte	1	8:29
Great Western	Tidmarsh	1	10:01



Tom Alley in No. 12 Duesenberg which made a plucky fight

The Winning of the C. A. C. Cup

The Battle Between DePalma and Anderson—A 44-Second Victory

IT is 11 o'clock on Friday and twenty cars are lined up in front of the expectant grandstand in ten rows of two each to battle for the Chicago Automobile Club Cup

Six cars that were nominated for the race have been withdrawn. Bob Burman is a spectator, his Peugeot having sustained a broken cylinder the day before. Mel Stringer, slated to drive the No. 7 Marmon, is in the pits with his arm in a sling and his car is in the garage, wrecked by a spill in practice. The No. 18 Marmon is another absentee, being ruled out by the technical committee because its piston displacement exceeded 450 cubic inches. No reason is given for the withdrawal of the No. 23 Maxwell and the No. 32 Keeton. The No. 33 Peugeot is far from the scene of the struggle, its owner, E. J. Schroeder, refusing to ship it from New York on hearing that DePalma would not drive it.

Bang—They're Off!

A bomb explodes in midair and twenty mechanicians are at the cranking handles of the cars. Exhausts pop petulantly and the smoke is blinding. Engines roar a challenge. Starter Wagner starts to toll off the seconds. Gears rattle. The crowd breaks out in a cheer as Dearborn and Tetzlaff are sent away. The second annual race for the Chicago Automobile Club Cup is on.

The Great Western, driven by Tidmarsh, fails to complete even one lap, engine trouble eliminating it before the motor is fairly warmed up to its task.

Mulford's Peugeot leads on corrected time, having reeled off the first 8.38 miles in 6 minutes and 27 seconds. Wishart's time is but 2 seconds slower. It is evident that all records for the Elgin course are to be shattered.

Wishart is a dangerous competitor, however, for the Mercer covers the second lap in 6 minutes 11 seconds.

Two cars are eliminated after making three laps, Rickenbacher docking the Duesenberg with a broken gearshift lever, and Grant, his trousers' legs covered with grease, abandoning the Sunbeam with a broken oil line.

Wishart leads DePalma by 2 minutes, and so close is the struggle that Anderson, in eighth place, is only 5 and a fraction minutes abaft the yellow pacemaker.

In the next five laps three more cars are eliminated, Tetzlaff's Maxwell, Pullen's Mercer and Maurice's Sunbeam.

The fourteenth lap proves disastrous for both Alley and Carlson. The Duesenberg is abandoned with transmission trouble, and a refractory motor results in the elimination of the Maxwell.

Otto Henning, driving the No. 26 Mercer, quits the race after covering twenty-two laps, encountering engine trouble. Wishart stops for a second time on the twenty-third lap to tighten the gasoline tank, which has been jolted loose. He loses only 1 minute and 10 seconds in making the repairs, and at the completion of 200 miles has a lead of more than 6 minutes on DePalma.

Engine trouble eliminates Roberts' Pahys on the twenty-fifth lap. On the same circuit DePalma blows a tire on the back stretch and stops twice, once at the side of the course to change casings and once at the pit to take on a spare.

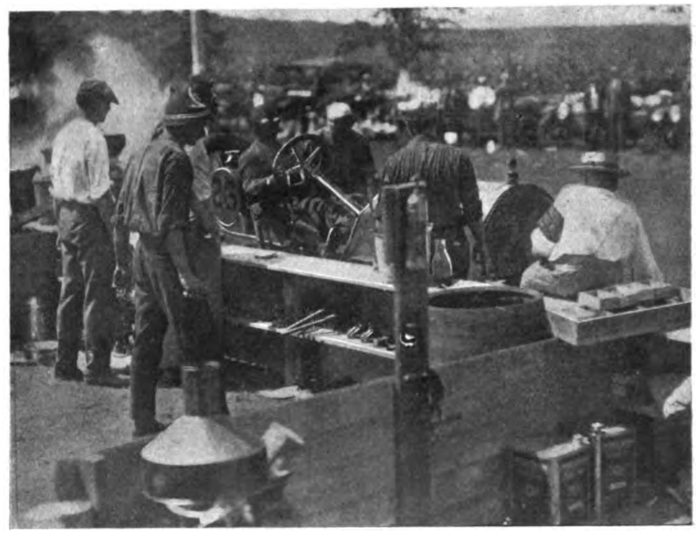
Although leading by a wide margin, it can be seen that Wishart is in trouble. His gasoline tank is leaking badly as he passes the stands, and on his twenty-sixth lap he stops for more than 2 minutes in a futile endeavor to strap on the tank. One more circuit of the course and Wishart is forced to abandon the Mercer in disgust.

At the time of Wishart's withdrawal Anderson has passed DePalma, and with the Mercer no longer a contender, the Stutz is leading the Mercedes by 39 seconds. Mulford is in third place; Oldfield, fourth; Chandler, fifth; Heinemann, sixth, and Dearborn, seventh.

On the twenty-eighth lap DePalma cuts down Anderson's lead to 26 seconds, but on the next circuit of the course the Stutz driver more than makes up the ground lost and has an advantage of 1 minute 4 seconds when he crosses the tape. Anderson loses a minute changing a rear tire on the thirtieth lap, and with but six more laps to go is only 23 seconds in front of the desperately driving Italian.

DePalma to the Front

On the thirty-first lap DePalma passes Anderson and assumes a lead of 44 seconds. On the next lap he increases this to 52 seconds, but does not gain or lose a second on the thirty-third circuit. DePalma has a friction over a minute to spare at the completion of the thirty-fourth lap, but so desperately does Anderson drive the last 16 miles that DePalma gets the checkered flag only 44 seconds before the Stutz pilot finished the most gruelling race in the history of the Elgin speed carnival.



One of the scenes at the pits. Henning's Mercer in the foreground

Capturing the Elgin National Trophy

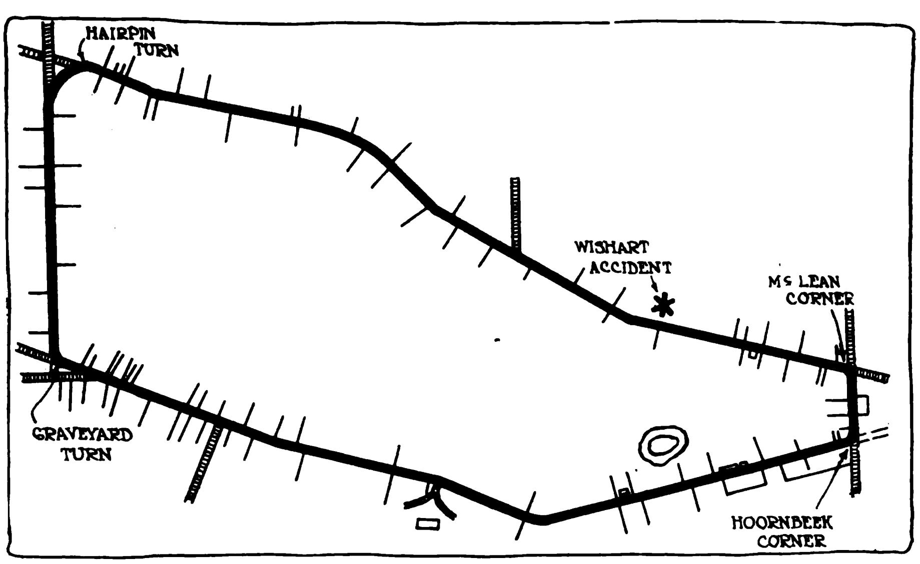
Wishart Was Leading Till 14th Lap —DePalma Wins Duel With Pullen

A HIATUS of 24 hours—a busy hiatus of tearing down and reassembling speed creations—and twenty-eight cars, the largest field that has ever faced a starter in an American road race, have answered the call of the clerk of the course and are awaiting the bomb that will start the struggle for the Elgin National Trophy.

Thirty-two cars originally were nominated, but four are missing—the No. 3 Duesenberg, the No. 7 Marmon, the No. 20 Peugeot and No. 23 Peugeot. Two, the Duesenberg and No. 20 Marmon, have spent their strength in the race of the day before and consequently will not start.

As on the previous day the cars are lined up in rows of two each and are sent away at 30-second intervals.

Wishart, forced out of the race of Friday with victory almost in his grasp, shows his car no mercy, and although running in eleventh position, is first on corrected time, having made the first 8.36 miles in 6 minutes 31 seconds. Burman takes 6 minutes 43 seconds to cover the initial lap and DePalma's Mercedes is only 1 second slower.



Map of the Elgin course on which Friday's and Saturday's races were run. Cross shows point at which Wishart's accident occurred

Fontaine, Burman, Dearborn and Pullen flash by the stands in the order named for a second time, but Wishart, traveling at a speed of 78.5 miles an hour, is announced as the leader.

On the third circuit of the course Burman passes Fontaine and moves up into the position of pacemaker, with Fontaine, Pullen, Dearborn and Rickenbacher taking his smoke. On corrected time Wishart is leading Anderson by 50 seconds and is driving like a madman to overtake and pass Burman.

On the fourth and fifth laps Burman is successful in throwing off Wishart's challenge. The Mercer is hanging onto the Peugeot with the tenacity of a bulldog, however, and it seems only a question of minutes un-

EQUIPMENT USED ON CONTESTING CARS IN ELGIN RACES

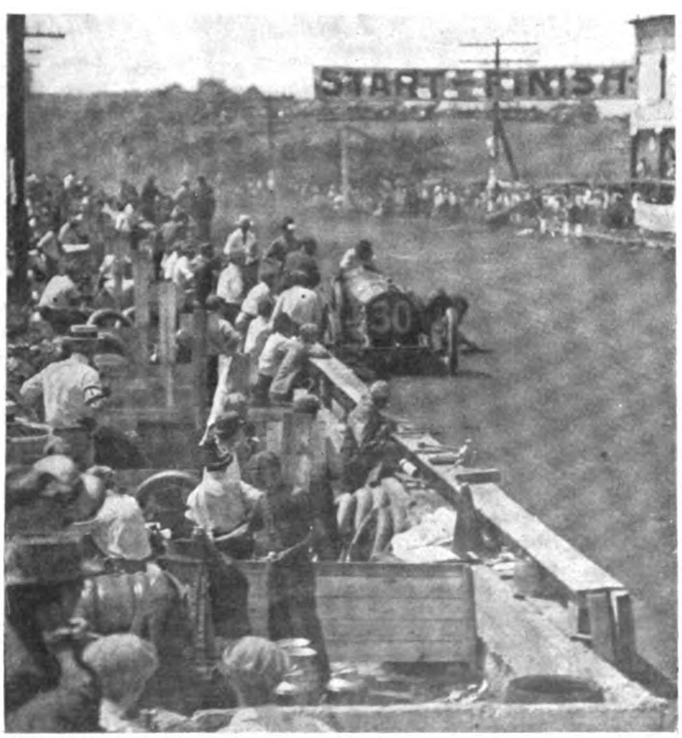
Car	Driver	Magneto	Plugs	Carbureter	Oil	Tires	Wheels
Stutz	Dearborn	Bosch	Bosch	Rayfield	Monogram	Firestone	Wood
Stutz	Oldfield	Bosch	Bosch	Schebler	Monogram	Firestone	Houk
Stutz	Anderson	Bosch	Bosch	Schebler	Monogram	Silvertown	Houk
Duesenberg	Rickenbacher	Bosch	Bosch	Schebler	Oilzum	Riverside	R. W.
Duesenberg	Alley	Bosch	Bosch	Schebler	Oilzum	Riverside	Wood
White	Shrunk	Bosch	Bosch	White	Polarine	Braender-Michelin	Wood
Mercedes	DePalma	Bosch	Bosch	Mercedes	Monogram	Nassau	R. W.
Maxwell	Tetzlaff	Bosch	Bosch	Harroun	Polarine	Silvertown	Houk
Maxwell	Carlson	Bosch	Rajah	Harroun	Polarine	Silvertown	Houk
Marmon	Heinemann	Bosch	Bosch	Schebler	Monogram	Palmer Cord	Wood
Gray Fox	Wilcox	Bosch	Bosch	Rayfield	Castor	Silvertown	R. W.
Sunbeam	Grant	Bosch	K.L.G	Master	Castor	Palmer Cord	Steel
Sunbeam	Maurice	Bosch	K.L.G	Master	Castor	Palmer Cord	Steel
Great Western	Tidmarsh	Bosch	Bosch	Schebler	Oilzum	Braender	Houk
Braender Bull Dog	Chandler	Bosch	Bosch	Rayfield	Oilzum	Braender	Dunlop
Mercer	Henning	Bosch	Bosch	Rayfield	Castor	Silvertown	R. W.
Mercer	Wishart	Bosch	Bosch	Rayfield	Castor	Palmer-Silvertown	R. W.
Pahys	Roberts	Bosch	Bosch	Rayfield	Oilzum	Michelin	Wood
Peugeot	Burman	Bosch	Bosch	Master	Castor	Nassau	R. W.
Burman	Hearne	Bosch		Master		Nassau	R. W.
Mercer	Pullen	Bosch	Bosch	Rayfield	Castor	Palmer	R. W.
Marmon	D'Alene	Bosch	Bosch	Rayfield	Monogram	Silvertown-Riverside	
Peugeot	Mulford	Bosch	Rajah	Rayfield		Braender	
Chadwick	Hoskins	Bosch	Rajah	Rayfield		Firestone	Houk
Keeton	Callaghan		Bosch	Rayfield	Polarine	Nassau	

til it will pass the French car. Anderson, who is pushing Wishart, is forced to stop at the pit to repair a leaking radiator cap, and loses almost 4 minutes before he gets away again.

At the end of 50 miles Wishart has a lead of 1 minute 5 seconds on Burman and is driving at a rate of 75.1 miles an hour.

Eight cars have been eliminated at this stage of the struggle. Mercedes Fritz Walker has failed to complete one lap of the race and has docked his Rae with a broken clutch. A broken connecting-rod has retired Tidmarsh's Great Western on the second lap, and a broken radiator has disabled Luttrell's White. Engine trouble encountered on the third lap caused the retirement of Caillouette's White. D'Alene, in rounding Hornbeek's turn on the fourth lap, crashed into a tree and broke the frame and radiator of his Marmon. Mort Roberts abandoned the Pahys with a faulty motor on the fifth lap, and Orr voiced a similar complaint about his Maxwell on the next circuit of the course. Early in the race Callaghan was ordered out on account of the Keeton's bad brakes.

At the completion of twelve laps, or 100 miles, Wishart has



A scene at the pits on Saturday. Heinemann's Marmon making a tire change before the pits

increased his lead over Burman to 3 minutes and a fraction. Alley's Duesenberg is third; Pullen's Mercer, fourth; DePalma's Mercedes, fifth, and Grant's Sunbeam, sixth.

Five more cars were docked disabled before the 100-mile mark was reached. Rickenbacher's Duesenberg suffered from engine trouble on the seventh lap; the Chadwick was withdrawn because of engine trouble, and the Braender Bulldog caught on fire on the eighth lap; the Lozier broke a wheel on the tenth lap, and engine trouble eliminated Tetzlaff on the eleventh lap.

Burman Takes the Lead

The accident that cost Spencer Wishart his life on the fourteenth lap gives Burman an opportunity to take the lead once more, and at the completion of the eighteenth lap, or with the race half over, the speed king is leading by 1 minute 1 second, with Alley in the Duesenberg chasing him. Pullen in the Mercer is third and DePalma in the Mercedes is fourth, 5 minutes behind the new leader. A stop for gasoline and oil on the seventh lap, DePalma's only stop in the 301 miles, has cost him 55 seconds.

Anderson, a dangerous competitor early in the race, goes out on the twentieth lap, due to radiator trouble. Heinemann's Marmon is rolled to the grass with disabled brakes on the twenty-first lap and the Gray Fox, Grant's Sunbeam and Dearborn's Stutz are withdrawn on the twenty-third lap, all three cars suffering from balky motors.

Alley stops for fuel on his twentieth lap and is relieved by Rickenbacher, who steps on the throttle and sends the Duesenberg in pursuit of Burman.

Five times Rickenbacher passes the grandstand, gaining a few seconds on each lap. The distance between the Peugeot and Duesenberg is gradually and slowly cut down until at the end of the thirtieth lap Rickenbacher has passed Burman and is leading the closely bunched field by 1 minute 13 seconds.

DePalma and Pullen's Fight

Rickenbacher shows the way to the field for two more laps. With only 33 miles more to go, a driveshaft on the Duesenberg breaks and Rickenbacher and his mechanician walk to the pits, eliminated at the very dawn of their hour of triumph.

The withdrawal of Burman's Peugeot leaves DePalma and Pullen alone on the course to fight for the nerve-racking victory. At the start of the thirty-fifth lap DePalma has a lead of only 47 seconds on Pullen, who has not stopped once since he was sent away at 11 o'clock. The Italian has the faster car, however, and increases his lead to 55 seconds on the next to the last circuit. Pullen, after getting the green flag, urges the yellow Mercer to the limit of its speed, but the chase is a hopeless one and DePalma thunders over the line a victor by 1 minute 10 seconds.

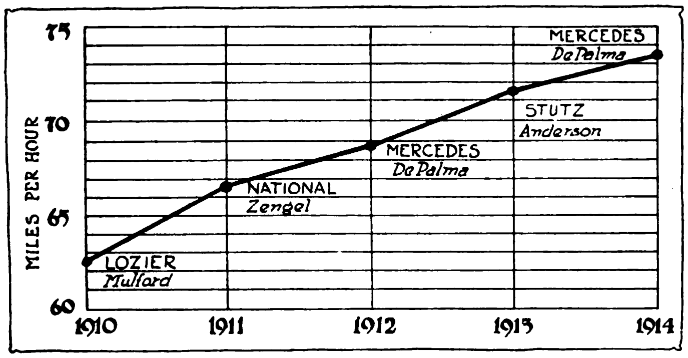


Chart showing the increase from year to year in the speed made in the Elgin National Trophy Race

Fast Team Work Lacking at Pits

Inadequate Preparation and Training of Crews Evident in Many Cases

THE 2 days of racing on the Elgin course were enlivened by eighty-eight pit stops. Forty-seven of these were made on Friday during the races for the trophy of the Chicago Automobile Club and forty-one on the following day. Out of these stops it was noticeable that a relatively small percentage were due to tire trouble as compared to other races. On the first day there were but sixteen stops for tires and on the second day, seventeen.

The fast team work at the pits which characterized the 500-mile Indianapolis race seemed to be lacking in the Elgin events. The tire changes were slow, even though demountable wheels were used and it did not seem as if the work of exchanging wheels had been sufficiently rehearsed. The Mercer, Stutz and Maxwell pits were exceptions to this rule, being manned by experienced crews.

Short Time at Pits by Some Cars

One of the features of the race was the short time spent at the pits by some of the cars. The three Stutzes all finished the race on the first day without having their bonnets lifted and the only tire changed by this team during that day was one on Anderson's car. Pullen ran his Mercer through the entire free-for-all without making a single stop.

Taking up the race on Friday for the Chicago Automobile Club Trophy, DePalma found it necessary to halt only three times in his 301-mile ride to victory. The total time lost at the pits was but 1 minute and 29 seconds. This was rather unexpected as it was the opinion of the railbirds that the winner would be held up at least 3 minutes at the pits, based on experience of former years.

Anderson Lost Needlessly

Anderson, who finished second, only 44 seconds behind DePalma, lost first place through the fact that he was not thoroughly familiar with the rules by which the race was governed. He lost a spare tire on the track and fearing to be disqualified he sent his mechanic back after the tire. This delay cost him 7 precious minutes during which time DePalma gained a lead.

The total time at the pits was 2 minutes 18 seconds but with 7 minutes lost on the back stretch the time stopped totaled 9 minutes 18 seconds.

Ralph Mulford in the Peugeot made three stops at the pits. This total stoppage at the pits was 4 minutes 54 seconds.

Barney Oldfield in the Stutz No. 11 halted only once in the 300 miles. This became necessary at the end of 160 miles when he stopped on the 19th lap for gasoline and oil. He was away in 1 minute 15 seconds. Oldfield did not change a tire during the event.

Chandler who drove his Braender Bulldog into fourth place made four stops at the pits changing seven tires and losing 10 minutes, 26 seconds in all at the pits. The pit work in Chandler's pit was very slow, particularly on the tire changes, and his running time could have been shortened quite considerably by some lively and heady work on the part of his assistants.

Heinemann in the number 30 Marmon who finished sixth lost considerable time at the pits, the chief trouble being the difficulty in keeping the spare tires tight.

He consumed 11 minutes 21 seconds at the pits in his five stops.

Stutz Drivers Did Not Lift Hoods

The Dearborn Stutz No. 1, which finished in seventh place, lost only 2 minutes, 31 seconds at the pits. Dearborn did not change a tire and, like the other Stutz drivers, never lifted the hood.

Wilcox's Gray Fox, which ran eighth, halted but three times, twice on account of valve trouble, the total time lost being 9 minutes 24 seconds.

Spencer Wishart, whose career was ended in the next day's event, was up in the lead for the first 190 miles but he was put out of the running by his gas tank becoming loosened by vibration. He lost considerable time trying to fix it up and finally withdrew in his 27th lap.

Pullen was well up for the first 10 laps until he went out on account of transmission trouble.

Pit Stops in Saturday's Race

DePalma made but one stop in the Saturday event and this was after he had gone 17 laps, taking 55 seconds to replenish his gasoline supply. DePalma changed no tires during the Free-for-all race and was riding on the same front tires that carried him through the event of the day before.

Pullen in the little Mercer holds the record for the 2-day's Elgin races as he was the only one to finish either day without making a stop of any kind. This he did Saturday.

Barney Oldfield halted at the pits five times but in none of them did he change a tire or lift the hood. All the stops were occasioned by taking on supplies of gasoline, oil and water, the last three being for water alone. His total time lost at the pits was 6 minutes 45 seconds.

Gaston Maurice, who piloted his Sunbeam to fourth place, stopped only once at the pits and this was to put a new spare on the rack to replace the one used on the tire change on the back stretch. He was away again in less than a minute and drove the final 140 miles without a halt.

The Burman Special with Eddie Hearne at the wheel drew up at the pits twice, both times to fill the gasoline and oil tanks and the radiator. The hood was not lifted at the pits and no tires were changed. The first stop occurred after 176 miles had been covered and the last one after 250 had been negotiated. His time lost at the pits was 2 minutes 55 seconds.

Carlson Has High Record for Stops

The Maxwell with Carlson at the wheel had only three laps to go when the finish flag put an end to the race. Carlson stopped more often than anyone else among the contenders. He stopped seven times in all and lost 12 minutes.

Bob Burman in the Peugeot had only two laps to go when he was put out on account of engine trouble. He had driven a very consistent race when he made only one stop at the pits. This was for gasoline and oil in the 32nd lap.

Wishart was in the lead in the number 19 Mercer when his fatal accident occurred in the 13th lap. He had not made a stop.

Anderson finished 19 laps without a stop when he was put out of the race with transmission trouble.

Rickenbacher went out in the sixth lap with a cracked cylinder and then drove the mount of his team-mate Alley until it went out with a broken drive shaft in the 32nd lap.

—

Tires Make Fine Record—Only 33 Stops on Two Days

UNPARALLELED in the history of the Elgin road races is the tire victory of this year's contests held last Friday and Saturday. Although in previous races the winning cars came through with comparatively few tire changes, this year shows a smaller number of tires per car than any other year, and the record stands above those made at Sioux City and other dirt courses in the country. Both contests this year showed a total of thirty-three tire changes and, with forty-eight cars on the course on both days, an average of less than a tire per car. Sioux City cannot boast of such a record, for in the 300-mile race just held twenty-one casings were replaced in the one race. Indianapolis, with its 500-mile classic, burned up more than $10,000 worth of tires in the race of last May.

Pullen's Remarkable Record

Some individual showings are of special interest. Barney Oldfield and Dearborn, both in Stutz cars, finished Friday's race without a single tire change, and on Saturday DePalma, the winner, not only went through without a change but used the same front tires which he used on the day previous. Oldfield and Dearborn used Firestone tires, and DePalma used Nassau casings. Still more remarkable than the showings mentioned is that of Ed. Pullen, who went through the entire race without a stop and without using his spare tire. Considering the heat of the day, the record speed and the condition of the course, the showing of Pullen, who rode on Silvertown cord tires, is to be compared only with that of Ralph Mulford's in the 1913 500-mile race. Mulford completed the grind driving a Mercedes, the heaviest car in the race, without making a single tire change. When compared with previous Elgin races this year's contests show a very low average per car for tires.

Tire Changes in Friday's Race

The first stop of the day for tires was made by Tom Alley who came in for a stop of more than 1 minute to change a right front.

Mulford came in again on his eighteenth lap with a tattered right rear which required 1 minute 30 seconds to replace, considerable time for a tire change when it is considered the record is something like 15 seconds.

In his 25th lap DePalma stopped at the pits for a spare tire, being his only change for the day. He was followed closely by Wishart who took on two spares which required 2 minutes 8 seconds and almost at the same time Mulford came in for a right rear. The last stop of the race for tires was made by Roberts in the Pahys who, after changing a right rear, discovered his gasoline tank was leaking and abandoned the race.

So, like the Sioux City race, the Elgin races showed that tire makers are not asleep and that speed contests have taught them much in the building of casings which can stand up under severe strains, heat and abrasion.

It was a victory of tires, but the work at the pits when it came to changing casings was indeed poor and the miserable performances at some of the pits was due directly to poor tool equipment and at others to inexperienced and excited attendants. In many cases a pitman with a jack in his hand and staring at a blown out casing would remain still until told by five simultaneous shouts that the right rear needed replacement.

Billy Chandler's crew seemed to be the only one which had quick-acting lifting jacks. The others had ordinary jacks.

Not one of the pit managers took advantage of the extra supply of casings on the back stretch on the second day. It was arranged that a supply of casings, watched by an attendant, could be placed on the back stretch and then there would be no need of stopping at the pits for a spare or if the spare had blown to run to the pits on the rim.

Oversight was evident. Road races call for strong supports for the extra tire, yet many of the cars came in front of the grandstand with the spare tire or wheel loose. The holding straps almost completely off in one case. In another instance the spare was lost on the back stretch because of insufficiently strong holding material. Charlie Erbstein warned his man before the race the leather straps were not strong enough. Mr. Erbstein may not be a prophet but he must be given credit for predicting the loss of Heinemann's extra casing.

One more correction might be made with regard to the method of approaching the pits for a tire change. It seemed that many drivers gave little thought to the fact that room is necessary to swing a wheel and not a few with a right front or rear to change came almost flush with the pits. This meant pushing the car to give the attendant a little room to get the wheel off and it also meant a great loss of time.

In both day's races few front tires had to be replaced, the greatest number of changes being necessary on right rears.

Faster Work on Saturday

On Saturday the first stop for tires came after the first lap when Carlson, driving one of the Maxwells, stopped at the pits to take on a spare, the original spare having been used to replace a blown-out casing.

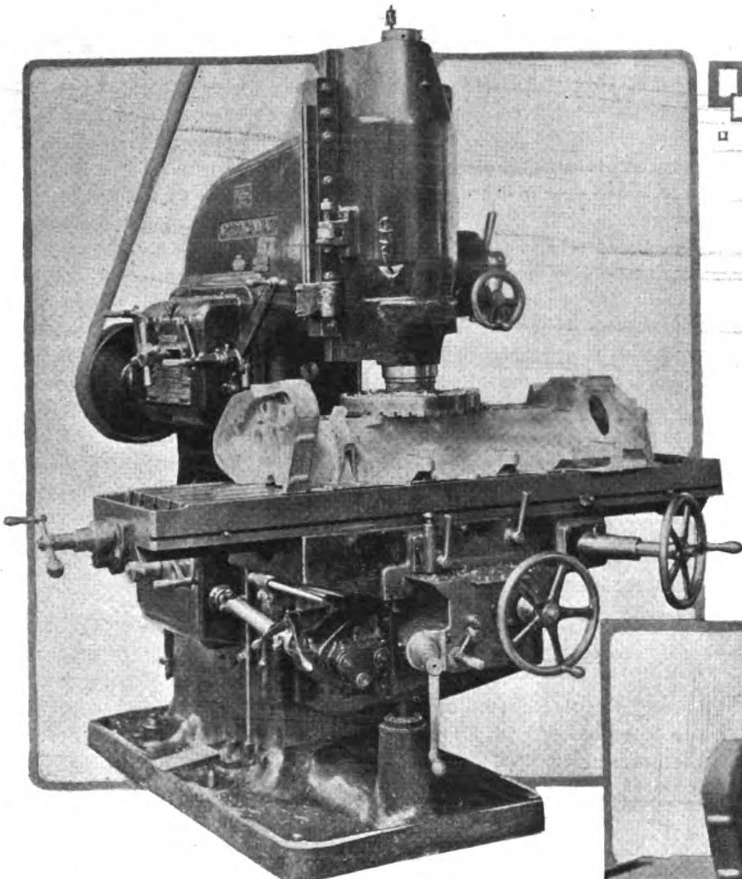
Tire changes at Chandler's pit were unusually fast, due primarily to pre-race training in spare and wheel-tire changes. Chandler's extra tire was taken on in less than 40 seconds and to bring out the speed of the whole crew, drivers changed positions, Mulford taking the wheel.

The last tire to be touched was the spare on Carlson's Maxwell which came loose at the end of the twenty-fifth lap and had to be tightened.

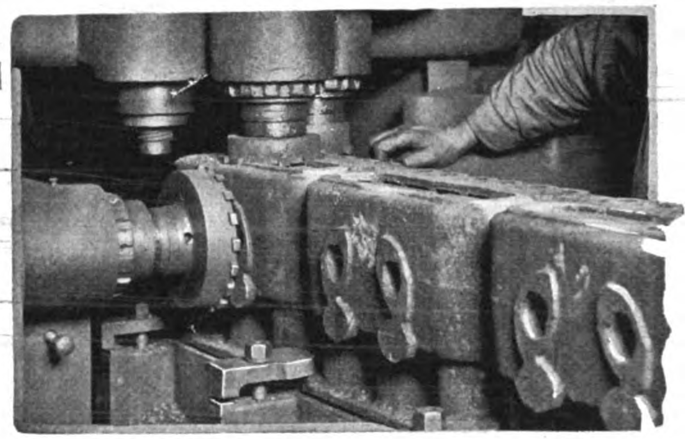
The Late Spencer Wishart

Spencer Wishart was 24 years old and had been racing since he was 18. His home town is Portchester, N. Y. He was married to Miss Louise McGowan, of Indianapolis, Ind., 2 months ago. He started by piloting cars owned by himself and finished second in the first race on the Indianapolis track. His work was a combination of daring and cool nerve, and soon he was called into the professional ranks and became the captain of a racing team for a manufacturer. On August 25, 1912, at Columbus, O., he broke the 75, 100, 150 and 200 mile track records. The first three are still standing. At the Santa Monica, Cal., races this spring he averaged 84.4 miles an hour before going out of the race. Funeral services were held on August 25 in New York City.

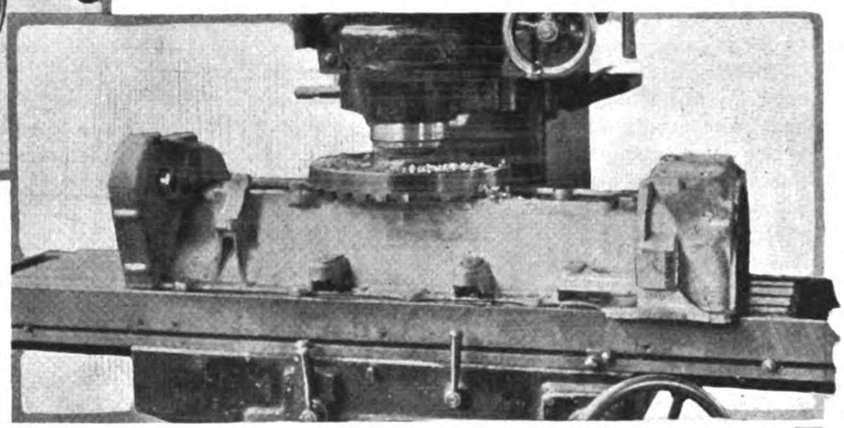
Cutter Life a Factor in Economy



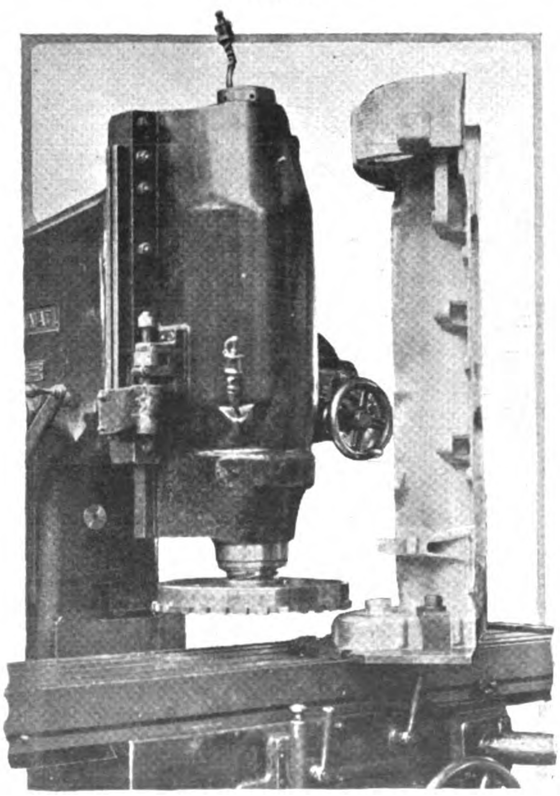
Tindel cutter milling a Continental six-cylinder crankcase



Cutters at work on the close-grain iron of Packard cylinders. The Packard Company states that, while the increased production has not appeared as a very great factor, owing to the close grain of the metal, the cutters last 20 to 25 per cent. longer without grinding



Milling the cylinder flange of a Continental six-cylinder crankcase



Milling the top and bottom faces of Continental crankcases

QUICK milling work is an essential feature in fast production methods in automobile plants. In the handling of cast iron it is desirable to have a fast feed on the machine and at the same time to have the life of the cutter as long as possible in order that the tool economy will be within the realms of reason.

The accompanying illustrations show the Tindel inserted tooth milling cutter in actual use in the plants of the Continental Motor Manufacturing Co. and the Packard Motor Car Co. In using these cutters in the Packard company's plant to mill very close-grained cast iron cylinders, the increased production has not appeared as a very great factor, but the Packard company states that it has found that the cutters stand up 20 to 25 per cent. longer without grinding.

Sometimes Table Feed Is 3.5 Inches per Minute

The table feed on the installation shown at the top right of this page is 2.5 inches per minute. The engineers of the Tindel-Norris company of Eddystone, Pa., makers of this machine, state that this can be easily exceeded and that there are cases where a 10-inch cutter is used to remove stock from cast iron with a rate of table feed of 3.5 inches per minute.

These tools operate on a semi-automatic principle and are thoroughly up to date as regards ease of handling. In the accompanying illustrations various steps in the milling of an aluminum crankcase are shown. The cylinder operation is for a Packard six.

Leaving Kretzy in the Russian military endurance trials, giving a good idea of the better class of roads in Russia

Russia—A Trade Opportunity

People Are Wary of Expense Attached to Ownership of Cars—Dealer is a Big Factor—Part II.

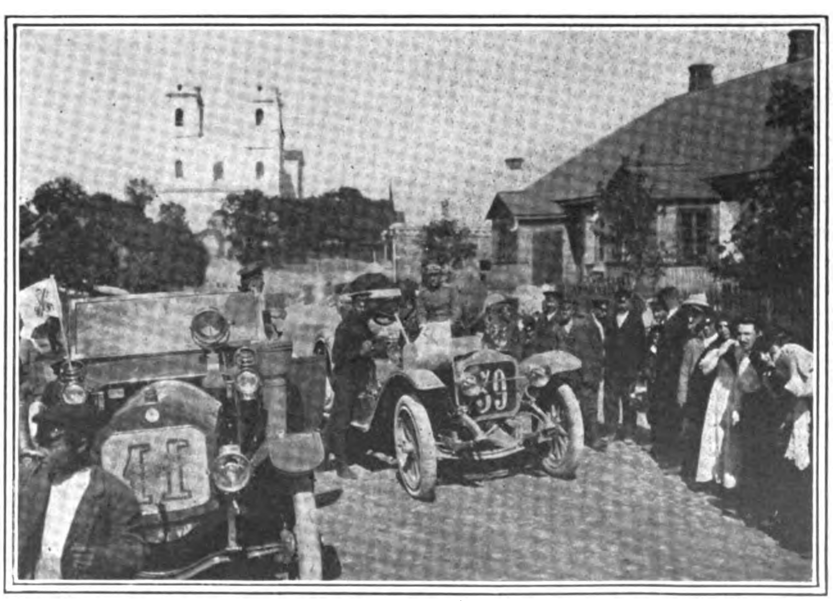
By the Late E. P. Batzell

¶ Editor's Note.—*This article was prepared some time ago by Mr. Batzell and so must be taken as a description of conditions in Russia at the outbreak of the great European war.* The Automobile *is indebted for the illustrations to The Autocar and to the White Company.*

THE character and the value of a car naturally put the owner in a certain class as to the service which he can reasonably expect and claim from the agent and from the car. On the other hand, it is so in reality that the richer parties buying more expensive cars can be made to pay for service without making them notice it and without scaring them away from becoming and continuing as automobile owners. It is that class of people who begin their automobile ownership at the medium- and low-priced cars who need most efforts and service to become cultivated into satisfied and permanent motorists. Many of them are attracted towards the pleasure they have in view when owning a car. Others would like to use their cars also for some commercial purpose. But, anticipating a big outlay for the upkeep of the car and the chauffeur, they all start with the purchase of a comparatively inexpensive machine, although under normal conditions they could and would have bought a much better and more costly one. They are not quite sure if they will remain automobile owners for long, their first machine taking the rôle of a trial one. Thus they gain knowledge and experience at the risk of the cheaper machine and consequently at the risk of little money, figuring correctly, that all expenses might be somewhat proportionally lower with a smaller price paid for at the time of first purchase. If this class of people is not getting the proper treatment and if they don't see their expectations come true more or less, the latter being largely out of the competence of the agent, they are lost customers to the dealer who sold them the first machine and they might become disappointed enough to leave motoring entirely, at least for a time, until, according to their expectations, the automobiles are further advanced and improved.

It is a fact that the few existing cheap makes of cars on the Russian market cannot boast of many repeated orders at the present when the owner would come back and dispose of his old machine to buy a new one of the same kind. The cases when such repeated orders have been taking place can be explained either by the cost of the particular machine being about all the owner really can pay, or that the use of the machine gives complete satisfaction. The latter generally happens very seldom if one uses it as a purely family machine; it is possible only if a commercial application is attached to it. The majority of automobilists who now buy the cheap grades of cars keep them only so long until they become more or less exacting as to features offered in them and until they obtain some automobile experience. Then they are prospects for better, more commodious and higher-priced machines.

Up to now the opportunity to try the use of an automobile with a limited outlay of money was very narrow on the Russian market, because one had hardly any choice of the cheap cars. Now their number and variety of types is gradually increasing, which means more competition between them



Part of third section of the Russian military trials stopping at Maljata

One of the cars in the Russian military trials on the road. Note poor road conditions

and consequently favors the buyer. That cheap cars are needed there can be readily seen from a few facts. The Ford has been practically the only type sold there since some years ago and which combines conventional automobile lines with a price much below that of medium European cars. Nevertheless now the lack of competition makes it possible there to sell a Ford touring car of the latest type for 2,375 rubles (about $1,200), because people are buying it anyhow, and one could not sell enough of them for a lower price to make the same profit because only 1,000 cars are sold yearly in the whole country. However, judging from statements at the Ford branch the above price is to be reduced for next year, which is caused either by a bigger allotment of cars to be sold or by increasing competition of the other cheap cars gradually making their appearance on that market. It is characteristic of the market conditions to note and compare the rate of sales of the Fords with the distribution of other much more expensive machines. In some districts there are more cars of some particular high-priced European make in one town than there are Fords in the whole district, the latter being bigger than a state. For example, the whole southwest of Russia with a populace of some 20,000,000 absorbs with difficulty 120 Fords in a year, whereas Laurin & Clement sell as many cars just around the city of Kief, in that same district. The latter city proper has some 500 automobiles registered, in which number are only about a dozen Fords. It is true, however, that the Ford branch there has existed but a short time.

Abnormal Prices the Rule

The sale of Fords is a good example, demonstrating how people are buying cars and paying abnormal prices for them, as long as they get a machine which is cheaper than another of much better grade. The big factor of price with new buyers also can be seen in the quite large rate of business carried on by the Cyclonette type of vehicle. This three-wheeler is very popular in Germany, where it originated, and in Russia. It has been much improved in recent years, having a four-cylinder, air-cooled motor exposed and set in front above the driving wheel. It seats four or five passengers, is considered as an automobile and, being cheap, has gained quite a field for city use. It is used for private purposes and also commercially, notably as a sort of taxicab.

Considering transportation charges and duty in bringing cars into Russia, one should make good profit there in selling the average $1,000 to $1,200 car for the price asked for the Ford now, or a little higher. Big business would be assured, although it could come only gradually. A car resembling the high-priced machines, and which combines good quality with attractive service terms for the owners, should bring many repeated orders among the class of medium rich people who can be satisfied and receive personal pleasure with an average car performance when there is not as much speed and luxury attached to it as in the better European cars of three times the price. To that class of people belongs the large mass of those who are no automobile prospects at the present, because they cannot afford to change cars quite often and stand much extra expense in that connection, but who would buy cars as soon as they are reasonably assured of their service ability without having to connect this feature with a high-priced car. Naturally, the efforts used to persuade them into buying cars are to be based on the evidence of favorable facts concerning the cars and their reputation among the users, which is very important.

Business Value Not Realized

The business man, the merchant, the doctor, etc., have not grasped as yet that the automobile is a contrivance not only for the pleasure of rich people, but that it can be used to a large part for their own business convenience. It seems that the European standard for the time factor in any transaction is to blame for the above. Things go much slower there and it is considered that a person is in haste if he rides in a hack. The cost of hiring or owning one of those is quite low, especially when securing one on a contract basis, for the daily needs of a doctor, contractor, etc. Although slow, the horse vehicle accomplishes its purpose satisfactorily, because the number of daily transactions and the distance to be traveled are generally much smaller than in the United States under the same conditions where an automobile would have been indispensable. Besides, the hired hack does not require any initial outlay, which is very important for the beginner in business, and it is free of the trouble one meets there in connection with the ownership of an automobile and with the chauffeur for the latter. People who are better off naturally own their horses and have hired drivers for them, but an outfit of good quality costs less than an automobile; the driver is not a privileged expert, but an ordinary peasant who is much easier ordered about than a chauffeur, and, most of all, one is not called upon by the fashion to change outfits every so often to keep pace with the rest, as in the case of automobiles.

Horse-Drawn Vehicles Predominate

At present in Russia one finds many instances of automobile use for business purposes, even heavy and light trucks, buses and delivery cars, aside from all those cars which are used by the government in many branches of civil and military activity. But their proportion to the horse-drawn vehicles of the same kind, except the buses, is very small. The large concerns which do much carting of heavy loads and where a number of trucks can be employed for this purpose are gradually introducing them. They are able to maintain a large garage and repair shop where proper expert management can be easily installed without making things too costly for the firm, as would be the case with smaller concerns with a small number of machines. The latter naturally would be putting greater responsibility on the shoulders of their drivers and are obliged to use the service of a public garage and repair shop for every piece of work requiring facilities and skill. Trucks are giving better satisfaction in the larger business enterprises and where they are accompanied by a service guarantee of a properly equipped selling agency. The lack of department stores and other large individual concerns which have much hauling to do is also a reason why the commercial vehicle does not spread rapidly in Russia. On the other hand, the advent of the automobile for bus service has practically begun this type of locomotion there. The horse-drawn buses never have been used, except as stage coaches between towns or between the hotels and the depots. Now the larger cities have one or more regular bus lines installed for competition with the street car systems and also separately. These lines appear to work out quite satisfactorily. They have also supplanted some of the formerly existing stage-coach lines for the transfer of passengers and freight between commercially connected towns when the available railroad facilities are not sufficient. In this respect the country is awakening to the possibilities of automobiles, the government setting the pace in all branches.

Reputations Grow Rapidly

The nature of the present gradual development of the automobile in Russia dictates some interesting points which it is valuable to keep in mind when going after business with the view of establishing a permanent undertaking there. The majority of present automobile owners and those who are the possible prospects of the near future for pleasure or commercial vehicles, as a general rule, are so situated that they come in contact with each other very easily, which is assisted by the many clubs of which they might be members or visitors. Very many owners and even prospects are sufficiently interested in cars, etc., to belong to the different local branches of the Imperial Automobile Club. The number of machines being limited as yet, the reputation of each individual make travels rapidly between this class of people and their acquaintances interested in automobiling. A person well known in automobile circles in Russia stated to the writer in this connection that any accident or mishap to a car in the south of Russia is very soon known in St. Petersburg and vice versa, thus taking a share in the establishing of a good or unfavorable reputation for the particular car all over the country.

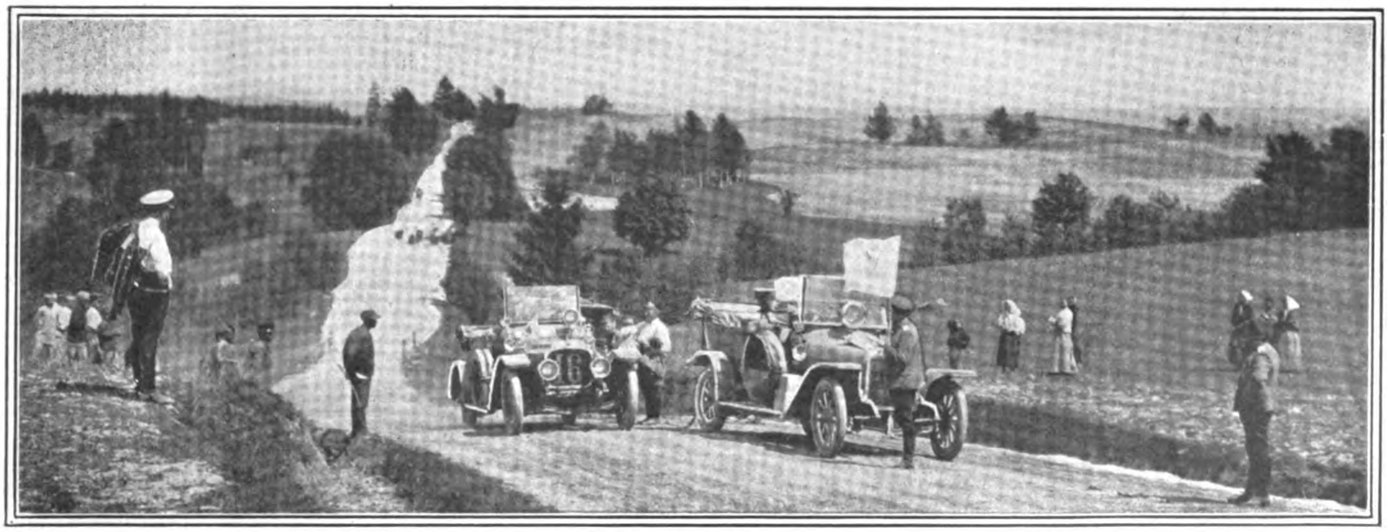
Some makes are firmly established in the Russian market. The efforts required for the introduction of a new make of car can be best realized by actually observing them. It is considered good policy to select one's customers, not selling the car at random to everybody who wants to buy it until the machine has made a good reputation for itself.

Much influence upon public opinion can be derived from contests, which are being held every so often under the management of the different clubs and other organizations. The advertising value gained in winning a contest is very great, but at the same time the character of the contest and the list of entries should be looked into before taking part in it. It it better to abstain from entering it than to come out a bad loser, particularly if one has a new make on his hands, in which case one must be sure about the winning chances for it. There are cars which originally had a good business in Russia but are gradually dropping out of line, simply because they have made an unfavorable showing in contests.

Advertising Brings Good Results

Advertising in daily papers and in the two Russian magazines devoted to the automobile business brings good results. But the style of advertisement there is entirely different from the American style. Generally one does not say much, merely giving a few brief but convincing facts about the car and its record. A long advertisement or one written in boastful form will most surely displease the readers, who are all inclined to be sceptical in regard to any statement which is not strictly proven by facts at the same time. The public may have very little technical knowledge, but it has a highly developed literary sense. A few well and reservedly written facts are bound to attract attention. Short explanations of some of the meritorious mechanical points, run as a series, should satisfy those who are more or less mechanically inclined and who like to know something about the parts of a car before buying it, to which class belong practically all those who are interested enough to be subscribers of the trade papers. The distribution of advertisements among the different territories is best done through a central office, so that agents of one territory would not feel as if they carry the burden of cost for the benefit of the other fellow. That might be the case because people in the provinces very often read newspapers published in Moscow and St. Petersburg and the advertisements of the dealers in these two cities help a lot to the dealers in the province, for instance in southern, western and other parts of Russia. The cost of advertisements is much lower than in the United States, a dealer of a popular-priced car in Moscow spending only about $3,000 yearly for quite frequent publication in several daily papers there.

(To be continued)



One of the steep hills encountered on the Russian military endurance run. Note the rolling character of the country

Thinks the Light Car Solves the Economy Problem

Engineer Finds that Public Favors the Light Car Type for Maximum Service Combined with Low Maintenance Cost — Principles of Light Car Design

By William B. Stout
Chief Engineer Scripps-Booth Co.

A car twice as big costs four times as much to run.

A car half as big has one-fourth of the surface and weighs only one-eighth as much.

A car twice as big weighs eight times as much.

LIGHT weight is the basis of low car cost and upkeep. Light axle weight is the basis of car comfort. Total weight has very little to do with comfort and the lighter the car the more comfortable it can be made, for the smaller the weight of the car in proportion to the rider's weight the less it can affect him. The weight of a mere man has little effect on a 400-pound rear axle under stiff springs.

The Tread-Wheelbase Ratio

A light car can hold the road as well as a big car. A short wheelbase car can be as comfortable and easy to steer as a long wheelbase limousine. This depends not on the wheelbase but on the ratio of tread to wheelbase. Any narrow tread car can negotiate even the worst of road conditions and the narrower the tread the better chance it has to pick a good track. The idea that the smoothest part of the road is in the ruts is erroneous. The ruts, as a rule, contain the biggest bumps and "thank-ye-ma'ms," and in bad places the wise driver of the big car spends his time dodging ruts, not trying to stay in them.

Much that has been believed regarding big cars and tread has been upset by the light car movement and the public can take a new attitude of mind towards road vehicles as a result.

Horse Set Tread Standard

The first motor cars were built horse size. Horses were a certain height and to drive them the seats had to be a certain height. To accommodate the height the tread of the wagon or carriage had to be a certain width, and hence the road standard of 56 inches. This is a horse standard.

When motor cars were built the idea was to make horseless carriages and these were first built with this idea in mind. The seats were buggy-high and buggy-wide and the wheels were large, as in buggy practice. The vehicles were in truth horseless carriages and fit for horse speeds. As speeds were increased it was found that the weights were too high in the air, and the wheels too high, and lower constructions were gotten up with weights better distributed.

At first engineers saw the advantage of the light car and many were built up and put on the market. Crest, Blood Bros., La Vigne, Orient, etc., etc., and yet the public, not yet wise on motor engineering, wanted something the size of Mrs. Croesus' brougham and big enough so that one wouldn't be looked down on. They refused to buy the light car. The motor buying public at that time was the rich man and the rich man's son and wife. These wanted, not a cheap light car, but a horseless carriage. To build a machine of this size took weight and power and road juggernauts were the result.

Since then the rich public has been supplied with cars. It has driven heavy cars and light cars and big cars and little cars; cars with two, four and six-cylinder motors; one-lungers, air-cooled cars and water cooled, friction driven and planetary, and the common people with them have come to know about the motor car and what each construction will do and will not do. They know the limitations of each construction, but only recently, since the moneyed buyer has been supplied with cars and the common people have begun to buy has the need for really light weight been insistent.

Light Car Economy

The people know that light weight means low upkeep and low first cost. They know that the particular light cars that have been sold in thousands as the only cars of this class are not ideal for everybody and they want a different car even at more money. Indeed, the great surprise of the light car movement has been that price was the smallest object; that is, the first price. The public wants a small car with dignity, refinement of line, luxurious finish, deep upholstery, high dust-proof sides, with the latest of everything in fitment and are willing to pay so the low upkeep be there. A car at $300 looking cheap will not sell in such quantities as a $600 car with the luxury and finish the public want.

A certain light car selling at about $500 offered an electric starter at $90 additional. Eighty per cent. of these cars are going out fitted with starters. The public wants the latest thing even in a light car and is willing to pay.

Every firm making light cars is having small difficulty with sales. The trouble is to make the cars fast enough. This is different from the cyclecar factories, nearly all of which have been disappointed in sales while surprised at road performance. The reason is not far to seek, when the simpler cyclecars are considered.

The public knows a water-cooled motor and is slow to be convinced of the V-type air-cooled even though it performs well. They know sliding gear and shaft drive, but are chary at first of belts and friction. They are willing to pay $100 more, even for a car of standard construction, to be sure they made a good buy rather than to pay less for a faster, easier-riding car perhaps, but about whose construction they know little.

Cyclecar Lessons Taught

The cyclecar movement, however, taught two things: first that there was a real road advantage, instead of a disadvantage, with a narrow tread; and second, that the light car could be as comfortable as a big car. They learned that the proportion of weights under and over the springs, not total weight, determined road comfort, that the proportion of tread to wheelbase determined the road performance of the car, not wheelbase alone.

The wonderful road work of some of the simple cyclecars with small motors was due to wheelbase tread proportions equivalent in some cases to 180-inch wheelbase on standard tread, and 80-pound axles under the springs instead of 400 pounds.

These discoveries are being made use of by several light car makers who are taking these ideas and fitting to them standard water-cooled motors, shaft drive and sliding gearsets, making them motor cars in every particular but with extra light axles, bevel or worm, and narrow tread. These cars stay with anything on the road and are very luxurious in their riding quality, while the light weight makes them easy to handle. There is a future for light cars of any tread, for tread of standard road width is of far less importance than is imagined, while narrow tread has advantages from every standpoint.

In building light cars the idea is to build a small motor car, a reduction in size of a big car.

Surfaces have two dimensions, volumes three. When you make a part of half size it has one-fourth the surface area and one-eighth the weight or volume. To make a car the same way reduces the weight in proportion. To halve the weight of a car, however, is to show one-fourth the upkeep expense, so one can see that the light car is enormously cheaper to run than a big car irrespective of price.

The Weight-Trimming Process

The small car of today is not a reduced big car, though that is the aim. To bring down size but retain the same tread, through the reduction of wheelbase makes the cars heavier riding than their big brothers, and does not allow of the light weight necessary. To hold the strain and twist of standard tread the axle weight is almost the same as in larger cars and the light car that is built on standard tread is strong enough for a four-passenger body. This capacity body has about four times the sales field of the two-passenger, which is a city machine, so that it is probable that the standard tread light car of the future will be a four-passenger job.

Cut Wheelbase and Tread

If one would make a minimum-weight car, which is a minimum upkeep and comfort car, the tread may be reduced in the same proportion as the wheelbase and thus retain for the new car the same road comfort of the big car that it is copied from. Without this reduction in tread in proportion there is a tendency to spin when one front wheel strikes a bump, which absorbs power continually though hardly noticeable to the driver. The lines of the big car cannot be retained, the long sweeping body lines that give the dignity desired, unless the car width is kept in proportion. Hence the possible tendency on two-passenger jobs toward narrower treads than standard. These are obtaining beautiful lines and appearance and the road quality of the best cars. They are country travelers as well as city vehicles, and are especially fitted to touring work.

One reason for their touring fitness is the ease with which they may be handled, some of them steering like a bicycle and being set very low to the ground. This nearness to the ground gives the driver and passengers a sense of safety not to be found in cars with high seats and allows of a higher average road speed under the same road conditions.

The light car of the future may very possibly do 50 miles per day more in touring than the average big car, largely on account of the lack of fatigue on the part of the driver, and due to the higher average speed.

In building a light car the writer believes in certain principles as necessary for real performance, one of these being narrow tread, to give a tread-wheelbase proportion of sufficient ratio, and the other light axle weight, especially rear axle.

The reason for the narrow tread has been outlined and can be well understood. It is a thing which cannot be explained as to its road performance wonders, but which one can readily appreciate after a 5-minute ride. The feeling of the narrow low car is different and very pleasing, with an entire absence of the danger sense, hence allowing greater speeds. That narrow tread can meet any road condition has been proved too many times to require further argument, and for two-passenger work the writer believes the narrow tread car to be the motor vehicle of the future, if not the four passenger.

Make Axles Light

Light axle weight is vital. When you reduce the size of a car you must reduce the axle weight in proportion, and the advantage of narrow light constructions is that the rear axle weight can be kept under 100 pounds, including wheels and tires, even with a shaft drive.

The springs of a car introduce a time element into a shock, making it a pressure rather than a blow. The stiffer the springs the greater the pressure, and the more resilient the springs the more comfortable a car can be. A heavy axle, however, needs a stiff spring to control it and keep it down on the road, or when it flies into the air over a bump it will take too long in getting back to the ground again. In other words, its trajectory is not shortened sufficiently. It takes a stiff spring to control a 400-pound standard rear axle in a big car.

With a light axle of 100 pounds a 50-pound deflection spring can control the weight easily and the time element, when small bumps are hit, is very short. A light axle car does not notice small bumps at all, such as running over rough cobble or crushed stone roads. Bigger bumps give the effect of striking a feather bed, the shocks are so distributed.

Another problem of the light car is the differential action. If one were asked the weakest point of the modern car an engineer would probably say the differential. If this is so in big cars it is more true in small cars where the differential gears are very small and correspondingly delicate. With the light car the weight needs distribution to obtain traction, and by using some form of differential, such as the new gearless types, which drive from both wheels this traction can be had and cheap construction as well with a solid rear axle shaft.

Requires Very Long Springs

The springs of a light car should be as long as those in a big car, for the road bumps met are the same size, and the car should show ability over the same roads. The light car can set a new standard of road comfort if these ideas are followed.

All of this is getting away from the horse-size idea, and horse tread, and by carrying the weight low on the new cars of narrow tread great stability is obtained with very little side throw. The seats are as near to the ground as comfort allows, the floor as low as consistent, and one can step from the running boards into the car at the same floor level, perhaps.

The light car is coming. It will be available in cheap construction and in luxurious elegance; it can be had with the latest mechanisms and with older tried-out but less efficient constructions at a lower price. It will be welcomed by cities and traffic police as taking less street space and moving faster and surer. The dawn of the light car era is at hand.—WILLIAM B. STOUT, Chief Engineer, Scripps-Booth Co.

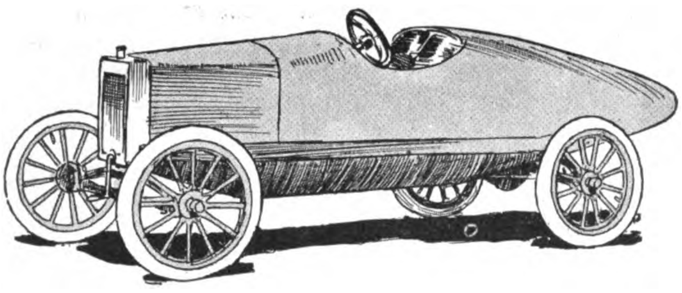


Fig. 1—Ford racer with streamline body and narrow aeroplane radiator

The Rostrum

How to Build a Ford Racer

EDITOR THE AUTOMOBILE:—I am planning to convert a new Ford chassis into a racing car. I want to make it as fast as possible and am willing to buy anything for it that will accomplish this end. It will not be used in races but on dirt country roads.

Macomb, Ill. EVERETT A. REXROAT.

—Increased speed may be obtained by reducing the wind resistance, carefully balancing the motor, lightening the reciprocating parts, changing the valve timing, advancing the spark and reducing the gear ratio between the motor and the rear wheels.

It probably will not be necessary to do all the things enumerated in order to get the speed you desire, unless you want the absolute maximum.

By cutting down the wind resistance and carefully balancing the parts the speed should be considerably increased probably to 60 miles per hour, although we have no figures.

If more speed is wanted, lighten the reciprocating parts and reduce the gear ratio.

Changing the timing or increasing the lift of the valves is not advised because of its expense, and you should be able to get sufficient speed without it. Furthermore, the motor probably would not stand the strain for any length of time that the new valve timing would permit, and even if it would it is doubtful whether the car would hold the road, due to the stiffness of the springs.

Lowering the wind resistance is a simple matter, and most important because the resistance offered by the wind increases as the cube of the speed. That is, the loss at 60 miles per hour to that at 20 is not triple but in the ratio of

$$\left(\frac{60}{20}\right)^3 = 3^3 = 27 \text{ times.}$$

A full streamline body, Fig. 1, with sweeping curves from front to rear may be used. The cost of construction should be under $200 if made by a body builder and less, of course, if you do the work yourself. If you have the body built, the exact cost will depend on whether any of the panels are spherically curved and require beating into shape. Where sheets of metal can be bent over the body framework without beating the cost is less. The latter type of body is the only one you could build yourself. The appearance of the car would be enhanced by employing a V-type Ford radiator or a narrow radiator such as is used on aeroplanes. As far as cooling is concerned the present radiator would be all right for short spurts but for continued running you would need to increase the capacity of the cooling system either by the use of a pump, a larger or higher speed fan, a larger radiator, or all three. The gasoline, oil and tires should be carried in the rear.

It would be simpler but almost as effective to fit two bucket seats to the floor of the chassis, and place the gasoline and oil tanks, and tires in the rear. Such a car is shown in Fig. 3.

It will be noted that the angle of inclination of the steering gear has been increased, in order that the driver can reach the wheel. This is done by forging a new steering gear bracket.

Bucket seats can be obtained at a cost of about $25 each from any body builder, and gasoline and oil tanks can be ordered through your supply dealer.

The fenders should be left off altogether, or else simple canvas ones fitted as shown.

Remove the pistons and connecting-rods and weigh the four rods and the four pistons. Then take off enough material from the heavier ones to bring them to the exact weight of the lightest.

If you want to lighten the pistons, drill below the wrist-pin. One-quarter-inch holes at a distance of one-half to three-quarters of an inch should be satisfactory. It is best to remove this material before the pistons are balanced.

Piston clearance should be increased except at the lower end. Make the top of the piston .005 of an inch smaller than the cylinder and taper off until the lower end is reached where the size remains the same.

The valve timing may be changed either by advancing the camshaft, or using a new camshaft with special cams that give increased lift and a longer opening, the latter is expensive however, because it costs money to make a camshaft. As already stated it is doubtful whether the motor would long stand the strain due to the increased speed that the motor would be capable of if this were done.

Advance the camshaft one tooth and note the result, then advance it another tooth and if the running of the motor is improved it may be found advisable to set it forward still another.

New Camshaft May Be Needed

If a new camshaft is made, the valves should open and close as follows: Intake opens, 20 degrees after upper dead center; and closes 50 degrees after lower dead center; exhaust opens 60 degrees before lower dead center and closes 15 degrees after upper dead center. It would also be advisable to increase the steepness of the cams to give a quicker opening and closing. Heavier valve springs will need to be fitted to hold the pushrods to the cams at high speed. The lift might also be increased to 5-16 or 3-8 inch.

The next size larger carbureter and a larger manifold might also be installed.

Sufficient lubrication is very important, and an auxiliary tank should be fitted so that oil may be injected directly into the crankcase, when running fast. Such a tank might be attached to the left side of the motor, allowing the oil to be fed by gravity through a pipe running into the crankcase, the rate of discharge being regulated by a plug cock that is controlled from the dash. Or you might place the oil tank in the rear of the car and feed by means of air pressure produced by a hand pump lying within easy reach of both driver and mechanic, when one is carried.

The gear ratio may be changed to about 3 to 1, although with the reciprocating parts of the motor perfectly balanced and lightened the car should do between 55 and 60 miles per hour anyway. The new gears will have to be made by some machinist, as the Ford company does not make any gears other than the standard ones which give a ratio of 3 7-11 to 1.

With the lighter body, the stiffness of the rear springs should be reduced. Try the car both with one and two leaves removed.

It must be remembered, however, that in increasing the speed of your car you are shortening its life. Furthermore, it will not run slowly on high gear if the suggested changes are made in the motor.

2—No steering gears are absolutely irreversible. One that would not give way when struck would soon break. It takes more force, however, to deflect the wheels with this type than an irreversible.

Formula for Long-Stroke Motors

Editor THE AUTOMOBILE:—Will you please give me the formula for figuring the horsepower of the long stroke motor for both four and six-cylinder motors?

Clinton, N. C. F. RAWLA.

—You might use the formula,

$$\text{h.p.} = \frac{D^2 N S R}{15{,}000}$$

where

D = bore in inches.
S = stroke in inches.
N = number of cylinders.
R = number of revolutions per minute.

This is not official; there is no formula that has been generally adopted that takes the stroke into consideration such as the S. A. E. formula which is based entirely on the bore and number of cylinders.

Effect of Tire Diameter on Differential

Editor THE AUTOMOBILE:—Recently I purchased a clincher tire stamped 32 by 4 inches. It measures 31 1-2 in. in diameter, and the cross-section is correspondingly skimpy. Would you advise using it on the rear with another tire, of different make, full 32? What effect will it have on the differential? The front tires are of different size, so it cannot be used there.

Milford, Conn. J. H. NETTLETON.

—This slight difference in tire size will not cause an appreciable amount of wear in the differential. Since it is only 1-2 inch in 32, the ratio is 1 to 64 and the percentage is 1.56. In other words the smaller tire will make 1.56 more revolutions in 100 than the larger one.

Speedometer Gear Makes Noise

Editor THE AUTOMOBILE:—1—There is a swishing sound issuing from the neighborhood of the right front wheel of my car when it is in motion. It seems to occur once every revolution. What do you think can be causing it?

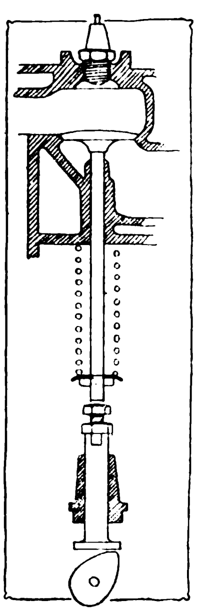


Fig. 2—Valve mechanism of typical motor

2—A short time ago I found that I could turn the front wheels of my car when it was standing on the garage floor by merely pulling on the tires, yet I thought that my steering gear was irreversible. What is the explanation?

Mt. Vernon, N. Y. E. W.

—1—There are two very likely causes of such a noise. It may be due to the speedometer gears meshing too tightly, or the demountable rim has a wedge loose. Jack up the wheel and rotate it slowly, and you can soon determine whether the gears are too close. If this is the case, loosen up the arm that carries the driven gear, and move the gear only far enough away so that the noise is eliminated. If the trouble is not found in the speedometer gears, tighten up the wedges on the rim. One loose wedge will make a noise similar to that you have described due to the lack of support at this point.

Valve Operation of Motor

Editor THE AUTOMOBILE:—1—Please publish a cut showing the valve system and all points of adjustment on the 1913 Regal underslung motor.

2—Also please inform me as to where I can obtain a transmission gear for a 1910 E. M. F.

Vineland, N. J. R. W. CALL.

—1—The complete valve mechanism is illustrated in Fig. 2—It consists of a cam, valve tappet, and valve together with its spring.

The valve opening is accomplished by the rotation of the cam which is part of the camshaft, which is driven by a

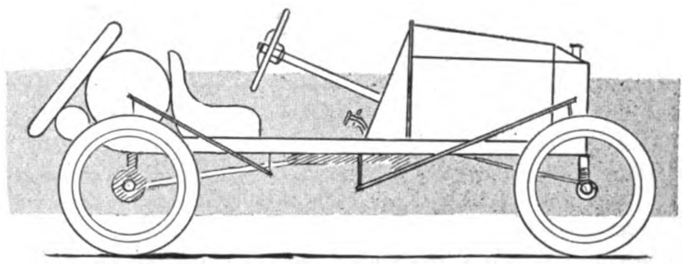


Fig. 3—Ford raceabout with pointed radiator

pair of gears from the crankshaft of the motor. This cam comes into contact with the mushroom face on the lower end of the tappet and the tappet is forced upward, its movement pushing the valve with it, and thus opening the port and allowing the gases to flow out. As the cam moves out of contact with the valve tappet, the spring on the valve forces the valve closed. When the valve is fully closed there is a slight amount of clearance between the valve stem and the top of the tappet and also between the lower end of the tappet and the circular surface of the cam.

The former space should be about the thickness of a piece of writing paper and as it is liable to change with wear, the tappet is adjustable. The upper end of the tappet has a hexagonal head, and screws into the lower half which is milled flat on two sides to provide a place for gripping with a wrench.

In addition there is a lock nut that holds the two parts securely in place. The adjustment is accomplished by loosening the locknut by turning it to the right, meanwhile the lower part of the tappet is held against rotation. Then the upper part of the tappet is turned while the lower part is held stationary, until the gap is the proper distance. Then the locknut is turned to the left again until tight.

The valve is removed by taking out the valve intake plug and then raising the valve spring seat by means of a tool that is made just for this purpose, then the key holding the spring seat in place is pulled out and the valve removed for grinding or inspection. In case it is desired to take the spring out this may be done with the fingers. The valve tappet and guide may be removed by unbolting the guide.

Standard Speedometer Shaft Revolves 1,680

Editor THE AUTOMOBILE:—Will you kindly tell me how many revolutions the link chain in a Standard speedometer makes during a steady run of 1 mile?

Indianapolis, Ind. I. P. ZIMMERMAN.

—The shaft of the Standard speedometer revolves 1,680 revolutions per mile, regardless of the diameter of the car wheels. This particular figure was selected because it gives a very simple method of figuring the number of teeth in the

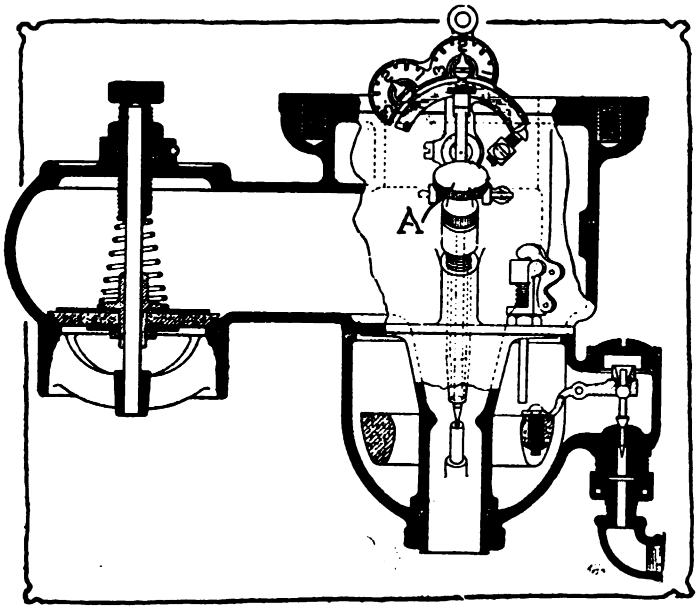


Fig. 4—Schebler model L carbureter

driving sprocket for a tire of a given size, namely, one tooth in the driving sprocket for each inch of tire diameter. A 12-inch wheel will revolve 1,680 times in traveling 1 mile. Therefore, if this wheel were attached to a 12-tooth driving sprocket which in turn drove a 12-tooth gear which was attached to the speedometer shaft, the ratio between the gears would be 1 to 1 and the speedometer shaft would make 1,680 revolutions per minute. If a 24-inch tire were used the wheel would make half as many revolutions per mile or 840. By using 24 teeth in the driving sprocket to drive 12 in the driven one the reduction is 2 to 1, and the speedometer shaft revolves 1,680 revolutions per mile just the same. With a 36-inch tire, 36 teeth would be used and this would give a ratio of 3 to 1, etc.

Cylinder Should Not Leak

Editor THE AUTOMOBILE:—Will you please tell me whether a cylinder should leak compression past the rings when stopped on dead center? If it should not leak, how do you remedy this?

2—Are the patented rings practical?

Westmount, Mont. W. H. HASKELL.

—1—The rings should be tight enough so that no appreciable loss of pressure will occur for, say, a minute, but it cannot be expected that the pressure will stay there indefinitely when the piston is stopped on dead center. From the way your question is worded it seems that you have turned the motor over until one of the pistons has reached the end of the compression stroke and that you left it there for a few moments, at least. If, however, we have misunderstood you, and the fact actually is that when you turn the motor over slowly without stopping, that the pressure decreases, then you have a leak. It may not be the fault of the rings, however, but due to the valves.

If the trouble is due to leaking rings they must be replaced and if the pistons and cylinders are very badly worn it may be necessary to bore out the cylinders and fit larger rings.

Before going to the trouble of tearing down the motor and examining the pistons and rings, remove the exhaust valve and note whether it is carbonized, or pitted. If so it must be ground. Also note whether there is any clearance between the valve stem and the push rod. (See Fig. 2.)

There should be sufficient space to insert a piece of writing paper, and if there is not the push rod must be adjusted by loosening the lock nut, which is the lower one and then turning the upper nut to the right. If there is no clearance the valve will be held off its seat and leakage will occur. If the exhaust valve is found to be in good condition, examine the inlet valve. It is not likely that it will need grinding although the push rod may be out of adjustment.

2—Some of the patented rings are satisfactory but whether they all are we cannot say with certainty because we have not seen them all in use.

Economy Record Is 86.6 Miles

Editor THE AUTOMOBILE:—Kindly advise me what carbureter holds the world's economy record on an automobile, and what is the number of miles?

Plainfield, N. J. PLAINFIELD AUTO TIRE CO.

—A Newcomb carbureter on a Franklin car undoubtedly holds the record for economy, the car having traveled 86.6 miles on 1 gallon of gasoline over Long Island roads, on June 21, 1913.

The car had a four-cylinder motor with a bore and stroke of 4 by 4 inches and without passengers weighed 1,690 pounds and with two passengers, 1,995 pounds.

Everything was done to reduce the coasting resistance of the car used in this trial for the record. Ball bearings were placed on the rear axle, a Newcomb carbureter fitted, the spring cut down so that there were but four blades in each half of the elliptic front and rear springs, the drive was taken through the springs and through one rear wheel, the other running free. One set of brakes, controlled by the hand, was used, 34 by 3.5-inch plain clincher tires pumped to a pressure of 35 pounds were fitted. The brake drums were even perforated to bring the weight to its absolute minimum. Wind resistance was cut down by using the streamline torpedo body, which carried a tapering cowl to cut the resistance.

Gasoline 63 Baumé

The gasoline used was 63 Beaumé test carried in a measured copper receptacle on the dash before the observer's seat. This was fed by gravity to the Newcomb carbureter which was standard except that the easy-starting, air shut-off valve was omitted. The odometer used was a Casgrain.

The course followed was on the Queens boulevard. The car traveled from the Williamsburg bridge out Queens boulevard to Hillside avenue, Jamaica, swinging left to the Jericho turnpike which was followed to the hamlet of Jericho where a turn was made across the island and then back over the same roads to the starting point. On the return to the starting point it was found that a little better than 60 miles had been covered and that some gasoline still remained. The remaining 20 miles was covered by a trip out Jackson avenue, and back and then another out the same route and nearly back to the starting point, so that the car went up practically every grade that it went down, although at times it seemed as if the car was fairly coasting up grade, so easily did it run.

Speed 14.5 Miles per Hour

Country passed through on the Franklin test was fairly level with an occasional 2 or 3 per cent. grade. The test lasted six hours, which makes an average speed over the entire distance of 14.5 miles per hour or regular touring speed. The driver would open his throttle until he had attained a speed of close to 20 miles an hour and then would stop the motor and coast.

It has always been a fascination to determine what mileage can be secured from a gallon of gasoline. A motorcycle has traveled 190 miles on 1 gallon and 10 ounces. This was done by S. A. Baker, September 13, 1907. The average accomplishments, however, of stock models with regular bodies fall far below these record tests. The average gasoline automobile travels from 15 to 20 miles on a gallon, although some touring cars go as low as 4 miles to the gallon and others as much as 28. The average steam automobile goes 10 miles to the gallon. The average aeroplane 10 miles to the gallon, but with its fuel mixed with lubricating oil. The average motorboat of corresponding horsepower to an automobile goes about 12 miles to the gallon, while a single-cylinder motorcycle will average better than 75. The strength of gasoline may be fully appreciated from the fact that it has been stated that could the entire energy contained in 1 pound be utilized it would lift a 1-pound weight 15,941,220 feet.

Rich Mixture Causes Leakage

Editor THE AUTOMOBILE:—Will you please tell me how to remedy the Schebler carbureter L on a 1913 Buick. When cranking, the gasoline flows out the air opening next to the pipe that carries the gasoline into the carbureter. At every crank the gasoline sputters out. It will not fire in the engine until all of the gasoline has sputtered out. All joints are tight. The float has been dried and shellacked. I can find no leak.

Madison, Ga. A. K. B.

—The needle valve, which controls the low-speed adjustment is open too far, allowing the fuel to flow out too freely. Screwing down on this valve should remedy the trouble. This valve is shown at A, Fig. 4, and should be turned down until the motor idles perfectly.

Formula of Calculating Water Capacity

Editor THE AUTOMOBILE:—Kindly publish a formula for figuring the amount of water needed to cool a gasoline motor.

2—Also a formula showing how to figure what size pipes are needed on a thermo-syphon motor.

St. Louis, Mo. V. C. KLOEPPER.

—1—The only data we know of on this subject is that represented in the curves shown in Fig. 5. With the piston displacement per minute known, the pounds of water required per minute and the B. T. Us. lost to the cooling water for any given range in cooling water temperature can be figured.

For example let us assume that the displacement per minute is 1,000 cubic feet and that the difference between the temperature of the incoming and outgoing water is 50 degrees. Reading vertically from 1,000 cubic feet per minute piston displacement, to the B. T. U. curve, proceed horizontally to the left until the diagonal representing 50 degrees range is reached. The vertical line through this point represents a flow of about 115 pounds of water per minute and the heat loss to the cooling water is shown by the horizontal line which indicates that the loss is about 6,400 B. T. Us.

2—No formula, as far as we know, has ever been published giving the size of pipe needed. In fact, it is difficult to see how a formula, that would give any more than a general idea, could be constructed unless, all types of motors, equipped with all shapes of pipes, types and sizes of radiators, and fans were tested out and constants for a general formula thus determined. It is seen that the factors that may be varied are so numerous that there are innumerable combinations, each one of which will give a different result and require a different size of pipe.

If you are designing a motor and want to know what size nipes to use, it would be best to find out the dimensions of the pipes on the successful motor that it resembles most, and make your pipes the same size. If it is found, after the motor is built, that the pipes are too small use a larger fan or increase its speed, or fit a larger radiator.

Car Jerks; Motor Fires Well

Editor THE AUTOMOBILE:—I have a 1912 second-hand Buick roadster which has a jerk which local mechanics have failed to locate or remedy. I have recently ground the valves; have put new platinum points in the magneto and the motor is firing perfectly, but there is a jerk, usually regular, which resembles the actions of a car when one cylinder is completely misfiring. The rear axle is slightly sprung and this might cause some of the jerking, but many times I can throttle the car down with cut-out open and it will run along smoothly for a block or so and then will start to jerking. There is some play in the universal joint and differential, but no play in the rear wheels themselves. The peculiar part of it is that when the car is jerking, the motor is firing perfectly.

Warren, O. P. D. TAYLOR.

—Excess play in the universals would be enough to cause the jerking, but assuming that this is not the cause you may look to the clutch, which may be gripping only at intervals. Do not throttle the motor down too low and expect it to pull smoothly. The usual cause of such action is play somewhere between the rear axle and the motor and if you will remove this play the jerking no doubt will vanish. It would be wise to take the car to the nearest Buick agent and have him look it over.

Crank With Throttle Nearly Closed

Editor THE AUTOMOBILE:—What, in your opinion, is the best way to crank a motor, with the throttle open or nearly closed?

Albany, N. Y. E. A. STOKES.

—It is preferable to crank the motor with the throttle only opened a small amount, say an inch or an inch and a quarter movement on the quadrant. With some carbureters it is impossible to start the motor with the throttle wide open, while with the others it is generally done with difficulty.

Please Sign Your Letters

Communications to the Rostrum should be signed in full and the writer's address also stated. A great many letters are forced into the waste basket because of lack of proper identification.

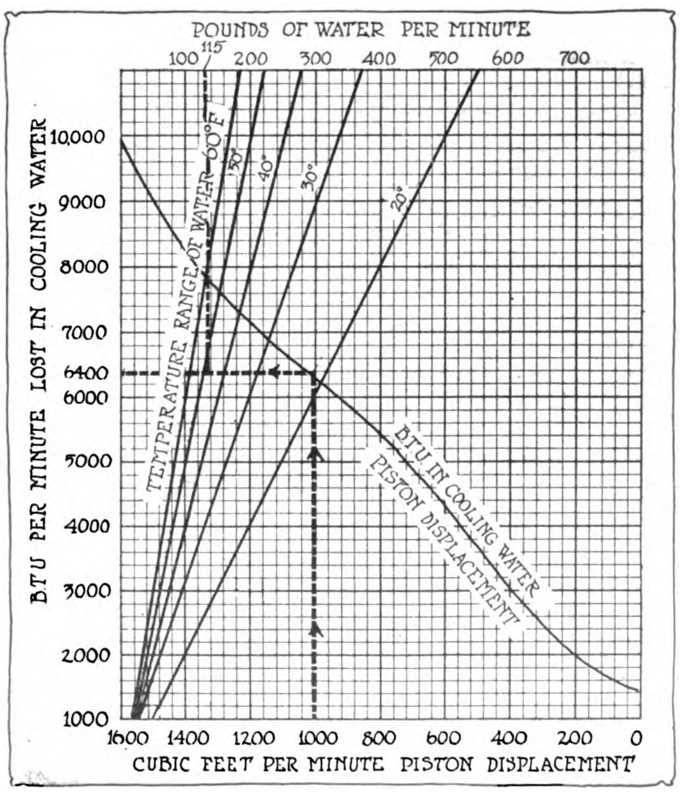
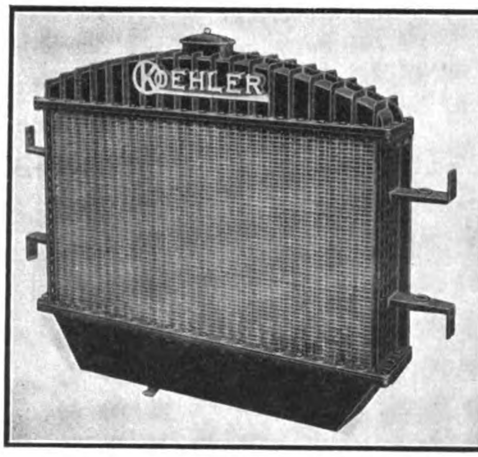
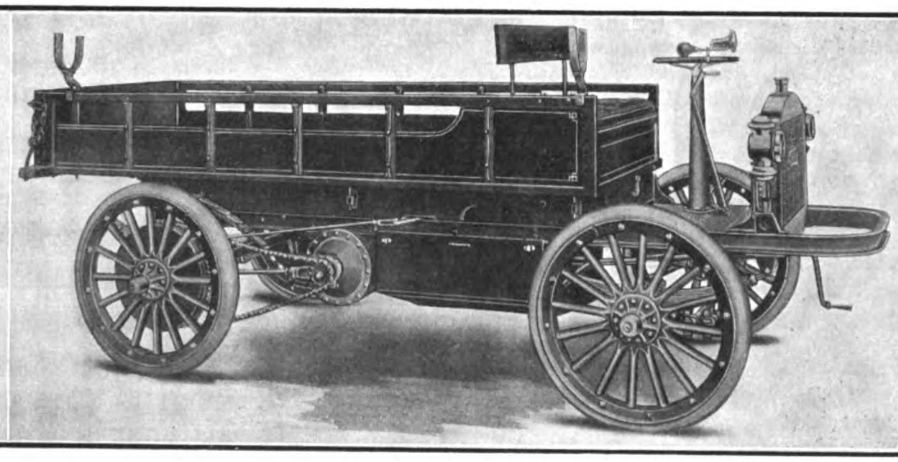


Fig 5—Curve showing pounds of water per minute and B. T. Us. per minute lost in cooling water for a given piston displacement





Left—New Koehler radiator with a cooling area of over 1,450 square inches. Right—Koehler 1-ton truck with open type of body

Koehler Has Improved Radiator and Gearset

Two-Speed Planetary System Housed with Jackshaft—Under-Body Included in Chassis Price of $725

ONE of the important low-priced commercial car announcements for 1915 comes from the H. J. Koehler S. G. Co., New York, which markets a 1-ton chassis selling at $725, including the under-body. The new Koehler, although in essentials the same as the previous model, has been improved where necessary and the most important parts to receive attention are the radiator and gearset.

The new radiator, which is hung between springs, has a cooling area of over 1,450 square inches, it is claimed, and is built up of five separate units. These are the upper head, lower head, the core and two side pieces, to which the lamp brackets are attached. Ninety-nine tubes are used in the present construction and the entire radiator improved upon so as to make it better able to withstand severe strains. An important feature of the Koehler radiator is the ease with which it may be removed and replaced. In the event a part be broken only that part need be replaced.

Gearset Part of Jackshaft Unit

A novel feature of Koehler construction is the two-speed planetary gearset which is contained in a cylindrical housing containing the jackshaft, as shown in the illustration herewith. The jackshaft itself is of one piece from the left-hand sprocket to the differential, which is at the end of the planetary set and may be seen in the illustration. The jackshaft transmission and differential run in oil and thus the wear is reduced considerably, while an added feature is the ease with which the planetary set in this unit may be removed for inspection purposes.

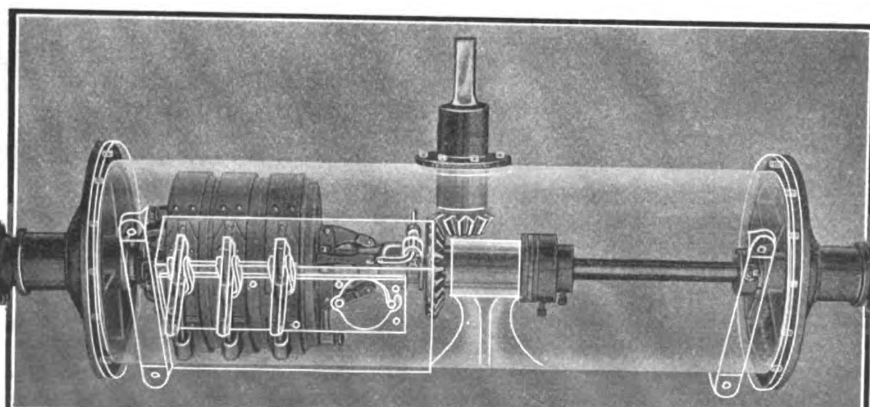
By taking off the end of the housing nearest the set the entire unit may be slipped out of the housing. The high-speed clutch of the set has a metal-to-metal contact and the low and reverse speeds are individual bands lined with wire-woven asbestos. It is stated that the operating speed of this gearset is one-half that of the ordinary construction, thus making for long life of the parts. The driving pinion shown has thirteen teeth and the large driven gear has twenty-five. All gears are fully protected from dust.

A two-cylinder motor is installed under the body of the Koehler, the dimensions of this engine being 5.25 by 4 inches. The carbureter used is a Schebler and the magneto a Bosch with fixed spark. As before stated, it drives a planetary set incorporated in the jackshaft and the power then is transmitted by chain to the rear wheels. These are equipped with 36 by 2 1-2-inch solid, demountable tires. The wheelbase is 90 inches.

Sediment Strainer Added

Another slight change in Koehler construction has been the addition of a sediment strainer beneath the gasoline tank and the installation of a combination outlet valve which allows a 2-gallon emergency supply feature.

The express-type car forms the largest part of Koehler production, while a number of types have been brought out which are particularly adapted to some special business.



Phantom view, showing two-speed planetary gearset contained in a housing with the jackshaft

Technical Service of A. C. A. To Be Broadened

NEW YORK CITY, Aug. 15—It has been decided to place the efficiency bureau of the Automobile Club of America under the direction of the technical committee and to extend its activities.

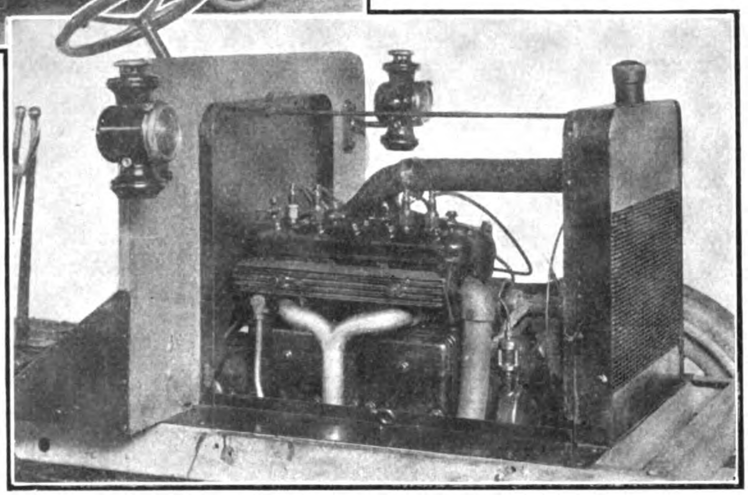
It is the idea to make frequent, perhaps weekly, examinations of members' cars registered in the bureau, a monthly report with recommendations to be sent to the owners. Any repair or adjustment that is urgent will be the subject of an immediate notification to members.

By proving wasteful operation to members and that unsatisfactory delays and discomforts are due to neglect of cars, the bureau hopes to increase the general efficiency of the automobile.

Six-passenger wagonette, $695

$635 Vim Delivery Has Standard Parts

Four Types of Bodies— Unit Power Plant Design— Block Motor of 20 Horsepower



View of motor showing disposition of piping

SIX hundred and thirty-five dollars is the astonishingly low price of the Vim light delivery wagon manufactured by the Touraine Co., Philadelphia, Pa. Yet the car is manufactured of standard parts throughout. It has a four-cylinder Northaway truck motor rated at 20 horsepower, a clutch and gearset in unit with the motor, made by the same concern, these members being capable of transmitting 35 horsepower, and a Weston-Mott rear axle designed for 30 horsepower.

Three other types of bodies mounted on the same chassis are offered, these being the large delivery body for $685, the flare body for $695 and the Wagonette, a 6-passenger bus, for $695. Thus it is seen that a large factor of safety is allowed.

The chassis, with any type of body, has a capacity of 800 pounds, weighs but 1,850, and may be turned in a 36-foot circle, which is made possible by the 89-inch wheelbase. The loading space is 56 inches long and 42 inches wide, only 10 inches overhanging the rear. The floor is low, only 24 inches from the ground, being carried directly by the frame members. The motor is an L-head block construction with integral exhaust manifold and separate Y intake. The bore is 3 inches and the stroke 4.5 inches, giving an S. A. E. rating of 14.4. The valves are inclosed by two removable coverplates. The crankshaft bearings are 2 inches in diameter and three main bearings are employed. Cooling is maintained by a honeycomb radiator, the circulation of the water being on the thermo-syphon principle and assisted by a belt-driven fan. Lubrication is effected by a combination force-feed and splash system with a capacity of 2 gallons, sufficient for 600 miles. Ignition is supplied by an Atwater Kent system.

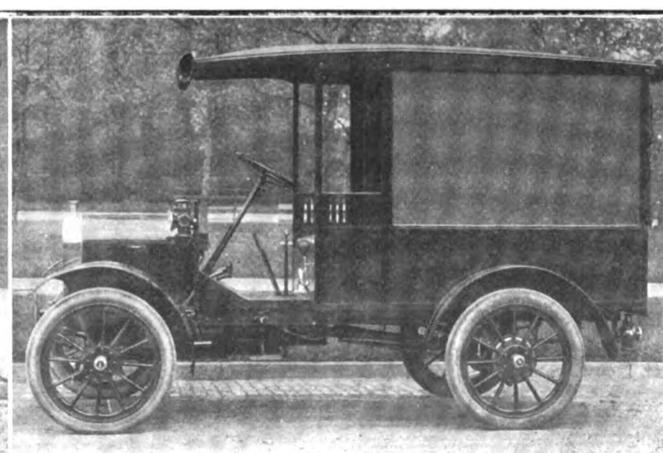
The clutch is a leather-faced cone type 12 inches in diameter and with a 2.5-inch face. The gearset is a selective sliding design, with gears of 3-4-inch face. The shafts are all of chrome nickel alloy, on imported annular bearings.

The front axle is a special drop-forged, I-beam section, the knuckles and steering arms being drop-forged and heat-treated. The rear axle, as already stated, is a Weston-Mott construction and is equipped with a Brown-Lipe differential. The drive shafts are 1 1-8 inches in diameter. The universals are of Hartford make.

Two sets of brakes, both acting on the rear wheels, are used, the contracting brakes for service and the expanding for emergency use. The drums are 10 inches in diameter and 2.5 inches wide.

Left drive with right control is employed. The maximum speed is 30 miles per hour. The tires are 30 by 3 inches, although 31 by 3.5-inch tires are optional at an increase of $20.

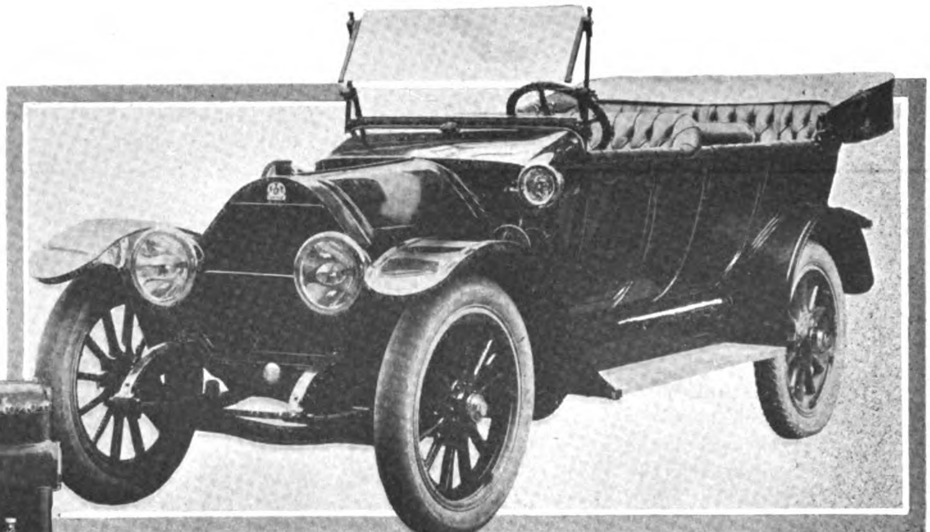
Vim chassis with flare body



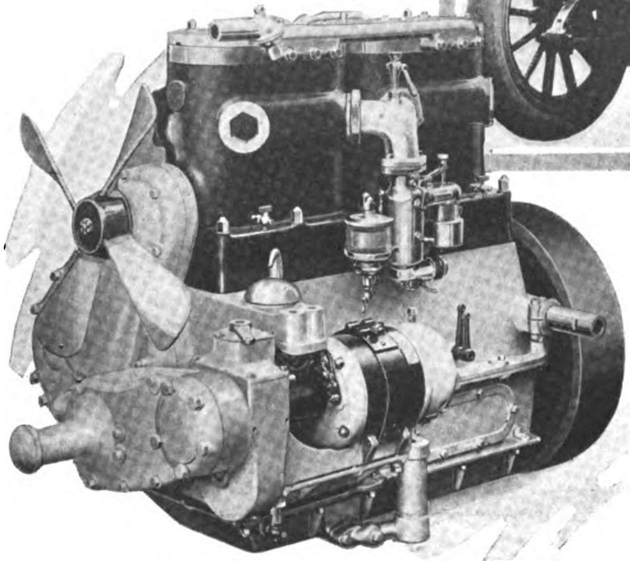
Vim delivery wagon

Lyons-Knight Has Streamline Body

Few Mechanical Changes of Importance —All Instruments Now On Cowl Board



Lyons-Knight touring car of foreign lines



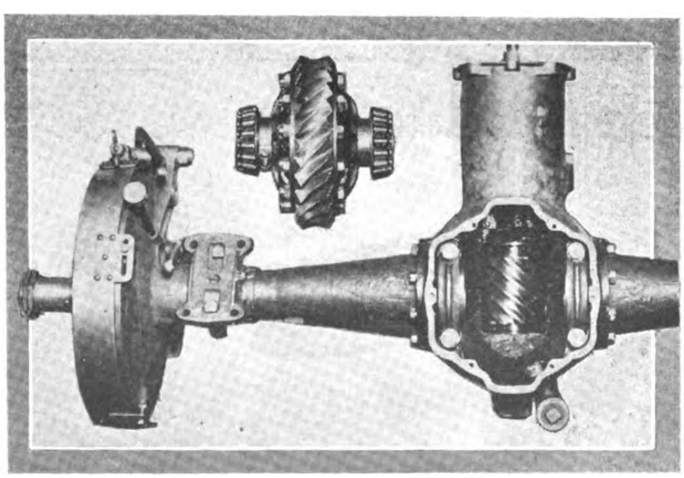
Side view of motor used in Lyons-Knight cars

MAINTAINING the same prices and practically the same chassis as last year, the model K Lyons-Knight for 1915 is marked by many innovations in body construction. For the coming seasons the Lyons-Atlas Co., Indianapolis, Ind., offers a choice of four bodies on a single chassis model. The prices are, for the seven-passenger touring car, $2,980; the five-passenger, $2,900; five-passenger sedan, $3,900, and seven-passenger limousine, $4,300. In addition to this body line the purchaser has a choice of two-passenger roadsters which will be built to special order.

The Lyons-Knight chassis upon which these bodies are mounted has a Knight power plant and a worm drive rear axle. The chassis has a wheelbase of 130 inches and is equipped with 37 by 5-inch tires, the rear ones with non-skid tread. All these features distinguish the previous line of Lyons-Knight cars and it is only in the development of the streamline design that the most radical changes are apparent. The upholstery is now carried along the tops of the doors, giving a straight-line effect from front to rear, and the sides are now higher with wider front and rear seats. The rear seat is unusually wide, measuring 52 inches from side to side.

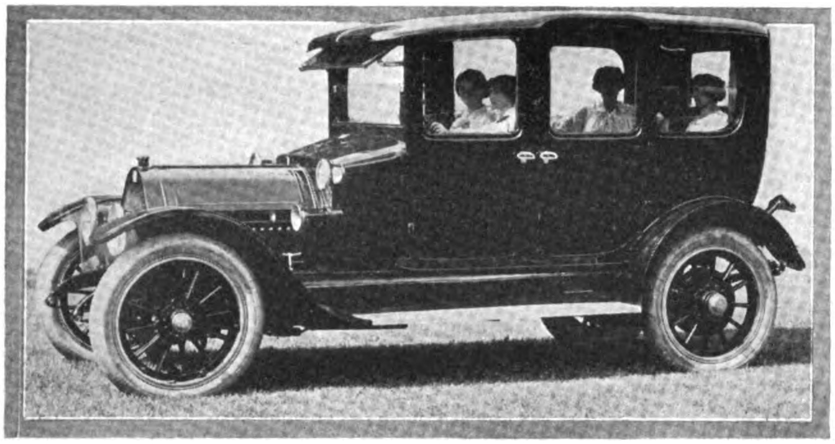
Instruments on Dash

All instruments such as speedometer, clock, gasoline gauge, oil pressure gauge, ignition and lighting switch and so on now are mounted flush with the instrument board. A convenient feature of the lighting control is a switch which may be locked in any combination of lights. Equipment is somewhat more complete than formerly and consists of a Golde one-man top, option of Jiffy or Collins curtains, Warner speedometer, a combination double tire holder and trunk rack, two extra demountable rims and a Manzel power tire-pump. Mechanically, there is no change in the car. The Knight engine, which is manufactured by the Lyons-Atlas company, is a four-cylinder, 4 1-2 by 5 1-2, and, although the S. A. E. rating is but 33 4, factory test has shown that it develops 52 horsepower at 1,200 r.p.m., and a maximum of 76 at 2,000. The cylinders are cast in pairs and the crankcase, chaincase and cylinder head covers are cast of aluminum. The feature of covering the cylinder heads to keep out dirt and moisture and to protect the spark plugs is exclusive with the Lyons-Knight engine. Hard-rubber buttons are mounted on the covers by which the spark plugs can be short-circuited and tested without removing the covers. Crank and eccentric shafts are carried on five bearings and fitted with adjustable bronze bushings, babbitt lined. These two shafts, as well as the connecting-rods, are heat-treated chrome-nickel steel. The eccentric shaft together with magneto pump, starter and fan are driven by silent chain in order to do away with possibility of noise from the timing drive, a feature most necessary with the sleeve valve type of engine on account of



Worm drive rear axle continued this season the quietness of the valve operation.

Lubrication is by force feed to all bearings, pistons and sleeve. An oil reservoir is located in a sub-base of the crankcase, having an intermediate air space to prevent overheating of the oil. A plunger pump operated by one of the sleeve eccentric rods takes the oil from the reservoir and forces it under pressure to the crankshaft and eccentric shaft bearings, the eccentric rod bearing and thence through holes drilled through the center of the crankshaft to the connecting-rods. The latter are hollow and the oil is forced through their interior to the upper bearing. The piston pins likewise are hollow, and the oil flows to these to the outside of the piston, thence through holes in the sleeves to the cylinder walls, so that all friction surfaces are lubricated by a positive flow. An adjustable oil pressure regulator is connected with the throttle lever so that the pressure of the oil is in proportion to the engine speed.



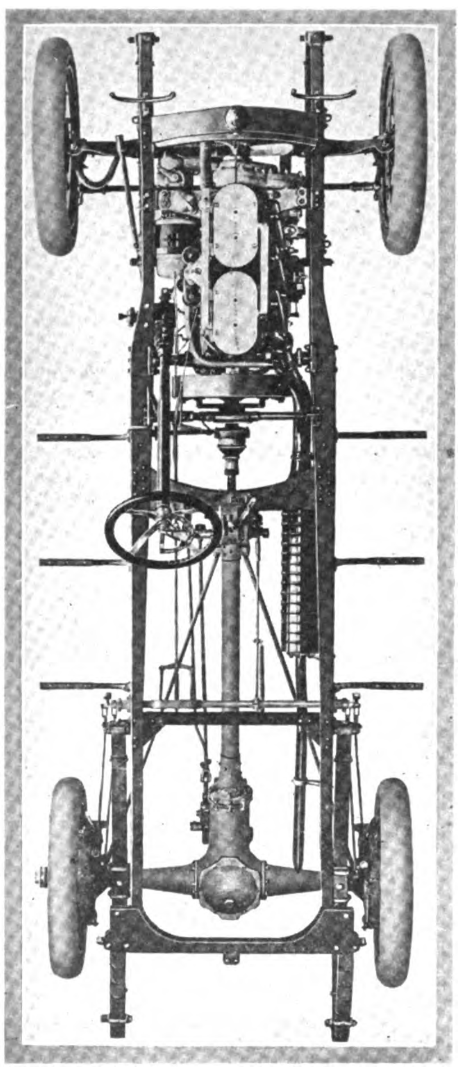
Inclosed sedan body on Lyons chassis

Ignition is furnished by a Simms dual, high-tension magneto of the water-proof type. Cooling is by a centrifugal pump, honeycomb radiator and a four-blade cast aluminum fan, which is operated by a silent type of chain. Following the European custom, the fuel tank is mounted in the dash cowl, giving a gravity feed to the specially designed Stromberg carbureter.

Single Electrical Unit

Cranking and lighting is provided by a single unit Northeast system which is connected directly to the front end of the crankshaft to a silent chain. A simple foot button connects the starter, and when released converts the motor into a generator for charging the storage battery, the latter furnishing current for the starter, the lighting equipment and the electric horn.

From the motor power is transmitted through a three-plate dry disk clutch, three-speed selective gearset, worm final reduction and floating axle. The clutch is inclosed in the flywheel, the single central floating member engaging by being gradually compressed between the two outside plates through the action of three powerful toggle joints. A special bronze casting is used for housing the gearset differential and worm gear, which are in unit and to which is attached the seamless steel tubing on which the wheels are mounted. Differential case and wheels are fitted with Timken bearings. The 3-inch torsion tube incloses the driveshaft and terminates in a large, hollow, bronze, ball and socket joint at the forward end and is attached to the heavy center cross-member of the frame.



Plan view of the chassis on which all body types are mounted

One of the main features of the Lyons-Knight design is the worm drive. This is of the underslung type and runs in oil. In spite of the fact that the worm is underneath, it has a clearance of 10 inches above the road.

Suspension is by three-quarter elliptic springs at the rear, 54 by 2 1-2 inches in size, and one-half elliptic springs in the front, 38 by 2 1-2 inches, all ends being provided with bronze additions to give easy replacement in case of wear. The front springs are very quiet, being arranged so that they hold the front axle parallel with the rear axle, and prevent wabbling of the front wheels on rough roads. All models are equipped regularly with wood wheels which carry demountable rims, accommodating either straight-side or clincher tires. Expanding and contracting brakes act on 16 by 2 1-2 drums. Wire wheels may be obtained at an additional cost, not being specified.

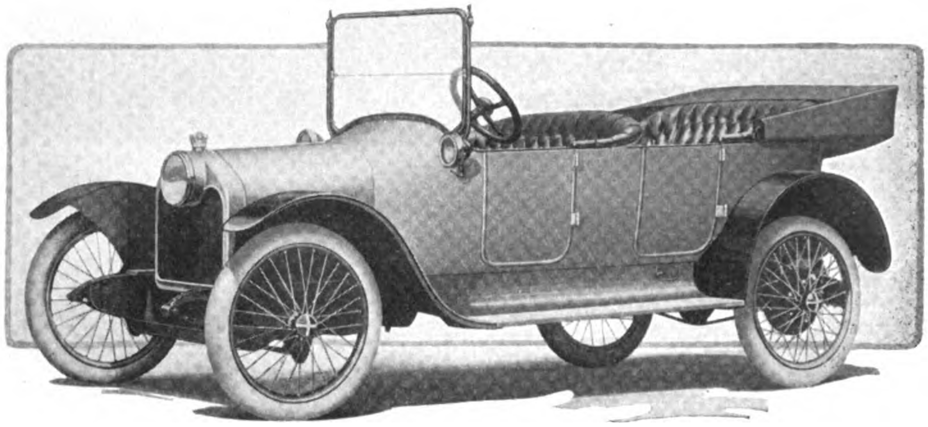
Easy riding qualities are made a particular point in this car, the design being made with an eye to equal distribution of the weight and correct spring suspension.

Norway's Duty 12 Per Cent.

CHRISTIANIA, NORWAY, Aug. 10—Automobiles shipped to Norway completely set up or assembled are subject to an import duty of 12 per cent. ad valorem; if shipped separately, bodies to a duty of 15 per cent.; motors to a duty of 10 per cent. ad valorem; automobile wheels pay $0.61 per 100 pounds; other parts, such as steel are dutiable $1.82 per 100 pounds; brass or copper, $6.08 per 100 pounds; nickel parts, $12.15 per 100 pounds; varnished or tinned iron, $3.64 per 100 pounds.

Accessories are assessed according to the material of which they are made at the above rate for parts; speedometers are subject to a duty of 10 per cent. ad valorem. Rubber tires are subject to a duty of $3.64 per 100 pounds. Lamps, bells, horns are assessed $6.08 per 100 pounds. Motorcycles are classed as bicycles and are assessed $8.04; in addition, the motor, classified as machinery is assessed 10 per cent. ad valorem; parts of motorcycles, apart from the motor, tires and accessories, are classified as parts of bicycles at $30.39 per 100 pounds; parts of the motor classified as machinery are subject to 10 per cent. ad valorem; the invoice must show the value of the motor, whether part of a motorcycle, or otherwise; tires are assessed $3.64 per 100 pounds.

Briscoe Adds Roadster and Coupé



Five-passenger Briscoe touring car for 1915. Note center headlight.

Few Mechanical Changes—High-Speed Motor—Combined Intake and Exhaust Manifold—Streamline Bodies

BRISCOE cars, which are now issuing from the Jackson, Mich., plants of the Briscoe Motor Co. to the tune of about ten a day, are proof of the fact that a high-grade light car of European design can be efficiently manufactured in this country.

Benjamin Briscoe, old-timer in the industry and head of the company bearing his name, did the experimental work and designing of the car in France and exhibited the result of his labors to the American public for the first time at the last automobile shows. The distinctive design and pleasing appearance of the car took the American fancy at once, and with this as a starter the concern has since perfected a far-reaching selling organization.

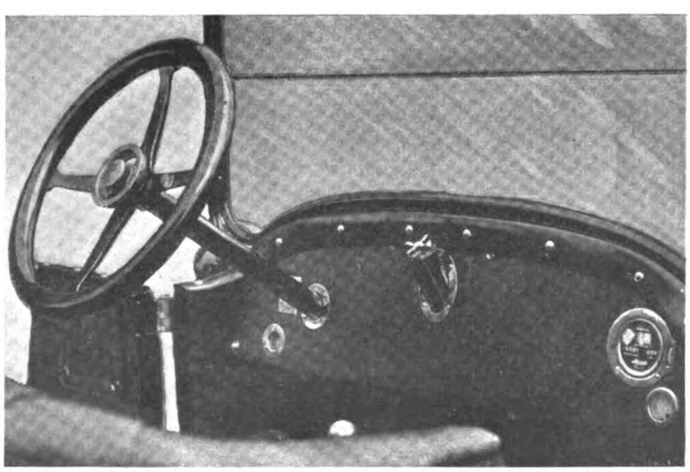
Changes for Production Demands

Though essentially the same as the experimental models which came over from Europe, the car has been put through its paces at the Jackson factories as well as on foreign soil, and the cars now coming through show some minor differences to meet manufacturing conditions and production demands without in any way detracting from mechanical excellence or appearance.

Outwardly, the single headlight in the center of the top of the radiator shell is perhaps the most distinctive feature, while the streamline body and unbroken curves are in accord with the very latest in the body-making art. French gray with black upholstering have been decided upon for the standard colors, and this combination is very pleasing.

Roadster and Coupé Added

Besides the five-passenger touring car models which were the only types seen at the national shows, the line has been extended to take in a roadster and a coupé, both mounted on the standard chassis. The former is styled the Clover Leaf runabout because the seats are so arranged as to give the appearance of a clover leaf. That is, three may be accommodated, the two outside seats being in line, while the middle seat is somewhat back of them.



Cowl board and control of new Briscoe. Note unique spark and throttle lever control on wheel

Body lines of both the roadster and the coupé are very pleasing. The rear is really of torpedo shape and somewhat similar to the back end of several well-known racing cars, notably the Peugeot. The coupé top is very rakish and low in appearance, though of standard height. Windows are large and are designed to afford the driver views of the road from all angles.

As at first planned, the price of the Briscoe, with electric horn, lamps, accumulator battery, tools, jack and so on, is $750, and when equipped with electric starter and generator, top and boot, windshield and speedometer in addition the figure is $900.

Car Weighs Only 1,700 Pounds

The Briscoe is truly a light car, for its weight is 1,700 pounds, despite the fact that the wheelbase is amply long—107 inches. Tread is standard at 56 inches and wheels are of wire, on which are mounted 30 by 3 1-2-inch tires all around.

In accordance with present-day practice, the gasoline tank, of 9 gallons capacity, is mounted in the cowl dash, affording direct gravity feed to the carbureter.

The motor is of the high-speed type, with the cylinders block cast and of L-head form. Bore and stroke are 3 1-8 by 5 1-8 inches respectively, according the engine an S. A. E. horsepower rating of 15.6 and a stroke bore ratio of 1.64. Due to this ratio, the horsepower developed is greatly in excess of that given the motor by the formula.

The valves are all located on the right and covered in accordance with regular practice by readily removable plates. One feature of this motor which is of note is the covering of the valve pockets by a valve plate which is securely bolted to the main cylinder casting. This single plate makes it easy to expose valves and explosion chambers and facilitates the removal of carbon, not only from these parts but from the piston heads as well.

The moving parts are all substantially made and well balanced. There are two main crankshaft bearings, while the camshaft is also carried on two. Connecting-rods have two-bolt strap ends and are steel forgings of chrome vanadium composition, properly heat treated. The pistons, each of which carries two diagonally split rings, are cast from special piston metal, which is said to be very light in weight, thus permitting of higher piston speeds without vibration.

Silent Chain Drive for Camshaft

The drive for the camshaft, as well as for the magneto, is of uncommon form in that a silent chain, located at the rear of the cylinder block instead of in the usual forward position, takes care of these parts. There is a single chain which is driven by the crankshaft just back of the rear main bearing, passes over the camshaft sprocket and on to the magneto drive sprocket above. This drive is entirely housed against oil leakage and is located between the cylinder block and the flywheel.

Magneto Protrudes Through Floorboards

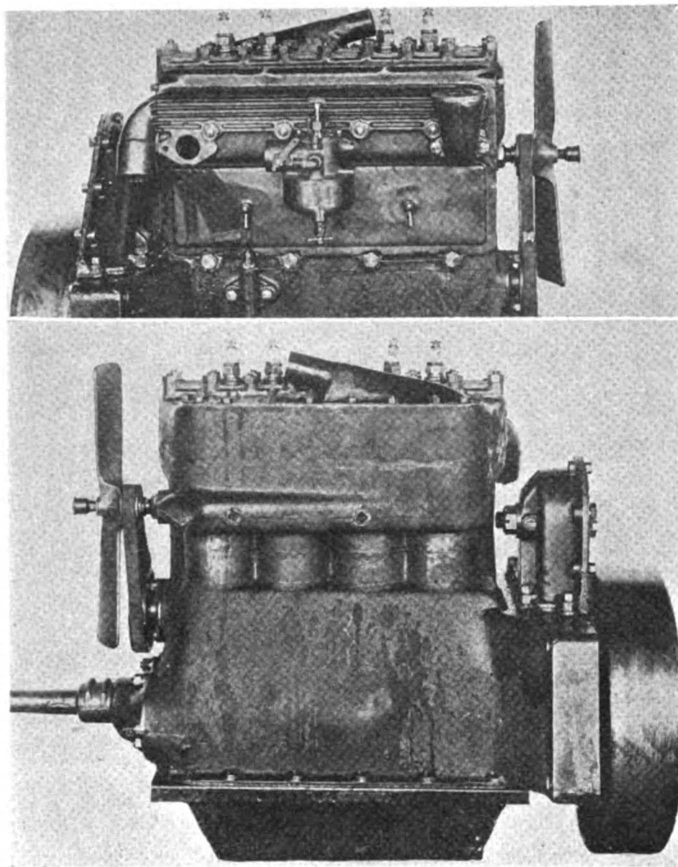
Due to this drive mechanism, the magneto, which is a Splitdorf, Model EU4, is mounted on a bracket attached to the gearcase housing, and in this position naturally protrudes through the inclined floor boards of the front compartment of the car. A metal plate goes over that portion of the magneto which comes through and this may readily be removed for access to the ignition unit. Locating the magneto in this position is not known to American car practice, but it is a departure from usual design.

The lower part of the crankcase may be removed and permits of the inspection or adjustment of the connecting-rod, crankshaft and camshaft bearings. The upper part is in unit with the cylinder block casting, and thus the barrel form of crankcase construction, which is common to American practice, is attained. This design makes a very rigid construction and is another enemy to appreciable vibration.

Combined Intake and Exhaust Manifold

The construction of the combined intake and exhaust manifold, which is placed above the valve cover, is very neat. Being cast together, compactness is attained, and lightness as well. The intake passages are above those distributing the gases internally to the intake ports. The combination also serves to heat the incoming gases, due to their proximity to the exhaust and better vaporization is the result.

Due to this manifold arrangement, the carbureter flange bolts directly to the opening at the center of the intake portion of the combination and there is the least possible amount of exposed piping. Of course, this rather high mounting of the carbureter on the motor is made possible through the fact that the gasoline tank is considerably above it in the cowl. The carbureter used is a Holley.



Upper—Valve side of Briscoe motor, showing combined exhaust and intake manifolds
Lower—Left side of motor showing simplicity of casting

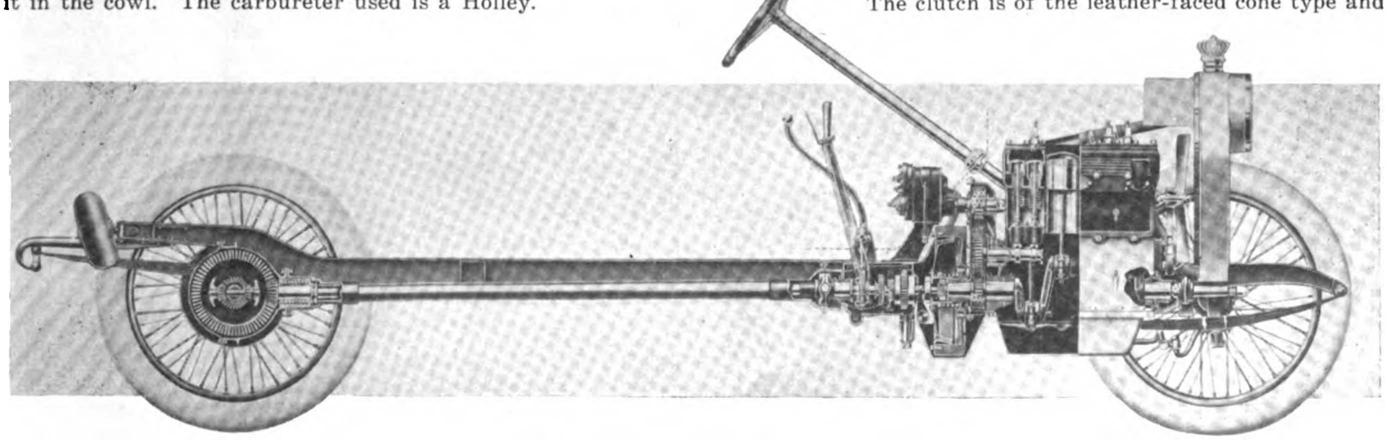
Lubrication is provided for by the conventional form of constant level splash system, there being a separate trough under each connecting-rod to take care of the splash function, while a pump on the right side of the crankcase and operated by the camshaft keeps the troughs at the proper level. The lower part of the crankcase is the reservoir, and the flow is checked by the dash sight feed.

Thermo-Syphon Cooling

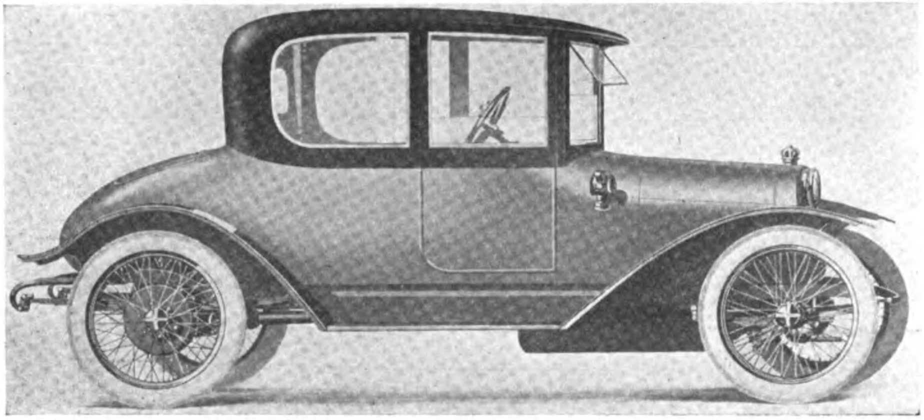
Cooling is by thermo-syphon and inlet and outlet connections are of large diameter to afford a free flow.

Although the flywheel is not inclosed, a substantial yoke passes around it on either side and these arms carry the gearbox. Thus the latter is virtually in unit with the motor, and a three-point suspended unit power plant construction is attained.

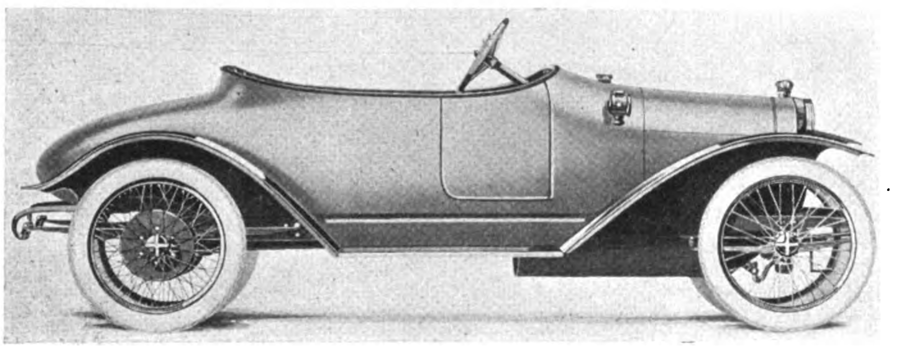
The clutch is of the leather-faced cone type and



Part sectional view of Briscoe chassis on which are mounted touring, roadster, or coupé bodies. Note mounting of magneto on bracket above gearcase and protruding through front floorboards as shown by dotted lines



New Briscoe coupé. Note streamline front and torpedo-type rear as well as general low appearance



Briscoe torpedo three-passenger roadster, called the Clover Leaf because of the seating arrangement

acts within the flywheel rim. Back of it is a three-speed gearset of compact design. This is of selective type and has center control. The gears and shafts are made of chrome vanadium steel.

Combined Starter and Generator

To the right of the gearbox and bolting to the right arm of the yoke passing around the flywheel is placed the Aplco combined electric cranking motor and generator. This unit connects through a completely inclosed silent chain to the main driveshaft between the clutch and the gears in the gearbox. The ratio between this electric unit and the shaft is 2 1-2 to 1. As is usual with combination motor-generator units, the device draws on the storage battery for starting purposes, and, when the engine runs under its own power, becomes a generator for sending current back to the battery.

An automatic cutout switch takes care of the battery charging and cuts the generator into the charging circuit at 14 miles an hour. As a motor the device will turn the crankshaft at the rate of about 150 revolutions a minute, and is unusually silent while doing it. The Aplco unit is of the 12-volt type and the battery, which is placed under the rear floorboards, is rated at 12 volts and 35 amperes. Fourteen-volt side and tail lamps of 2 candlepower are fitted, while the single headlight is a 7-volt, 18-candlepower one.

Driveshaft Is Inclosed

The drive from the gearbox to the rear is through a torsion-tube-inclosed shaft equipped with a universal joint, also inclosed at the forward end. The tube takes the drive and the torque in the usual way, and the power goes direct to the bevel gears of the rear axle which is of the floating type with live axles accepting only the drive. The weight of the car is carried on 4-inch Hyatt roller bearings and there is also a ball thrust bearing independent of the live axles. Although the standard drive ratio is 3 3-4 to 1, the purchaser may have a 4 to 1 ratio, if he desires. The axle gears are also carried on Hyatts.

There are two internal expanding brake drums and shoes on each rear wheel, one operating from emergency and the other from the service brake control. Steering is on the left and mechanism is of the worm and gear type, mounted upon a trunnion and forged from vanadium steel. Rather unusual spark and throttle controls are used on the steering wheel. These are not used with a lever and quadrant construction, but simply rotate on the steering post center. The spark control is a button which may be turned, while a large ring outside of it turns to control the throttle.

The suspension of the Briscoe chassis is by means of semi-elliptic springs all around. In the rear, spring horns attach to the frame and take the rear ends of the long springs. Easy riding is claimed, due to the length of these members.

The frame, which kicks up at the rear to clear the axle, is made of special frame steel having a channel section 3 3-4 inches high and 1 1-2 inch wide and made of 5-32-inch metal.

Some of the principal motor dimensions are given:

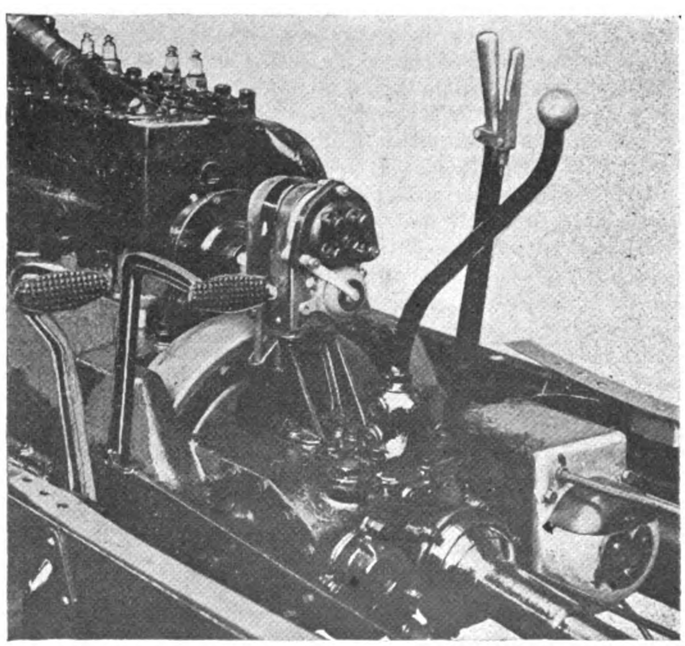
Valve diameter—1 3-4 inch.

Crankshaft bearings—Front, 1 7-8-inch diameter by 3 inches length; rear, 1 7-8-inch diameter by 3 1-8 inches length.

Connecting-rod bearings—1 7-8-inch diameter by 1 3-4 inch length.

Connecting-rod length—10 1-4 inches center to center.

NEW YORK CITY, Aug. 21—The Bosch Magneto Co., this city. reports that the European war will not hamper it in getting out its product. It states that the raw material which it has been getting heretofore from Europe it is now getting from domestic markets.

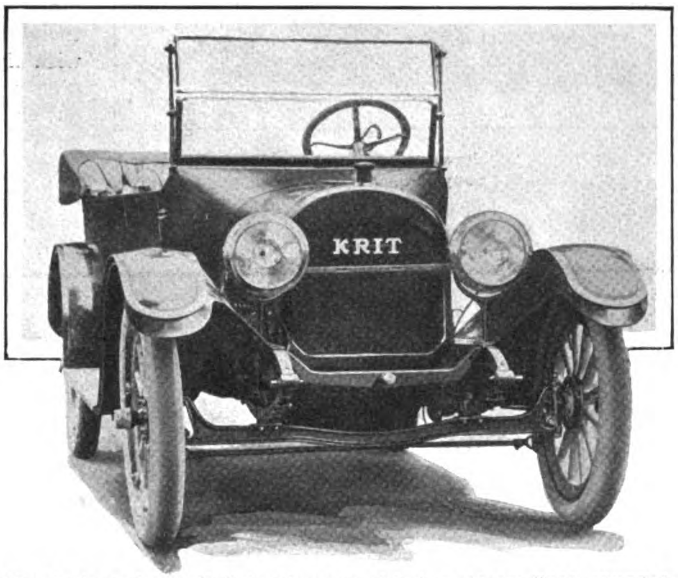


Mounting of magneto on bracket above gear case on new Briscoe, showing location of the combined starting motor and lighting generator

Krit Adds Cabriolet—Lowers Prices

Touring Cars and Roadsters $55 Less—Motor 25 Per Cent. More Powerful—Bodies More Roomy—Center Control

ALTHOUGH the price of the 1915 Krit models has been materially reduced, still greater refinement has been accorded them. Continuing the same general attractive outward appearance as in 1914, they have larger and more roomy bodies, a more powerful motor, better and most complete equipment and a number of detail chassis alterations leading to greater efficiency.



Front view of 1915 Krit touring car, showing stream lines, rounded-over radiator and crowned fenders

The price on the roadster and touring car models has been reduced from $1,050 to $995 with full electric equipment for cranking and lighting, one-man top, non-skid rear tires and additional instrument board units. Besides these two body styles, the Krit company has added a cabriolet type to meet a growing demand for such an all-weather machine. This is to sell for $1,295. The special touring car and roadster which were well received last season have their successors in the 1915 line also. In either roadster or touring car form, the special sells for $1,070 with five wire wheels, leather-faced seat covers and optional color in addition to the equipment with which the regular models are fitted.

Fenders Are Crowned

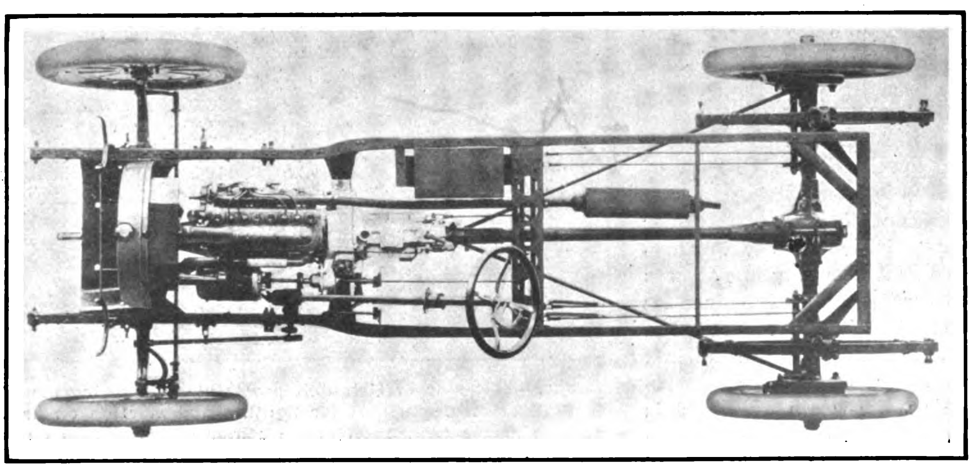
While the body lines are substantially the same as they were, a trifle has been added to the width, while the touring car has been increased 4 inches in length to give more room, most of which has been accorded the front seat. Another distinctive touch which adds to the effect of the streamlines is the crowning of the fenders, a touch which nearly all makers are now recognizing as meritorious. Rounded top radiator with coped over edges and sloping hood which conforms to it have been unchanged.

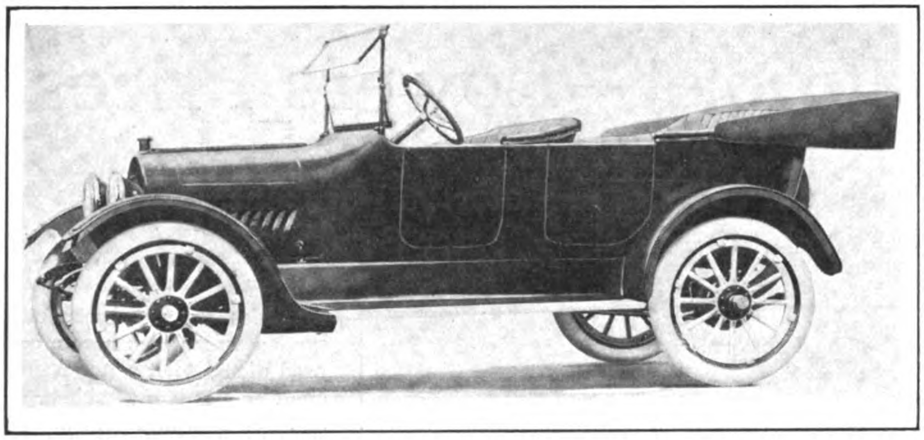
One new body feature is the doing away with all mouldings along the top edges. Instead, the metal of the sides rounds over the top edges and lends a very smooth and clean look to the car. Door tops conform to the same idea. This construction makes a better manufacturing proposition and at the same time is advantageous both from the standpoint of appearance and serviceability.

In the motor, while the basic design is retained, a new oiling system has been incorporated which combines the flywheel pump system which was heretofore used along with a pump circulation. It is a combination of force feed and splash. In the new arrangement, the reservoir which forms the lower portion of the crankcase is open on top with the exception of four troughs, one beneath each connecting-rod. The oil is positively forced from the reservoir to each of these troughs by a gear pump attached to the front end of the magneto time gear shaft. The rods dipping in the troughs cause a splash, lubricating all parts of the motor, and, as each trough is supplied independently by a lead from the main oil manifold running along the inside of the crankcase, the lubrication of each cylinder is assured, whether running on the level or on any kind of grade. The flywheel system which was heretofore used alone, now is the secondary supply, so that lubrication is very effective.

North East Electrical Unit

An important change has been made in the electric equipment, a North East single unit system replacing that fitted last year. This new motor-generator is 38 pounds lighter than the corresponding unit heretofore used. It is mounted on the left forward side of the motor on a bracket integral with the crankcase. This unit connects to the crankshaft through a shaft running back to a sprocket which in turn connects with another sprocket on the crankshaft and between its rear end bearing and the flywheel. The whole chain mechanism is completely housed within an integral ex-


Plan view of Krit 1915 chassis, showing bottle-neck frame, center control, fore and aft steering mechanism and mounting of North East electrical system at left of motor



Side view of 1915 Krit five-passenger touring car, showing streamline form and absence of side lights and of mouldings along top edges of the body, the metal of the sides rounding over the top edges

steer is practically standard with the majority of American cars now. Another improvement is in the center cross member of the frame which this year houses the brake cross rods and levers, relieving them of twisting strains and cleaning up the chassis.

The Krit motor, which is of the block cast type with L-head cylinders, has a bore of 3 3-4 inches and a stroke of 4 inches, giving it an S. A. E. formula rating of 22.5 horsepower, although due to the high speed design with light reciprocating parts, the engine will develop close to 30 horsepower on the block. Its maximum power output is attained at a crankshaft speed of about 2,000 revolutions, although it can be run as high as 3,100 revolutions.

tension of the flywheel housing. The shaft running from the electric unit to the upper sprocket is fitted with two leather universal joints. The ratio between the motor-generator and the crankshaft is 2.96 to 1.

The unit operates in the usual way. When used for cranking purposes, a switch sends current from the storage battery to the unit, it being temporarily transformed into an electric motor. After the engine is running, then the unit becomes a generator and sends current back to the battery. The latter is a 120 ampere-hour Willard and is located to the right of the gearbox inside the frame and under the front floor boards. The new cranking system is very silent and turns the engine at 175 revolutions a minute. On test, it rotated the shaft for 51 minutes with a fully charged battery. The system is a 12-volt, two-wire type.

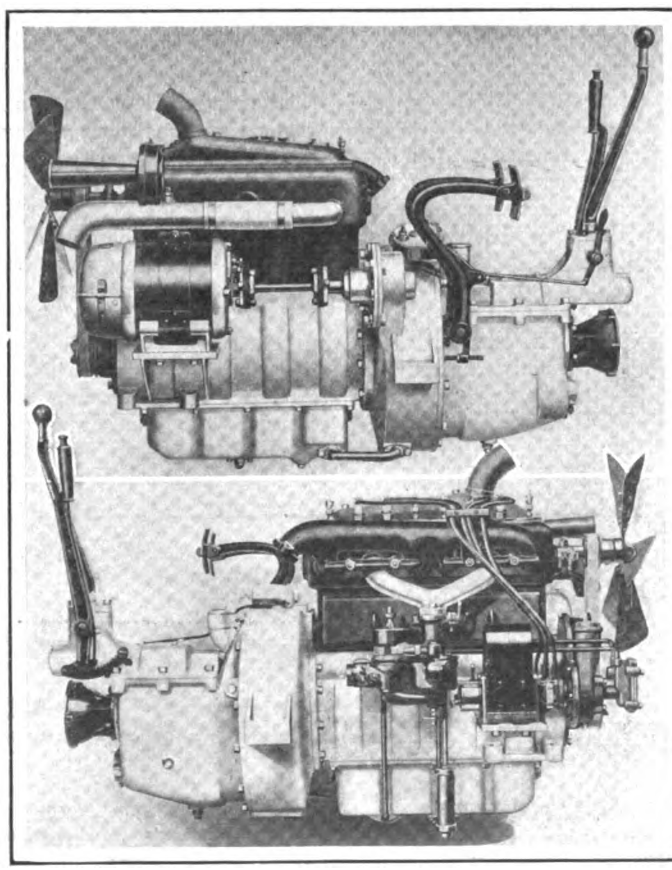
25 Per Cent. More Power

Some 25 per cent. has been added to the power of the motor, through the increasing of the valve size from 1 1-4 inch to 1 3-8 inch diameter; through the light weight pistons, each of which carries three concentric rings, and through the redesigning of the camshaft to allow for wider valve opening and closer tappet adjustment.

Center Control Adopted

Three chassis changes are of special note. First of these is the shifting to center control from the former left position of the levers—the Krit company has always advocated left drive since its inception in 1909. Second is the adoption of fore and aft steering mechanism to replace the cross type. This relieves the frame of the steering side thrust and therefore makes steering easier. The fore and aft

In general construction, the motor is entirely conventional. The unit power plant idea is carried out by bolting the gearbox directly to the flywheel housing, supporting the unit at either side of this housing, and cradling the front end on a frame cross member at its center. Valves, magneto and carbureter are on the right, and the exhaust manifold, with a separate opening to each cylinder, runs above the two branch intake, which has a common opening for each two cylinders. Due to a new design of Stromberg carbureter fitted this year, the shortening somewhat of the intake manifold has been made possible with better carburetion the theoretical result. The magneto is of the Bosch high-tension type.



Upper—Left side of Krit unit power plant, showing mounting of North East electrical unit for lighting and starting on bracket at the side of the crankcase. Note center control levers on gearbox and horn mounted on motor.

Lower—Right side of power plant showing intake and exhaust manifolds, new Stromberg carbureter and Bosch high-tension magneto

One distinctive feature of the Krit motor is the mounting of the crankshaft on two annular ball bearings of S. R. O. make. This design has proven very satisfactory, it is said.

Aluminum Cuts Weight

Due to the great amount of aluminum used with the motor, the Krit engineers believe they have reduced the power plant weight to the minimum, although strength is increased by the use of this material. The crankcase, gearcase, oil reservoir, water pipes and intake pipe are of cast aluminum, and the total weight of the engine, with magneto and carbureter, is 276 pounds. The complete gearset weighs 73 pounds, and the electric unit 45 pounds, bringing the total weight of the unit power plant to 394 pounds. This lightness is commendable and leads to greater car efficiency.

The drive back from the motor is through a multiple saw steel disk clutch which is within the flywheel. The housing of the latter is connected by a pipe to the oil reservoir so that the clutch runs constantly in a bath of oil. The drive shaft in the gearset is mounted on annular ball bearings and is cut from heat-treated chrome-vanadium steel, the gears, however, being made of chrome-nickel steel, heat-treated and tempered in oil. Their faces are of ample width for their service. The gearbox affords the usual speed changes—three forward and reverse.

Few Changes in Chassis

Except for the few changes in the chassis which have been enumerated, it remains of the same general construction as from the beginning. The drive to the rear axle is through a vanadium steel driveshaft inclosed within a torque tube, and fitted with a Spicer universal joint at its front end. Diagonal radius rods run from the front end of the tube back to the outer ends of the rear axle housing, and they, together with the tube, take the drive and the torque and preserve the proper alignment of the various units.

The rear axle is of the semi-floating type and Hyatt roller bearings are fitted, with a ball thrust bearing on the drive pinion. The brakes are of the usual internal expanding and external contracting type acting upon 10 by 2-inch drums. Rear springs continue to be of the elliptic type, underslung from the axle. Their rear ends are of the scroll form, and this suspension makes for resiliency and consequently for easy riding.

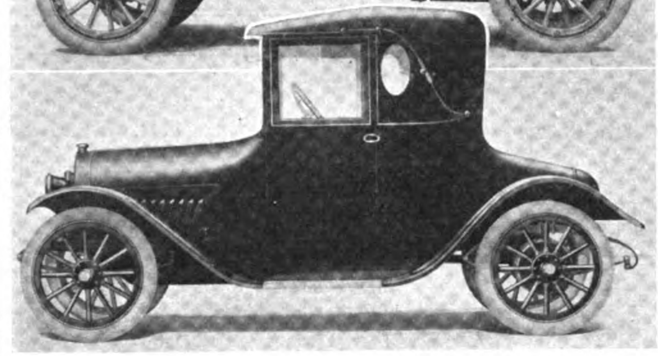
The frame is made from specially heat-treated steel, 5-32 inch in thickness, with a channel depth of 3 5-8 inches. It is of the single-drop type and curves in at the front end in bottle-neck form, thus providing for lower center of gravity and a short turning radius—29 feet 4 inches. There are three frame cross members.

All Instruments Grouped

The gasoline tank under the cowl and hidden by the leather-covered instrument board, through which projects the filled pipe, was a feature of the 1914 Krit and is retained without change for 1915. There is capacity for 10 gallons for direct use. A new feature, however, is the grouping of all the dash instruments on a single plate which is mounted on the instrument board. Containing gasoline gauge, Stewart speedometer, ammeter, switches and carbureter air control, this arrangement makes it easy to illuminate all the devices by the one dash lamp, which is added this year.

Bodies Are More Roomy

Roominess in the bodies is very noticeable, and due to the increasing of the size of the front compartment, it has been possible to lower the front seat—an item for better appearance and greater comfort. Doors have been widened, and ready access from any point is thus augmented. A new design of spare tire carrier is provided which is very rigid.



Upper—New Krit roadster, showing streamline design. Note rear deck and graceful lines of crowned fenders

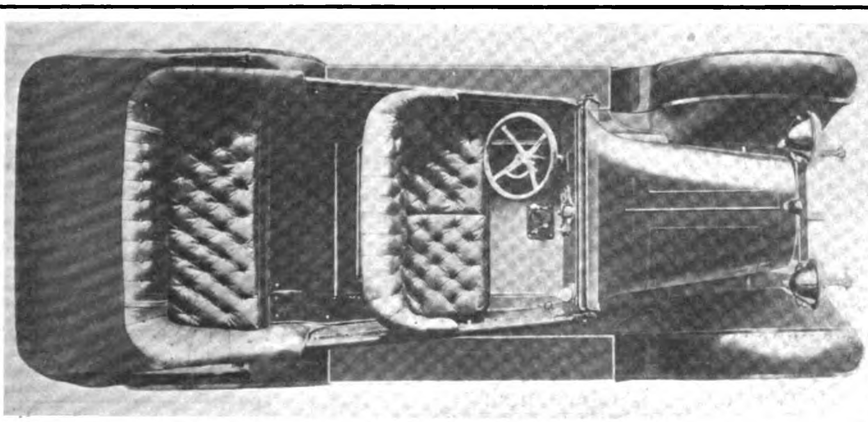
Lower—New Krit cabriolet which is added to the line for 1915. It is designed to meet the growing demand for an all-weather vehicle. It sells for $1,295

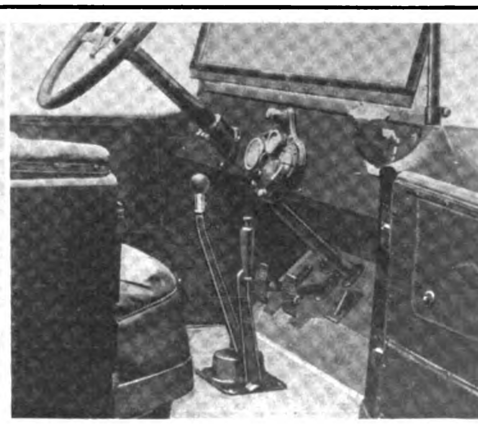
National Automobiling School Created in Honduras

NEW YORK CITY, Aug. 22—On July 4, 1914, the president of Honduras issued an executive order creating a school of instruction for automobilists, to be known as Escuela Nacional de Automovilistas, with the object to teach, theoretically and practically, the construction, working and handling of automobiles.

Applicants for the training must present certain qualifications of good conduct, education and health, and after a 3 weeks' probationary trial may be accepted as matriculated students. When the course is completed an official certificate of his qualification will be given the graduate. The result may be to create a demand for automobiles in Honduras. Only a few machines have ever been imported. Correspondence with the school should be in the Spanish language, if at all possible.

WICHITA, KANS., Aug. 22—Local automobile and accessories dealers have decided to promote an automobile, parts and accessories show to be held in the Forum in October.





Left—Plan view of Krit five-passenger touring car, showing center control. Note absence of side lights. Right—Driver's compartment of touring car, showing grouping of all instruments on a single plate illuminated by a small electric lamp. Note gasoline tank filler at right of instrument board. Note center control

The Automobile

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Stamina Is Needed

IT is more difficult to develop export business today in South America than it has been for some years, notwithstanding so many European factories are closed and that apparently South America will have to look to the United States.

Unfortunately, today South America is short on finances. Europe has been her banker, and when your banker goes back on you it is difficult to get money to purchase automobiles. America may first have to loan to South America much of the money with which we expect it to do business with us.

But even loaning money on these conditions is not an impossibility. These days call for the exercise of business courage, and the men and the organizations who put their money to this use will earn the trade they win and at the same time render patriotic service.

With the exception of commercial vehicles, the automobile industry is stagnant in Europe. The people do not want to purchase cars. They are hoarding their money. We must look elsewhere for markets, and although these markets may not be in their usual healthy condition, master efforts should be made to develop them. We must clear up the atmosphere in South America, wipe out the remembrance of extravagantly high prices on American cars, and of inadequate service for those already sold. This course is not specially remunerative, when considered in conjunction with the fact that some of the South American countries are declaring a 3 months' moratorium. But it is our task. Let us apply ourselves capably to it.

Racing Interests

LAST Saturday's road race on the 8-mile Elgin course once more demonstrated that the interest of the public in speed contests is not over. The attendance was greater than at any previous race in Elgin's 5 years of racing. This was not expected, many believing that the war situation would reduce the attendance perhaps 25 to 35 per cent. But the crowds were greater on both days than in previous years, and the public once more gave assurance that it is interested in speed contests, where competition is seen.

Although many attend races primarily to witness the spectacle of specially-designed racing cars travelling along the highway at upwards of 95 miles per hour, it must be remembered that these spectators carry home many impressions of the race that have a direct influence so far as their attitude towards automobiles goes.

For example: The car that makes the 300 miles without a single tire change, tells its lesson as compared with the slower car that makes five changes in the distance. Why does one car use more tires than another? This is the question on the lips of the interested owner-spectator. To him tires mean money. His annual tire expense is far in excess of his fuel and oil outlay. Perhaps the tire bill exceeds that of his garage. Little wonder, then, that he is vitally interested in a racing car that performs so admirably. To this spectator racing has a prodigious value. It has a direct dollar-and-cents interest to him.

But we can go further: Generally the racing car that is easy on tires, holds the road well, and travels 80 or 90 miles per hour over the roadway with scarcely a bounce, whereas other cars, changing tires and travelling little over 75 miles per hour, are bouncing from side to side. The car owner is interested in personal comfort. The car that holds the road appeals to him. It is more comfortable than the one bouncing from side to side. But in addition to being more comfortable it is safer. What more desirable factor of safety is there than that which causes a car to cling to the roadway?

Both safety and easy riding can be accomplished without a manufacturer entering in road or track races. One maker can learn the lesson through his racing team, and another can learn it in his engineering department. It is an open question which is the better, but it remains an undisputed fact that the roadway race is the great demonstrator to the public that many of our cars are yet far from the eventual so far as their ability to cling to the road is concerned.

It is most valuable to have these great object lessons, such as afforded by contests, where the public can have these merits in car construction demonstrated to them convincingly.

Downward Tendency in Tires —Companies Renew Old Prices

Supply of Crude Rubber in Sight Still Low But Market Recedes from Last Week's High Level

NEW YORK CITY, Aug. 25—The tire situation shows an appreciable improvement. Prices in several instances have fallen back to list and the present tendency is downward rather than upward.

Goodyear, which led the advance with 20 per cent., fell back to list Tuesday, August 18, with the explanation that it had secured means of obtaining crude rubber.

Empire followed August 20 by removing its advance of 12½ per cent., and the Mohawk company and the Miller Rubber, both of which had advanced 15 per cent., returned to the old list August 20.

Sterling has stated that it does not expect to advance.

The crude rubber situation remains much as it was, according to Henderson & Korn, rubber brokers, New York City, with little immediate prospect of material relief. Some rubber has been received in this country from South America in Brazilian ships, and some plantation grade has been received from London. The total, however, is negligible in comparison to what would ordinarily be received.

Para went to $1.12 and plantation to $1.10 immediately after the European war broke out, but these prices have fallen considerably. Para is now quoted at about 90 cents a pound and plantation at 75 to 80 cents, although there is little of either available. A small quantity of plantation from London sold as low as 72, but is not indicative of market conditions. Shipping and exchange, the prime causes of the shortage, show little improvement.

One hundred employees at the Hartford, Conn., plant of the United States Rubber Co., who were laid off when the war opened, have been taken back; the company expects an increase in business.

S. A. E. European Trip Postponed Indefinitely

NEW YORK CITY, Aug. 25—The Society of Automobile Engineers has postponed its second European trip indefinitely. The sailing date had been set around October 10 and the first stop was to have been Paris, but present war conditions have brought forth the postponement. The trip, as outlined, extended through France, Italy, Switzerland, Germany and England.

Colonies Are Buying Cheaper Cars

WASHINGTON, D. C., Aug. 22—Shipments of motor cars and parts, except engines and tires, to the noncontiguous territories of the United States during various comparative periods, are shown in figures compiled by the federal bureau of statistics. During June last 14 motor cars, valued at $13,737, and parts valued at $750, were shipped to Alaska, as against 8 cars, valued at $7,585, and parts, valued at $931, shipped there during the same month of last year. During the fiscal year ended June, the shipments of cars increased from 16, valued at $18,435, in 1913, to 54 cars, valued at $60,930, in 1914. The shipments of parts increased from $3,020 to $7,505.

Sixty-three motor cars, valued at $59,199, and parts valued at $7,040, were shipped to Hawaii in June last, while in June a year ago the shipments amounted to 54 cars, valued at $70,413, and parts valued at $6,172. During the fiscal year the shipments of cars decreased from 718, valued at $1,182,166, in 1913, to 701 cars, valued at $841,458, in 1914. Shipments of parts likewise decreased in value from $107,640 to $85,813.

Porto Rico received 19 cars, valued at $17,781, and parts valued at $4,456 from the United States in June last, as against 16 cars, valued at $24,729 and parts valued at $7,114, in June a year ago. The shipments of cars decreased from 323, valued at $406,440, in 1913, to 291 cars, valued at $320,680, in 1914, while the shipments of parts decreased in value from $93,813 to $70,025.

During June last 42 cars, valued at $45,646, and parts valued at $6,605, were shipped to the Philippines, while in June, 1913, the number of cars shipped was 94, valued at $105,919, together with parts valued at $7,195. The car shipments increased from 560, valued at $668,849, in 1913, to 652, valued at $761,980, in 1914, while the shipments of parts increased from $53,434 to $69,933.

Buick 1915 Schedule of 40,000 Cars To Stand

FLINT, MICH., Aug. 24—According to president Charles W. Nash, of the Buick Motor Co., the original plans of the company to build 40,000 Buick cars for the season of 1915 will be carried out notwithstanding the war. More than 5,000 men are now employed at the plant and the average daily output is 230 cars. The total value of the 1915 output will be worth about $42,000,000.

While the European export business will be non-existent, President Nash thinks that other markets will be able to take care of the American made cars.

Peerless 48 Only Six Next Year

CLEVELAND, O., Aug. 26—The line of large six-cylinder cars produced by the Peerless Motor Car Co. is continued for 1915 by the 48-Six which may be had in an open touring car and a limousine of standard type. In addition a wide variety of special cars fitted to the individual taste of the purchaser may be built on specification.

Convenience has been improved by the adoption of the new style of instrument board in the front compartment which places everything that needs to be touched within easy reach of the driver's hand.

Most important among the many minor mechanical changes that have been made in the car this year is the adoption of the spiral bevel gear in the rear axle. A constant level gasoline tank holding about a gallon is mounted under the cowl to supply an even pressure upon the carbureter under all conditions. The screen in the carbureter has been made removable so that it can be easily cleaned. Dry cells have been provided for emergency starting in winter. A new style of open wiring has been provided for accessibility and to improve the electrical efficiency the single wire system for both starting and lighting with separate fuses for the different circuits, has been adopted.

This year's open car is fitted with a touring body. It is exceptionally wide and spacious and provides room for carrying seven passengers in the greatest comfort. Folding seats of a new and exclusive Peerless design are used for the first time. These are more comfortable than any that have previously been available.

The side lamps have been removed from the dash and placed in the windshield filler board. A new type of glass front has been adopted which has a handle that makes it easy to fold.

The limousine follows the general lines of last year's body of the same type with some improvements in appearance. The front of the roof has a more pronounced curve and the quarter lights in the driver's compartment have been omitted. This leaves the view on either side open.

Windows throughout the car are of the sashless marine type and are fitted with much improved window lifts. All toilet cases and other interior equipment are mounted in and flush with the walls. Two types of auxiliary seats may be had: the special Peerless folding type which disappears into the front wall of the rear compartment when not in use, or the swinging type which folds against the side wall.

Interior lighting has been improved by the adoption of oval corner lamps and a large dome ceiling lamp.

In addition to the standard body types the Peerless Motor Car Company will always undertake the production of cars of special design containing features that are especially desired by the customer. Many extremely handsome cars have been produced in this way. This year special bodies of the Berline limousine, landaulet, Sedan roadster and torpedo types have been designed and can be specified by the purchaser who desires them.

The beetle decked roadster will carry three passengers on the main seat and a fourth upon a folding seat which is ordinarily carried under the deck of the car. The driver's part of the large seat is set forward about 9 inches so that the passengers may have the greatest possible freedom of movement. The five-passenger torpedo is fitted with a divided front seat which permits the passengers to pass from the front compartment to the tonneau without leaving the car. The Sedan also is fitted with divided front seats. It has only two doors, one on the right and the other on the left side of the tonneau.

1914 Deliveries Too Slow for Milwaukee Dealers

Dealers Report Increases in Business from 50 to 250 Per Cent.—Majority Felt a Shortage in Cars

MILWAUKEE, WIS., Aug. 21—With but few exceptions, Milwaukee motor car dealers did the largest business in the history of the local industry during the period from August 1, 1913, to August 1, 1914. The increases range anywhere from 50 to 250 per cent., and in most instances would have been considerably larger but for the fact that dealers could not obtain all of the cars they were able to market. A shortage is reported by more than 85 per cent. of all dealers. The other 15 per cent. consists of that class of dealer who handles approximately the same number of cars year after year and by reason of their peculiar circumstances are content to sell only that many and are not out to make records.

Books have just been closed on the fiscal year's business and show a most gratifying situation, particularly so in view of the unsettled state of business during practically all of the period.

Ford, of course, takes the lead, both in quantity of sales and percentage of increase. The Hickman-Lauson-Diener Co., Milwaukee, state agent, has disposed of 5,400 cars since October 1, 1913. Its fiscal year ends October 1, and there seems to be no doubt that the concern will make a 100 per cent. increase over the corresponding period a year ago, when 3,000 cars were marketed. It is only a question of getting cars.

Buick reports a 100 per cent. increase in sales through the Milwaukee branch, 150-160 Wisconsin street. M. J. Monson, manager, states that the 1914 allotment was absolutely sold out March 11, and no sub-dealer in the state has had a car to sell since May 1. What is more, the Milwaukee branch on August 1 had booked orders for 482 of the 1915 models and daily there are new buyers clamoring for more.

A like situation is reported by the Reeke-Osmond Motor Car Co., Milwaukee, which handles most of southern Wisconsin for the Thomas B. Jeffery Co., Kenosha. Business up to August 1, 1914, was 85 per cent. better than for the preceding period, and up to this time the company has booked orders for more than 325 cars of the 1915 type.

The Hoppe-Hatter Motor Co., 539 Broadway, Chalmers, Saxon and Rauch & Lang electric, reports an increase of 100 per cent. in electric vehicle sales and better than 50 per cent. in gas cars. Orders booked ahead are much larger than a year ago, and the only thing the firm is concerned about is getting enough cars to fill requirements.

A 50 per cent. increase is also reported by the Milwaukee branch of Cole Motor Co., 188 Eighth street, and Manager F. E. Tabbert says this could have been increased indefinitely if the factory had been able to supply enough cars.

A shortage of Reo cars is reported by Curtis Automobile Co., 142 Eighth street, which experienced a 33 1-3 per cent. increase, and was sold out long before August 1.

Frank J. Edwards, manager of the KisselKar Co., 178-180 Seventh street, did a business that was 50 per cent. better than the previous year and until 1915 goods arrived booked more orders for future delivery than at any time since the business was established.

Mitchell Automobile Co., 528-532 Broadway, branch of the Chicago wholesale and retail house, is able to report only a 25 per cent. increase in Mitchell business, but this was due to its inability to get more cars. Briggs-Detroiter being more liberal, the Milwaukee house was able to swell its percentage of increase on Detroiter business nearly 200 per cent. This is for the entire state of Wisconsin territory, while its representation of the Mitchell covers only three counties, Milwaukee, Waukesha and Ozaukee.

Schreiber-Boorse Motor Car Co., 180 Fifth street, reports a 50 per cent. increase on Locomobile and Hudson business. Both lines were dropped August 1, and the National and King substituted. Bookings already made indicate an exceptional increase during the coming year, although it is hardly fair to make comparisons of this kind.

An increase of 57 per cent. in Stutz business and 150 per cent. in Overland sales is reported by George W. Browne, Broadway and Biddle street. Browne's requisition for the new Overland Six and the allotment of the $1,075 model means even a larger percentage of increase during the coming season.

The Milwaukee branch of the J. I. Case T. M. Co., at 493 Broadway, did a 50 per cent. better business than during the previous year. The branch is under the direction of the Madison district office, which reports an even larger percentage of increase.

Moline sales were not so large as a year ago, but this is due to the smaller allotment given to the Wait Automobile Co., 222 Fourth street, state agent, by reason of the adoption of the Knight motor and heavy increase in price. William J. Wait said the concern could have disposed of at least 25 per cent. more if the cars could have been granted by the factory. The 1915 allotment has been increased that much.

W. W. Burgett, manager of the Stanley Steamer Co., Fourth and Prairie streets, says he sold twice as many 1914 cars as 1913 models. He had no difficulty in disposing of all the cars the Stanleys could give him. He has recently taken on the Lewis Six and has booked orders to cover all of his 1915 allotment.

The McDonald Motor Car Co., 239 Wisconsin street, reports a 25 per cent. increase in Lozier business. The concern has never experienced any trouble in disposing of the limited number of cars it can get from the Lozier factory and its shortage was greater this year than last.

The American Automobile Co., 187 Wisconsin street, state agent for the Pierce-Arrow, sold just as many cars as a year ago and as it has every year since it took the agency. No effort is made by this concern to break records, its allotment being the same year after year.

Cadillac sales increased 40 per cent., which was the percentage of increase in the 1914 allotment. Jonas Automobile Co., Eighth and Wells streets, has increased its 1915 requisition about the same percentage and expects to meet with the same shortage it has year after year.

The Chase Motor Truck Service Co., 2602-2606 North avenue, increased its 1914 sales 250 per cent. over 1913. Louis Pauly, manager, states that if the cars could have been got from the factory the increase would have amounted to not less than 300 or 350 per cent. Especially in the grocery trade is the Chase popular and Mr. Pauly expects a much larger allotment for 1915, so that his sales record will probably be the same during the coming year as last.

There has been no let-up in purchases since August 1, and there is every indication that the prosperity of 1914 will be duplicated during the coming year. If anyone can doubt the reports of Milwaukee dealers, it is only necessary to study the record of 1914 motor car registrations in the state of Wisconsin. On December 31, 1913, the Wisconsin registration by private owners was 34,646. On August 1, 1914, the registration had passed the 51,000 mark. Registrations expiring at the close of each calendar year, there are no duplications to swell the total. At the present ratio of gain, Wisconsin will show a total 1914 registration of 20,000 more than 1913, or nearly 55,000.

Buick Employes Plan To Eliminate Waste

INDIANAPOLIS, IND., Aug. 19—The employes of the Indianapolis branch of the Buick Motor Co. have organized the Buick Efficiency Society of Indiana whose slogan is: "All together all the time," and whose purpose is to promote higher efficiency among all Buick employes in all matters concerning or interesting motoring.

There are four classes of members, the first being the active members or employes of the local branch; the second membership consists of associates who are the dealers and sub-dealers within the territory looked after by the local branch; employes of dealers and sub-dealers make up the third class, or student members, while the fourth class, or honorary members, is made up of Buick owners.

Among the various important matters which will be taken up by the society is the problem of eliminating waste of materials and expenditures.

Blue Book Establishes New Service Bureau

NEW YORK CITY, Aug. 24—A new touring service bureau has been installed at both the New York and Chicago offices of the Automobile Blue Book Publishing Co. for the free and exclusive use of owners of the 1914 Blue Book.

Any owner of a current issue of the book is entitled to the free use of this Bureau for any kind of advice on any contemplated tour. This service covers the entire territory covered by the five volumes of the book—viz., all of the United States and Southern Canada.

General Motors Made 58,000 Cars in 1914

NEW YORK CITY, Aug. 24—During the fiscal year ended July 31, 1914, the General Motors Co. manufactured approximately 58,000 cars compared with about 55,000 in 1913.

It is understood that the balance of net profits for the 1914 fiscal period will run about 40 per cent. on the $16,476,000 common stock. This is substantially the same as in the 1913 year.

The export business will not suffer greatly as a result of the war. Only 10 per cent. of the total sales are foreign, and if it were all cut off the loss to net would not be a weighty matter.

Sales manager W. K. Chilcott states that sales made by the G. M. C. Truck Co. for the last half of the fiscal year, ending July 31, 1914, exceeded the same period in 1913 by 44 per cent. Sales for the entire fiscal year ending July 31, 1914, exceed the preceding year 33 per cent.

Sales for July, 1914, exceeded July, 1913, by 137 per cent. Sales for July, 1914, exceeded June, 1914, the record-breaker, 8 per cent. The term sales as used above does not mean orders received, but actual, bona fide deliveries of new models.

The number of dealers handling G. M. C. trucks is 232 per cent. greater than on January 4, 1914. With 32 per cent. less productive labor and 49 per cent. less non-productive labor, the company built 56 per cent. more trucks in June, 1914, than in June, 1913.

Helena Dealers Sell 150 Cars in 1914

HELENA, MONT., Aug. 18—Although every one of the local dealers has received literature about the 1915 models few have received their showroom models and all are trying by all means to get them as quickly as possible, as the business outlook is the brightest ever experienced.

The 1914 business year may now be considered closed since the announcements for the 1915 have been appearing and people do not want to know anything more about this year's cars. It is estimated that 150 to 200 cars were sold all told by the dealers.

The Western Auto & Supply Co., which handles the Ford had contracted to sell fifty of these cars in 1914 and up to date sold sixty-eight, the business being especially good during the last few weeks. The T. C. Power Co., which sells the Buick and Packard disposed of fourteen of the former since March and quite a few of the high priced Packards, which is good business considering that the company only has the western part of the state as its territory. H. La Chapelle, who has the state agency for the National and Apperson is well satisfied with his sales thus far. A very large number of Mitchell cars have been sold by A. D. Mitchell who handles them. While James Walker, the father, runs his grocery store, Edwin Walker, the son, looks after the sales of the Detroiter and Jackson cars of which a goodly number were sold during the year. Probably more Franklin cars were sold during the last 6 months by the Swendeman Automobile Co., than during any previous year. The company has the selling right for Broadwater, Jefferson, Lewis and Clark, Meagher and Powell counties.

Wilkes-Barre Agents Sold 818 Cars in 1914

WILKES-BARRE, PA., Aug. 25—Automobiles to the number of 818 have been sold this season by the dealers of Wilkes-Barre and its immediate environs. They range in price from $395 to $5,000, the total valuation being estimated at about $2,000,000. The population in the districts represented by the owners of the cars is about 150,000, which would mean one car for every forty-six families, using the average of four people to a family.

British Engineers' Society Changes Address

LONDON, S. W., ENGLAND, Aug. 20—The address of the Institution of Automobile Engineers has been changed to 28, Victoria street, Westminster, London, S. W.

N. Y. Hupmobile Agent Gets Newark

NEW YORK CITY, Aug. 24—Charles E. Riess & Co., the New York City agent for the Hupmobile car, will open a branch in Newark, N. J., at 373 Central avenue, the same place occupied by the former Hupmobile agency. A service station will be maintained at that location and a complete line of parts will be carried in stock.

Red Head Platinum Point Plug Is $2

NEW YORK CITY, Aug. 25—In the two-color page advertisement in THE AUTOMOBILE for August 13, the list price of the Red Head platinum point plug was inadvertently quoted as $1. This is the price of the regular Red Head plug. The platinum point plug lists at $2.

Wood-Wire Wheel Test Is Pennsylvania Tire Triumph

After 60,772 Miles "Little Is Actually Determined Except Staying Qualities of Tires," Says Report

NEW YORK CITY, Aug. 22—Completing 60,772 tire-miles, the test held for the Pennsylvania Rubber Co. by the Automobile Club of America for the purpose of denoting the relative merits of wire and wood wheels, as related to tire wear, has ended with little actually determined except the staying qualities of the pneumatic tires employed. The test was held under the supervision of Herbert Chase, laboratory engineer of the club.

The test started on March 31 when two new Lozier fours left the Automobile Club of America, one equipped with wood wheels and the other with wire. The cars were operated over the roads of New York City and vicinity until the Pennsylvania vacuum cup tires with which they were fitted wore out. Altogether there were nine tires used in the test, one of which did duty on both the wire wheel and wood wheel car, and therefore cannot be considered in making up resulting figures.

On the wood wheels the four tires which went throughout the test made 5,700, 7,500, 8,940 and 10,164 miles, an average of 8,078.

On the wire wheels the tires made 5,820, 4,300, 9,220 and 6,540 miles. This gives an average of 6,107 miles. The tires were frequently changed from wheel to wheel on both cars.

On the surface this would seem to give an enormous difference in favor of the wood wheels, but such is not the case by any means, as the tires on the wire wheels were subject to accident in the early periods of the run, thereby causing them to blow out sooner than would have been the case were they subject to ordinary wear. In fact, out of the nine tires used, but two perished through being worn out, one of these traveling 10,164 miles and the other 9,228. One of these was on the wood wheel and the other on the wire, showing a difference that cannot be compared owing to the fact that it was a single isolated instance, offering no basis for accurate comparison.

The ninth tire traveled 2,660 miles, at which time it blew out, owing to a cut it had received at the end of the 1,040th mile. As this tire had traveled this distance on the wood wheel, and after being repaired had been transferred to the wire wheel car, it cannot be reckoned in the comparison of mileages.

The Pennsylvania Rubber Co. entered into this test with the idea of demonstrating that a guarantee of 4,500 miles for its casings was not too high. Taking the average mileage of all nine tires, an average of 6,754 miles per tire was covered. The weight of the wood wheel car was 4,150 pounds, and of the wire wheel 4,050 with passenger load.

Outside of the value of the figures obtained on the mileage of the tires, which were secured from the stock of different dealers scattered about the country and which were purchased by the engineering department of the Automobile Club of America, the fact which is really brought home by the tests, that only two of the nine tires perished through being actually worn out; the others were all subject to cuts and bruises which might have occurred at any time during their life and which were subsequently the causes of their failure. In fact, one of the tires was cut and bruised by a sharp stone at 1,040 miles, and although repaired as was allowed under the rules of the test, it blew out at the point of injury at the 2,660-mile point.

No doubt the number of cuts and bruises sustained would be less if the car were run over dirt roads. A summary:

Tire No.	Wheel	Miles Traveled	Cause of Elimination
1	Wire	9,220	Worn out; never deflated.
2	Wood	8,940	Cut by sharp stone at 7,610 miles; blew out.
3	Wood	7,500	Bruised; blew out; never deflated.
4	Wire	6,540	Cut by sharp stone at 3,350 miles; blew out at point of injury.
5	Both	2,660	Cut and bruised by sharp stone at 1,040 miles; blew out at point of injury.
6	Wood	5,700	Punctured by screw at 3,290 miles; blew out at point of injury.
7	Wire	4,300	Cut by sharp stone at 2,390 miles; blew out at point of injury.
8	Wire	5,820	Cut at 5,690 miles; blew out at point of injury.
9	Wood	10,164	Worn out; never deflated.
Total miles		60,784	Average miles per tire, 6,754.

127 Detroit Cos. Incorporated in 7 Months

DETROIT, MICH., Aug. 20—The Board of Commerce of Detroit has published some statistics concerning local business conditions during the first 7 months of the year as compared with the corresponding period of 1913. It shows among other things that thus far this year 127 companies have been incorporated, or 8 less than last year, but the total capital stock subscribed is $8,110,400 or $4,331,820 more than during last year's first 7 months. In this increase of capital stock the automobile industry is far ahead of all others inasmuch as one single concern, Dodge Brothers, was incorporated for $5,000,000.

The total value of the automobiles, parts and accessories exported up to the end of July was $5,004,245 or $86,607 less than for the similar period last year, and represented 16.1 per cent. of the total value of all exports from Detroit, while last year's percentage of the automobile industry in the total exports was only 12.6 per cent.

Armored Autocars for European Powers

PHILADELPHIA, PA., Aug. 25—Armored steel automobiles for use by the European powers engaged in war are being manufactured in this city by the Autocar Co. and will be shipped from its plant at Ardmore as soon as completed. The firm is said to work with the knowledge of Secretary Bryan.

Cars have been sold to nations on each side of the conflict. One order includes fourteen cars for the British Government. These cars are to be shipped to private individuals in Canada and thence reshipped to England.

Negotiations with France, Russia and Greece have also been entered into and it is said orders for 1,000 more cars have been placed by the various powers.

Market Reports for the Week

This week's markets experienced a general advance in prices. Both Bessemer and Open-Hearth steels rose $1.00 per ton. Electrolytic copper rose $0.00 1-8 per pound. The larger exports of copper to Great Britain in the last few days have encouraged the producing interests in this city to hold a little more firmly, but the larger supply abroad has resulted in lower prices there. The domestic market continues dull with small demand from domestic consumers. The supply of copper is more than ample to meet current requirements and notwithstanding the decrease in output, current production seems to be in excess of current requirements. Lead is quiet but firmer. Tin has come down to normal prices again. On Tuesday it was quoted at $39.50 per 100 pounds. The opening price was $49.00, leaving a $9.50 cut in price for the week. The demand for tin from domestic consumers is light. Warehouse supplies are a little more concentrated, but more tin is being offered for future delivery. On Tuesday, a steamer from London arrived with 100 tons of tin, while another ship from Rotterdam brought 10 more tons. Rubber has come down to $0.80. Manufacturers are still holding aloof pending developments.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.12	.12	.12	.12	.12	.12	......
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	......
Bessemer Steel, ton	19.00	19.00	19.00	19.00	20.00	20.00	+1.00
Copper, Elec., lb.	.12⅛	.12	.12	.12	.12¼	.12¼	+ .00⅛
Copper, Lake, lb.	.12⅜	.12⅜	.12⅜	.12⅜	.12⅜	.12⅜	......
Cottonseed Oil, bbl.	6.53	6.60	6.62	6.75	6.80	6.68	+ .15
Cyanide Potash, lb.	.17	.17	.25	.25	.25	.25	+ .08
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.93	.93	.93	.93	.93	.93	......
Lead, 100 lbs	3.85	3.85	3.85	3.85	3.75	3.87½	+ .02½
Linseed Oil	.60	.60	.60	.60	.60	.60	......
Open-Hearth Steel, ton	19.00	20.00	20.00	20.00	20.00	20.00	+1.00
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	......
Petroleum, bbl., Pa., crude	1.50	1.45	1.45	1.45	1.45	1.45	— .05
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	.90	.90	.90	.90	.80	.80	— .10
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	49.00	45.00	42.00	42 00	39.00	39.50	—9.50
Tire Scrap	.04¼	.04¼	.05	.05	.05	.04½	— .00¼

motorists of the state is thus returned to their home counties to be used for the permanent improvement of highways. Milwaukee county, naturally, has the largest drawback. There were registered from Milwaukee county 8,602 motor vehicles, at $5, or $40,010; 130 dealers at $10, or $1,300; 1,892 motorcycles at $2, or $3,794, a total of $48,069 received. The return to Milwaukee county is $33,213.94. Dane county, seat of the state capital, has a drawback of $10,519.23; Rock county, $6,655.04; Fond du Lac, $8,074.26; Racine, $5,665.90; Sheboygan, $5,541, and Winnebago, $5,116.55.

Wire Prices Advance $1 a Ton

NEW YORK CITY, Aug. 25—The American Steel & Wire Co. has announced a price advance of $1 a ton on all products to take effect immediately. This is in line with the advance of $1 a ton made by the Youngstown Sheet & Tube Co.

According to the local wire wheel dealers and manufacturers this will have no effect on the prices of wire wheels.

Approve Claims of 1,641,382 Against Pope Co.

BOSTON, MASS., Aug. 24—Claims aggregating $1,641,382 against the Pope Mfg. Co. have been approved by the receivers, according to the first report filed in the United States District Court here. This does not include a claim for $1,000,000 filed by the Empire Trust Co. of New York as trustee for the noteholders, which the receivers have approved for only $5,000.

The total assets on June 30 last were valued by the receivers at $1,562,895. Accounts payable on that date aggregated $60,595.

Since their appointment last November the receivers have sold 21,062 motorcycles and 40,602 bicycles up to June 30 last. They recommend the sale of the plant at Westfield, Mass., at public auction and as soon as an upset price can be fixed they will apply to the court for permission to sell.

Texas Fire Insurance Restricted

AUSTIN, TEXAS, Aug. 24—In a ruling to the State Department of Insurance, the Attorney-General's Dept. has held that a mutual fire insurance company is not authorized to avail itself of the provisions of the law permitting such companies to insure automobile and other motor vehicles. This includes risks against loss or damage by fire, lightning, wind storms, hail storms, tornadoes, cyclones, explosions, transportation by land or water, theft and collisions.

Sparks-Withington Adds 50,000 Sq. Ft.

JACKSON, MICH., Aug. 24—The Sparks-Withington Co., Jackson, Mich., has just completed a structural steel and concrete building at the rear of its plant which gives it 50,000 square feet additional floor space for the exclusive use of nickel plating and shipping departments.

An improvement for facilitating in and out shipments, and relieving the men of the strain caused by heavy lifting, is a concrete pit 10 feet wide by 25 feet long, which permits the automobile trucks to enter freely, bringing the body floor of the trucks on a level with the cement floor, thus enabling the men to run the hand trucks directly to the material and overcoming the necessity of hoists.

Auto Wheel Company Elects

LANSING, MICH., Aug. 20—At the annual meeting of the stockholders of the Auto Wheel Co., the following were elected members of the board of directors: E. S. Porter, H. E. Bradner, Lawrence Price, J. C. Watzel, Elgin Mifflin, Harry P. Woodworth, all of Lansing, and Henry J. Campbell, of St. Joe, Mich. E. S. Porter remains president of the company; H. E. Bradner, vice-president and D. L. Porter, secretary-treasurer. The business year just ended has been satisfactory and the outlook for 1915 is promising. The business of the company has been steadily increasing and from a small factory with only a dozen workingmen it has become a concern which now employs about 100 men.

German Cars Predominated at Swedish Show

MALMOE, SWEDEN, Aug. 24—At the exposition which opened in Malmoe, Sweden, May 15, and which it is reported was closed a week after war between Germany and Russia was declared, only four countries exhibited their products in the 117 buildings on the exposition grounds. There were 1,225 Swedish exhibitors, 668 German, 241 Danish and 151 Russian. The German automobile industry took up one-fifth of the total number of German exhibitors as every car, parts and accessories manufacturers of Germany is reported to have been represented. In fact, it is stated in German publications that never before in the history of the German automobile industry was that country so thoroughly represented. More than 150 complete German automobiles were on display.

Garage Men and Dealers to Meet in Minneapolis

MINNEAPOLIS, MINN., Aug. 24—There probably will be several hundred retail automobile dealers and garage owners in this city September 10 and 11 when the first convention of the Retail Automobile Dealers Assn. of the Northwest will take place. The 2-day affair will be a composite of pleasure and business, it being the object of the convention to be a go-between for the retail and wholesale trade. The association was organized for the purpose of standardizing the retail automobile industry and receives the co-operation of the retail dealers and garage men, on the one hand, and the wholesale accessory and supply houses, distributors and manufacturers, on the other hand. The officers of the association are: C. W. Jewett, Bemidji, Minn., president; G. A. Lewis, Mankato, vice-president; P. C. Frazee, Pelican Rapids, secretary-treasurer.

An Electric Vehicle Day Throughout America?

NEW YORK CITY, Aug. 22—An Electric Vehicle Day, staged simultaneously in a large number of American cities, is being considered by the Electric Vehicle Association of America. It was suggested by Robert Montgomery, commercial manager of the Louisville Gas & Electric Co., Louisville, Ky., and such a day may be held in that city this season. The national project, however, may not mature until next summer.

Montgomery's suggestion is that a certain day be set aside, preferably a holiday, and that parades and demonstrations be held everywhere on that date. Prizes for various competitive features would be offered by the central stations and newspaper and poster advertising would center public attention upon the electric vehicle.

Warships To South America As Sample Cases

NEW YORK CITY, Aug. 24—A resolution was introduced recently at Washington, D. C., by Senator Weeks, of Massachusetts, calling upon the Secretary of Commerce for information as to the cost and feasibility of sending six vessels of the United States navy with samples of American products to South American ports for the purpose of encouraging trade between the United States and the South American republics.

H. T. Sigwalt with Federal M. T. Co.

DETROIT, MICH., Aug. 25—A number of important changes have been made in the organization of the Federal Motor Truck Co. H. T. Sigwalt, formerly with the Fort Wayne Corrugated Paper Co, Fort Wayne, Ind., has joined the company as advertising manager. R. G. Hargreaves, well-known as an engineer, and who was formerly with the Cadillac Motor Car Co., Detroit, has been appointed transportation engineer.

In the sales department the following appointments were made: C. T. Cary, formerly with the Peerless Motor Car Co., Cleveland, O., as manager of its truck department, is now Eastern district sales manager. E. W. Hurd, formerly with the J. D. Whitmann Co. is district manager for the territory comprising Michigan, Ohio and Pennsylvania. L. L. Barnes, formerly with the Chalmers Motor Co., Detroit, is now southeastern district sales manager. Charles Case, who was with the Oliver Motor Truck Co., Detroit, has become southwestern district sales manager.

U. S. Exports Began to Fail in June

WASHINGTON. D. C., Aug. 22—In addition to the general export figures published last week in THE AUTOMOBILE, the following detailed figures show the exports of commercial and pleasure cars, together with parts, during June and the fiscal year ending June 30, 1914, with comparative figures:

	JUNE—				TWELVE MONTHS ENDING JUNE—			
	1913		1914		1913		1914	
Automobiles	No.	Value	No.	Value	No.	Value	No.	Value
Commercial	115	$167,391	90	$120,257	993	$1,737,141	784	$1.181,611
Passenger	2,039	2,023,761	1,982	1,870,882	24,293	24,275,793	28,306	25,392.963
Total	2,154	$2,191,152	2,072	$1,991,139	25,286	$26,012,934	29,090	$26,574,574
Parts of (not including engines and tires)	..	$549,616	..	$473,968	..	$5,240,599	..	$6,624,232

	JUNE—				TWELVE MONTHS ENDING JUNE—			
	1913		1914		1913		1914	
Automobiles	No.	Value	No.	Value	No.	Value	No.	Value
France	71	$54,746	143	$88 874	824	$625,795	1,429	$924,130
Germany	157	136,171	44	56,249	849	768,418	1,435	1,059.249
Italy	55	33,098	17	13.801	331	280,961	343	242,695
United Kingdom	386	289,457	240	239,274	3,979	3,026,895	7,222	5,853,127
Other Europe	204	171,783	242	203,816	1,805	1,540,437	2,928	2,337,733
Canada	383	596,681	513	642,024	7,212	9,233,561	4,624	5,919,776
Mexico	5	9,505	3	4,577	270	506,486	167	256.675
West Indies and Bermuda	23	19,315	65	44,657	438	449,421	556	513,124
South America	169	187,185	76	50,683	2,820	3,165,205	1,985	1,939.212
British Oceania	318	187,185	425	369.693	3,062	2,914,451	4,244	3,695,595
Asia and other Oceania	206	207,105	147	149,121	2,231	2,151,392	2,140	2,076,278
Other countries	177	153,894	157	128,370	1,465	1,349,912	2,017	1,756,980
Total	2,154	$2,191,152	2,072	$1,991,139	25,286	$26,012,934	29,090	$26,574.574

	JUNE—		TWELVE MONTHS ENDING JUNE—		
Tires for Automobiles	1913	1914	1912	1913	1914
Belgium	$16,470	..	$51,620	$401,900	$15,730
Germany	28,035	$6,586	1,160	401.196	132 181
England	144,087	192,510	1,177,579	1,125,718	1,503,440
Canada	158,358	168,976	696,433	1,324,459	961,937
Mexico	21,603	2,577	148,480	203.883	111.948
Philippine Islands	17,597	14,040	73,763	100,476	141,205
Other countries	44,975	68,489	508,774	385,588	638,826
Total	$431,125	$453,178	$2,657,809	$3,943,220	$3,505,267

Imports.

	JUNE—				TWELVE MONTHS ENDING JUNE—			
	1913		1914		1913		1914	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles	44	$105,516	22	$31,746	748	$1,759,380	300	$620.493
Parts of (except tires)	..	11,996	..	96,739	..	263,827	..	812,083
Total automobiles, and parts of	..	$117,512	..	$128,485	..	$2.023,207	..	$1,432,576

	JUNE—				TWELVE MONTHS ENDING JUNE—			
	1913		1914		1913		1914	
Automobiles	No.	Value	No.	Value	No.	Value	No.	Value
France	20	$45,293	10	$17,365	357	$844,392	134	$304,716
Germany	9	25.642	2	2.293	99	261,168	21	45,680
Italy	4	7,149	5	5,989	116	205,931	55	79,464
United Kingdom	1	2,300	..	..	78	218.932	40	115 042
Other countries	10	25,132	5	6,099	98	228,957	50	75,591
Total	44	$105,516	22	$31,746	748	$1,759,380	300	$620,493

At Last an A. A. Is Formed in Oklahoma

OKLAHOMA CITY, OKLA., Aug. 25—Automobile owners and dealers have perfected a state-wide organization known as the Oklahoma Automobile Assn. Members of the association met at Oklahoma City recently to elect officers and discuss plans for preparing road maps and logs of every county for the owners and tourists visiting in the southwest. Short speeches were made on the question of good roads legislation and plans were laid for concerted effort to procure a revision of the present road laws of the state. A committee was chosen to obtain rooms for offices for state headquarters to be maintained here where residents and visitors can obtain reliable information concerning routes and road conditions.

Officers were chosen as follows: C. B. Shafer, Cushing, president; F. H. Tidman, Oklahoma City, first vice-president; Frank Kraft, El Reno, second vice-president; Directors: J. D. Butts, Cherokee; A. C. Trumbo, Muskogee; J. M. Berry, Tulsa; J. W. Deam, Geary; A. H. Purdy, Bristow; E. I. Eckelkamp, Eufaula, and W. H. Vincent, Foss. F. E. Harkness of Oklahoma City was chosen state secretary.

N. A. A. M. Appoints Committees for Year

NEW YORK CITY, Aug. 24—Appointment of committees to handle various branches of the industry has been made by the National Automobile Chamber of Commerce.

The new appointments just announced by Charles Clifton, president, are as follows: Traffic committee, W. E. Metzger, Argo, chairman; E. R. Benson, Studebaker, and R. E. Olds, Reo.

The patents committee: C. C. Hanch, Marmon, chairman; W. H. Van Dervoort, Moline; William T. White, White, and W. C. Leland, Cadillac.

The commercial vehicle committee: Windsor T. White, White, chairman; Alvan Macauley, Packard, and H. Kerr Thomas, Pierce.

The electric vehicle committee: H. H. Rice, Waverley, chairman; F. R. White, Baker, and W. C. Anderson, Anderson.

The good roads committee: R. D. Chapin, Hudson, chairman, and S. D. Waldon, Packard.

The legislative committee: H. H. Rice, Waverley, chairman; G. H. Stilwell, Franklin, and J. I. Farley, Auburn.

The show committee: George Pope, chairman; H. O. Smith, Premier, and W. C. Leland, Cadillac.

May Have Two Truck Conventions

NEW YORK CITY, Aug. 25—Whether there will be two truck conventions or one this fall will doubtless be decided at the regular monthly meeting of the Board of Directors of the National Automobile Chamber of Commerce, September 2.

Two weeks ago the Motor Truck Club of America announced plans for a motor truck convention to be held October 7, 8, 9, and 10 in Detroit and President George H. Duck of the Motor Truck Club invited the National Automobile Chamber of Commerce to co-operate with it in conducting a convention which will bring together manufacturer, dealer and user.

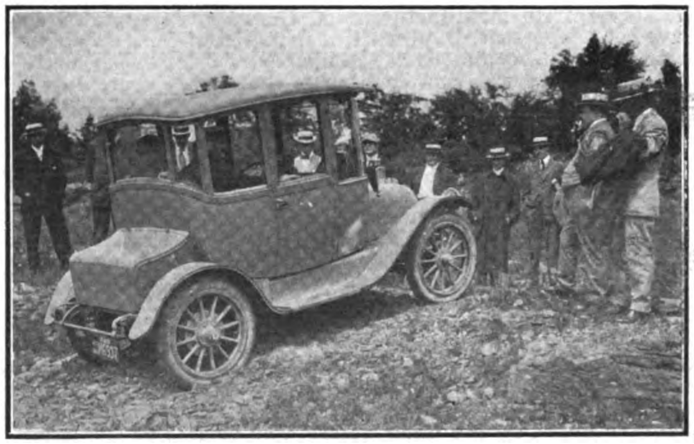
The Chamber of Commerce had been planning for some time on holding such a convention and at the summer meeting of the directors, held at Christmas Cove, Me., a plan was endorsed for a truck convention to be held sometime in the fall, the date and place to be selected at the September meeting.

The result may be a single convention combining all interests in the truck field or there may be two independent meetings. In the meantime the two organizations are conducting their plans independently, each having prepared a tentative program.

N. Y. Division of Electric Veh. Assn. Formed

NEW YORK CITY, Aug. 20—The New York City members of the Electric Vehicle Assn. of America met tonight at the auditorium of the Consolidated Gas Bldg., and formally inaugurated the New York division of that association with the following officers: chairman, Harvey Robinson; vice-chairman, D. C. Fenner, and secretary, D. F. Tobias. The executive committee consists of the above and the following: W. C. Andrews, T. C. Martin, S. W. Menefee, Nathaniel Platt, F. S. Sampson, F. W. Smith, S. G. Thomson, C. A. Ward and C. Y. Kenworthy.

The new branch will start off with a membership of nearly 200, which is the largest local in the country. Chicago has 120, Boston 110 and Philadelphia about eighty. In all, the national organization has a dozen local branches at present, and a membership of almost 1,000.



Demonstration of new Buffalo electric before automobile men and electrical engineers

Buffalo Electric Makes Debut

BUFFALO, N. Y., Aug. 23—For the purpose of formally announcing the new Buffalo Electric, the Buffalo Electric Vehicle Company on Aug. 21 entertained several of the more prominent citizens of Buffalo together with representatives of the automobile and electric industry in Buffalo.

Starting from the offices of the Buffalo Electric Vehicle Company, the caravan made a trip of about nineteen miles out to the club house of the Buffalo Automobile Club where luncheon was served. On the trip stop was made on what is known as the Transit Hill—a hill of some length with an average of about 23 per cent. grade and practical demonstrations were made of the ability of the new car to climb the hill as well as demonstration of the fact that in going down the hill it is unnecessary to use brakes of any kind other than the motor. As described before in this new electric, the motor is used for all brake purposes, excepting coming to a dead stop and when coasting down hill or even around curves the motor is transformed into a generator and charges back into the battery.

After the luncheon very brief addresses were made by: A. G. Batchelder, Laurens Enos, A. A. Grey, and Howard L. Spohn.

Baker Electric Makes 130 Miles on 1 Charge

PHILADELPHIA, PA., Aug. 21—A new record for an electrically propelled car was established here yesterday when R. S. Pullen, sales manager of the Carroll A. Haines Co., 2212 Spring Garden street, agents for Baker electrics, and S. S. Pancoast, electrical engineer, drove a Baker electric from this city to Atlantic City, N. J., and return on one charge of the battery.

The total distance covered on the one charge was 130 miles. The car was equipped with a Philadelphia storage battery and averaged 15 miles per hour.

Gasoline at 10.3 Cents a Gallon in Kansas City

KANSAS CITY, MO.—The Sugar Creek Refinery of the Standard Oil Co. of Indiana is operating at the same capacity as before the outbreak of war in Europe. About 1,000 men are employed at this refinery now.

Gasoline is selling here at 10.3 cents a gallon, the lowest price in 4 years. There is strong competition between the Standard Oil Co. of Indiana and minor producers in the local market, and as a result prices have been forced down from 15.5 cents last April to the present level.

About a month ago the Cudahy Oil Co. announced its intention of allowing the members of the Kansas City Automobile Club 1-2 cent on every gallon of gasoline sold at its stations here for their good roads fund. A little later, the Standard Oil Co. of Indiana, here, followed this up with an announcement that this company would give four of the leading Kansas City charities 1-2 cent for every gallon of gasoline sold by it here in August. It is expected that the charities will receive between $2,000 and $3,000 from this distribution.

New York City gasoline prices are quoted at 13 cents. New Jersey prices are quoted at 11 cents.

In a war between the Standard Oil Co. and the Indiana Oil Co. at Goshen, Ind., the retail price of gasoline has been reduced from 18 cents per gallon to 9 cents. Every garage in the city became involved.

County Prizes for Fair Motor Attendance

INDIANAPOLIS, IND., Aug. 24—A new feature at the Indiana State Fair, to be held at Indianapolis the week of September 7, will be an automobile contest, which is being arranged for the state board of agriculture, which controls the fair, by the Hoosier Motor Club. This contest will be for thirteen counties in central Indiana, excluding the county in which Indianapolis is situated. The county having the largest number of cars at the fair, Wednesday, September 9 will be given $100; the county having the next largest number of cars on the ground will receive $65 and the third largest $25. The counties are to decide for themselves how the prize money shall be spent.

Two-State Tour Over Pikes Peak Highway

DENVER, COL., Aug. 20—A 635-mile reliability and sociability run is being made this week from Colorado Springs to Salt Lake City over the Colorado-Utah link of the Pikes Peak Ocean to Ocean Highway. Twenty cars, representing eight states, made the start, and after those unable to take the time for the entire run turn back there will still be about a dozen cars to complete the week's trip through the Rockies.

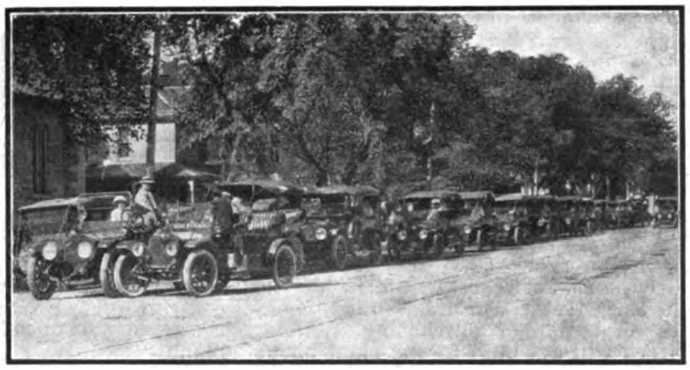
The run is expected to demonstrate the practical feasibility of this new picturesque route across the continent and through the heart of the mountains.

The road goes through Manitou, over Ute pass to Buena Vista and Leadville, then over Tennessee Pass at an altitude of 10,400 feet, where the new grade is only 4 per cent., and on through the splendid scenery of the Canyon of the Grand to Glenwood Springs, through the wild country across from Rifle to Meeker and on across the fertile Uintah Basin and the Utah plateaus to Vernal and Salt Lake City. Mountains, canyons, lakes, rivers and brooks are all along the way, and the road promises to attract a large per cent. of the transcontinental travel by motor.

Several Perfect Scores in Seattle Paper's Run

TACOMA, WASH., Aug. 18—Flying Canadian and American flags, sixteen out of the twenty-one cars entered in the Second Annual Post Intelligencer Tour completed, covering a distance of 593.9 miles in the State of Washington and the province of British Columbia, returning to the starting point, Seattle, on the evening of August 18.

The group at the demonstration of the Buffalo electric at Buffalo, N. Y.: Standing, left to right—1—J. P. Mallett, Engineer, Society for Electrical Development. 2—Henry D. Knox, F. W. Woolworth Co. 3—A. A. Grey, Managing Editor Electrical Review. 4—Richard O'Keefe, Secretary Automobile Club. 5—F. G. Peck, Engineer, Buffalo Electric & Vehicle Co. 6—John W. Van Allen, Wilson & Van Allen, Attorneys, Buffalo, N. Y. 7—Laurens Enos, Ex-President A. A. A. 8—John T. Steele, Organizer, Buffalo Electric & Vehicle Co. 9—H. B. Niblette, Goodrich Tire & Rubber Co. 10—W. A. Zimmerman, Sales Mgr., Buffalo Electric & Vehicle Co. 12—Dai H. Lewis, Secretary Automobile Club. 15—F. T. Turner, Editorial Department Buffalo Times. 17—Howard L. Spohn, Class Journal Co. 18—A. G. Batchelder, Chairman Executive Board A. A. A. 19—W. F. Fuqua, W. F. Fuqua & Co., Bankers, Philadelphia, Pa. Kneeling, left to right—1—E. J. Fouts, City Editor Buffalo Courier. 2—M. M. Wall, president Buffalo Automobile Club. 3—G. K. Rudolph, Managing Editor Buffalo Enquirer. 4—Dan Ferry, Editor Buffalo Motorist. 5—E. E. Denniston, General Manager Buffalo Electric & Vehicle Co. 6—Edward Deitzer, Advertising Manager Buffalo Courier. 7—Frank Bloomer, Assistant Editor Buffalo News



Start of the Colorado White sociability tour. This tour, which was detailed in The Automobile for August 20, started in Manhattan, Kan., and had for its objective the city of Pueblo, Col.

The first competing automobile to arrive was No. 16, a Chalmers, driven by Joe Thomas, and which duplicated its performance of last year. The Chalmers was closely followed by the Franklin with W. A. Wicks at the wheel. Other perfect scores were made by Harry D. Austin in a Metz; George Purdy, Buick; T. F. Barsby, Studebaker, and F. C. Sheraton in a Ford.

Hughie Hughes in a Maxwell "25" drove nearly the entire distance without an adjustment, but on the final day was unlucky in burning up a bearing in the connecting rod. The motor of the car had to be taken down, and for this the racing driver received a penalty of 408 points.

Novelty Racing in Denver Labor Day

DENVER, COL., Aug. 20—A revival of motor car racing in Denver will be witnessed on Labor Day, September 7, when one of the liveliest race meets ever staged in Colorado will be pulled off on the Overland Park course by the Denver Motor Club. The program will start with a race for Fords in a 10-mile dash all their own and finish with a 25-mile landscape-streaking event open to stock cars of all kinds. There will also be some novelty features of exceptional interest to motor car owners, and plans are also under way to put on an exhibition event of powerful racing machines.

The other amateur events, all of which carry prizes, will be as follows: 5-mile race exclusively for the old-timer cars built prior to 1909. Obstacle race requiring cars to dodge dummies, boxes and other obstacles scattered across the track, with a point against the driving score for every obstacle struck. 2-mile trouble race, requiring cars to stop in front of grandstand and change one tire at the end of the first mile. 15-mile open race for cars of not more than 35 horsepower.

The entries so far include several drivers noted for their daring and the meet promises to furnish plenty of thrills. The following will be among those in the final event of 25 miles: E. W. Swanbrough in a Lozier, Eddie Bull in a Franklin, Harry Ball in an Overland, Benny Knott in a Pathfinder, William Thorney in an Apperson, and Jimmie McDonald.

Two-Day Meet for Brighton Beach Sept. 5-7

NEW YORK CITY, Aug. 24—Two days of automobile racing instead of only 1 is scheduled for the Labor Day holidays at the Brighton Beach track. The matinee meet will open Saturday, September 5, and will be resumed on Monday, September 7.

The program for the opening day is to be made up of a number of small sprints, while on Labor Day will be the feature event, the Labor Day Sweepstakes, for a distance of 100 miles and for a purse of $1,000. This event is to be a class D free for all.

The majority of the star drivers who raced at Elgin have arranged to express their cars East in time to tune them up for the opening meet.

Cyclecar Race for Columbus

COLUMBUS, O., Aug. 24—Arrangements have been completed for a cyclecar race meeting to be held at the Columbus Driving Park, Sunday, August 30. The race meet will consist of about eight events ranging in distances from one mile to an hour race. Ralph S. Breckbill of the Buckeye Cycle Car Company of Columbus is receiving the entries which are coming in well. A. A. A. sanction has been applied for.

TWOMBLY Leases N. Y. Motor Factory—The Twombly Car Corp., New York City, has leased the plant formerly occupied by the New York Motor Works in Nutley, N. J., with an option of purchasing it. The concern will get busy at the plant about the middle of next month. It will manufacture light delivery wagons, taxicabs and town cars.

Will Build Taxicabs—Taxicabs built in its own factory will shortly be put in service by the Spokane Taxicab Co., according to announcement made by Manager G. E. Riegel, of Spokane, Wash.

1,000 Engers for 1915—President F. C. Enger, of the Enger Carriage Co., Cincinnati, O., announces that the company will build 1,000 cars during the coming year.

Acquires Imperial Wheel Plant—The Monroe Motor Co., Flint, Mich., recently incorporated for $250,000, to manufacture automobiles, has acquired the plant of the Imperial Wheel Co.

2,000 Sommers Motors for Allen—The Allen Motor Co., Fostoria, O., has contracted with the Sommers Motor Co., of Bucyrus, O., for 2,000 four-cylinder motors for its 1915 cars.

New Process Gear Adds—The New Process Gear Corp., Syracuse, N. Y., is taking bids for a case hardening building, 36 by 95 feet, three stories high with a basement, to be erected on Plum street.

Aluminum Co. Enlarges—The Aluminum Specialty Co., of Manitowoc, Wis., which recently added new capital, will erect a new plant, 60 by 200 feet, of brick and steel. It is to be ready for occupancy about September 15.

Besser Purchases Alpena Plant—The Besser Mfg. Co., Alpena, Mich., has purchased the plant of the defunct Alpena Motor Co., at a receiver's sale. The Besser company, which manufactures concrete mixing machinery, will operate the factory as an addition to the present plant.

Auto Products Co. Will Move—The Board of Trade of Canal Dover, O., announces that the Auto Products Co., Canton, O., will remove its plant to Canal Dover. An effort is now being made to sell $20,000 of the preferred stock of the company. It is expected the plant will be removed in about 60 days. The company manufactures automobile parts and accessories.

Largest American Diesel Engine Built—The Lyons Atlas Co., Indianapolis, Ind., has recently completed and shipped the largest Diesel engine constructed to date in this country. This engine is composed of four cylinders, 21 inches bore by 30 inches stroke, and is of the vertical, four-cycle type, rated at 600 brake horsepower with an overload capacity of 15 per cent., or 690 brake horsepower maximum.

Detroit Gear Co. Adds—A two-story brick building will be started within a few days as an addition to the plant of the Detroit Gear & Machine Co., 129 Franklin street, Detroit, Mich. The new structure will cost $22,000. The local concern started in business only 4 years ago with a capital stock of $100,000, which has since been increased to $150,000. The business has been steadily increasing and even a very satisfactory foreign trade has been worked up.

Hupp Makes New Additions—Work has been started on a large addition to the general office building of the Hupp Motor Car Co, Detroit, Mich. When completed, the offices will have about double the floor space which they now occupy and will be one of the finest and most modern office buildings in the city. One of the features will be a new and much larger dining room where the noon luncheons will be served, which have been found by the officials of the company, to be of the greatest aid in effecting close co-operation among the men.

Broc Organization Moved to Saginaw—The entire organization and equipment of the Broc Electric Vehicle Co., Cleveland, O., has been removed to Saginaw, Mich., owing to the recent consolidation of the company with the Argo Electric Co., Saginaw, and the Borland-Grannis Co., Chicago, Ill., into one concern known as the American Electric Car Co., with general headquarters in Saginaw. This company has established a service station at 1976 East 66th street in Cleveland, O., in charge of H. C. Young, formerly with the Broc company.

Blodgett Plant in St. Joseph—The Blodgett Rubber Co., Warren, O., will locate its plant in St. Joseph, Mich. The new concern was secured by the St. Joseph Development Co., which is to furnish a factory site and building which, under certain conditions, will become the property of the rubber company after 5 years. The Blodgett company manufactures a tire of non-puncture variety, under a patented process. W. E. Bryan, a Chicago attorney, is president of the company, and M. D. Wilber, secretary. It is expected to have the factory in operation in 60 days.

The Automobile Calendar

Sept. 4	Des Moines, Ia., Track Race, Iowa State Board of Agric.
Sept. 5-7	Brighton Beach Race Track Meet; Motor Contest Dealers' Assn.
Sept. 6-7	Detroit, Mich., Track Meet, J. A. Sloan.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7	Brighton Beach, N. Y., Track Meet, New York Motor Dealers' Contest Assn.
Sept. 7	Denver, Col., Track Race, Overland Park Track, Denver Motor Club.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 9-11	Convention Paving Brick Mfrs. Assn., Cleveland, O.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 12	Hamline, Minn., Track Meet, Minn. State Fair.
Sept. 15-16	Norfolk, Neb., Track Race, Norfolk Commercial Club.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Kalamazoo, Mich., 100-Mile Track, Inter-State Fair.
Sept. 27	Pleasanton, Cal., Track Meet, Alameda County Fair Assn.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 3	Fresno, Cal., Track Meet, Fresno Co. Agricultural Assn.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 5-12	St. Louis, Mo., Show, Forest Park Highlands.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1	Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Dec. 1-4	New York City, Annual Meeting of the American Society of Mechanical Engineers.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Automobile Show.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Mar. 7	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 14	San Francisco, Cal., Panama-Pacifice Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

The Week in  the Industry

Motor Men in New Roles

ECCLESTON Apperson Sales Manager—Apperson Bros. Automobile Co., Kokomo, Ind., announces the appointment of J. B. Eccleston as general sales manager; Howard A. Bauer, assistant sales manager; J. H. Newmark, advertising manager, and Joe G. Roberts, general traveling representative.

Curtis Splitdorf's Boston Manager—The Splitdorf Electrical Co., Newark, N J., has appointed H. R. Curtis manager of its Boston, Mass., office.

Lebon Jeffery District Representative—M. F. Lebon has been appointed district representative for New York by the Thomas B. Jeffery Co., Kenosha, Wis.

Pickering Manager—L. C. Pickering has been appointed manager of the recently organized Grant Distributing Co., which has opened for business at 514 Grant avenue, Des Moines, Ia.

Canary Houk Chicago Manager—Dan J. Canary has become the manager of the branch of the George W. Houk Co. in Chicago, Ill. The branch is located at 2339 Michigan avenue.

Camp Chalmers N. Y. Sales Manager—A. Roy Camp has been appointed sales manager of the Chalmers Motor Co., of New York. He has been with the New York agency since its beginning in 1908.

Elkin Manager G. M.'s Chicago Branch—The General Motors Truck Co. has appointed Z. C. Elkin manager of the Chicago branch. He was formerly manager of the Thos. B. Jeffery Co.'s Chicago branch.

Paine Made Manager—Charles A. Paine has been made manager of Belcher & Loomis Co., Providence, R. I., succeeding Henry Paquin. He has been 3 years with the company and the change comes as a promotion.

Henderson KisselKar Executive—O. B. Henderson has been appointed vice-president of the Pacific Kissel Kar branch, Los Angeles, Cal. Previously he was general manager for the Baker Motor Vehicle Co., Cleveland, O.

Rutter Detroit Monarch Manager—L. Rutter has taken over the management of the Rutter. Raths & Theisen Auto Sales Co., 761 Dix avenue, Detroit, Mich., which handles the Monarch cars and conducts a service station.

Zimmerman Sales Manager—W. A. Zimmerman has been appointed general sales manager of the Buffalo Electric Vehicle Co., Buffalo, N. Y. Previously he was sales manager of the Mercury Motor Truck Co., Chicago, Ill.

Mollohan Switches to Buick—Charles Mollohan, 5 years credit manager of the *Daily Oklahoman* newspaper of Oklahoma City, has resigned his position to become identified with the city sales department of the Buick Motor Co.

Brown J. M. Special Representative—F. E. Brown has joined the staff of the H. W. Johns-Manville Co., New York City, as special representative to devote his attention to the sales development of the Noark service-meter protective devices.

Marshall Makes Change—William J. Marshall, formerly president of the Mercury Cyclecar Co., Detroit, has become general manager of H. Collier Smith, 815 Scotten avenue, Detroit, Mich., manufacturer of special sheet metal machinery.

Mauthe Batavia Rubber Representative—F. G. Mauthe, formerly manager of the Goodyear Tire & Rubber Co., in Newark, has become associated with the Batavia Rubber Co., of New York, as special representative in the State of New Jersey.

Henderson Canadian Regal Sales Manager—It is announced by the Regal Motor Car Co., Detroit, Mich., that R. P. Henderson has been appointed sales and advertising manager and Henry Nyberg production manager of the plant in Berlin, Ont., Canada.

Woodin Detroit Abbott Manager—T. C. Woodin, former eastern sales manager of the Abbott Motor Co., Detroit, Mich., has been appointed manager of the Detroit branch of the Abbott Motor Co., the salesrooms being at 467 Woodward avenue.

Birnie Joins Simplex—H. T. Birnie has joined the sales organization of the Simplex Automobile Co., New York City. He was formerly with the Packard Motor Car Co., that city. He succeeds F. H. Bowen, who has become manager of the S. G. V. agency in New York City.

Moore to Handle Rad-Fix—The Radiator Fix Co., Boston, Mass., has arranged with the William M. Moore Co., 1305 Sutter street, San Francisco, Cal., to handle the distribution of its product, Rad-Fix, in that territory. This product is a solution for repairing radiators.

Godbey Assistant Sales Manager—W. H. Godbey, Jr., formerly with the Memphis Motor Car Co., and also with the Ford Motor Co., Memphis, Tenn., has been appointed assistant sales manager of the Premier Sales Co., Memphis, Tenn., which handles the Premier, Oakland and Chevrolet cars.

Hughes Victor Parts Sales Manager—The announcement is made by sales manager W. R. Hughes of the Victor Auto Parts Co., Cincinnati, O., to the effect that in the future the products of the company will be sold direct by the factory instead of through Fulton McCutchan, formerly sales agent.

Dodge Bros. Make Appointments—Harvey Mack, with the Joy Bros. Motor Car Co., Minneapolis, Minn., has signed up for the Dodge car which is to be put in there in the near future. A. C. Templeton has been appointed district representative for Dodge Bros., Detroit, Mich. His district is Minnesota and North Dakota, and parts of South Dakota, Montana and Wisconsin.

Bush Studebaker Sales Manager—Vice-President Benson of the Studebaker Corp., Detroit, Mich., announces the appointment of W. T. Bush, formerly sales manager of a Detroit automobile agency, to be sales manager of the Studebaker Corp., of Canada, Ltd., Walkerville.

Garage and Dealers' Field

Purchase Hupmobile Agency—The Central Iowa Motors Co., Des Moines, Ia., distributor of the Hupmobile, has been purchased by Messrs. W. S. Adams, F. E. Card and H. R. Brown. The business will be continued under the same name.

Flint Sheet Metal Co. Organized—The Flint Metal Specialty Co. has been organized in Flint, Mich., to make sheet metal specialties for the automobile trade and also do a general repair work. The organizers are R. S. Gott, A. S. Allen and E. J. Vining.

Dodge Dealers' Requests Number 5,511—Voluntary requests for dealerships numbered 5,511 when a count was made recently by sales manager Arthur I. Philp and his sales force at Dodge Bros., Detroit, Mich., and it was found that from 60 to 90 per cent. of the first year's allotment of cars had been contracted for in most of the sixteen districts.

Ford Employees' Monthly Banquets—Employees of the Ford Motor Co., Oklahoma City, Okla., hold regular monthly banquets at some leading hotel of the city to discuss efficiency matters. The object of these meetings is not only to obtain the greatest efficiency among the employees but it is also for the purpose of working out various plans for the benefit of the Ford owners, especially for those within reach of the local office.

300 Chauffeurs Offer Military Service—At a meeting of the Toronto Chauffeurs' Protection Assn., Toronto, Ont., 300 men offered their services to the military authorities. A letter sent to Major General Lessard from the meeting, stated that of the number thirty were ready to leave at once, men of experience who could handle and do mechanical repairs on every kind of motor vehicle. Several of them had had military training.

Oklahoma City's Safety Plan—The automobile dealers of Oklahoma City, Okla., are discussing plans and co-operating with police authorities in preventing accidents there in preparation for the state fair by conducting a Safety First campaign. The members of the association propose not only to obey the law but to assist the authorities in breaking up speeding and hilarious joy riding. The state plan proposes that pamphlets be printed containing local laws in various parts of the state and be handed out by the gasoline dealers to drivers and tourists.

N. Y. Hupmobile Owners Reunion—A grand reunion of all Hupmobile owners is being planned by Chas. E. Riess & Co., of 1690 Broadway, New York City, on September 9. Invitations have been sent out to all Hupmobile owners in this section to be the guests of Chas. E. Riess & Co. at this reunion, and, so far, over 150 acceptances have been received. All will meet at 2.30 p. m. at 135th street and Riverside Drive, and will then proceed to Coney Island, and dinner will be served on the Upper Deck Banquet Hall, Brighton Beach Casino, Brighton Beach.

Accessories for the Automobilist

Fig. 1—Firestone demountable rims for Fords

FIRESTONE Ford Demountable—A demountable rim, Fig. 1, made specially for Ford cars is now made by the Firestone Tire & Rubber Co., Akron, O. To remove the rim it is only necessary to take off five nuts and therefore it is stated that a tire change can be made in 5 minutes. The rims are furnished complete with wooden wheels so that to install a set it is merely necessary to unbolt the hub flanges, take off the old wheels, put on the new ones with the demountable rims. The price complete is $25.

H-M Light Controller—The glare of the headlights is avoided in the device shown in Fig. 2, by means of frosting the upper part of the headlight glass to a point slightly below the center. Thus no strong, dazzling beams of light pass above the horizontal. The light diffused is not wasted but illuminates the roadway near the car, throwing the rays to both sides and thus aiding the driver when turning corners. It is made by Howard F. Mulcahey, 8 Mt. Vernon street, Providence, R. I.

Automatic Lamps—Increased safety when driving at night is obtained by the use of lamps that are designed to turn with the wheels and thus illuminate the roadway when making turns. The device shown in Fig. 3, consists of a special set of brackets that are clamped to the front of the car, a lever running to the tie rod. The device is made by the Automatic Lamp Control Co., 423 East First street, Dayton, O.

Noll Pneumatic Starter—A pneumatic cranking system, Fig. 4, in which the motor is started by means of the outward movement of a piston, which pulls on a cable and thus turns the motor over several times has just been announced.

A dust and waterproof case, 7 by 7 inches, containing the starter gearing and air compressor, is attached to the engine shaft in front of the radiator, and held in position by means of a bracket which is fastened to the frame.

The air compressor consists of a two-cylinder unit cast in a block and air-cooled, with pistons of cast iron having three snap rings, which are made from a hard alloy. The pistons and yoke form a complete unit and are operated by a specially designed movement which does away with connecting-rods.

All bearing surfaces consist of steel and bronze, one of the best combinations known to mechanics. There are no chains, gears, or sprockets, nothing to break.

The whole is lubricated by the well-known splash system which has proven so efficient in automobile construction.

The starting mechanism is controlled by a specially designed valve which is conveniently attached to the dash. The valve is fitted with patent seats which make leakage impossible. To start the engine, simply push the plunger with the foot and sufficient air is instantly carried to the starter to spin the motor at 600 revolutions per minute, much faster than any starter yet designed. The compressor is started and stopped from the seat, by means of a pedal similar to the ordinary muffler cut-out pedal.

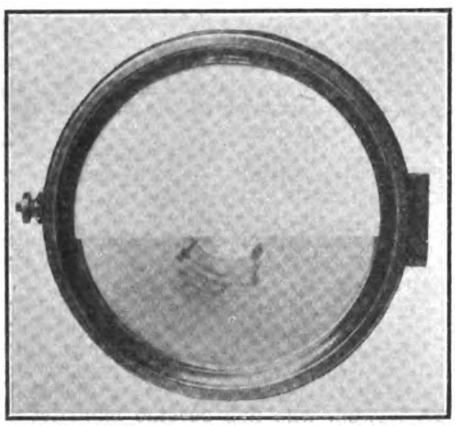


Fig. 2—H-M light controller, a dimming device

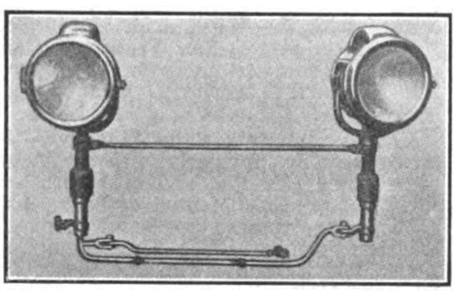


Fig. 3—Automatic lamps to illuminate turns

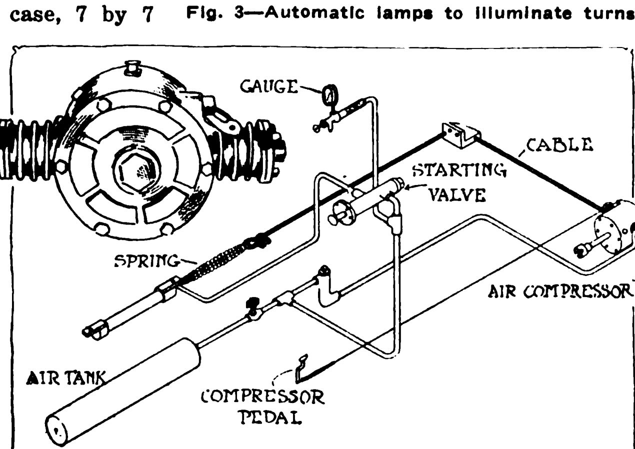


Fig. 4—Noll pneumatic starter. The air compressor that is attached to the front of the car is shown in the upper left and the piping diagram is shown below

The storage tank for compressed air, as well as the starting cylinder, is placed out of the way under the body of the car. Under the pressure gauge on the dash is fastened a specially constructed valve, with hose attachment, by the use of which any tire can be quickly and conveniently inflated, without the back-breaking work demanded by the old-fashioned foot pump. The compressor will inflate a 4 inch by 35 inch tire from complete deflation to 80 pounds in one and a half minutes. For ordinary pumping up of tires, sufficient air can be drawn from the storage tank without starting the compressor at all. It is made by the Currier-Koeth Mfg. Co., Coudersport, Pa.

Burke Tire Valve—Ease of inflation is claimed for the tire valve shown in Fig. 5. At the left it is shown with the valve open and at the right it is closed, being held merely by the pressure in the tire. The valve is provided with a re-

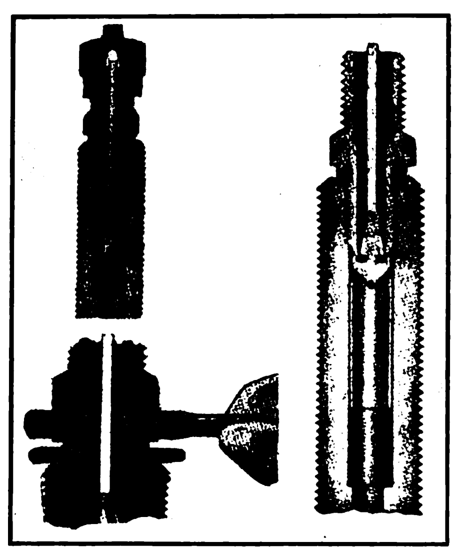


Fig. 5—Burke tire valve. The top left view shows the tire valve open. S is the removable stud, V is the valve proper, and P is a tube that limits the downward movement of the valve. The right view shows the valve closed. At the left, at the bottom is illustrated the method of cutting the gasket G

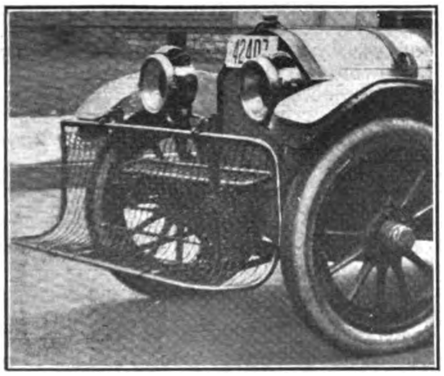


Fig. 6—Linquist automatic fender and brake

versible seat to give increased wear and the tire is deflated by depressing the plunger provided for the purpose. A feature of the device is that the stud is removable so that in case of injury it can easily be replaced.

The gasket between the two parts of the valve is automatically cut and may be made from leather, lead or any other packing material. This is shown at the left, the cutting being accomplished by screwing the two parts together with the gasket material between. The device is made by the Burke Tire Valve Co., 5213 Windsor avenue, Cleveland, O.

Stewart Radiator Meter—The Stewart Radiator Meter, described in THE AUTOMOBILE for August 20, differs from the model previously made in that the water in the radiator is at all times in contact with the thermostatic bar.

Linquist Automatic Fender—To insure the safety of those in the streets against being run over by automobiles and motor trucks, a fender, Fig. 6, has been brought out that automatically lowers itself when an object is struck and at the same time sets the brakes and shuts off the motor. It is made by Wm. A. Linquist, Minneapolis, Minn., and is attachable to any automobile. It takes up little room, extending only 15 inches in front of the car.

Airplex Inner Tires—Immunity against punctures and blowouts is guaranteed by the use of the Airplex inner tube, manufactured by the Airplex Inner Tire Co., St. Louis, Mo. It also protects the inner part of the tube. It consists of an outer cushion which takes the shocks, several layers of fabric to guard against blowouts and an inner tube that withstands the air pressure. The cushion is made of a vulcanized compound and contains no rubber, glue, gycerine, or similar materials. The inner tube is merely to hold the air.

Buob & Scheu Automobile Tops—Seat covers, dust covers and automobile tops for all the standard makes of automobiles are manufactured by Buob & Scheu, Court street and Broadway, Cincinnati, O. The seat and dust covers are waterproof and are made of the best material, it is stated. The arm rests are reinforced with leather. All the necessary hardware is furnished, together with instructions for applying.

Oakbrook Cyclecar Motor—A cyclecar motor, Fig. 7, with bore of 4 inches and stroke of 2.75 inches, and which develops 18 horsepower, it is stated, has been brought out by the Oakbrook Motor Mfg. Co., Reading, Pa. It is an L-head block construction with the valves on the left side and fully inclosed by two cover plates.

Exhaust and intake manifolds are cast separately and the cylinder is a separate casting so that by removing it all the valves and the piston heads are rendered accessible.

This motor car can be furnished either as a separate unit or combined with clutch and gearset.

Ford Valve Grinder—A tool for refacing Ford valves, Fig. 8, is manufactured by the Liberty Tire & Supply Co., 102 Chambers street, New York City. It consists of a suitable guide and cutting tools. The cutting edge can easily be resharpened. The price is $2.

Wireless Dash Light for Fords—H. J. Murphy & Co., Reading, Mass., is making a lamp, supplied with current by a self-contained battery, for attachment to the Ford steering post. In this position, it is stated that the dash is completely illuminated. When a trouble light is needed, it can be instantly detached and used wherever needed. The price is $1.25 complete, and it is finished in black enamel, polished brass and nickel, as desired.

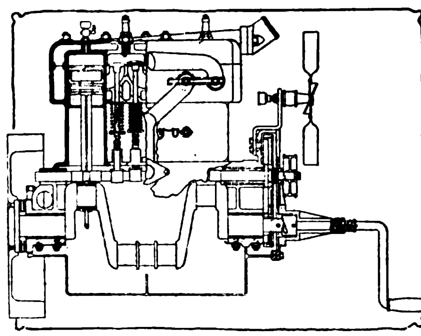


Fig. 7—Oakbrook cyclecar motor

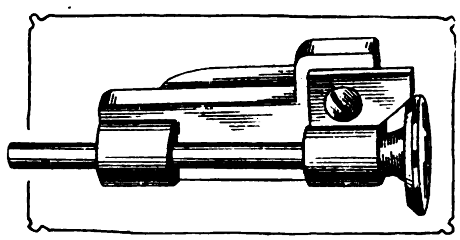


Fig. 8—Ford valve resurfacer or grinder

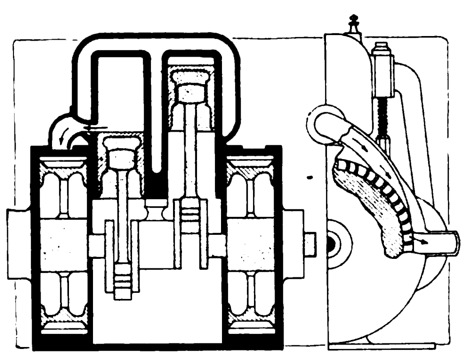


Fig. 9—Standard five-cycle motor

Standard Five-Cycle Engine—A special form of two-cylinder, two-cycle motor, Fig. 9, in which the exhaust gas from the cylinders is made to do work on a turbine type of flywheel, has recently been announced by the American Semi-Turbine Motor Co., 1414 Chouteau avenue, St. Louis, Mo.

It is stated that 30 horsepower at 1,200 revolutions per minute is developed, the bore and stroke being 4 and 5 inches respectively. The two cylinders are cast in a block. At either side of these cylinders there are flywheels, the peripheries of which are provided with vanes against which the exhaust gas is directed.

R. & H. Body—Fig. 10 shows a light car body brought out by the R. & H. Sheet Metal Co., Abington, Mass. The design of this body permits the comfortable and roomy seating of two passengers side by side. Allowance has also been made for the addition of an auxiliary seat in the main body, for a child or other small person. There is ample leg room, even with this extra seat. If wanted, the gasoline tank in the rear can be eliminated, and this space used for a rumble seat, in which case a special tank fitted underneath the cowl is used.

The large 6-inch springs in the seat cushion, and the 5-inch springs in the back cushion afford a measure of comfort seldom obtained in a low priced car. The upholstering material is good quality, black imitation leather.

The door, on the right side, allows for the installation of the popular left side drive. This allows easy access to the sidewalk on the right side of the street, against which most drivers prefer, and in many cases are compelled to stop.

The body is provided with two top irons placed on each side 22 inches apart allowing for easy attachment of the top. The hood is fitted with hinges at the top and finger hooks for lifting, permitting easy inspection of the motor.

Wolfe One-Man Top—Ordinary tops can be remodeled into one-man tops by means of a simple change in the front bows invented by J. Thurston Wolfe, 1843 Calvert street, Washington, D. C. The remodeling is effected by simply attaching the new side arms to the rear bow as shown in Fig. 11. The operation of the top is clearly indicated and therefore it will not be necessary to describe it. The retail price of a set of these bows is $5, and it is stated that any one with a little mechanical skill can put them on. In addition to remodeling, it is intended to sell the sockets to manufacturers for

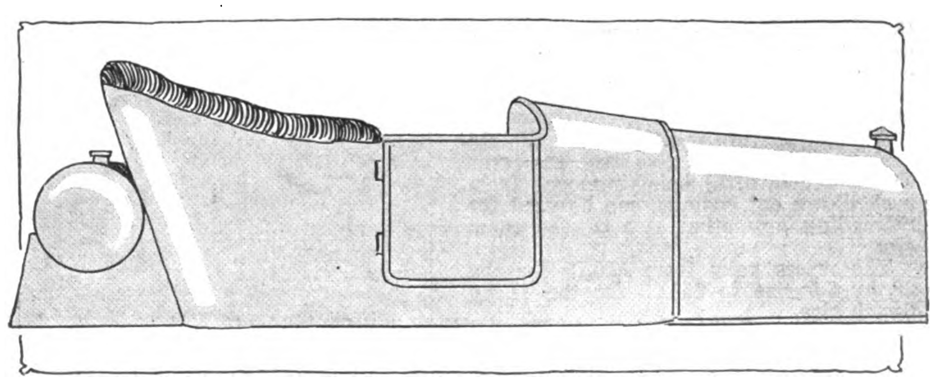


Fig. 10—R. & H. small car body. Also made with rumble seat and cowl tank

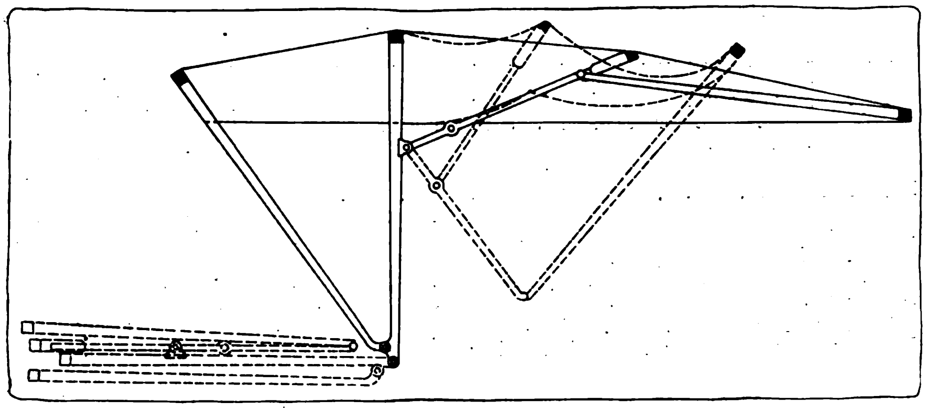


Fig. 11—Wolfe one-man top in three positions, up, half up, and down

new tops. This end of the work is taken care of by the American Distributing Co., Detroit, Mich.

Eight-Day Clock Free—An 8-day standard jewelers' regulator clock is offered to any dealer that will order one case of Non-Fluid oil, providing that he never handled this product before. A case consists of 12, 5-pound cans of K No. 000 Grade Non-Fluid oil at 14 cents per pound and the same amount of K No. 00 Special Grade, also at 14 cents. The former is for greasecups and the latter for gearsets. The clock is 38.5 inches high with a 12-inch dial and runs 8 days with one winding. It is incased in solid oak and will give good service for years, it is stated. The offer is made by the New York & New Jersey Lubricant Co., 165 Broadway, New York City.

Triple Tread Tires—At three-quarters the cost of a new plain tread tire, the Triple Tread Mfg. Co., 1545 Michigan avenue, Chicago, Ill., is offering to retread old casings with its steel studded leather tread, Fig. 12. Three plies of leather are used, the inner one inclosing the outside of the tire completely. A guarantee of at least 3,500 miles is given. Should the casing wear out before the tread, the latter can be transferred at a cost of from $3 to $6, depending on the size of the tire. This charge is to cover the cost of the labor.

The old casing is prepared to receive the tread by the removal of all the old and loose rubber, so that a firm foundation to which to fasten the tread is secured.

The three plies of chrome leather, one of which is brought down the sides of the tire and over the bead, form a tougher and more durable wearing surface than rubber giving better protecttion to the fabric against cuts, punctures, bruises, etc., it is stated.

The steel studs on the tread portion of the tire not only furnish absolutely the best protection against skidding making the use of chains unnecessary, but also protect the leather against being cut by glass, sharp rocks, etc., giving you the the advantage of the highest priced imported steel studded tires.

Another feature is that should the old casing or foundation give way, the same Triple Tread, after being removed from such blown out casings, can be used for retreading any other tire of the same size.

The prices vary from $10.75 for the 28 by 2.5 size to $51.90 for the 41 by 6-inch size.

Perfect Process Vulcanizer—To meet the demand for a medium-priced vulcanizer, simple and safe in operation, the National Cement & Rubber Co., 300

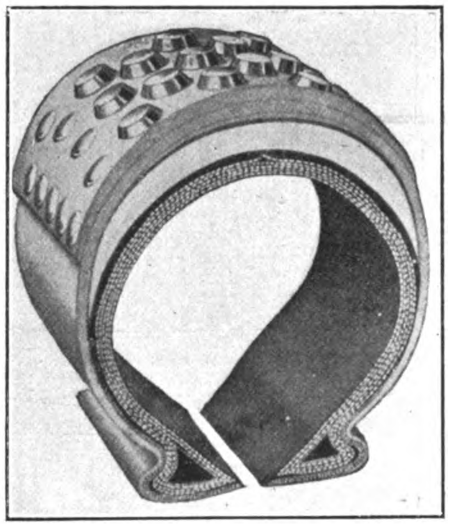


Fig. 12—Triple tread leather tire

South St. Clair street, Toledo, O., has brought out a device, Fig. 13, in which heat is generated by the combustion of gasoline or alcohol. The vulcanizer is placed in an upright position and the fuel poured into the holes in the top. A piece of thin cloth dusted with soapstone is placed over the repair and the vulcanizer is clamped on, as shown. The fuel is then lighted, allowed to burn out and then left to stand for 5 minutes.

Lewis Ideal Tape Reel—Kolesch & Co., New York City, is making a tape reel that is featured by the geared handle which allows greater speed in winding.

It is made of hard aluminum alloy.

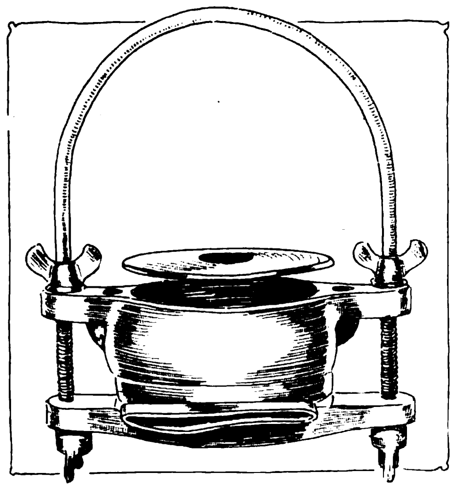


Fig. 13—Perfect Process vulcanizer

Wearing parts of hard steel, handle of bronze, 5 1-2 inches diameter, weight 10 ounces, with high-speed gearing, which will wind up 100 feet of steel tape in about 12 seconds.

Brake for stopping motion of tape at any point and holding it rigid without perceptible effort on the part of the operator. Valuable in winter, as it obviates the necessity of removing gloves.

Complete with 1-4-inch steel tape, 100 feet Eddy steel tape, $17.50 and 100 feet Lufkin steel tape, $15.

West Steel Wheels—Cast steel wheels for motor truck service are manufactured by the West Steel Casting Co., Cleveland, O. These wheels are made according to S. A. E. standards, and are produced in all sizes and styles. The advantages of these wheels are that they will not warp, twist, shrink or loosen—they are cast in one piece, and there are, consequently, no joints to open up, or bolts or rivets to break. Regardless of climate or weather, heat or cold, the shape and form remain the same.

Lefever Small Car Gearsets—Two types of gearsets, Fig. 14, are manufactured for light cars by the Lefever Arms Co., 600 Maltbie street, Syracuse, N. Y. One is a two-speed forward and reverse for cars of 10 to 15 horsepower, the weight of the car not exceeding 1,200 pounds, and the other is a three-speed selective type for cars of 15 to 20 horsepower, the weight of the car not exceeding 1,800 pounds. In both cases ball and roller bearings are used for the mainshafts while the lay shafts are pinned to the casing and the gears are bushed.

Inner Tube Armor—A protection against punctures and blowouts in the form of an inner tube protector is made by the Inner Tube Armor Co., Detroit, Mich. This armor is a liner of cotton fabric and rubber into which metal disks are secured. The armor fits between the casing and the tube and it is claimed no internal cutting is possible.

Apco Starting Crank Holder—A simple starting crank holder for Ford cars is marketed by the Auto Parts Co., Providence, R. I. This holder consists of a piece of spring steel and is applied by removing the spring clip nuts. The slight bend in the spring keeps the crank handle in an upright position thus preventing rattling. It sells for 25 cents.

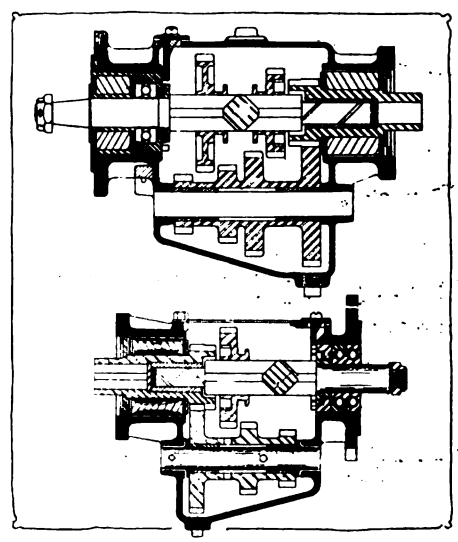


Fig. 14—Lefever small car gearsets. The upper one has three speeds and is for machines up to 20 horsepower, while the lower is a two-speed design for cars of 15 horsepower or under

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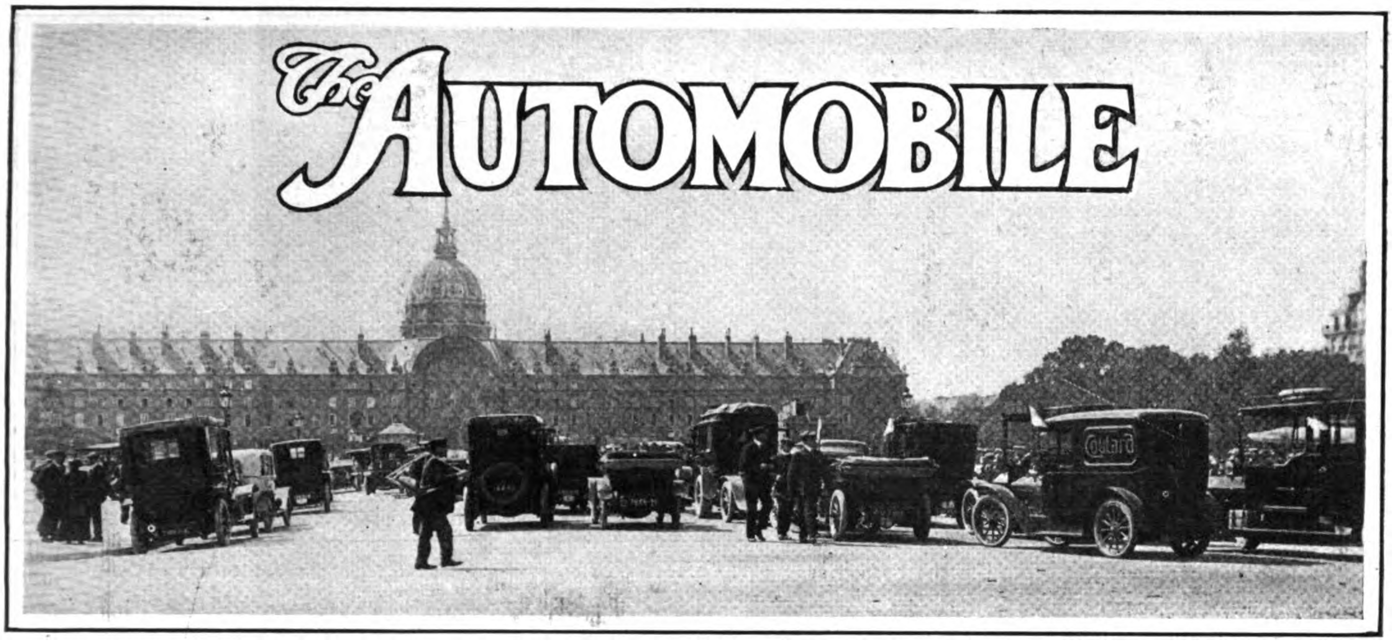


Automobiles gathered on the Esplanade des Invalides in Paris to be requisitioned for service with the troops

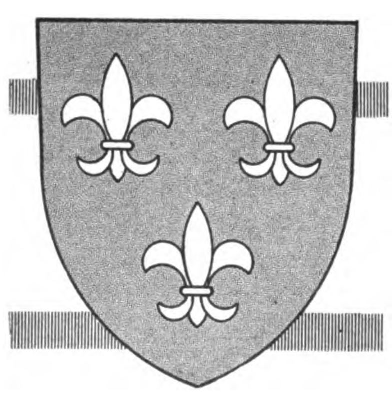
The Call of Mars

100,000 Cars and Trucks Precipitated into Military Service by European Mobilization Orders

By W. F. Bradley

(Special to THE AUTOMOBILE from Paris)

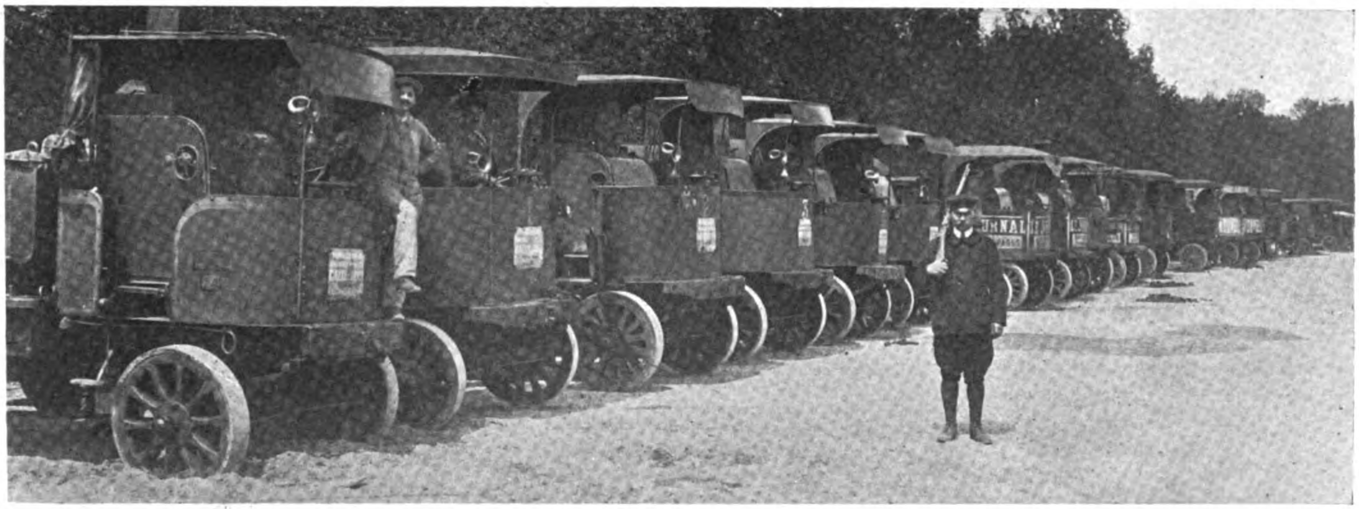
PARIS, Aug. 11—At 4.30 o'clock on the afternoon of August 2 a small, unimportant-looking poster was pasted on the walls of every public building in France announcing a general mobilization. Instantly the life of the nation was transformed. In the great automobile district around Paris machinery was stopped, workmen laid down the tools they were using and within 5 minutes were on their way to the railroad depot. This call to arms automatically shut down the automobile factories. The Delage factory, which normally employs 1,000 men, had but forty left when the army had been satisfied; these forty comprised the least useful units. All the heads of departments, being young men, had gone on the first day. The Darracq factory, which is run under English management, was left with its managers but with no workmen; every able-bodied man under 48 years of age joined the troops.



Exportation of Cars Forbidden

Within an hour of the issuing of the mobilization order another decree went forth forbidding the export of automobiles and parts. Thus, if the factories had been able to work they would not have been able to get rid of their produce. All automobiles on the railroad in course of shipment abroad were put onto sidings and will remain there until the war is over. Most of the cars for England are sent unpacked, while chassis are always exported with no other protection than a layer of grease. These machines are all laid up in railroad depots or on the docks, without any protection whatever and will suffer considerable damage.

There were few exceptions to the closing of the factories. When work could be done for the army the military authorities took over the establishment, or such portion of it as they required, placed the staff under military law and required them to work for the government. All factories producing aeroplane motors came under this heading. The Gnome aeroplane motor works was the first to be militarized; the aeroplane motor section of the Renault works were treated in the same way; Le Rhone, Anzani, Canton-Unne and Clement-Bayard works were militarized. The portion of the De Dion-Bouton factory building trucks and army searchlights continued at work for the army only. The same applied to the Panhard-Levassor factory, to the



Steam tractors commandeered for service in the French army. The transformation of these trucks from a peace to a war footing was marvelously rapid

Schneider works at Creusot, where, in addition to heavy artillery, the Paris motorbuses are produced, and to the Latil factory.

From Peace to War Footing in 10 Minutes

Within 10 minutes of the issuing of the mobilization order, subsidized motor trucks belonging to the big dry goods stores in Paris were being driven away by military reservists. Within an hour of the order going forth there was not a motorbus on the streets of Paris. The Paris General Omnibus Co., which holds a monopoly of this service, has 1,000 buses, of which 900 are constantly in service. As soon as the order was up the drivers continued the journey they were making and then ran for the central depot. Here the buses were transformed by taking out the seats and windows and fitting fine wire gauze screens. The rails for straphangers received meat hooks, and with this transformation, which occupied but a few hours, the vehicles were ready to move to the front. This work was admirably carried out; in most cases the drivers were eligible for military service and remained with their vehicles. The buses were divided into groups of about a dozen, and as all the units in the group are of one type spare parts could be reduced to a minimum. Absolute secrecy is observed regarding military movements, the journalists who publish information likely to be of use to the enemy being liable to court martial, yet it is possible to state that the transformation of the motor buses into meat wagons was carried out with remarkable celerity and that many of these vehicles are at the present time serving with the French troops. They made the journey from Paris to Belgium by road. With the taking over of the Paris omnibuses went the company's reserve supply of fuel and also all their sources of supply. To meet any emergencies a reserve of several hundred thousands of gallons of benzol is maintained in the underground tanks of the company's depots at Paris.

Over 100,000 Cars and Trucks in War

Most careful estimates point to the use of more than 70,000 motor vehicles of all kinds with the French army now advancing into German territory. Fifty thousand touring cars have been called up for service, these being made use of by officers in the various branches of the service, for reconnoitering, for despatch work, for rapid raids into the enemy's country, for flying brigades, and for the Red Cross service. Only a very small number of these cars were originally owned by the army; the immense majority have either been requisitioned or have been brought up by motor reservists, who remain as their drivers, according to a prearranged plan. When the cars are requisitioned their owners are given treasury notes payable after the war, the price being fixed by the authorities. Cars with elegant bodies are generally given over at a loss; officers have no need for fine paint work and elegant finish. Good automobiles with cheap bodies are generally paid a very satisfactory price.

Traveling work shop connected with the aeroplane corps. This is a gasoline truck with a van body containing a dynamo, lathe, drills, band saws, a forge, etc., for repairing aeroplanes

There is still a big demand for trucks. The army has secured 18,000, these comprising all the subsidized models, and many which have been purchased outright since the declaration of war; it has 1,100 motor buses supplied by the Paris General Omnibus Co.; 200 four-wheel-drive tractors, about fifty motor searchlights, and probably 100 various special vehicles, such as water wagons, traveling kitchens, captive balloon cars, etc.

The German army probably has the use of 35,000 automobiles of various types. Belgium, which does not keep up a very big service, has put into use from 6,000 to 8,000 private automobiles and trucks. This gives a total for the three Continental powers of France, Belgium and Germany of more than 100,000 automobiles in war service.

Service Test for Four-Wheel-Drive

Four-wheel-drive tractors, which have been carefully developed during the last 2 years, will come into active service for the first time. The majority of these vehicles have been built by Panhard, other makers being Latil, Renault, and Schneider. These tractors are hauling the 155-millimeter guns, together with their necessary ammunition, and are also being employed for hauling provisions on trailers. If the maneuvers can be taken as any indication of their value, they will render good service in this war. They can travel over any kind of country, for they have been tested over the most difficult land on the German frontier, while their capacity is much greater and their speed much higher than that of any horse vehicles.

Large numbers of automobiles are being used in conjunction with the flying brigade. These machines are a varied class, from light trucks carrying partially dismounted aeroplanes to what are practically ordinary touring cars fitted up to give first aid to disabled flying machines. Aeroplanes work in "escadrilles," each one consisting of seven or eight machines, and having a determined number of attached automobiles. In the important centers a traveling workshop is employed. This is a gasoline automobile with a van body containing a dynamo, a lathe, drills, band saws, a forge, etc., of such a complete nature that practically any repair can be carried out.

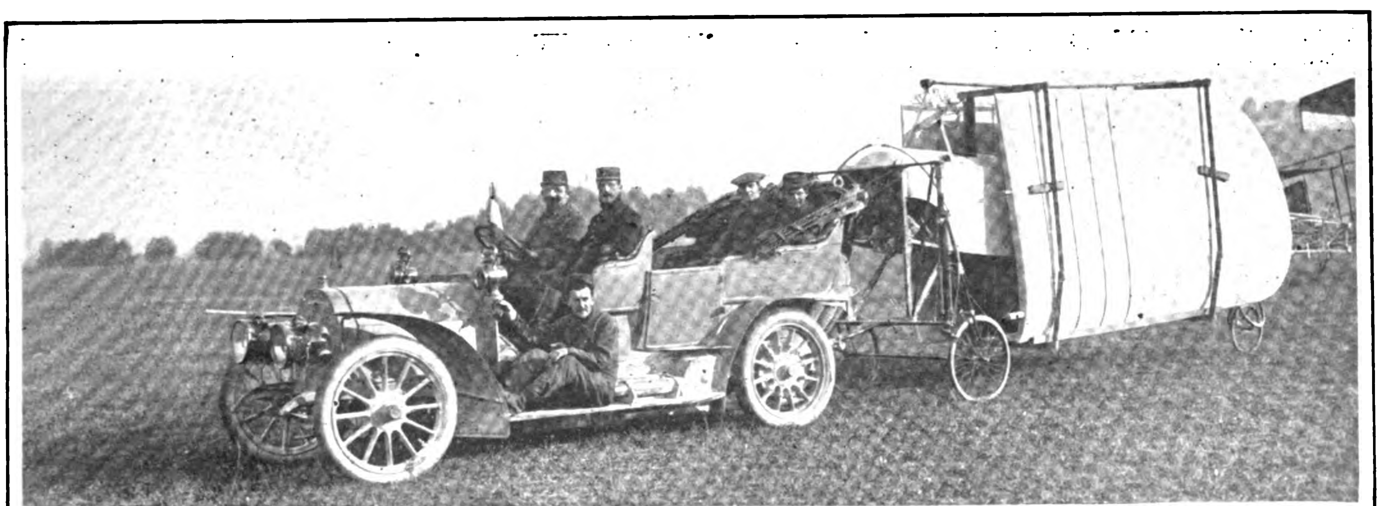
Racing Drivers at Their Posts

All the staff officers make use of private touring cars, the preferred type of machine being a five-passenger fast, open car. Practically all these machines have been taken from private service, the men who are driving them being reservists. In this category are numbers of the leading French race drivers. Georges Boillot was called up just before the declaration of war and with a fast Peugeot was given the task of driving General Joffre, chief of the French army. Victor Rigal, with a similar type of car, was attached to another general. Jules Goux's indicated post was in a fort at Belfort, practically within a stone's throw of German territory. He took up this position immediately he was called, although he might have been incorporated in the aeroplane corps if he had made application. Albert Guyot joined his corps at Orleans, where it is understood that he was given the task of driving an officer. His regiment was immediately ordered to the front and no news is available concerning it. Réne Thomas is in the aeroplane corps and Arthur Duray is said to be with the Belgian army.

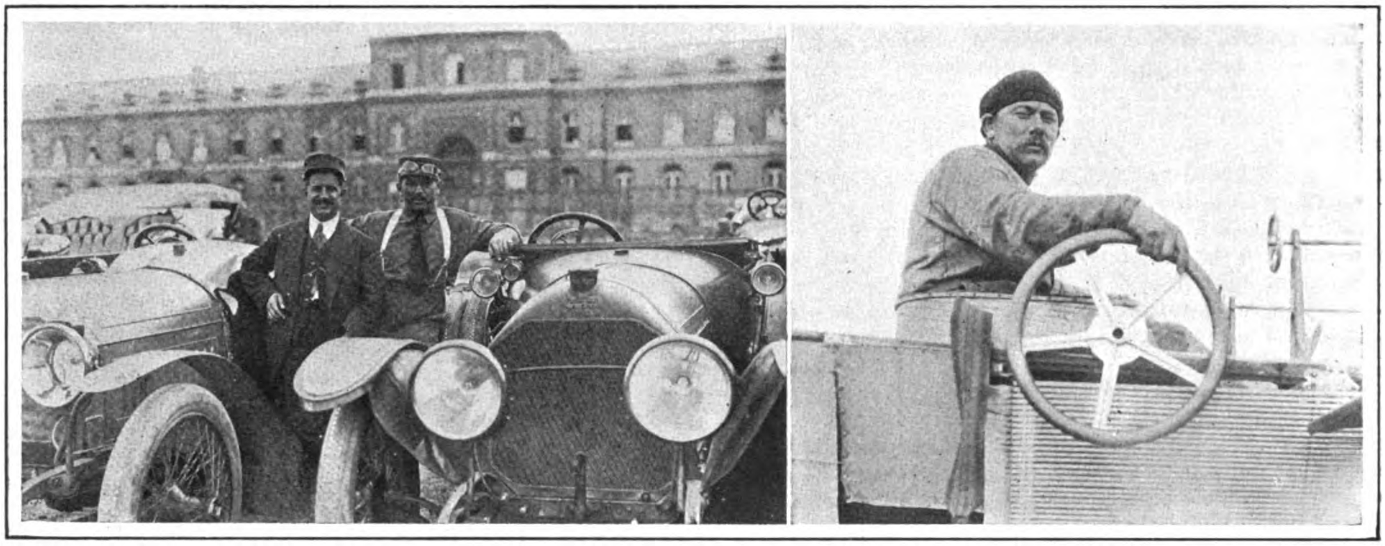
Portable wireless telegraph station used by the French army. This is a motor truck with a special body containing complete wireless outfit

Touring Is Impossible

Automobile touring in France, and indeed throughout the whole of Continental Europe, is an utter impossibility. France has been declared in a state of siege, thus putting the whole of the authority in the hands of the military. It is impossible for any person to use an automobile in Paris unless provided with a permit from the police. To travel outside Paris a special permit must be secured from the War Department. This bears the photograph of the holder and must be shown at every request of the authorities. I have just traveled from Dieppe to Paris, a distance of about 130 miles. On starting out the Dieppe authorities provided me with a pass which had to be presented to the chief of police in every town where I stayed more than 6 hours, and had to be given up for examination when requested. The first request came about 7 miles out of Dieppe. A couple of soldiers carrying rifles with fixed bayonets barred the road and asked for my papers. After they had been carefully examined I was allowed to continue. At the entrance and exit to every village, at the passage over or under every railway, at every bridge over a river, the same close scrutiny took place. At 7.30 o'clock every person had to be off the road, the guards having orders to fire on every person traveling after that hour. My own pass gave me the right to travel to Paris only; before another journey can be made a fresh pass must be secured indicating the route to be followed. This system makes it possible to keep a close control of all cars. As soon as war was declared French subjects who were eligible for military service but were not in the automobile corps had to bring their automobiles for inspection. Many of these machines were commandeered. Others, having no military obligations, had to obtain a special military pass before they could use their cars, and by reason of this application they were brought in contact with the authorities who thus obtained



One of the methods of transporting the aeroplanes over the country by the French army. The aeroplane is compactly folded together and towed by a touring car



Left—Victor Rigal and Georges Boillot as soldiers in the French army. Boillot is driving General Joffre. Rigal is driving an officer of the headquarters staff. Right—René Thomas, winner of the Indianapolis race, who has volunteered for aeroplane service with the French army

the assurance that the cars were in running order, and only consented to issue the pass if assurance was given that the cars could be obtained for army purposes when required.

Escape of American Tourists

American automobilists touring in France were badly hit on the outbreak of the war. Germans and Austrians were given 24 hours to get out of the country or be made prisoners; other foreigners had to leave the country within the same period or comply with stringent police regulations. On the expiration of this period foreigners could only leave the country with a special permit. The only means of escape for American automobilists was by the Channel ports to England. Many a party raced across France with the hope of reaching Dieppe, Havre, Boulogne, or Calais before the expiration of the first day of mobilization. After driving in many cases for 18 to 20 hours without a stop and without a break for food, it was found that the car could not be taken abroad, for at the time the expulsion notice was given an order went into force immediately forbidding the exportation of automobiles. Even if this law had not been in force, the cross-Channel boats were so crowded that it was an utter impossibility to get cars abroad. The outbreak of hostilities coincided with the English Bank Holiday period, when thousands of Britishers invaded the French coast with no thought of war. These people had to get out of the country by midnight of August 2, when all ordinary boat service with England was cut off. Boats which normally carried a thousand passengers took on three times that number; women dropped on the decks and lay where they had dropped.

Abandon Cars on Streets

Motorists, unwilling to believe that the laws were drastic, moved along the coast from Havre to Dieppe, from Dieppe to Boulogne, and from Boulogne to Calais, only to find themselves at midnight on a pier with crowds of casual visitors fighting for a place on a boat and willing to abandon all their baggage if they could get out of the country. In the town of Dieppe alone sixty English and American cars were left behind; along this coast it is estimated that 300 foreign cars were abandoned. Most of the owners had the forethought to place their cars in a reliable garage, from which they could withdraw them after the war, if not requisitioned in the meantime. Others waited until the last minute, then abandoned their cars in the public square. A few, thinking only of their own safety, told the chauffeur to do the best he could, and as soon as the owners had made for the boat, carrying their own baggage, the chauffeur left the car in the street and fought his way abroad. At Dieppe I saw two Packard cars abandoned on the quay side; a French car owned by Americans had also been left behind, the chauffeur not even taking the trouble to stop the motor. I saw this car at 7 o'clock in the evening; when the last boat went out soon after midnight the motor was still running. When the foreigners had departed the French authorities collected these abandoned cars; some have gone into active service with the troops; others can be claimed after the war.

French families were as hard hit as the foreigners. Thousands of motorists were staying on the Normandy and Brittany coasts, 120 to 200 miles from Paris. With the mobilization order the entire railroad service went into the hands of the military; passengers were carried if there was room for them, but no heavy baggage would be handled. As one, two, and sometimes three members of a family had to leave for the front within 24 hours, it was necessary to get back to Paris without a moment's delay. In very many cases open touring cars were decked over, piled up with trunks to a height of 6 feet, and the chauffeur told to make for Paris as quickly as possible. The family followed in a second car, if they possessed one, or trusted to the train service.

Officers Only Motorists in Paris

In other cases a contrary movement took place. Timid persons imagined that safety lay in getting as far away from Paris as possible, and cars were loaded far beyond their capacity to take passengers and their belongings to some distant corner of Brittany. The automobile traffic on the roads during the first day of mobilization was intense. Now that all the troops have been moved toward the east the roads west of Paris are deserted. It is possible to travel a whole day and not meet a dozen cars. Eastward, on the other hand, the movement is intense, but is entirely of a military nature.

Paris traffic is confined to automobiles carrying officers. There is not a single motorbus in the city; three-quarters of the taxicabs have been withdrawn owing to the departure of their drivers for the front. Within the city limits traffic regulations are normal, but no automobile is allowed to go out of the city without a military pass and no car can be on the roads outside Paris later than 7.30 p. m. With very rare exceptions the automobile stores in Paris are closed. The German firms, Continental, Mercedes, Benz, Opel, etc., have taken the precaution to remove all their signs in order to prevent the wreckage of their buildings. There were a few popular outbreaks against Germans on the declaration of war, although no automobile firms were attacked. Since then the authorities have taken all necessary precautions to prevent rioting, for these patriotic outbursts gave an opportunity to the criminal class to work for their own ends. A civil guard has been instituted and big sight-seeing automobiles are maintained at the police headquarters to carry police to the scene of any disturbance which may be reported with the least possible delay.

Many American Cars Held Up

There are numerous American cars held up in France, but they have not been seized. It is possible for their owners to use them, under certain restrictions, but it is not possible for them to take the machines out of the country. There are a few cases of Americans having had their cars taken from them through transgression of the military laws. One of these is James Gordon Bennett, who traveled to Chalons sur Marne, the center of one of the greatest French camps, and was ordered to forfeit his car. The interdiction against touring in certain zones was not put into force without warning, and it is doubtful if there is a single case of a genuine touring party having been detained while seeking to get home.

While the general result has been an abrupt cessation of business, the Packard company appears to be exceptional in having found the war profitable. The Paris branch has not been closed, and, it is declared, will not be shut down so long as it is possible to do any business. With the sudden outbreak of hostilities hundreds of Americans sought to hire cars to travel to the ports. Many had passages booked on steamers but without a car could not get to the shore. Touring parties were willing to pay any fancy price in order to get a car to take them to one of the Channel ports. The entire fleet of Packard touring cars was pressed into service and for several days an uninterrupted service was maintained between Paris and the sea. Among those who got to the sea by the Packard service was the sister of President Wilson.

American Cars May Gain Business

Miss Goode, who is temporarily in charge in the absence of General Manager R. N. Goode in America, states that so far as their branch is concerned the ultimate result of the war may be satisfactory. French people who have had their cars requisitioned are already making inquiries for Packards.

No Molestation of German Car Industries

The Mercedes stores spare-parts department and repair shops at Puteaux, near Paris, have been requisitioned by the army authorities. These buildings are next door to the French artillery factory and have been made use of as an extension to the gun-making works. All the cars which were found in the building have been taken over by the French troops. A portion of this building is also used as barracks for the Paris firemen, now doing service in the suburbs. The Mercedes showrooms in the Champs Elysees have been closed in the usual way, and remain untouched. About a dozen handsome cars ready for delivery are in this store, and are visible from the street, but they have not been taken nor has any damage been done to the building by the populace. Every other automobile store in Paris has been cleared of its stock, and in not a single case is any attempt being made to do business. Much of the French stock has been taken over by the army.

Panhard tractor hauling 155 millimeter siege guns and ammunition wagons

Special army pass given to automobilists, without which it is impossible to travel in a motor car of any description on French roads

In place of cars manufacturers display flags in their windows and a notice is posted to the effect that inquiries should be addressed to the factory. In the whole of the Avenue de la Grande Armée and Champs Elysees district the only store open all day is a big accessory department; a few tire and accessory dealers open for a few hours. Some firms have even taken the precaution of nailing heavy boards across the windows of their showrooms, although the city is so quiet that such a measure is entirely superfluous.

The Continental Tire Co. shut down both its factory and its general offices as soon as mobilization was declared. The precaution was taken to remove the name of the firm from all the buildings, for during the past few years rival firms have conducted a jingo campaign against this firm, maintaining that it was established for the purpose of securing French military secrets. The campaign was never looked upon as more than a doubtful business move, but with the war fever running high precautions had to be taken.

On Belgian Battlefields

I have just been able to make a journey into Belgium, where there is rather more liberty, and to travel a considerable distance by automobile and on foot. Every road is guarded, it being impossible to advance more than 5 or 6 miles without the order being given for papers to be presented. To the east and northeast of Brussels on all the roads leading to the German lines special precautions have been taken against the passage of spies and to prevent the inroads of Germans using automobiles. Heavy farm wagons are placed across the road, one wagon blocking half the road and a second wagon a few yards away obstructing the other half. It is possible to pass between the two wagons, but only at a walking pace. When attacks are feared the space under the wagons is filled up with granite blocks commonly used for paving roads. This makes a strong barricade and at the same time provides interstices for firing.

(*Continued on page* 463)

Standardize Used-Car Prices

Used-Car Central Market Reports of Chicago Automobile Trade Assn. Show Dealers Actual Prices Paid for Cars Without Revealing Business Secrets

Based on Chicago Prices at Present but System Will Be Extended to Other Centers

CHICAGO, ILL., Sept. 1—A "Used-Car Central Market Report," which tells you how much you should allow when taking a used car of any make or any vintage in trade on a new machine, is not a creation of the imagination but an actual fact.

This "Used-Car Central Market Report" has been an actuality for a little over 2 weeks.

The idea of a "Used-Car Central Market Report" was conceived in Chicago by H. M. Allison, President of the Chicago Automobile Trade Assn., on his election to that position last February. The idea was made a reality within the past 6 months by President Allison and his energetic board of directors.

The "Used-Car Central Market Report" is a forty-page book with pages 10 by 7 inches. The book is filled from cover to cover with valuations of used cars. If you are a dealer and a prospect wants to trade in a 1909 Chalmers Model F, 24-horsepower runabout, you can look up your Central Market Report and see that the average allowance for this car in trades has been $325, and further that its value has been appraised by other dealers at $220. So with twenty other Chalmers models any one of which you might have to take in trade; and so with an even hundred other makes of gasoline cars and besides these are fourteen different makes of electrics. You have the value of them all as used cars.

Fig. 1 is a specimen page taken from the first issue of the "Used-Car Central Market Report." It shows the valuation placed on used Packard and other cars. The first column gives the model, the second the year of its manufacture, the third its body type, whether roadster, touring or runabout; this is followed by passenger capacity, number of cylinders, horsepower calculated by A. L. A. M. formulæ and then comes the list price of the car when new.

Actual Prices Paid Are Given

Next you come to the real information, the column headed "Allowance," which means what the dealer selling Packard cars is supposed to allow for the different models. Do not pay too much attention to this column, but pass on to the column marked "As is." This column tells the real story, contains the information you want. "As is" means what these models have actually been sold for, after being taken in in trades. This figure does not mean what one car has sold for but it is the average of perhaps what a dozen used cars of this model have sold for.

After the "As is" column is another headed "Partial overhaul," in which are given the figures these cars have actually sold for after being taken in trade and then partially overhauled.

Then follows another column headed "Rebuilt," which indicates what these used cars have actually brought after the dealer has rebuilt them. These figures are, of course, much higher than those in the two preceding columns, in that the rebuilt used car should bring much more than the partially rebuilt one, or the car that is sold just as it is taken in in the trade deal.

We now come to the last column in Fig. 1 headed "Appraised value." By "Appraised value" is meant a value placed on the car by all of the dealers in Chicago selling other makes of cars listing in the same zone as the Packard. Thus this appraised value would be arrived at by such dealers as Pierce, Locomobile, Peerless, White, Winton and some others. Generally this appraised value comes very close to the actual prices that used cars have brought, it being quite common for the appraised value not to be more than $50 or $75 under the actual selling value of these cars.

Here is another instance from the first issue of the Used-Car Central Market Report of the Chicago Automobile Trade Assn. At the top of the page appears a portion of the Chalmers line, the earlier models being on a preceding page. The prices for Model 10, 1912, show how close the "As is" selling value is to the "Appraised Value." This model was actually sold for $680, and the group of Chicago dealers sell-

USED CAR CENTRAL MARKET REPORT

PACKARD
Mfd. by Packard Motor Car Co., Detroit, Mich.

Model	Year	Type	Pass. Capac.	Cyl.	H. P.	List Price	Allowance	Aver. Sale Price Last Quarter: As Is	Partial Overhaul	Rebuilt	Appraised Value As Is
NA	1909	Rd.-Tr.	2-5	4	18	$2200	...	$ 650	$ 650	....	$ 430
UB	1909	Rd.-Tr.	2-7	4	30	4200	....	875	....	....	470
NB	1910	Rbt.	3	4	18	3200	$ 600	....	....	....	520
UC	1910	Tour.	7	4	30	4200	750	975	....	....	640
NC	1911	Rbt.-Tr.	2-5	4	18	3200	800	....	....	....	650
UB	1911	Rd.-Tr.	2-7	4	30	4200	1000	....	....	....	850
NE	1912	Rd.-Tr.	5	4	40	4200	1400	....	....	....	1070
UE	1912	Rd.-Tr	2-7	4	36	3200	1000	....	....	....	1190
RE	1912	Rd.-Tr.	2-7	6	48	5000	1600	....	....	$2100	1275
1348	1913	Tour.	7	6	48	4850	2100	....	3000	....	1775
1438	1913	Rd.-Tr.	2-5	6	38	4150	....	....	2700	....	1615

PAIGE
Mfd. by Paige-Detroit Motor Co., Detroit, Mich.

Model	Year	Type	Pass. Capac.	Cyl.	H. P.	List Price	Allowance	As Is	Partial Overhaul	Rebuilt	Appraised Value As Is
1	1910	Rds.	2	2	25	$ 800	....	....	....	....	$ 75
A	1911	Rds.	2	2	25	800	....	....	....	....	100
B	1911	Rd.-Tr.	2-4	2	25	800	....	....	....	....	100
Beverly	1912	Rd.-Tr.	2-4	4	25	975	....	$ 325	....	....	350
Bruns.	1912	Tour.	5	4	25	1000	....	....	....	$ 700	350
25	1913	Rd.-Tr.	2-5	4	25	950	....	....	....	....	450
36	1913	Rd.-Tr	2-5	4	36	1275	....	....	$ 800	725	500

PALMER & SINGER (Discontinued)
Mfd. by Palmer & Singer Mfg. Co., Long Island City, N. Y.

Model	Year	Type	Pass. Capac.	Cyl.	H. P.	List Price	Allowance	As Is	Partial Overhaul	Rebuilt	Appraised Value As Is
32	1909	Rds.	3	4	30	$2250	....	....	....	....	$ 220
62	1909	T-Ton.	5	6	60	3800	....	....	....	....	265
4-40	1909	Tour.	7	4	40	4000	....	....	....	....	260
XXXIIB	1910	T-Ton.	4-5	4	28	2500	....	....	....	....	285
XXXIIB	1910	Town Car	4	4	28	3500	....	....	....	....	300
LXII	1910	T-Ton.	4-5	6	60	3500	....	....	....	....	290
LXII	1910	Gunboat	4-5	6	60	3900	....	....	....	....	345
6-40	1911	Tour.	5	6	50	3300	....	....	....	....	410
4-50	1911	Tour.	5	4	50	3500	....	....	....	....	395
6-60LXIV	1911	Tour.	7	6	60	4200	....	....	....	....	450
Brighton	1912	Tour.	3-5	6	40	2000	....	....	....	....	490
46 Brigh.	1912	Tour.	3-5	6	40	2500	....	....	....	....	510
	1912	Tour.	7	6	40	2700	....	....	....	....	535
6-60	1912	Rbt.	4-7	6	60	3000	....	....	....	....	545
6-60	1912	Tour.	7	6	60	3300	....	....	....	....	585
Brighton	1913	Tour.	2-5	6	45	2205	....	....	....	....	730
LXIV	1913	Tour.	7	6	60	3200	....	....	....	....	815
LXIV	1913	Rd.-Tr.	2-5	6	60	3325	....	....	....	....	865
Brighton	1913	Rds.	2	6	45	2000	....	....	....	....	695

PARRY (Discontinued)
Mfd. by Parry Automobile Co., Indianapolis, Ind.

Model	Year	Type	Pass. Capac.	Cyl.	H. P.	List Price	Allowance	As Is	Partial Overhaul	Rebuilt	Appraised Value As Is
40	1910	Rds.	2	4	32	$1285	....	....	....	....	$ 200
40	1910	Tour.	4	4	36	1485	....	....	....	....	200

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Fig. 1—Page taken from the first issue of the Used-Car Central Market Report of the Chicago Automobile Trade Assn. This page shows the valuation of several makes of used cars. Figures record actual purchase and sales prices without betraying any business secrets of the dealers

ing other cars in this class had appraised this model at $700, but $20 higher than it had actually brought during the first 3 months of this year.

Down further in this Chalmers group is a Model 17, 1913 roadster with an allowance by the Chalmers dealer of $900, an actual sale or "As is" value of $850 and an appraised value by rival dealers of $800. These three figures give proof positive of the value of this Used-Car Central Market Report, to the dealer, no matter where he resides. The report is a real guide, not a bit of guess work or approximation.

These values are all based on the first 3 months of this year, and the figures were obtained from Chicago dealers who actually took the different cars in trades and sold them at the figures given, or at other figures that were used in getting the averages of this market report.

Fig. 2 shows the blank form that each member of the Chicago Automobile Trade Assn. is provided with. This slip was actually made out by some dealer; it may have been the Pierce-Arrow dealer, or it may have been Packard, Locomobile, or any other dealer that took this Model 36, 1911 Pierce-Arrow in trade on a new car. After taking it in the Pierce-Arrow was actually sold for $1,150. The dealer who made this sale furnished the information to the dealers' association, but he did not have to sign his name to the blank form, in fact, there is not an indication on the form as to whom it was received from.

The form is mailed to the dealers' association in a double envelop. It is first placed in a plain white envelop and sealed. This envelop, without address or any distinguishing mark, is placed in an envelop furnished by the dealers' association, and on this outer envelop is a number which the trade association has assigned to the dealer. Each dealer has a different number, and one dealer does not know the number of the other. The confidential secretary of the association is the only one who knows the numbers of the various dealers and the only reason that the envelopes are numbered is that he will know what dealers have been assisting in furnishing the information.

These information blanks or sales slips are the real secret of the system. Before this scheme was evolved it was impossible for the dealers to get together. One mistrusted the other. One refused to tell the other what he allowed on a certain used car and what he actually sold it for. But with the secret sales slip scheme many dealers were at once sold to the proposition. They saw that, although giving out the information, they were yet keeping their business secrets, and not throwing open their books to any rival dealer.

The first volume of the Used-Car Central Market Report came from the printer August 5. It contains the information from 753 slips such as is illustrated in Fig. 2. The information was obtained from many Chicago dealers. Each member of the Chicago Automobile Trade Assn. has received a copy of this first report, which is based on actual values in January, February and March of this year. All of the 753 information slips were based on actual sales of used cars in these 3 months.

Not Restricted to Members of the Association

This first volume is not being restricted to members of the Chicago dealers' association, but already books have been sold to dealers in New York, Philadelphia, Boston, Rochester, Buffalo, Detroit, Columbus, New Orleans, St. Louis, Minneapolis, St. Paul, Denver and San Francisco. The Chicago organization is selling a year's service of these market reports for "xx $24." For this amount you get four volumes of the report, one every 3 months. The next volume will go to press on September 5. It will be larger than the first one, and its information will be based solely on sales made during April, May and June. Already over 630 sales slips have been received and it is yet 2 weeks before the date of closing.

When the dealer buys this market service he does not buy

DEALERS USED CAR SALES STATEMENT

QUARTER ENDING June 30th 1914 191__

MAKE PIERCE-ARROW

MODEL	YEAR	TYPE	PASS. CAPACITY	CYL.	H.P	LIST PRICE	ACTUAL SALE PRICE		
							AS IS	PARTIAL OVERHAUL	REBUILT
36	1911	T. C.	7	6	36	$4000	$1150		

USE SEPARATE BLANK FOR EACH VEHICLE

FILL IN ONLY ONE CAR ON EACH CARD

Fig. 2—Blank form with which each member of the Chicago Automobile Trade Assn. is provided. These slips are made out by dealers and record actual business transactions

the books or reports but is only loaned them. He keeps volume one until volume two is published and reaches him, at which time he returns volume one. So on with succeeding volumes, a plan similar to the distribution of telephone directories.

In compiling this Used-Car Central Market Report the Chicago Automobile Trade Assn. divided the entire automobile field into four grand divisions as follows:

Div. 1—Electric automobiles.
Div. 2—Gasoline machines, listing at $1500 and under.
Div. 3—Gasoline machines, listing from $1501 to $3,000.
Div. 4—Gasoline machines, listing at $3,000 and over.

Each division is headed by a chairman and a vice-chairman and in addition to these the membership of the division is every dealer selling cars in this price zone. These dealers as a committee meet and settle the "Appraised value." They also pass on the "As is" sales, and the other department of the work. The committee or division meets perhaps three or four times a quarter year. So all four of the divisions work and pass on the market reports for each quarter.

And why should we not have market reports for used cars? We look into our daily papers for the iron and steel reports, the farmer consults them for the prices of cattle and hogs, the broker seeks them for the lists on cotton or corn. True we would not want a daily used-car report, but we have a quarterly one. In its initial scope the prices are based on Chicago only, but this is temporary. Other zones of prices can be included in succeeding volumes. The Pacific Coast dealers can be brought into line and their lists published under those of the Chicago territory. Added to this can be the New England list, perhaps the Southern list, and lists from any other zones that may be deemed desirable. There is no end to the chain of possibilities. In our grain reports we cite Chicago, Minneapolis, Seattle and other places and so in our used-car reports we can cite different territories.

President Allison of the Chicago trade association in speaking of the possibilities of this used-car market report said:

"This establishes every claim that was made in the Chicago Automobile Trade Assn. when its membership selected committees of appraisement, and emphasizes the value of Chicago as a great bourse in which standardization of used-car values has progressed to a practical point, not only for the members of our association but for dealers in every city in the country, where the clearing house method of establishing proper appraisements of used cars is not readily applied.

"If this great city volume of business in used cars does not make for a central market quotation every bit as reliable as the quotations from a stock exchange or board of trade, then all the laws of supply and demand and market conditions fail to operate."

South America Turns to United States

Long List of Commodities Will Be Supplied by This Country but Reconstruction of Financial Conditions Is Necessary

¶ *The accompanying article is digested from a summary by Charles M. Pepper in the August 27 issue of Iron Age. Mr. Pepper was for 8 years, prior to June, 1913, foreign trade expert of the State Department at Washington. He has toured extensively through South America and has been a close student of trade in all the South American countries.*

THE United States now has the opportunity to supply to the markets of South America commodities which have heretofore been secured from the European belligerents. There will be a deficiency especially in iron and steel products. Germany and Belgium, for the time being, are entirely shut off from the southern Continent and even England, though it may keep the ocean lanes open for its commercial fleet, will find its South American trade dislocated.

While this is the general situation, there is a limitation on the extent to which the United States may profit at once by the deficiency in supplies from Europe. This is the diminished ability of most of the South American countries to buy. The United States, by well-directed effort, may legitimately increase its permanent trade with South America as the result of the war. But too much should not be expected at the outset, because South America during the war period will buy much less abroad than during normal world conditions.

The probability is that the demand for material for harbor and other public improvements, for railroads and for construction enterprises of a public nature will be lessened. The war has paralyzed the ability of the South American countries to borrow money in Europe, and European loans have been the basis of their public improvements and their construction of railroads. Some of these countries were just emerging from commercial crises, due largely to economic causes, and were preparing to refund old loans and secure additional ones.

Brazil was negotiating for a loan of $100,000,000 in London, with some prospect of success. This money cannot now be obtained. Brazil, in fact, has issued an additional volume of paper currency to relieve the stress.

With the Brazilian government restricted in its opportunities for borrowing in order to carry on public improvements, and with private enterprise on a large scale compelled to restrict its activities in railroad building, it will be seen that Brazil is not likely to be a large buyer of certain commodities during the present year. This does not mean any lessening in the value and volume of its permanent market.

Argentina Recovering from Land Speculation

Argentina has been getting on its feet after the monetary crisis which followed the riotous land speculation. Argentine public credit always has been high, and there were some intimations that as conditions improved the effort to float a new government loan, which was abandoned a year ago, might be renewed. The province of Buenos Aires, which was in the market for a railroad loan, was also understood to be on the point of renewing negotiations.

None of these loans can now be floated and some big private enterprises which were dependent on foreign capital will have to be postponed. Argentina, however, is in a position to profit by the war, since the demand for its grain and beef will be increased and higher prices undoubtedly will be obtained. With this source of income assured, Argentina's purchases abroad may not be appreciably lessened on account of the war.

Finances of Chile and Peru

Chile's financial condition has been frequently described as sound, but not sane. That is, the country has abundant resources to meet its financial obligations, but is apt to be reckless in incurring these obligations. Chile will maintain her credit abroad, and will pay all her debts, but she is not likely to get fresh loans with which to carry on public improvements.

Peru was seeking a loan to refund existing loans and meet current obligations when the war broke out. It had no great public improvements under way, and no private construction enterprises of magnitude. Its demand for material therefore may not be materially lessened, but an increase cannot be looked for.

Peru has the gold standard, which helps it in economic and financial crises. The cable reports have stated that the government has authorized the banks to issue checks based on gold to meet the stringency caused by the inability to procure the loan that was sought. Credits may not suffer, but Peru, for the next year, is likely to remain stationary as a buyer of manufactured articles.

The financial and economic situation in these countries is set forth in order that a conservative view may be had of the prospect of the South American market for the United States. American manufacturers and exporters, not familiar with these conditions, might assume that South America would buy next year and this year just as much as it bought last year. If the totals show a falling off in certain lines they might draw misleading conclusions as to the real value of the market and abandon it. This would be a grave mistake.

Having stated some of the drawbacks, it is proper to describe some of the favorable aspects. The purchase of mining machinery is not likely to be altered because mining development goes forward under the most unfavorable conditions. Building and household hardware are not apt to be interfered with, since the demand for these is not affected by international imbroglios. The physical reconstruction of the great city of Buenos Aires will go right on, and the requirements for structural steel, which are so large a factor in its reconstruction, will continue to be large.

Iron and Steel Products—Customs Valuations

The nature of the market of the leading South American countries in detail, as relates to iron and steel products, is exhibited in the customs figures of imports by articles and countries of origin. Unfortunately, however, the statistics are not based on the same system as in the United States. The classifications of the different governments are in no way uniform, each country has its own practice in this regard, and none of them follows classifications similar to those which prevail in the United States.

Most of the South American countries have the system of "aforos," or fixed valuations of different commodities in the customs tariff classifications. Under this practice the value as shown in the manifest given by the exporter to the authorities in the United States may not be the same as the value under the customs classification of the importing country. A typewriter shipped to Argentina may show on the manifest at $50, while the Argentine customs may require it to be valued at $65, or vice versa. The same principle applies to numerous other commodities.

What chiefly concerns the American manufacturer is the commodities which are now imported from European countries, and which may, under the present disturbed conditions, be shifted to the United States if proper effort is made to obtain the trade.

In 1912 Brazil imported $5,368,650 worth of automobiles. Of this amount the United States sent $924,045; Great Britain, $317,873; Germany, $1,526,018; France, $1,470,795 and Belgium, $186,216. The import on motor car accessories amounted to $1,265,430 of which the United States had $110,530; Great Britain, $112,434; Germany, $320,209 and France, $483,508.

The Argentine Republic imported $5,346,149 worth of automobiles. The percentage of this from the United States was but 10.5 while Germany had 15.9 per cent. and France 43.6 per cent. In other words, of the two largest importing countries in the South American field, United States had but 10 per cent. of the business.

Must Buy More from South America

There is a forgotten side to this matter of South American trade. American manufacturers and exporters who are searching for wider markets overlook that some of the countries may also be hunting for expanded markets for their products in the United States. In the present situation it is quite essential that the market for South American products in the United States be enlarged since much of the European market is shut off.

The raw material which may be wanted for the iron and steel and allied industries need in no way be interfered with by the war. The only question is to what extent additional raw products may be absorbed by the industries of the United States.

Manganese, used much in automobile manufacture, exists in Brazil in superabundance, and it can hardly be assumed that the European war interferes with the ability to supply it. In an article on Brazil, published in *The Iron Age* on April 2, the richness of the Brazilian manganese deposits, the facility with which they can be mined and the adequate transportation facilities which now exist were explained. If the iron and steel industry of the United States is embarrassed for lack of Brazilian manganese, it is simply a case of hold-up by the Brazilians.

Big Amazon Rubber Supply

The scare of the automobile industry over a prospective shortage of rubber, because of the war, may or may not be justified, although the supply from the Belgian Congo is undoubtedly in danger, and there may be interference with shipments from the Straits Settlement. But the Amazon has an abundant reserve supply. The hundreds of boats which a few months ago were tied up at Para are doubtless now busy. The jump in the price of Amazon rubber ought to help Brazil through its economic crisis, since the drop in price was one of the prime causes of the trouble.

Chilean copper heretofore has gone largely to England and Germany. The low grade ores from the Braden mine, near Santiago, went to England. Most likely means will be found for absorbing larger quantities of Chilean copper in the United States.

Since the Bethlehem Steel Company's Tofo iron ore mines in Chile were acquired in order to supply the Bethlehem works, there will be none of this traffic to be diverted.

Peruvian copper has been so largely absorbed in the United States that there will not be large additional quantities to be taken by this country, yet there will be some increase.

A final hint may be given on the general subject. Ample data have been gathered by the Department of State and by the Department of Commerce regarding the details of South American trade. The reports of the Consuls to the State Department give much useful information regarding trade conditions. The reports of the Department of Commerce give a vast amount of technical data. What the American manufacturer and exporter should do is to digest this official information carefully and not seek to gulp it down.

United States Banks for South America

NEW YORK CITY, Sept. 1—That American Automobile manufacturers now have the opportunity to repair the damage done to themselves by their own tardiness in seizing the South American opportunity, is the opinion of Ernest E. Ling of the South American Department of the National City Bank.

The application of the National City Bank for the establishment of a branch in Buenos Aires, Argentine Republic and another in Rio de Janeiro, Brazil, is now under consideration by the Federal Reserve Board. Permission will no doubt be granted within a short time for the establishment of these two branches. Mr. Ling, in the course of his work leading up to the establishment of these branches, has closely investigated the financial situation of South America and states that this is but the beginning of wider banking relations between this country and South American nations.

Speaking of the possibilities in this field for the American manufacturer of motor cars, he said, "The automobile manufacturer does not take any risk in seeking the South American business. Of course, he must not expect to find the purchasing power in South America that was there before the war started. Financial conditions in the Southern continent have been much impaired by the war, just as they have been temporarily disarranged in this country. But they are on the eve of a sharp recovery.

"Financial conditions in South America have been bad for the past 7 years due to the wild land speculation engaged in throughout all the important countries. Improvement, however, with the establishment of better commercial relations with the United States, is sure to come and the establishment of better banking connections between New York and the Southern capitals is a big step in the right direction.

"While the purchasing power of South America may not be as high as it was last year nor as high as it will be in a year or two from now, still it will pay the automobile manufacturer to go after this business. He will not be taking any undue amount of risk in doing this, and he now has an opportunity to overcome the effects of his tardiness in securing the South American trade. He has been asleep while the German and French factories have been busy.

"What the South Americans would like to see most is not a single shipment of cars on the orders secured by traveling representatives of the factory, but permanent branches through which dealings could be carried on in a permanent manner and by means of which the owners would be assured of competent service in repairs and parts."

Australasian Trade Has Been Growing

War May Spoil Market—At Outbreak Country Was Very Prosperous—Australia Considering a Tariff

Passing a bullock train near Sydney, New South Wales

OUR trade with Australasia, which has been rapidly increasing during the past year or two, will probably fall off, on account of the European war. Facts, gathered just before the outbreak of hostilities, show that, while there are peculiar conditions to be met in this part of the world, many American companies had built up a flourishing trade. The country is in a prosperous condition. The wealth of the inhabitants is in the land and the majority of these people can afford cars but the war may prevent buying.

One feature that is worthy of serious attention is the possibility of prohibitive tariffs against imported automobiles. The question of putting a high tax on automobile bodies in order to stimulate the home manufacturers of these commodities is now being considered and extension of this policy would be disastrous to the import trade in motor cars.

"The demand for American automobiles in Australasia is increasing," according to Mr. Henry Kennady, managing director of the Studebaker Corp., of Australasia, Ltd, with headquarters in Sydney, New South Wales, and at the present time on a trip to Detroit—in an interview just before the war.

"Competition with European cars is exceedingly strong and the American automobile agent and representative has no easy task in overcoming this competition. It means everlasting hard work and using of strong, convincing arguments to show the good points of the American motor car. All leading automobiles made in Europe are represented in Australia and they were well known there long before American manufacturers of automobiles had representatives or agents in Australasia. Among the European cars most to be found are the Benz, De Dion-Bouton, Darracq and Brasier.

"The Australians want an automobile with right-hand drive, because in Australia they drive on the left side of the road and not on the right. Cars must have a high clearance, like American cars, because the road conditions are quite similar to those in the United States. There are many sections in the country where there are only sandy roads, others hilly and a great many with rocks. The Australian also wants a car with a four-speed gearset, prefers cars painted gray and having a low appearance, and with a khaki top.

Half of Business in Five Cities

"The bulk of the automobile business, at least 50 per cent., is transacted in five cities. These are the capitals of the states in which they are located: Sydney in New South Wales; Melbourne in Victoria; Adelaide in South Australia; Brisbane in Queensland, and Perth in Western Australia.

"People in the country who want to buy a car go to the big dealers established in those cities instead of going to the nearest located dealer of their city or nearby town. The retail business is conducted on time while the wholesale trade is on a cash basis.

"The farmers buy automobiles and some own several cars and all are as enthusiastic as the city people in reference to automobile matters. There is no prejudice against the automobile and the lawmakers do not spend much of their time in proposing measures which would injure the development of the motor car business. The same refers to the authorities who are well disposed towards the motorists. The taxes are reasonable and the only thing which is now very much needed is the improvement of the roads.

"Were it not for the very poor and bad roads there would be many more autombiles sold, but, outside of the city limits of the five big cities and a few smaller ones, the highways are about the worst that could be found.

"There are not many trucks and commercial vehicles and the demand for them is very limited. The cause of this is the fact that the concerns which could really use such vehicles to advantage think that owing to the bad roads, the motor cars would soon give out, and it would cost more to operate them than horses and wagons.

"The conditions of the automobile business in New Zealand are about the same as in Australia, with the difference that the business is not restricted to only a small number of big cities, but is spread over the whole country."

During the first six months of the present year motorcycles, motor car bodies, and motor car chassis to the value of £377,177 were imported into New South Wales. This exceeds the value of the motor imports for the corresponding period of last year by no less than £98,000, equivalent to an increase of 35 per cent.

These figures are significant in that the value of the motor imports for the first six months of last year showed a decrease of 10 per cent. when compared with the imports for the first half of the year 1912, and in consequence of the rapid gain in public favor of the inexpensive American runabout to the detriment, it is said, of the high-class European business, it was generally expected that the values this year would show a further falling off, despite the large numerical increase of cars on the roads of the State. This, however, is shown not to be the case. The United Kingdom still has a lead over all other manufacturing countries in the total value of motor car chassis, bodies, and motorcycles imported, but the United States of America delivered, roughly, £17,000 worth of motor car chassis and bodies more than the United Kingdom. America holds this position partly owing to her manufacturers supplying few other than completely equipped cars, whereas the British makers, as well as the majority of the Continental factories, export their cars in chassis form, leaving the building of the bodies to the Australian dealers, who thereby save a considerable amount in duty.

In the gross imports, including motor cycles, motor car bodies, and motor car chassis, Great Britain comes first with goods valued at £134,042, the United States second with £123,028, Canada third with £44,861, Germany fourth with £27,000, France fifth with £21,439, and Italy sixth with £18,520.

France is the only manufacturing country which has lost ground in her exports to the State during this period. Her motor cycle trade has fallen from £107 to nothing, motor car body trade from £2,081 to £618, and motor chassis trade from £23,362 to £20,821.

In the wheat and wool seasons, all the harbors and ports are congested with ships waiting for the big cargoes that are offering. According to a large dealer in Sydney, writing under date of July 30, "Should anything ever happen that the foreign markets become affected through any cause, such as the present scare through the Austrian-Servian war, conditions in Australia will become bad, and the reverse to general prosperity will immediately set in. As soon as the products of the land cease to find a foreign market, the city trade comes in a very bad way very rapidly. It merely requires a sign of a drought, and depression sets in immediately. Australia has been famous for droughts in the past, and everybody is nervous of the word.

"Everybody on the land who has a small holding, is making money, and this is due to the rapid rise in prices in land products. Foreign buyers all over the world are increasing in number each year, and the last couple of years or so we have had representatives of Libby's, Armour's, and Swift's, well-known in Chicago, giving good prices for sheep and cattle, and there has recently been started a direct service from Australia to American ports with frozen products for these three well-known firms.

"With such rapid rise in prices, money has been flowing very freely into the whole of this country, and the bulk of the money has gone to the man on the land, and he is to-day the most prominent automobile buyer there is in Australia. Every house in the city is advertising in such a way as to draw the attention of the farmer.

May Adopt Tariff on Bodies

"The adoption of a tariff will probably affect the trade in America a great deal. There is a royal Commission sitting in the various States taking evidence on the tariff question and there is every probability that there will be an almost prohibitive tariff imposed upon motor car bodies. The motor car body building business in this country is in a bad way. Practically no companies have any capital behind them and consequently manufacturing is carried on by what one might call amateur methods. Machine work and stamps, etc., are entirely unknown.

"However, as I have said the tariff is likely to be raised to such an extent that bodies on the cars will land here at a great expense. Strange to say the body builders are asking for very high protection against bodies fitted to the cheap American cars; that is their phrase, and as the labor market dominates a great deal in politics in this country, there is every indication of substantial increases.

"Two American small cars arc now in Australia and this line of vehicle is going to catch on and thoroughly drown the British cycle car in the matter of numbers of sales. The British car, however, will still live, on account of its superior finish and workmanship, but of course the price is more than double.

"The greatest motoring centers in Australia are New South Wales, Victoria, South Australia and Queensland, in the order named. Western Australia is only a small populated place and is principally a mining center and the interests in the mines are generally owned in the Eastern part of the continent, hence the profits and the wealthy people are living in the East.

"Of the remaining States there is an Island State called Tasmania, about 90 miles in diameter. This little island is very rich in soil, and the whole of Australia is practically fed with fruits and vegetables from it, and a tremendous fruit export, chiefly apples, is carried on each year. Tasmanian apples are well known in the English markets.

"The wealth of the country is in the land. Australia, by reason of its small population, is not a large manufacturing country, although several prominent works are now being started, including two large steel and iron factories. These have just lately been erected, and give promise of a very large industry.

"The main thing Australia depends upon is wheat and wool. New South Wales is a sheep and wool country, and the Southern portion of New South Wales, and the whole of Victoria and South Australia are practically a wheat belt. Without exaggeration, some of the largest farms in the world are to be found in South Australia. There is also a very large wool export both from South Australia and Victoria.

"Queensland is mostly a cattle country, and practically the whole of the beef for Australia comes from Queensland. Along the Queensland coast in prominent towns, are nothing else but huge meat preserving depots, carried out on the same lines as some of the American ones, but of course much smaller. As a matter of fact, there is a lot of American capital invested in these meat works.

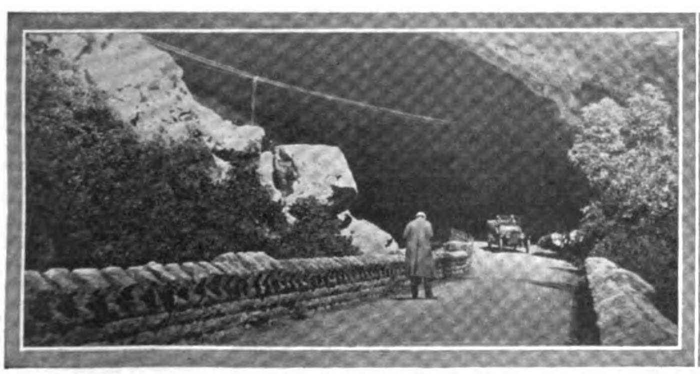
"Each of the five States of Australia has great mineral wealth. Queensland is notable for the Great Mount Morgan Copper Mines, also many gold mines, whilst New South Wales is one of the largest coal fields in the world. It is only second to the great Welsh Coal Fields in Great Britain.

"Victoria is a gold-mining country in one of the first ranks, and so is Western Australia.

"South Australia is very rich in copper. In fact a large portion of the world's supplies comes from Moonta, Kadina and Wallaroo Mines.

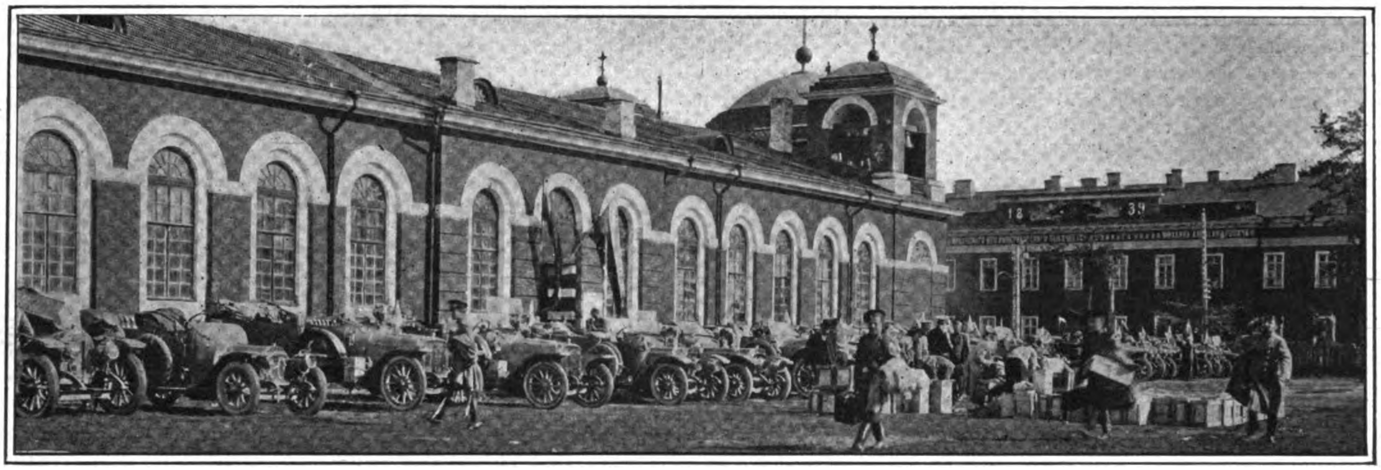
"Broken Hill, which commercially belongs to South Australia, but is in the State of New South Wales, is famous for silver and lead mines. The Broken Hill Proprietary claim that they have a greater output of lead than any other mine.

"Thus it is readily seen that with the big production of mineral wealth, also of wool and wheat Australia has to look to foreign markets, and every boat that comes to Australia with general cargo, generally goes away with a full cargo of wool and frozen products, and bullion."



Entrance to Jenoleon cave in the State of New South Wales

Camping party in the Australian bush



The cars lined up in the early morning at Pskow. A scene in the Russian military trials in which automobiles and motor trucks took a prominent part

Russia—A Trade Opportunity

Prejudice Against American Cars Because of Ugly Appearance of Early Types and Rough Finish—Few Attempts Have Been Made to Gain Russian Market—Part III

By the Late E. P. Batzell

¶EDITOR'S NOTE.—*This article was prepared some time ago by Mr. Batzell and so must be taken as a description of conditions in Russia at the outbreak of the great European war.* THE AUTOMOBILE *is indebted for the illustrations to The Autocar and to the White Company.*

CONCERNING the standing of American cars on the Russian market at the present, it is satisfactory, no make having acquired any particular territory. Even the Ford, which is most advanced in this respect, cannot show any gain over the European cars, as was explained in the preceding installments. In this connection it is interesting that the public reveals a certain well-pronounced prejudice against the American machine, as the writer was able to ascertain by investigation of different parts in Russia. No American car has definitely conquered public antipathy in any part of that country, the Ford selling chiefly through its comparatively low price to the more undiscriminating parties. This situation is not characteristic with other American goods, which are generally well liked there, but one has a hard problem on hand when trying to convince the public as to the merits of an American automobile. Leaving aside the question of price, there is no belief in the even quality and better adaptability to Russian conditions of the American car in comparison with the European, when the matter deals with a car costing about $2,000. Those few who are more or less familiar with automobiles in a technical way and who understand their production are inclined to give due credit to the American machine and the way it is made, reproaching it merely as to its looks.

Early Cars' Appearance Created Prejudice

The American machines indeed possessed a particular appearance until very recently, differing from the general European style, the latter being the more attractive to the tastes of the Russians. Their criticism followed naturally. It is gratifying, however, for the American foreign trade, that the latest and most up-to-date American car creations have successfully overcome this point, by adopting the European style of body, fenders, etc. These will find the door into the Russian market somewhat more open than before, inasmuch as they will meet the taste of the public.

The prejudice existing against the American machines is not only because of their exterior appearance. The much less careful work noticeable on the average product of American factories building cars in large quantities certainly leads the observer to believe that the working and vital parts of the machine are apt to be made equally roughly and with a lack of accuracy essential for their proper functioning. This point of view is further increased by the amateur conception of American production methods in general. A talking point of immense scope thus is available to the dealers in European cars which are smoother, better looking and better balanced in their exterior appearance. The American car and its early efforts to come into the Russian market are both much to blame for this unfavorable reputation, from which it is hard to divert the public now, even by offering them products of much superior quality. Apparently the better American car building firms have not tried to work the various export markets until recently, because their output of cars could be easily distributed and absorbed in the home market without the additional trouble and expense connected with the endeavor of establishing a foreign trade, particularly in a country as little known and as little attractive from the industrial point of view as Russia is. To producers of popular-priced machines in very large quantities, for whom it was impossible to place all their cars in the home market, the export trade offered a good prospect for profits, and thus those cars came into Europe and into Russia. Some introduced their cars through independent agents, other who were building automobiles parallel with other articles already used in Russia, could use the services of the latter representatives. Although the imported machines could have been quite successful in the United

States, with their first appearance repulsed the public, who were used to seeing something much better looking and more carefully made. Nevertheless, the price at which the imported machines were offered made many sales, the buyers trusting that there was good stuff behind the rough exterior appearance. It is to be regretted that only very few of these purchasers have not been disappointed after short period of ownership. In some cases the machine bought was of poor quality, of a make which could not have any standing for its product at home. In other instances the cheap American machine offered at $1,500 to $1,800 in Russia was expected by its owner to do as well as the $3,000 to $4,000 European car of the same weight and power. Nobody will deny, that there can be no comparison between the above two types, because in such an American machine one does not find the materials and workmanship to be found in the European car of double the price. Therefore, the inexperienced owner trying to maintain a pace of 30 miles per hour in his cheap American machine upon the country and cobblestone roads of Russia within a few months' time reduces his car to an annoying rattlebox, at the very best. One can imagine how this owner would feel about his purchase, and, as rumors travel far and wide, the public got to base its dislike on something more concrete than mere appearance. Even now one looks on the American machine generally as a cheap product, not wanted by anybody of a certain standing, just the same as there is a different class of trade for one store than there is for another.

Some reputable American concerns are doing hard work through their agents to establish good reputations for their cars in the public opinion, and they start to have some not unfavorable returns. They sell cars and sell more from year to year, but even the sale of Fords does not approach in number the sale of European high-priced machines, as was mentioned before. The Ford car is finding much use in its inclosed body type for city driving with those who don't care to spend much on an inclosed car for winter only, having a more expensive touring car for the summer.

Large Capital Required by Agents

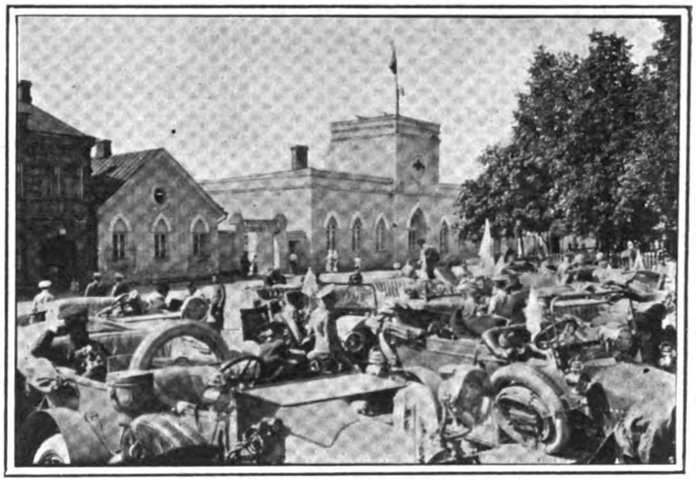
European automobile factories doing big business in Russia almost always have their own branch houses there. This should be preferable for a large scope of business, because many agents, especially those representing German cars, get their stock of the latter practically without deposit, just on commission. When the agent has to pay considerable deposits to the factory for cars received or shipped, he is obliged to possess a large working capital, particularly so if he works in connection with sub-agents. These are generally small parties, who even cannot always devote the whole of their time to the selling of the cars they are representing, and they seldom deposit much of an amount with the main agent who furnishes them cars, until the latter are sold. This method ties up the capital of the main agent if he has to pay for his cars to the factory on their delivery, at the same time being able to get his money back only after the cars are sold to customers. One must keep in mind, that business goes much slower in Russia than here, and whereas an automobile agent here can make a yearly business of tenfold and more than his working capital amounts to by changing it around rapidly, there he must have a much greater proportion of working capital to the yearly business transacted, because it is impossible to turn one's capital around rapidly enough. Only the richest agencies start on a big scale there, the majority growing up gradually, increasing their facilities and their scope of business with their ability to get better credit at the factory which they represent. The Russian agent is said to be a little better off than elsewhere in the matter of storage space for cars arrived in shipment. In many instances he finds it more profitable to let the cars be kept in the warehouses of the carrier, until they are needed, paying a nominal charge for that, than to rent a suitable storage house for them. This method also offers other conveniences.

Garages and Repair Shops Have Difficulties

From the standpoint of service, those buying better and higher-priced machines actually get good satisfaction. As a general rule the agencies and branch houses have their own garages and repair shops, or, if the business is small, they rent space in a garage and shop for their customers' needs. All dealers carry repair parts in stock now and it does not take much time to make a repair or replacement there. Some have shops equipped to make parts to order, serving the owners of old automobiles and those whose cars have no direct representative in the country. Occasionally the agency or branch house does not run its own service garage and repair shop, but contracts with a party well equipped to do this kind of work, where it directs its customers. This latter method is particularly profitable for a small business of late, when, with the use of electricity in cars and some other improvements, they require occasionally the service of expert specialists, which the small business could not afford to hire directly for their exclusive benefit. On the other hand large garages and repair establishments with a large trade of great variety can afford and have such specialists. The arrangement shows some benefit to the owners also, who can deal with the garage, etc., through their agent.

The repair work in branches and private establishments generally is done well, because the reputation of the enter-

(*Concluded on page 457*)



The gathering of the cars at Rjejitza in the Russian military trials

Two White ambulances passing on the road in the Russian military trials

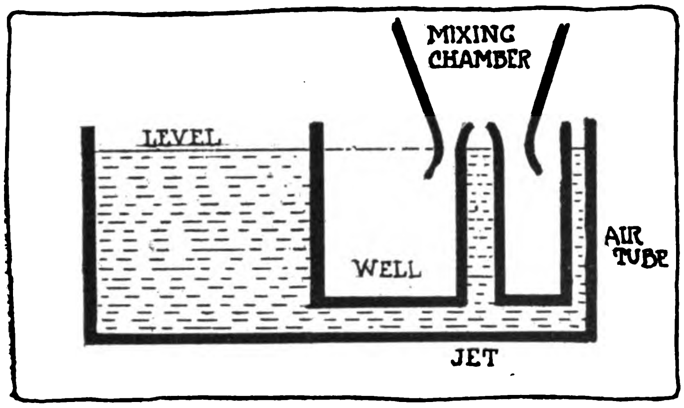


Fig. 1—Diagram showing principle of flooded jet

The Rostrum

Explanation of Flooded Jet

EDITOR THE AUTOMOBILE:—Will you please explain what is meant by the flooded jet and illustrate the working principle upon which it is based.

Atlanta, Ga. H. CORWELL.

—As the name implies, this is a jet placed below the level, Fig. 1, and through which the gasoline tends to flow constantly on account of the difference in levels. In order to eliminate a mechanical means of closing the jet when the motor is not running it is placed at the bottom of a well, the sides of which are slightly higher than the level of the gasoline. When the motor is at rest the well fills up to the level of the gasoline, completely drowning the jet and preventing it from giving off any more gasoline. An air passageway in communication, at one end with the base of the well, and at the other extremity, with the exterior allows air to pass in and carry with it the gasoline given off by the jet.

Well Filled When Motor Is Stationary

When the motor is stationary the well and the passageway are filled up to the corresponding height of the level in the float chamber. As soon as the motor is started a depression is produced in the mixing chamber or throat. The gasoline tends to rise in the well to a height equivalent to this depression. But, as the sides of the well are scarcely any higher than the level, the gasoline leaks or dribbles along the walls of the well and is carried along, at any rate in part, by the lapping effect. At this moment the carburetion is very insufficient because the gasoline that trickles along the outside walls of the well is not vigorously vaporized and carried in by the current of air. The flow of gasoline is then that of an ordinary jet acted upon by the depression which obtains at the orifice of the well. According to the degree that this depression increases the level decreases in the air passageway and as soon as the depression is equal to the column of gasoline which is flooding the jet, the air will enter the passageway, carrying with it the gasoline that remains in the well, and leaving the extremity of the latter, passing into the mixing chamber.

Depression Becomes Double

At that moment there is a discontinuance of the procedure, as the depression which exists in the mixing chamber makes itself felt in the base of the well as soon as it is empty. The moment the gasoline is taken from the well the depression, which was as great as the height of the flooding, suddenly becomes double. Further the flooded jet does not come into operation until the depression is sufficient to expel the gasoline from the well; but at that moment it is stirred up, leaving the orifice of the well, and then intermingles with the air. The gasoline thus expelled, which operation is not the least of the advantages of the flooded jet, makes an effective combination, producing a great mixture even with small depressions, which is equivalent to slow-speed running for picking up and running on a grade.

Determine Acidity with Hydrometer

Editor THE AUTOMOBILE:—1—Is there an instrument made for determining the acidity of a storage battery solution? I do not mean a hydrometer, but something to show when the battery contains the proper amount of acid and water. If there is such an instrument, please describe it and tell the principle on which it works.

2—I have been told that it is a good idea to pour out the battery solution occasionally and replace it with new solution. Do you recommend this?

3—A short time ago I had a pound in my engine which disappeared after having the carbon burned out with oxygen. After running only about 150 miles the pound is beginning to come back.

East Canaan, Conn. D. C. CANFIELD.

—1—There is no simple method of determining the acidity of the electrolyte other than by the specific gravity method which involves the use of the hydrometer.

The acidity could be determined by one of the methods used in quantitative analysis, and while this could be worked out so as to be simply done, it would not be as simple and as convenient as the hydrometer method.

With 100 per cent. sulphuric acid the specific gravity is 1.94, which means that it is 1.89 times as heavy as water at 60 degrees Fahrenheit. It is evident that if water is added to the acid the specific gravity of the solution will decrease, and in exact proportion to the amount of water added, until with no acid the gravity is unity. In other words, the specific gravity of the solution indicates the amount of acid or the acidity.

Possibly you have misunderstood the purpose of the hydrometer. It is not to determine the gravity itself, because that is of no intrinsic importance, but to find out the acidity—the proportion of acid to water. Fig. 2 gives a curve showing the percentage of sulphuric acid in water, for varying densities, at 60 degrees Fahrenheit.

2—This should never be done. You should, however, observe the following directions. Distilled water should be added weekly in summer and twice a month in winter, to replace that lost by evaporation. Add enough water to submerge the tops of the plates by about ½ inch. If distilled water is not available use rain water or melted ice.

If the tops of the plates are uncovered the effective area of the battery cell is reduced. While if too much water is added the cells will slop over.

Never add acid unless you know that some has been spilled out. Every few weeks the gravity of the cell should be determined by means of a hydrometer. The syringe type is most convenient for this purpose and can be bought anywhere.

The electrolyte of a fully charged cell should, when first put into service, have a specific gravity of about 1.280, and although with age this gravity will change somewhat, the battery will continue to give good service if the solution is between the limits of 1.250 and 1.300. If, on testing the electrolyte, it is found to be above 1.280, with the battery charged, a small amount of the solution should be removed and distilled water added. Make sure, however, that the solution is not allowed to drop more than ½ inch above the tops of the plates.

Low gravity in a battery is usually caused by acid being combined in the plates through lack of charge, although if a battery is upset and acid spilled or a jar is broken and acid leaks out, no amount of charging will restore the gravity.

Battery Should Be Charged First

Before attempting to raise the gravity of any cell by adding acid always charge the battery until sure that a maximum gravity has been reached, or, in other words, until no acid remains combined in the plates. For example, if the electrolyte in a cell should be adjusted to 1.275 when 50 points of acid remained in the plates, the gravity would come up to 1.325 if the cell were afterward charged to the maximum.

To adjust the battery to its proper value, 1.280, first bring the battery to its true maximum, which can only be assured by charging until no further rise in gravity is noted during a period of at least 24 hours of continuous charging at one-half the normal finishing rate. Then if the gravity is too high remove the electrolyte down to the tops of the plates and replace with water or 1.300 electrolyte as required.

3—The knock is probably due to some other cause than carbon, if the removal was complete. But without more details concerning the sound made it is impossible to say exactly where the trouble is. Lack of oil or improper cooling would cause a knock, but as you are using a large amount of oil it hardly can be the former. See that the water is circulating properly and that the fan belt is tight.

Next see that the compression is good in all the cylinders and that the spark lever is working properly. It is possible that some part of the linkage is loose, so that when the lever is moved the spark is not retarded. If the carbureter is not in good adjustment it should be attended to, because a poor mixture will cause a knock.

Possibly there is play in one of the motor bearings. If the knock is more perceptible when the motor is being slowed down, it is likely that this is the case.

Gasoline Consumption Low

Editor THE AUTOMOBILE:—1—I would like to know whether I could cut down my gasoline bill by putting on a new carbureter, as the one I now have gives me only 8 miles per gallon. My machine is a 1912 Palmer-Singer, having a carbureter of the three-jet type of the same make. The motor is the T-head type. This car weighs 5,300 pounds. Is the carbureter O. K.?

2—If the carbureter is O. K. what could I gain in miles by fitting another magneto to fire over the exhaust valves?

3—Where could I buy new caps for plugs for this car?

Swedesboro, N. J. T. H. BOLTON.

—1—This car should give about 10 miles per gallon in ordinary driving where a reasonable amount of stops are made and a certain mileage is spent in driving around the town or city. Where country driving at a good rate of speed is indulged in, the mileage per gallon should be somewhat above this figure.

It is possible that your carbureter is out of adjustment. By cutting down on the strength of the mixture your fuel bill should diminish.

See that the compression is good and that the valve timing is correct. Push the car over the garage floor, and if it takes much effort, look for friction in the running gear. Possibly the brakes are dragging.

Drive with your spark as far advanced as possible at all times without causing the motor to knock. Also see that the breaker points are in adjustment.

2—We do not believe that a noticeable increase in economy would result from the fitting of an extra set of spark plugs.

3—New plugs can be obtained from the Singer Motor Co., Jackson avenue, Long Island City.

Motor Overheats in 10 Miles

Editor THE AUTOMOBILE:—I have a 1913 six, seven-passenger touring car, that has been giving me a lot of trouble through overheating. It has been run about 4,000 miles and had a tendency, from the beginning, to overheat. I called the dealer's attention to the fact soon after I bought the car, but he told me it would get better after the car had been run a while, but instead has been getting worse, until at the present time I am unable to run any more than 8 or 10 miles before the water begins to boil in the radiator, and that on level country roads. I have taken it to several automobile machine shops without any results. They all declare the timing to be right; the fan seems to be working all right, so is the pump. We can find no obstruction in water lines and there seems to be nothing wrong in the timing or water circulation. The magneto is advanced as far as possible, and I am using as lean a mixture as possible. The car has a world of power and could not work any better up until the time that it begins to boil, when, of course, I have to stop and let her cool off and refill the radiator. The car is equipped with a Rayfield carbureter and Splitdorf magneto.

Ogden, Utah. J. W. L.

—You have named practically all the conditions that might cause overheating, yet since the trouble is still there it would seem that the search has not been thorough enough.

Overheating may be due to a defect in the cooling system, rich mixture, retarded spark, improper lubrication or incorrect valve timing, and possibly a slipping clutch or excessive friction in the chassis.

Under the first head there are several places that there might be difficulty. First determine that the water is circulating properly by emptying enough water out of the system to uncover the return connection to the top of the radiator. Then with the motor running note whether the water flows freely. If it does not, fill the radiator full of water and run the motor until the water boils. Then feel the various parts of the cooling system, noting the relative temperatures. For instance, if there is an obstruction in the return water header, such as a piece of loose rubber, the water on one side of the obstruction will be hot and on the other cool.

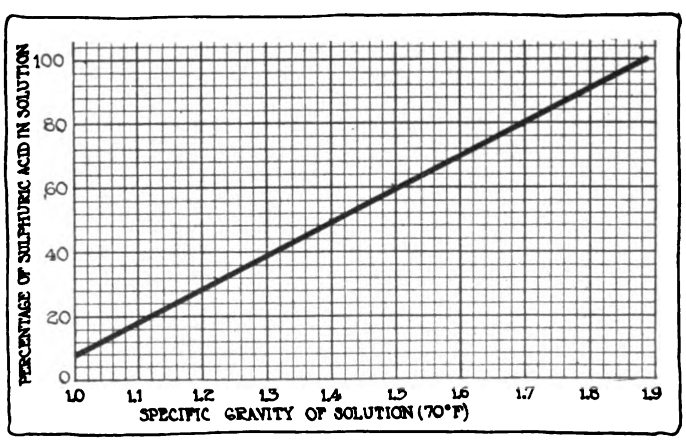


Fig. 2—Curve showing the specific gravity of various percentages of sulphuric acid and water

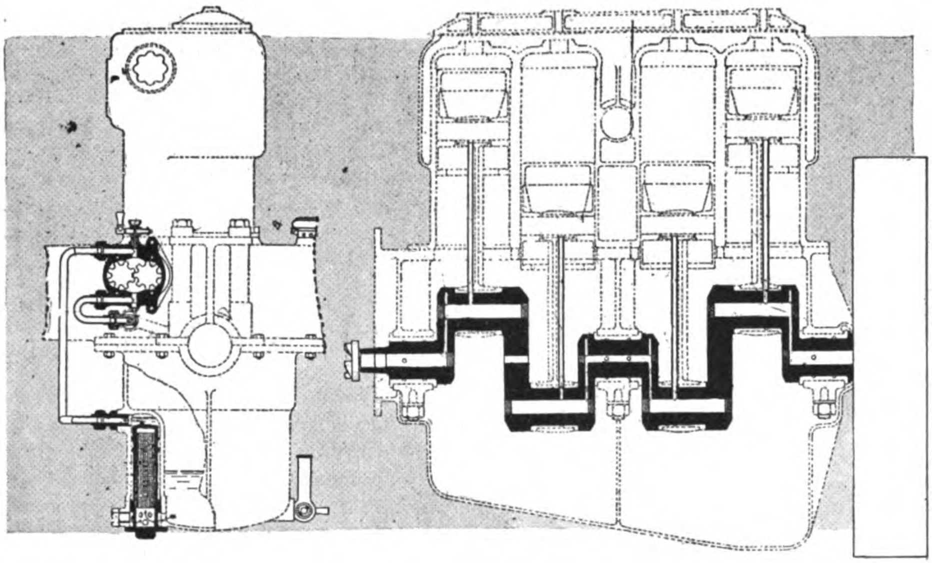


Fig. 3—Two views of the Lancia motor showing the oiling system. It is a force feed type in which oil is carried to all the bearings through a hollow crankshaft

Similarly, if the pump is not operating, due to a broken vane or to a sheared pin that holds the vane to the shaft, then the return header will be very hot, while the lower part of the radiator and the connection from thence to the pump will be cool. If the radiator is clogged up, the top should be very hot and the bottom cooler than usually. It may be that there is sand or some other obstruction in the water jackets. If the trouble cannot be found after diligent search it would be advisable to change the radiator. It may be that the fan belt is too loose.

While you may drive with the spark lever properly advanced and the magneto may be correctly timed, it is possible that the linkage connecting the spark lever with the magneto is loose, so that when the lever is advanced the breaker box is not acted upon.

See that the lubrication system is in proper working order and check up the valve timing.

Installing Spark Advanced on Lancia

Editor THE AUTOMOBILE:—I have recently purchased a four-cylinder 1909 Lancia with runabout body, 3.5 by 4.5-inch bore and stroke, cylinders cast in pairs, Bosch ignition, four-speed gearset.

1—What are the gear ratios? Is fourth speed direct?

2—The engine consumes, as near as I can measure, 1 gallon of oil per 225 miles, and consumes exactly 1 gallon gasoline per 19.6 miles. Are these figures unusual?

3—The magneto is set three-quarters full advance and has no timing control. Unless I get the car rolling at not less than 25 miles per hour it will not take any moderate grade on fourth without knocking. I find I am using third speed more than half the time, and do an excessive amount of changing between third and fourth speeds. I am told by experienced drivers that a car of this type, geared high on fourth speed, is managed differently than the usual three-speed American car, which is geared lower on high speed, and that it is customary to do a lot of gear shifting in place of manipulating the spark.

On third speed the car will take with ease all but the most precipitous hills. It knocks sharply on fourth speed if the throttle is not opened very gradually and delicately.

4—A very pronounced singing comes from transmission on first, second and, above all, third speed, but with four-speed it is noiseless. Does this mean excessive wear? The sound is musical rather than discordant.

5—Please describe the oiling system in full. A gallon reservoir with gauge leads to a rotary pump and thence by numerous leads to the bearings, apparently. Is there a splash system combined? And how is excessive oiling prevented?

LAWRENCE W. WHITE.

Milton, Mass.

—1—Fourth speed is direct. Several gear ratios are used on this car, but the common one is 4 to 1 on high, 6 to 1 on third, 8.5 to 1 on second, 13 to 1 on low.

2—The oil consumption is normal and the gasoline consumption excellent. The oil reservoir in the base of the motor holds over 2 gallons, and this should be changed every 500 miles by removing the plug at the base on the left side, Fig. 3. Take the strainer out and clean it. Put it back and replace the plug. Then flush the motor with kerosene, which is put in through the oil filler opening. Crank the motor over several times until the kerosene has penetrated to every part and then drain it out. After this the base should be filled with oil.

3—The knocking in your motor is not unusual in a car of this type, although it should not be necessary to use third as often as you state. It may be caused, as you suggest, by the early occurrence of the spark, and also to some extent by the carbureter.

In the first place it appears likely that the magneto is set too far in advance. It should be timed so that the breaker points are separating when the mark AA on the flywheel is at the top. But even with the spark so timed the motor may knock, and if the carbureter is found to be in good condition it is advisable to fit a spark advance, as will be described later.

There is no adjustmet to the carbureter except that obtained by filing the edge of the throttle valve, which is a cylindrical one. This should be left to a man that has had experience with this car. Part of the knocking, however, may be the result of dirt in the low-speed nozzle of the carbureter.

This carbureter has a large jet and a low-speed jet. The latter is located at the base of the tube that runs up the side of the main passageway. At the base of this pipe is the low-speed jet, which is so small that daylight can barely be seen through the aperture. Clean away any dirt that may be stopping up this hole and also wash all dirt out of the float chamber. If you have no strainer or sediment trap to catch the water before it reaches the carbureter, it would be wise to install one.

If it is found that the motor still knocks to a noticeable extent you should install a spark advance, as shown in Fig. 4. Return the magneto to the Bosch Magneto Co., 224 West 46th street, New York City, and have a new breaker box fitted, so that the spark can be advanced. Have the arm on the breaker box on the side next to the motor. The charge for doing this is small, but depends on the condition of the magneto, so that no definite figure can be stated.

Bowden Wire Spark Advance Used

A simple mechanism for controlling the movement of the breaker from the steering post is sold by the J. S. Bretz Co., 250 West 54th street, New York City. It consists of a spark lever that is clamped to the wheel, a flexible tube in which is carried a Bowden wire and a bracket to hold the lower end of the flexible tube in place. The spark is advanced by the pull of the cable and the return is accomplished through the spring shown. The friction in the advance lever is sufficient to hold the lever in any position in which it is set. This is accomplished by means of a small helical spring.

The bracket may be bolted to the crankcase, as shown, it merely being necessary to remove one of the bolts holding the two halves of the crankcase together and installing the bracket. Before this is done a hole must be drilled in the end of the bracket.

After the bracket is in place it should be bent by hand until the fitting through which the cable emerges is in line with the eye or hole in the breaker arm.

Be careful to order enough flexible tubing. The cable should be a few inches longer than the tubing.

Next take the spark lever fitting apart and fasten the back of it to the steering post. Then slip the cable in place, fasten it solidly and put the lever back in place. Slip the flexible tubing over the cable and pass the latter through the hole in the dash and fasten the end to the fitting on the bracket attached to the crankcase. With the spark lever at retard and the breaker box in the same position, fasten the cable solidly to the breaker arm by means of the yoked fitting shown. Finally tighten up the nuts that hold the cable in place. It only remains to attach the spring that returns the breaker to retard position and this is fastened at its upper end to the cylinder casting, as shown.

In timing the magneto set it so that with the breaker retarded the points separate when dead center is reached.

4—While the gearset may be noisy, it does not necessarily mean that any replacements need be made. Take off the gear-case cover and examine the shafts for play and note whether the teeth are in good condition. If any of the gears are very badly worn they should be replaced, and if there is any large amount of play when the shafts are shaken by hand, new bearings will be needed.

5—Lubrication is accomplished by a pressure system, Fig. 3, which delivers oil to all the bearings. The main bearings are lubricated directly from the main oil pipe. The crankpin bearings obtain oil from the main bearings by means of a hollow crankshaft, and from these bearings the oil is fed to the wristpins through tubes that are attached to the connecting-rods. From here the oil flows to the cylinder walls.

To go more into detail. The oil passes from the main feed pipe by means of canals cut into the main bearings, to the crankshaft bearings and to the timing gears. It continues to flow and enters the crankshaft itself through the small holes shown in the journals. The oil then passes through the crank arms and out into the copper tubes which carry it to the wrist-pin bearings and from thence out through the wrist-pins to the cylinder walls.

Oil circulation is maintained by a gear pump mounted on the back end of the camshaft. The pump obtains its supply from a 9-gallon reservoir in the base of the crankcase.

Pressure is automatically regulated by means of a bypass valve or oil pressure governor, at the side of the crankcase. The excess pressure opens this valve and allows the surplus oil to return to the reservoir.

The height to fill the crankcase to is determined by means of the stand pipe, or drip cock, depending on the model, at the side of the crankcase.

Double-Acting Motor Complicated

Editor THE AUTOMOBILE:—I would like to have your opinion of a double-acting four-cycle motor. I have been granted a patent on a motor that receives a firing impulse above and below the pistons.

Richmond, Ind. EDWARD L. YOUNG.

—While we do not know anythig about your particular motor the general objections to double-acting motors for automobiles are that it is too difficult to cool the stuffing box required around the piston rod; that there is danger of pre-ignition and warping of the piston due to the fact that it is exposed to intense heat on both sides; that such a motor must be a great deal higher, due, first of all, to the fact that there are two combustion chambers in the same vertical line, and also because a cross-head construction must be used.

To Cut Sheet Metal in a Vise

Editor THE AUTOMOBILE:—I have seen many a man go through all kinds of performances in cutting a strip off of a piece of thin sheet metal. Some use hack saws, some lay the sheet metal flat on a block of lead and drive a chisel through along a scratch line, and others will bend the sheet along the aforesaid scratch to an acute angle then bend the sheet straight again, etc., etc., until the break comes along the desired place.

The simplest way to cut sheet metal, provided it can be inserted into a vise, is shown in Fig. 5. Clamp the edge of the vise jaws along the line to be cut, and with the cutting edge of the chisel pressed down against the top of the vise, but as nearly at right angles as possible to the sheet metal, drive the chisel along with the hammer.

The cut made in this way is clean, accurate and easy. If you have never tried it, its simplicity will surprise you.

New York City. W. F. SCHAPHORST.

Manufacturer of Bergdoll Motors

Editor THE AUTOMOBILE:—Please publish in your next issue who manufactures the Bergdoll motor which is used in the Bergdoll 40 car.

St. Louis. E. EDWARDS.

—Write the Louis J. Bergdoll Co., Philadelphia, Pa.

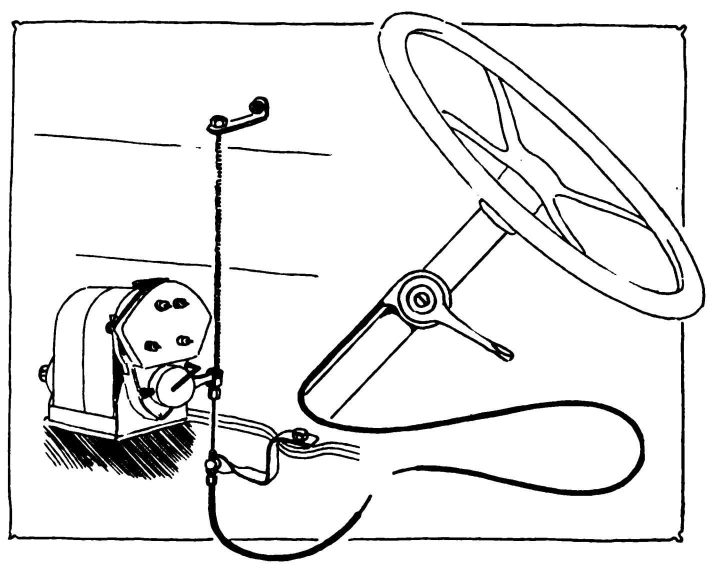


Fig. 4—Spark advance installed on 1909 Lancia. The lower end of the flexible cable is held in a bracket attached to the crankcase. This bracket is bent into shape by hand. The breaker is returned by means of the spring which is attached at its upper end to bracket that is bolted to one of the studs on the exhaust plate.

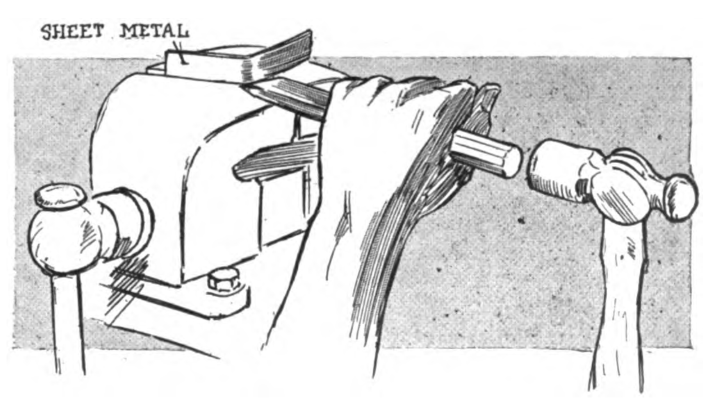


Fig. 5—Method of cutting sheet metal with a cold chisel and a vise

The Engineering Digest

Elements in Gearing and Clutches Serving to Avoid Jerky Starts and Needless Wear of Tires

EDITORIAL NOTE—The study which is presented herewith relating to the mechanics involved in the starting of a vehicle from an internal-combustion motor, is believed to be the first of its kind. The author seems to feel the difficulties and to grope his way toward definite conclusions. The language in the German original is super-condensed, uninviting and non-committal. But the equations which the author has gathered and the figures deduced from them to show the extent of the slip-movements involved in starting a vehicle, form an excellent basis for further attempts at digging out of the subject what there should be in it with regard to the proper relations of clutches, transmission gears, vehicle weights, motor sizes and speeds and several minor design features—a large subject which has been especially neglected, so far as theory and practical refinements are concerned, and which is especially important with regard to vehicles intended for carrying heavy and variable loads.

If, in contrast to what the author means to convey, it may be shown that heavy loads in reality may be started easily from a small high-speed motor working through any ordinary clutch—on average or poor roads and without slipping of the driving-wheels—or if, on the other hand, the opposite is shown to be true, something would evidently be gained toward getting at the reasons for the very different starting-qualities actually observed in different makes of trucks, delivery wagons and omnibuses. The essay of Mr. Achilles conveniently supplies some of the reasoning-material which might be used for this purpose.

The question of the feasibility of using small motors of high speed for heavy work is among the most important ones on which an elaboration of the subject would shed light.

WHEN a motor vehicle is so constituted that skilful slipping of the clutch and manipulation of the throttle are required in order to avoid jerky starts or the spinning of the driving-wheels, with the tires in frictional contact with the ground, it is to that extent less perfect than one which can be handled more carelessly or less skilfully without undesirable consequences. F. Achilles, an engineer of Mannheim, Germany, examines the factors which must be considered in the design of cars with reference to this matter, assuming at first that the motor runs at a certain regular speed and that the clutch has no slip. The argument may be rendered as follows:

It is necessary to know the difference in the distance covered by the actual acceleration of the vehicle from a standstill and that which would be covered if the driving-wheels followed the motor, without retarding it, during the time occupied by the acceleration.

If the motor at the starting runs with N turns per minute and the factor of total speed reduction on the lowest gear is U, the driving-wheels make n turns, n being equal to N divided by U. With a wheel diameter D the vehicle would then have a uniform speed of V meters per minute, V equalling $\pi D n$. Conforming with the custom of having V stand for meters per second, we have $V = \frac{\pi D n}{60}$. The distance S covered by the vehicle in the time T is VT.

On the other hand, the motor applies a torque which, with the transmission ratio and the diameter of the driving-wheel duly considered, gives a pull Z at the point of tire contact with the ground. After deducting the value representing the starting-friction there remains a surplus Z_1 for the acceleration of the vehicle. The value of the acceleration P involves the weight of the vehicle G and the acceleration factor $g = 9.81$ meters (corresponding to 32.20 feet), making $P = \frac{Z_1 \times 9.81}{G}$, and with this acceleration there is in the time T covered a distance $s = \frac{PT^2}{2}$.

For a given time T it is thus simple to figure the difference in the distances. But it is of more importance to know what the maximum difference in the distances amounts to and at what time it occurs. When P and T are given, these are the factors to be determined. Calling the maximum difference Y, one has $Y = S - s = VT - \frac{PT^2}{2}$, in which the greatest value for Y is obtained (according to simple maxima-and-minima rule) when $T = \frac{V}{P}$. Inserting this value, one has

$$Y = \frac{V^2}{P} - \frac{V^2}{2P} = \frac{V^2}{2P}$$

Still more directly of interest than the difference in distances at the circumference of the driving-wheel is perhaps the same factor expressed in revolutions of the driving-wheel. In other words, the difference is to be expressed between $n_v = \frac{VT}{\pi D}$, which is the number of revolutions which the driving-wheel would make in the time T from the beginning of the starting with the vehicle speed V and, on the other hand, $n_p = \frac{PT^2}{2\pi D}$, being the number of revolutions of the driving-wheel in the time T with the acceleration P beginning at the start. The maximum value is found exactly as above, with insertion of the value for $T = \frac{V}{P}$ which gives the maximum value for the difference sought, and the latter is thus seen to be $Y_n = \frac{V^2}{2P\pi D}$

To illustrate the meaning of these general values it may be

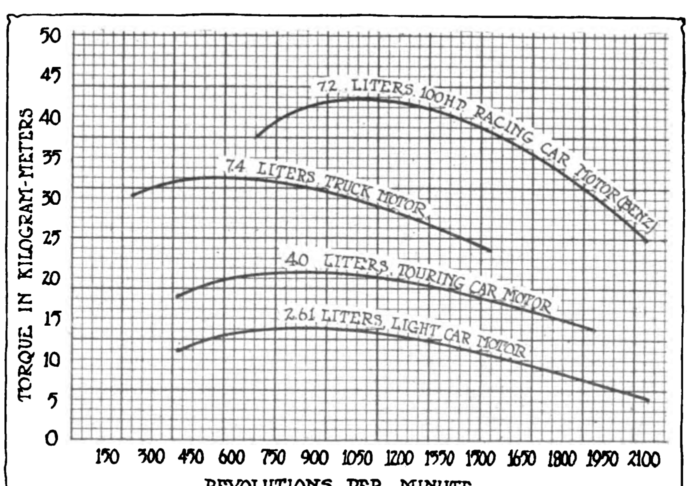


Fig. 1—Comparative torque curves of different vehicles

advisable to give also a general example. Let it be assumed, then, that a motor vehicle has a wheel diameter $D = 1$ meter and with its lowest admissible motor speed and its greatest speed reduction gives a uniform vehicle speed V of 1.5 meter per second and by its pull gives an acceleration $P = 1.5$ meter per second. With these data the figures obtained from the preceding equations may then be arranged in the following table:

TIMING OF MAXIMUM SLIP IN STARTING

Time from beginning of start T = (seconds)	1/10	1/5	¼	½	¾	1	1¼	1½	2
Distance covered S = ...(meters)	.15	.3	.375	.75	1.125	1.5	1.875	2.25	3.0
Distance covered s = ...(meters)	.0075	.03	.047	.1875	.425	.75	1.175	1.7	3.0
Difference S—s = ...(meters)	.1425	.27	.328	.667	.70	.75	.70	.55	0
Revolutions with motor speed V; n_v =	.048	.096	.12	.24	.36	.48	.60	.72	.96
Revolutions with acceleration P; n_p =	.0024	.0096	.015	.06	.14	.24	.38	.54	.96
Difference, $n_v - n_p$ = ... (revolutions)	.0456	.086	.105	.18	.22	.24	.22	.18	0

In this example, it will be noticed, the maximum differences in the movements occur when $T = 1$ second.

It is now necessary to compare practice with the principles of movement expressed in this schedule of figures. In reality the motor is not coupled rigidly with the transmission gear. The friction clutch creates the possibility for reconciling the differences in movement. When it is considered, however, that these differences are U times greater in the clutch than in the driving-wheels, it is plain that they may tax the clutch surfaces unduly. In the case of the scheduled example, where U is 16, as common for touring cars, a maximum difference of $.24 \times 16 = 3.8$ revolutions is obtained for the driving and the driven portions of the clutch. In other words, during the first second of the start the driven portion of the clutch must be allowed to slip 3.8 revolutions.

[While the author means to show principally that it is desirable in the designing of a car to take close account of the relations between speed and torque of the various revolving parts, in order to be able to proportion the clutch and the gears, and even the wheels, suitably for the work expected of the vehicle and its driver, it is clear that his argument bears with equal force upon the advantages to be derived by bringing all slip movements under the most facile control without resorting to extraordinary maintenance care of the slipping surfaces or to extraordinary demands for operative skill on the part of the driver. Indirectly the merits of a good hydraulic clutch, especially for the heavy load-carrying vehicles in which the torque of the wheelshafts necessarily must be considerable, thus enter in the subject, as well as the question of the preference for one or another of the standard types of clutch, according to the nature and purposes of the vehicle involved in each case.—Ed.]

How Tires Are Affected

The movement required of the clutch is of considerable importance. But there are other elements in which the required movements can be equalized. The yielding properties of rubber tires, especially air tires, admit of some displacement in the direction of motion. But the principal element of this nature comes into existence through slipping of the driving-wheels on the road after overcoming the road friction. The condition for having this element come into action is that the driving-pull at the tire circumference, with the lowest gear in mesh and the motor at the lowest speed which may be depended upon to start the vehicle, is in excess of the resistance to the sliding of the two wheels. If this condition exists and is aggravated by lack of skill on the part of the driver it becomes the cause for abrasion of the tires at every start.

On the whole, in order to be able to start at all, there must be the possibility for

(1) either slipping the clutch to allow for the difference in movement, and the clutch spring pressure must in that case be adjusted to correspond to the torque resistance;

(2) or slipping of the driving-wheels on the road surface, and in that case the road friction and the required pull at the tire circumference must correspond;

(3) or a movement in the transmission gearing admitting of the equalizing of the different movements.

In order to know in advance how a certain vehicle will act at the starting, the numerical value of the following factors must be known:

(1) Total weight G of the vehicle; (2) G_w, being the portion of G resting upon the driving-wheels; (3) diameter of driving-wheels D; (4) Factor U of speed reduction in the transmission from motor to wheelshaft on lowest gear speed; (5) power development of the motor throughout the lower range of motor speeds.

With regard to the latter factor, which must take the form of a schedule of figures or a torque curve like those shown in Fig. 1—giving comparative torque curves for several vehicles—the well-known fact is to be noted that each motor produces its highest pull and torque at a certain number of revolutions depending in each case on its design (see Fig. 1). At the starting, under the throttle, the number of revolutions will drop till the pull produced by the motor corresponds to the frictional resistance to rotation at the tire circumferences. At that moment the highest available pull of the highest torque is realized.

The maximum motor torque is to be figured from the mean piston pressure p, which may be done in the simplest manner by counting on $.8\ p$ for each liter of cylinder volume. And from the number of kilogram-meters motor torque so obtained the effective torque can be figured under the assumption of a mechanical efficiency in the transmission of 70 to 75 per cent., and the driving pull at the tire circumference can be determined from the wheelshaft torque when the wheel radius is known.

The starting speed of the vehicle must be determined from the number of motor revolutions giving the necessary pull.

Finally there is required knowledge of the friction coefficients on different road surfaces. These figures may be about as follows:

Ordinary macadam—rubber tires 50 to 60 per cent.; iron tires 40 to 50 per cent.

Better macadam—rubber 40 to 50 per cent.; iron 30 to 40 per cent.

Stone pavement—rubber 30 to 40 per cent.; iron 25 to 30 per cent.

Wood blocks—rubber 30 to 35 per cent.; iron 20 to 25 per cent.

Asphalt—rubber 20 to 30 per cent.; iron 15 to 25 per cent.

With this material arranged it is possible to illustrate the previous reasoning by definite examples. Let the first one refer to a light 10-tax-horsepower car with a cylinder volume of 2.61 liters. Out of the total weight of 1,500 kilograms, everything up, 900 kilograms come on the rear axle. Let the wheel diameter, including tire, be 820 millimeters and 16 the factor of the transmission ratio on low gear. On the supposition of a mean effective piston pressure of 6.5 kilograms per square centimeter there is found to be a motor shaft torque of 13.6 kilogram-meters and at the tire circumference, with the 75 per cent. efficiency in the transmission and the transmission ratio of 1 to 16, a torque of 162 kilogram-meters. Out of this torque a pull of 400 kilograms becomes available at the tire circumference, and, figuring on using about 50 kilograms to overcome the starting-friction, there remains a pull of 350 kilograms for acceleration. This has an acceleration value $P = \frac{350 \times 9.81}{1,500} = 2.3$ meters per second.

As it is further to be assumed that the maximum torque is furnished by the motor at 600 revolutions per minute, the coupling should take place at this speed, and the vehicle speed V corresponding to this motor speed, being $V = \frac{600 \times \pi \times D}{16 \times 60} = 1.6$ meter per second, is the one to be considered in the figuring.

With these figures the time T after which the difference between S and *s* reaches maximum is determined as before by giving T the value $\frac{V}{P} = \frac{1.6}{2.3} = .7$ second, because this value for T gives maximum value to $Y = S - s$ in the equation $Y = S - s = VT \frac{PT^2}{2}$

The greatest difference Y in road distances—according to whether motor speed or available torque is made the basis for the determination—is on the same plan found to be

$$Y = \frac{V^2}{2P} = \frac{1.6^2}{4.6} = .55 \text{ meter}$$

and the greatest difference in the movements as expressed in revolutions Yn of the driving wheels, being Y divided by πD, is seen to equal $\frac{.55}{\pi D} = .215$ revolution.

The difference in revolutions of the motorshaft is of course 16 times as large, or $16 \times .215 = 3.45$ revolutions.

TABLE SHOWING VARIATIONS IN CONDITIONS FOR USE OF CLUTCH

Type of Vehicle	40 H.P. Car	70 H.P. Car	100 H.P. Benz Racer	3-Ton Truck	5-Ton Truck	6-Ton Military Truck with Trailer
Cylinder volume, liters	4.0	8.0	7.2	5.2	7.4	7.4
Vehicle weight, kilograms	1,750	2,200	1,540	5,600	9,000	12,000
Weight on driving-wheels, kgs	1,050	1,350	860	3,300	5,400	4,800
Mean effective piston pressure referred to motorshaft, in kilograms per square centimeter	6.5	6.5	7.0	5.5	5.5	5.5
Torque of motorshaft, in kilogram-meters	20.8	41.6	40.25	22.8	32.5	32.5
Total transmission ratio, U	15	10.25	6.65	37	37	57
Torque of wheelshafts, kilogram-meters	235	325	200	630	900	1,300
Diameter of driving-wheels, meters	.880	.935	.810	.930	.930	1.030
Pull at the wheelrims, kilograms	535	690	495	1.350	1.950	2.550
Co-eff. of road friction corresponding to driving-pull, per cent	510	510	570	410	360	530
Available acceleration P, meters per second	2.75	2.95	3.4	2.1	1.85	1.80
Motorspeed giving max. torque, N, rev. per minute	700	500	800	400	400	400
Vehicle speed corresponding to N, meters per second	2.15	2.35	5.1	.66	.66	.38
Time T of max. slip movement, $T = \frac{V}{P}$, in seconds	.75	.80	1.5	.32	.36	.21
Max. road difference, $Y = \frac{V^2}{2p}$, in meters	.83	.93	3.75	.104	.117	.04
Max. diff. in wheel rev., $Y_n = \frac{V^2}{2P\pi D}$	.3	.315	1.46	.036	.04	.012
Max. slip in clutch, in revolutions	4.5	3.3	9.75	1.25	1.5	.73

If it is further considered that a pull of 400 kilograms can be applied through driving-wheels under a load of 900 kilograms only when the co-efficient of road friction gives a minimum resistance against slipping of the wheels of $\frac{400 \times 1,000}{900} = 44.5$ per cent., the inferences relating to practical operation of such a car as referred to in the example may be formulated as follows:

With a rigidly acting clutch the driving-wheels will slip to the extent shown on a road surface having a friction coefficient exactly corresponding to the torque required for starting the vehicle. On roads with smaller friction the slipping will occur at the application of a smaller torque, and in considerably aggravated degree because under that condition the acceleration is smaller. On roads with higher friction the vehicle will remain on the spot if the clutch cannot be slipped the required amount.

The appended table gives numerical values for the factors of interest, as applied to six other standard automobile types.

It is left to the reader to draw conclusions from these figures with regard to the properties required of the clutches and the sizes of motors by which the necessary starting torque may be produced at a motor speed sufficiently low not to tax the clutches actually available too severely.—From *Auto-Technik*, July 4.

Hydraulic Clutch with Ball Pistons Made in England

CONSIDERABLE activity is noticed, mainly in this country and in England, aimed at the improving of hydraulic mechanism for the transmission of power and foreshadows perhaps the time when cheap and very durable devices of this class will take the place in automobiles of friction clutches and toothed transmission gears. If the mechanical efficiency of the perfected hydraulic element may not be expected to equal that of refined gears when these are new, it may on the other hand be relied upon to remain practically the same for a number of years, while cheapness and lightness must be assured in the final outcome through the avoidance of costly machining and hardening of parts and through the equable distribution of stresses. The use of packings, to obviate leakage along the shafts, is still an important drawback in hydraulic devices of small dimensions, but the improvements of recent years usually include provisions for returning leaked-out oil to the circulation system—as, for example, in the Hele-Shaw hydraulic gear for ships and motor trucks—and thereby allow the use of packings which are relatively loose and not subject to much wear.

It is naturally in the easier applications of the hydraulic principle that the improvements take the most acceptable form. Pumps with fixed capacity, for each shaft revolution, and hydraulic clutches—from which only a graduated slip but not a changeable torque is required—are first to bid for serious practical attention from automobile builders, while the more complicated devices meant to take the place of the four-speed gearbox still present themselves with too many interrogation points to the critical engineer bent on safe results.

The hydraulic clutch becomes of special interest in connection with the design problems submitted by Mr. Achilles of Germany in the preceding article, relating to the starting of vehicles and clutch maintenance. A clutch of this class is one of four hydraulic mechanisms brought out by R. F. Carey of Variable Pumps and Motors, Limited, of England, and the main features of its design are shown in Fig. 2. One of the innovations is the use of steel balls as pistons, and this is also found in the three other mechanisms designed by him, comprising a pump with fixed capacity, one with variable capacity and a variable-torque transmission.

The driving-shaft or rotor A of the clutch is fixedly secured to the steel cylinder F which is formed with six radial pump bores containing snugly fitting steel ball pistons and is mounted eccentrically in the driven casing, comprising parts G and B, by means of ball bearings HH. Between the two portions of the casing there is mounted the hardened steel ring J which forms a track limiting the in-and-out movements of the steel balls, eccentrically, so as to cause the balls to reciprocate in the pump bores when the rotor is revolved. This track is held in position by the same bolts that hold G and B together. Centrifugal force holds the balls against the track, and the friction with it gives the balls a rotary movement while they are being reciprocated. The apparatus, in the dimensions shown in the drawing, is intended to transmit 20 horsepowers at 1,000 revolutions per minute.

In the position shown the casing will remain stationary when A is revolved, the oil simply circulating among the cylinders, but by moving the clutch ring C to the left the valve body D, whose inner end is a cylinder ground to fit in a central longitudinal bore in the rotor, is moved by means of the transverse pin K and obstructs more or less the communication from one pump bore to another. Pressure then rises in those bores in which the steel balls are being driven inwardly by reason of their relations to the track J, and the friction created with the track eventually causes the casing to be carried along with the rotor. The more completely D obstructs the oil flow the less is of course the slippage which takes place. When D separates the bores entirely, except for the internal leakage along the contacting surfaces, B will move at almost the same speed as A. At this point the connection can be made positive by moving D a little further, as then the dog clutch L is brought into engagement with corresponding dogs MM on the rotor, the slowness of the relative movement of the two parts rendering it easy to effect the engagement without clash of the dogs.

The box E carried on the rotor shaft is connected to an oil reservoir and is used for filling the apparatus. It also provides for expansion of the oil and for the displacement of oil which is due to forcing the body of D into it.—From *The Engineer*, London, August 14.

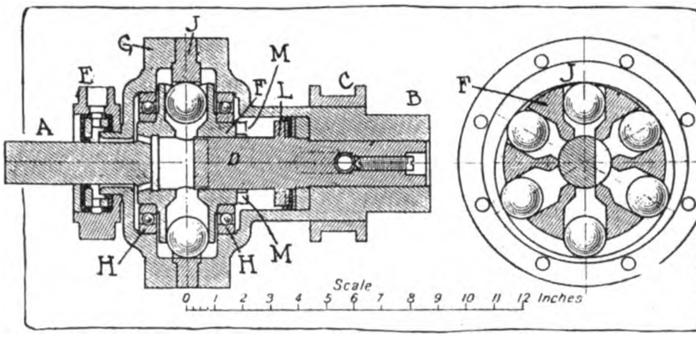


Fig. 2—Carey's hydraulic clutch with balls as pistons

How Low's Small-Size High Compression Motor is Progressing

WITH the economical production methods instituted by the American automobile industry—and now imitated more or less thoroughly in all manufacturing countries—creative engineering, and therefore also designing, is necessarily two or three years in advance of manufacture, being concerned with that which may become embodied in popular motor vehicles two to three years hence. From this viewpoint it is to those constructions and construction features which have not yet reached common acceptance but which nevertheless seem to possess a good fighting chance that most attention is paid in these DIGEST columns, rather than to fully accomplished and recognized improvements. Among the tentative constructions claiming notice the small-size motors designed by Dr. Low of England hold a prominent place because they are operated with very high compression and represent a development promising fuel economies for small and light motors similar to those accomplished with Diesel motors in another field. With regard to the progress made with the Low motors, F. X. Schmelz, a German engineer, writes from London substantially as follows:

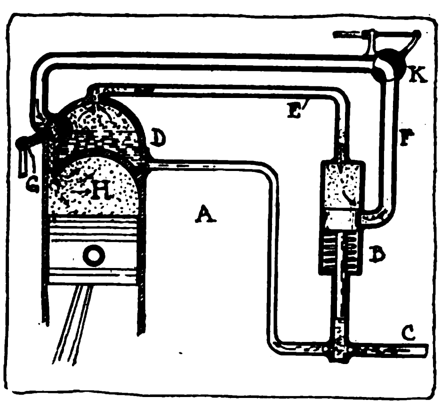


Fig. 3—Scheme of Low motor

The high-pressure motor constructions developed by Dr. Low have passed through the experimental stage and before long [this was written before war began] several models adapted for automobiles, motor trucks and aeroplanes will be placed in the market. The patents have been acquired by a strong syndicate and this is at present working with the inventor on the last refinements intended to make the motors foolproof. A number of well-known English motor firms are also experimenting with these motors and the military authorities are strongly interested in them, mainly with aeroplane service in view.

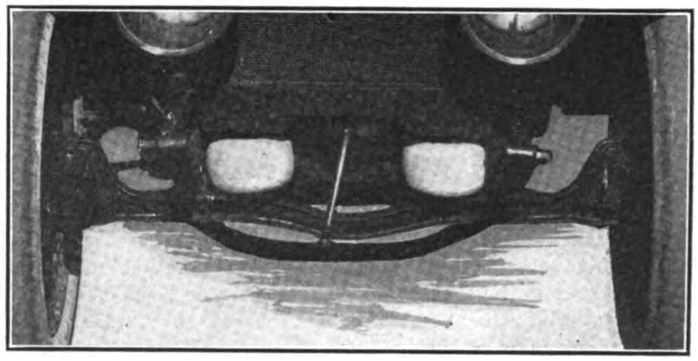
The Low motor now works on the four-cycle system. [An account of the previous stage in its development may be found in THE AUTOMOBILE of March 13, 1913, page 632.] The suction stroke takes in only atmospheric air which is brought to a tension of 35 atmospheres by the compression stroke. This high compression has made the use of a steel sleeve for the cylinders necessary, as with the ordinary cast-iron cylinders the air leaked out through the walls. A still more forcible reason for making the walls absolutely inpenetrable is that gasoline vapor under a pressure of 70 atmospheres is stored in a jacket surrounding the cylinder and if this could be forced into the cylinder through its wall an explosion during the compression stroke would be the result.

The accompanying diagrammatic sketch, Fig. 3, indicates clearly how the gasoline is taken into the jacket, how it is vaporized and how it is finally admitted to the cylinder. The jacket is in this sketch represented by the tube A and is connected at one end with a special plunger pump B and with the gasoline tank—by the pipe C—while the other end connects with a dome D over the cylinder head. From the dome a pipe E leads to the space above the piston in the pump barrel. Another pipe F branches from this barrel near the lower end of the plunger stroke and leads by way of throttle K to a valve G giving admission to the combustion chamber H. The starting of the motor is effected with small compression and magneto ignition, as in ordinary motors. The gasoline jacket is filled with gasoline by the first few revolutions and, as the motor has been preheated, this fuel is vaporized and raised to high tension. When this has been accomplished the mechanism is adjusted to produce full compression and thereafter only air is drawn in and compressed. In the first experimental motors the piston at the end of the compression stroke impinged against a needle valve which admitted high-tension vapor to the cylinder, but this arrangement did not admit of speed changes by regulation of the fuel feed, and therefore the rotary valve G was devised which could be regulated mechanically and imparted

(*Continued on page* 459)

Pneumatic Spring Gives Varying Resiliency

Cox Air Cushions Automatically Increase Pressure with Load—Frame Level Constant



Cox pneumatic cushions attached to the front of a car

RESILIENCY that varies with the passenger load is obtained by the pneumatic cushion spring manufactured by the Cox Pneumatic Cushion Co., New York City.

As will be noted in the accompanying illustrations the spring consists of a ball cushion several inches in diameter that is put between the axle and the frame in the place of the ordinary leaf spring. This cushion is connected at its upper end or neck to a large auxiliary tank and when the cushion is compressed, air is transferred from it to the tank. The tank is so large, however, in comparison, that the pressure rise is negligible.

Accommodation to varying loads is automatically obtained by a regulator which changes the pressure in the auxiliary tank and cushion by allowing air to flow from the main tank to the auxiliary tank. The pressure in the main tank is maintained by a pump. The pressure in the auxiliary tank and air cushions varies from about 20 to 30 pounds depending on the load. How the regulator works will be described later but it automatically holds the frame, when the car is at rest, at a certain distance from the ground regardless of the load.

The cushion is made from several layers of rubber and tire fabric and resembles the ordinary tire casing in construction.

The life of these cushions is from 2 to 3 years although in some cases it has been more than this. A leaky cushion is unheard of.

Only the pressure in the rear pair of cushions is varied, the load on the front of the machine being so nearly uniform that the pressure is maintained constant by using a separate tank. That is not connected to the pressure regulator.

Pressure Fixed Before Car Starts

The pressure in the rear cushions is brought to the required amount, before the car starts. But after the machine is in motion the pressure cannot be changed except the small amount due to the compression of the cushions. When the axle is raised on striking a bump, the cubical capacity of the cushion is reduced and some of the air is transferred to the air tank. The walls of the cushion fold back over the conical plungers that support it at the top and bottom, thus increasing the supporting area in accordance with the violence of the shock rendered. Each fraction of an inch of axle movement thus increases the resistance, and the axle, moving upward, gradually slows down and stops.

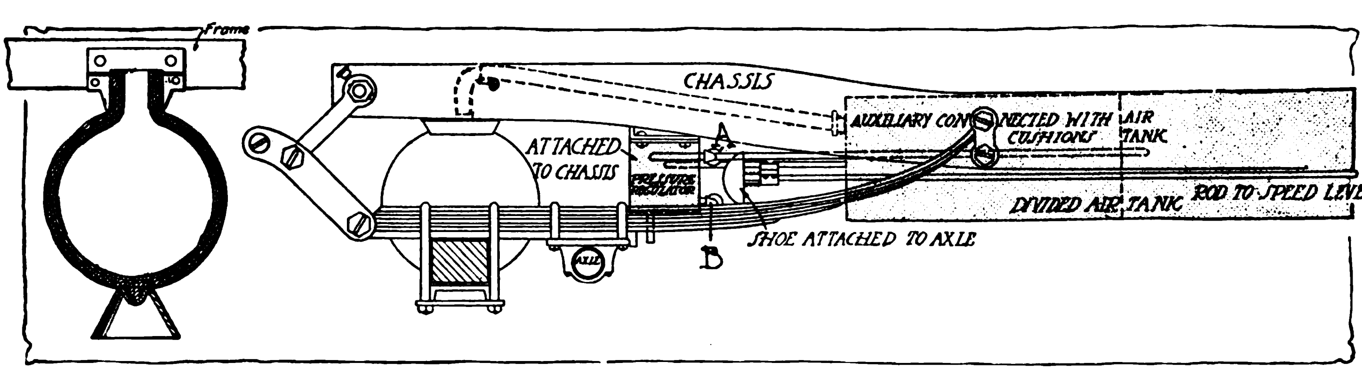
This is the principle of the pneumatic tire, and, by comparison, the spring and plungers take the place of the road and tread of the tire, the volume of air in the auxiliary tank being more than equal to the volume of air in the tire. This increase of the supporting area of the springs is very much along the same lines as the tire increases its supporting area when it flattens out on the roadbed under an added load or shock. Thus it will be observed that shocks caused by road obstructions are sustained by an automatic increase in the contact area of the springs with the plungers. The auxiliary air reservoir, owing to its large volume of air, relative to the small amount of air displaced from the springs, obviates any perceptible increase in the air pressure while the vehicle is running, thereby allowing a long travel of the plungers into the spring cushion.

Pressure is increased according to the load by means of the regulator, already mentioned, the main part of which is attached to the chassis frame. What is known as the shoe, however, is fastened to the axle. It is the relative movement between these two parts of the regulator that varies the pressure so as to keep the frame level constant.

This shoe is moved out of reach of the rollers when the car is started, by being connected to the change gear lever. If this provision were not made, the relative movement of the axle and frame would cause a transfer of air on a rough road that would prevent the working of the device.

When passengers enter the car, the frame sinks a certain

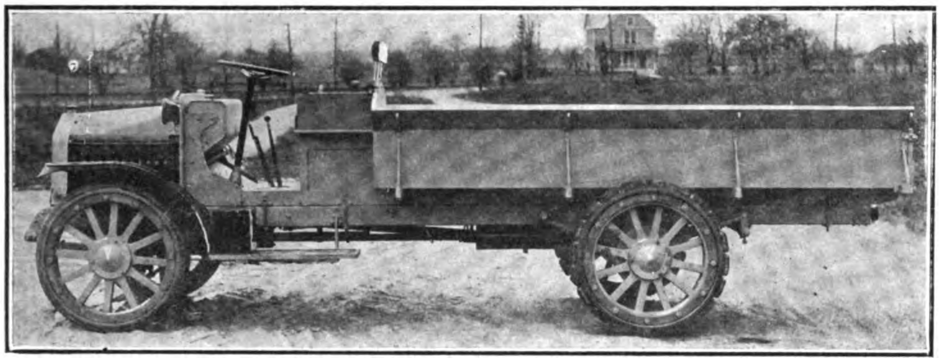
(*Continued on page* 455)



Left—Section through air cushion showing method of attachment and support. From the conical shape of the plungers, it will be noted that when the cushion is compressed, it folds back over these plungers and the effective area is increased.

Right—Cushion attached to rear of car. The spring has been sawed off and a new rear shackle put on. The cushion is placed directly behind the axle. A pipe connects the cushion with the low pressure, or auxiliary side of the air tank. The movement of air from one to the other is free and uninterrupted, when a bump is struck. The right side of the tank contains high-pressure air which is introduced into the auxiliary tank by the regulator when load is put on.

Fremont-Mais Has Double Reduction Axle



Fremont-Mais 1.5-ton truck

Made With Two Frame Lengths—Chassis 1.5-Ton—Flexible Frame and Unit Power Plant

THE new 1.5 ton truck, known as the Fremont-Mais is notable for the flexibility of the frame and of the various power units in relation to it, and for the unit power plant, and double reduction rear axle.

The truck is the design of Albert F. Mais and is manufactured by the Lauth-Juergens Motor Car Co., Fremont, O. It is made in two wheelbase lengths, 132 and 144 inches.

The frame is of pressed steel, substantially straight from end to end, with integral spring horns in front. It is designed to carry but few cross-members, these being designed with integral gussets.

The power plant is placed well forward under a blocky hood, with the radiator in front. It consists of a Buda truck type motor, 3¾ by 5½, fitted with Eisemann fixed-spark ignition and pump cooling; a Warner leather-faced cone clutch, and a Warner three-speed selective gearset, all three being rigidly secured to one another and suspended from the frame at three points. From the gearset the power is transmitted to the rear axle through a shaft with two universals.

Internal Gear Drive Used

The rear system consists of a specially-designed internal-gear-driven rear axle, the axle proper being an I-beam which carries the brake flanges. Bolted rigidly to this is the jackshaft, consisting of a bevel-driven differential driving spur pinions in each brake flange. The third member enters the differential housing through a bearing in the axle web. In the brake drums are internal teeth which mesh with the spur pinions, thus taking the drive through a secondary reduction. The spring pads are of liberal size and integral with the axle beam, the springs being relied upon to take both torque and propulsion.

Foot brakes are located in the rear drums, the hand brake being on the driving shaft, just in front of the axle. The brake and gearshift levers are both in the center, the steering wheel being located to the left. Although the spark advance is fixed, there are two levers on the steering wheel, one for the throttle and the other for the air adjustment of the carbureter.

A storage battery provides current for the electric side and tail lights. The wheels are of the square-spoked pattern, having 36 by 3½ front tires and 36 by 5 in the rear.

Pneumatic Spring Gives Varying Resiliency

(*Continued from page* 454)

amount, which brings the shoe, which is attached to the axle and moves with it, into contact with the roller A. This action opens a valve between the pressure tank and the auxiliary tank. Pressure flows from the former to the latter, until there is sufficient in the system to bring the frame up to the normal level, when the roller moves out of contact with the shoe and the pressure is shut off. Similarly, if a passenger gets out of the car, the frame will rise and the shoe will press against the roller B, and open a valve that allows the pressure in the auxiliary tank to flow into the atmosphere.

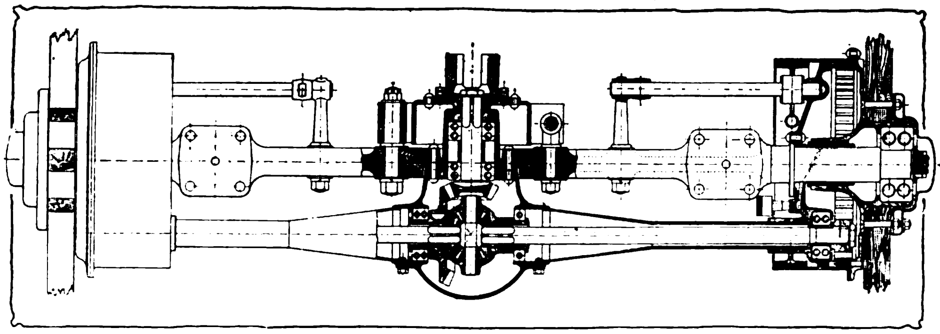
The system may be applied to any car by cutting off the rear ends of the rear springs and putting in a shackle with a double joint in it, thus allowing free vertical movement but no lateral. At the front, all the leaves but two are removed, these being merely to hold the car against side sway. Thus the spring is used as a guiding member. On new cars a solid bar would replace the spring.

A representative of THE AUTOMOBILE had a ride in a touring car equipped with these springs and found that the car rode smoothly on cobblestones at all speeds.

It is claimed that as much as 18,000 miles can be obtained from a set of pneumatic tires due to the superior resilience of these springs.

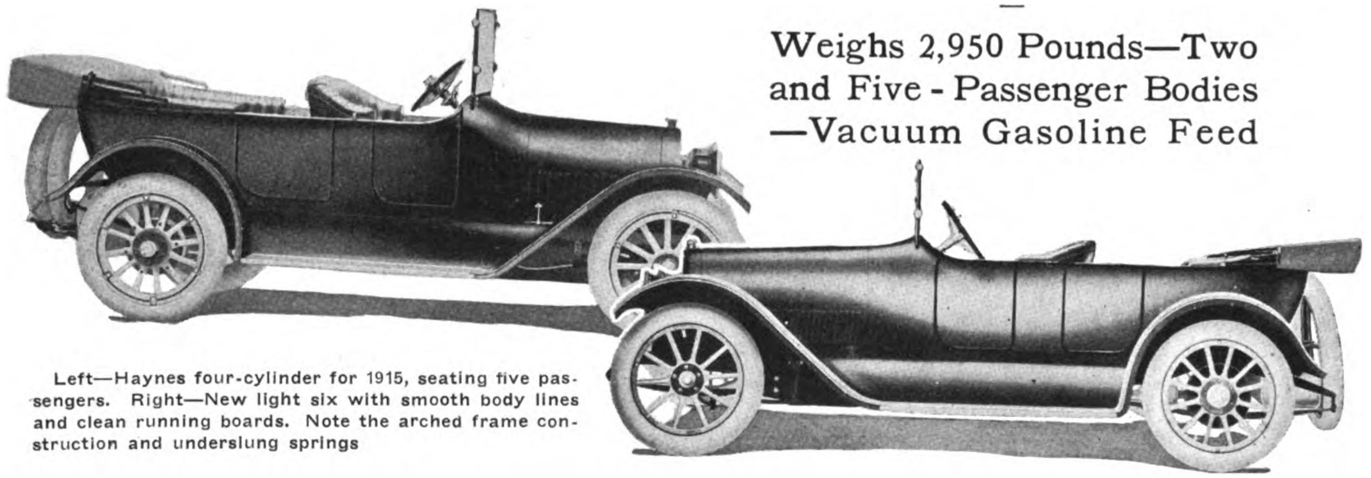
A prominent concern in New York that has a great many trucks, has been using this spring on one of its trucks for over 2 years, and greatly increased tire mileage and reduced wear and tear on the machinery have resulted.

Floating rear axle of the double reduction type used on the new Fremont-Mais truck. The second reduction is in the shape of a driving pinion and internal gear at the wheels. The load is carried on an I-beam axle and the differential gearing and driving shafts are in a separate housing at the rear. Note that the hand brake is located directly in front of the I-beam axle. It is a contracting band type, while the foot brakes expand in drums attached to the wheels.



New Haynes Six Sells for $1,485

Weighs 2,950 Pounds—Two and Five - Passenger Bodies —Vacuum Gasoline Feed



Left—Haynes four-cylinder for 1915, seating five passengers. Right—New light six with smooth body lines and clean running boards. Note the arched frame construction and underslung springs

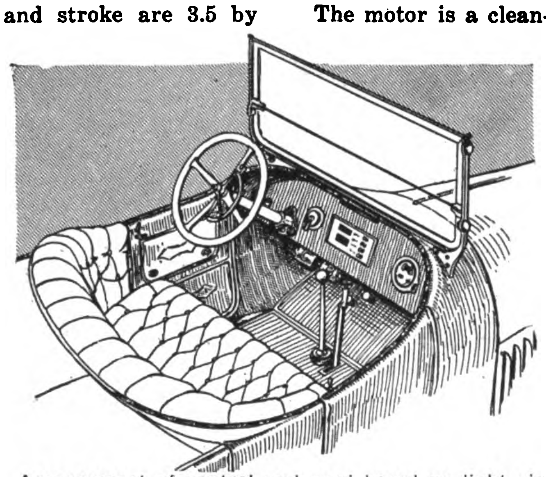
FOR 1915 the feature of the Haynes line will be a new model light six of 55 horsepower, weighing 2,950 pounds, and selling for $1,485, fully equipped. The wheelbase is 121 inches. It will be furnished in both two and five-passenger body styles, and will have left drive and center control. The vacuum system of gasoline feed has been adopted, but the electric method of gearshifting will not be used on this model. A unit power plant with the cylinders cast in a block is used. The bore and stroke are 3.5 by 5 inches.

In addition, the Haynes Automobile Co., Kokomo, Ind., is offering a big six rated at 65 horsepower and selling for $2,250, and a four developing 48 horsepower and selling for $1,660. The electric gearshift will be fitted to these two models at an additional price.

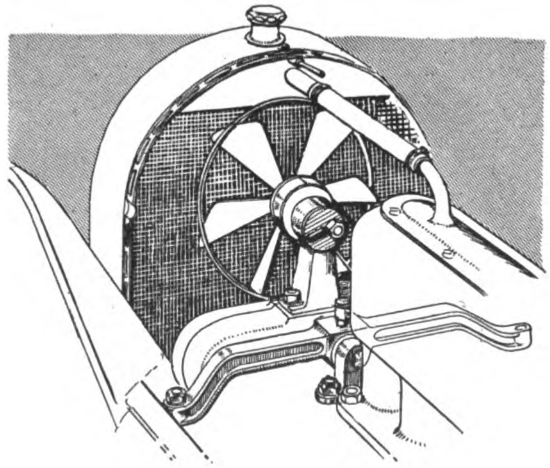
Light Six Entirely New

There are many features of interest in the new six, which is an entirely new job from headlights to spare tire. Smooth body lines are noticeable. The radiator has rounding edges, and the hood tapers slightly to the cowl, where the slant almost imperceptibly increases until the windshield and door panels are reached. The sides of the body sweep down gracefully from the foot of the windshield, the sides being practically horizontal from the center of the front door to the rear of the car. A modern feature is seen in the absence of upholstery on the top edges of the body sides, these being topped off by strips of polished wood. A rakish appearance is produced by the long, straight body lines and the low suspension that is obtained by slinging the springs under the axles.

Unusually complete equipment is a feature. This comprises a motor-driven tire pump, Firestone demountable rims, including one extra rim, and the tire carrier already mentioned. A ventilating clear and rain-vision windshield built into the cowl is part of the outfit, as well as a one-man top, with a Neverleak cover and Collins quick-adjusting curtains. There is an electric horn under the hood, operated by a button on the steering wheel. The headlights are provided with a dimming attachment for city driving. Robe and foot rails are found in the tonneau, and there is a full tool equipment.



Arrangement of control and cowl board on light six showing the flush mounting of the ignition switch, lighting control switches, and speedometer



Front motor support and fan construction on new six. It will be noted that the front of the motor is hung at just one point. The fan is adjusted by the eccentric bushing shown

The motor is a clean-cut design, rigid and compact in construction. The valves are inclosed. Cooling is by means of a cellular radiator, pressed steel fan and large centrifugal water pump. Lubrication is supplied by a combination splash and force-feed system. A plunger pump circulates oil through the motor at the rate of one-half gallon per minute. The connecting-rod dip pins splash the oil from the troughs, which are filled by the pump.

A Rayfield carbureter with hot-air connection to the exhaust pipe is employed, and the intake manifold is cast integrally with the cylinders, so that, not only is the exterior of the motor simplified, but carburetion is aided by the heating of the charge in the inclosed manifold.

Carbureter Under Constant Pressure

The carbureter is fed directly by gravity from an auxiliary tank situated on the dash. Fuel is automatically drawn into this tank from the main tank in the rear by means of the suction of the motor, the auxiliary tank being connected to the manifold by means of a small pipe. Since the amount of fuel in the tank is always the same, the gasoline is fed to the carbureter at a uniform pressure, whether the car is moving along the level, up or down hill.

Separate units, of Leece-Neville make, are used for starting and lighting. Both are dust-proof. Ignition is supplied from the main storage battery through a Remy combination circuit breaker and distributer. The intensity of the spark is independent of the speed, and this is a great advantage in starting.

From the motor the power is transmitted through a positive three-plate, dry-disk clutch which is lined with Raybestos. It is mounted on ball bearings, is completely incased, yet is easily adjusted from the outside. It is smooth and effective and easy to operate.

The gearset is a three-speed, selective sliding type. The gears are manufactured from drop-forged Samson steel, heat treated, while the shafts are also made of this material, and are mounted on imported ball bearings of ample proportions.

Semi-elliptic springs are used all around. They are made of high-quality spring steel, oil tempered. The front springs are 38 inches long by 2 inches wide, and the rear 54 by 2 inches.

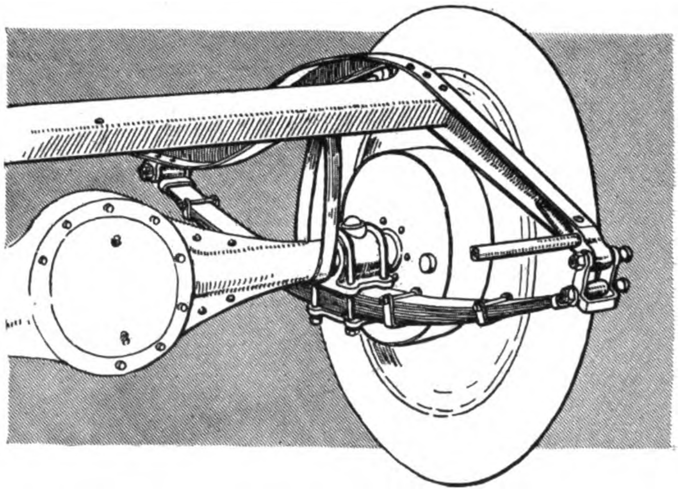
The rear axle is a special Haynes floating type. Unusually large bearings are used throughout, it is stated. Nickel steel is used as a gear material, and the double internal brakes are 14 inches in diameter.

The rear end of the Haynes light six frame is arched in order that an extremely long semi-elliptic spring may be used. Such a construction gives a number of distinct advantages. The length of these springs is 54 inches, giving a very easy riding car.

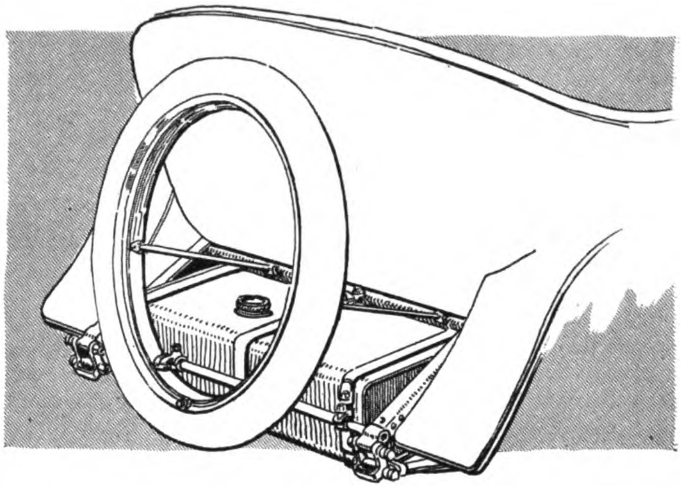
The gasoline tank is carried between the frame members in the rear, and directly back of it is the carrier for spare tires.

Left drive with center control has been adopted, and all the instruments are neatly arranged on the cowl board and within easy reach of the driver.

The light six is known as model 30. In addition, there will be the big six, developing 65 brake horsepower and selling for $2,250. This car is known as model 31 and has a wheelbase of 130 inches. Model 32 is the designation of the Haynes four, which gives a maximum of 48 horsepower, has a wheelbase of 118 inches and sells for $1,660. Closed bodies are built on these two chassis. The big six is furnished with a seven-passenger limousine, selling at $3,650 and with a four-passenger coupe at $3,000. A coupe body seating four passengers is fitted to the four. This sells for $2,500.



Rear axle construction on new Haynes six showing arching of the frame and the underslung spring

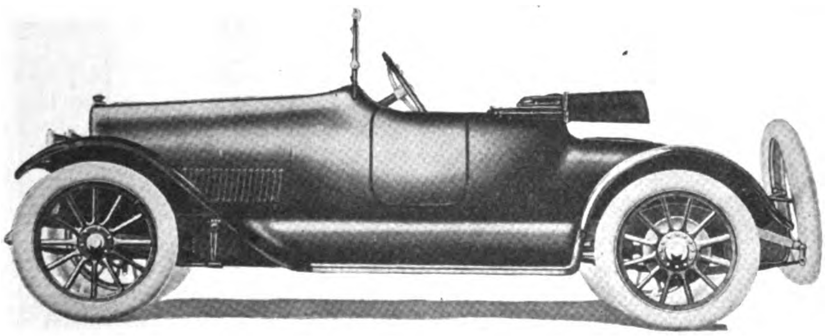


Tire carrier used on the Haynes six

Russia—An Opportunity

(*Continued from page* 445)

prise rests upon the treatment given to its customers. A poor shop could not exist in Russia, because no high-grade machine will be left for repairs there and no fortune can be made by repairing cheaply the cheap machines only. In reliable places the charges are quite high, considering the average wages paid to the workingmen, but they are lower than in the United States, being about 40 cents an hour. In a few instances the agencies have no repair shop in the true sense of this word, because they try to get along by making the necessary quick repairs and sometimes quite complicated replacements, such as changing crankshafts, right in the yard of their location, under the open sky. An arrangement like that is feasible only with the cheapest cars, when the customers are not very exacting, and it is explained by the difficulty to get a space for a suitable show-room and garage with shop in connection with it. The available places in old houses are not arranged for that, and one has to build to obtain it. Naturally, then, one tries to do the work in the open, when a customer drives up for a short job on his car. As in this country, the general garage business is frequently associated with the renting of cars, sometimes as a taxicab company. The owner is almost always obliged to rent space for his car in a public garage, as the living houses do not offer any accommodations for them, except when specially so arranged by the owner himself. Rent is about $8 per month and as one has a chauffeur, no inconvenience is felt from having the cars housed at some distance from one's residence.



New Haynes light six with two-passenger body

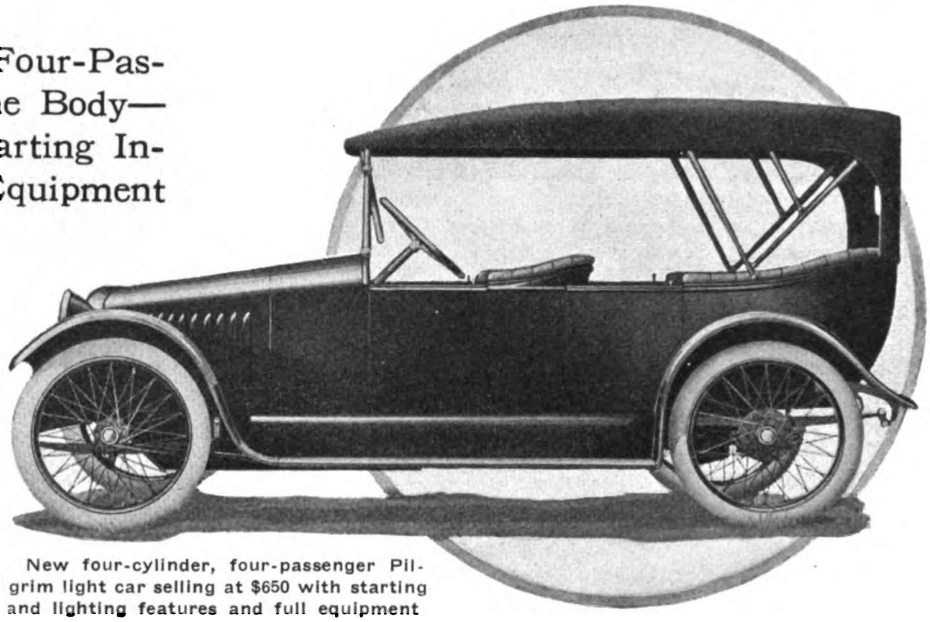
Personal element of the dealer naturally plays a great role in the matter of sales. It is remarkable how in Russia certain makes of cars are distributed in sections, one being the biggest seller in Moscow, another one in Kief (Kiev), being machines of equal standing.

Some cars have changed representatives before finding one who is giving satisfaction. The proper selection of agents is obviously very important for the business, and one can name a few makes of cars which did not get due favor at first but which are gradually spreading now chiefly due to the efforts of their present agents.

THE END.

Pilgrim Light Car to Sell for $650

New Car Has Four-Passenger Streamline Body—Lighting and Starting Included in Full Equipment



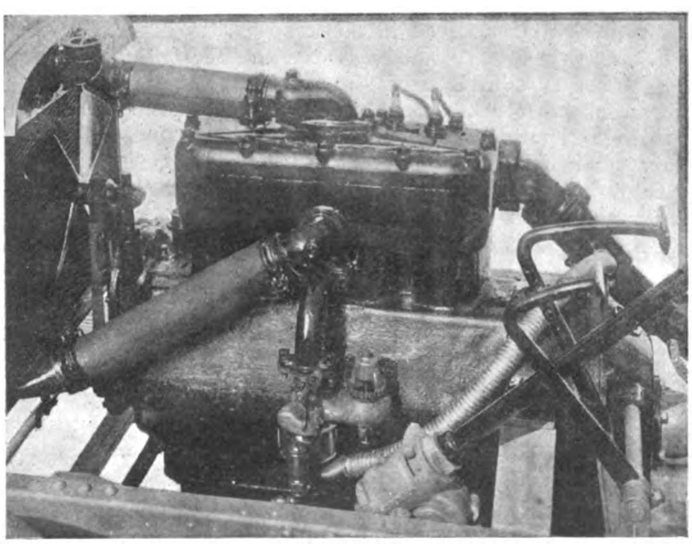
New four-cylinder, four-passenger Pilgrim light car selling at $650 with starting and lighting features and full equipment

DETROIT'S latest light car is the Pilgrim, designed by W. H. Radford, former chief engineer of the Warren Motor Car Co., and previous to that connected with the engineering departments of the Olds Motor Works and the Hudson Motor Car Co. Some time ago it was announced that Mr. Radford was at work upon a light motor vehicle, but THE AUTOMOBILE is now able to give complete details of this machine, which, with full equipment, including lighting and starting features, is to sell for $650 with four-passenger streamline body.

The Pilgrim Motor Car Co., which is laying its plans to manufacture in Detroit, is said to be amply financed by eastern capital, all of which is subscribed, the company being a close corporation. The factory has been located, material contracts are being let and dealers are contracting for territory, according to advices received from the new concern.

Deliveries are to commence on December first, and well-known standard units are incorporated in the design. Mr. Radford has had the first car on the road for some time, having driven it over some 3,000 miles so far.

Though the Pilgrim is a light car and weighs but 1,300 pounds fully equipped, it is amply roomy for four passengers on the wheelbase of 100 inches. Tread is standard at 56 inches, and the body is constructed of sheet steel, has 18-inch doors and 28 inches of leg room in both forward and rear compartments. The fenders, which are domed, conform closely to the wheels and bring the design strictly up to the minute. The fenders and running boards are 9 inches wide, the running board having a length of 57 inches. These parts are made of pressed steel.



Left side of four-cylinder block-cast motor used in new Pilgrim light car. Note the location of the radiator filler cap on water outlet pipe under the hood. Also note hot air intake for carbureter

Wheels are of demountable wire type and carry 30 by 3-inch tires on interchangeable clincher rims. The gasoline tank is also placed in accordance with present-day dictates under the cowl and has a capacity of 8 gallons.

The motor is an efficient appearing four-cylinder water-cooled type of 3⅛ inches bore and 4 inches stroke, block cast, with all valves on the right side and completely inclosed. This cylinder diameter gives the engine a rating of 15.6 horsepower, according to the S. A. E. formula, but it has developed considerably more than that. Valves, of conventional type, are 1⅛ inches in diameter and have adjustable push rods.

The motor does not combine the gearbox in unit with it, but rather that part is combined with the rear axle. At the same time, the power plant is three-point suspended and the flywheel inclosed.

Manifolds are a little out of the ordinary in that the cast exhaust manifold alone occupies the right side, bolting to the cylinder casting and having an opening to each exhaust port, while the intake passages are cored within the cylinder block itself and pass from the opposite side, where the Schebler carbureter is placed with but a single external opening from the casting to the vertical pipe from this carbureter.

The cylinder head is removable and bolts rigidly in place. It goes over the entire top of the casting and when removed exposes valves, water jackets and cylinders. This is a commendable feature of present-day motor design.

The working parts of the motor are all substantially made of conventional type. There are three main crankshaft bearings. These measure 1¾ inches in length for the front end crankpins and 3 inches for the other two. Pistons are each fitted with three rings, and the camshaft has its cams forged integral. Gears at the front end drive it, as well as the lighting generator.

Cooling is by thermo-syphon, employing a 12-inch fan, belt-driven. The radiator is a McCord vertical tube type with horizontal fins. The core has four rows of ¼-inch tubes. Ignition is taken care of by Connecticut distributer in connection with a Willard storage battery rated at 6 volts and 35 amperes.

This battery is also used with the lighting system and for cranking purposes. The Auto-Lite generator, located on the right side of the motor has the ignition distributer in unit with it, and serves for charging the battery. The starting unit has not definitely been decided upon, but it will utilize this same battery current for turning the crankshaft.

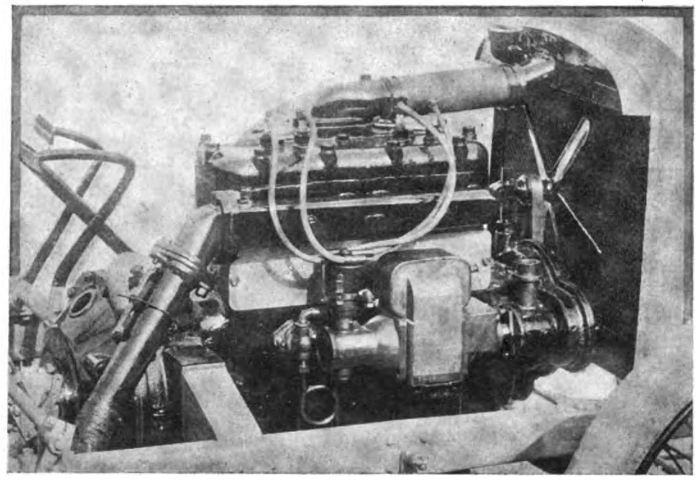
The drive back from the motor is through a cone clutch, leather faced, and a conventional form of driveshaft inclosed with a neatly designed torsion tube which is fitted with a Spicer double universal joint at the front end. In accordance with usual practice when the gearbox forms a unit with the rear axle, this box is inter-positioned between the tube and the axle housing, bolting to each through flange construction. The gearset is of the Northern Engineering Co.'s special design and gives three forward and reverse speeds. It utilizes Hyatt roller bearings, and the drive shaft is four-splined, insuring strength. The countershaft is mounted below the main shaft, and thus gets good lubrication.

The rear axle is semi-floating and has Hyatt bearings also. The drive is through bevel gears with a ratio of 4 to 1, while the propeller shaft and driveshafts are all of chome-nickel steel having a diameter of 1 inch. Due to the torsion tube and its diagonal brace rods all torsional strain and drive strain are carried to the forward cross member of the frame through the yoke at the front end of the tube. The brakes are external and internal, operate on the hubs and use 8-inch drums.

Spring suspension is standard in every way. The 30-inch front half-elliptics are overhung on the axle, as are the 40-inch rear three-quarter elliptics. All leaves have a width of 1½ inches, and, due to their length, these springs should be conducive to very easy riding. The frame is of pressed steel, having a channel 3 inches deep and a 3-inch kick-up at the rear over the axle. The top of the frame is 18 inches from the ground, and there are the usual cross members.

Steering is on the left and control in the center. There are no levers on the wheel, the accelerator pedal being so arranged that it can be either used in a fixed position or as the ordinary accelerator. The spark advance is on the dash. The steering gear is of the worm-and-wheel type, fore and aft, and the wheel has a diameter of 18 inches.

Standard equipment, in addition to that already mentioned, includes one-man top, top envelop, storm curtains, windshield, speedometer and electric horn and tools. The car is really ready for the road when purchased, it is pointed out.



Right side of four-cylinder motor used in Pilgrim light car. Note mounting of starting and lighting unit. Also single exterior manifold, the intake passages being cored within the cylinder block

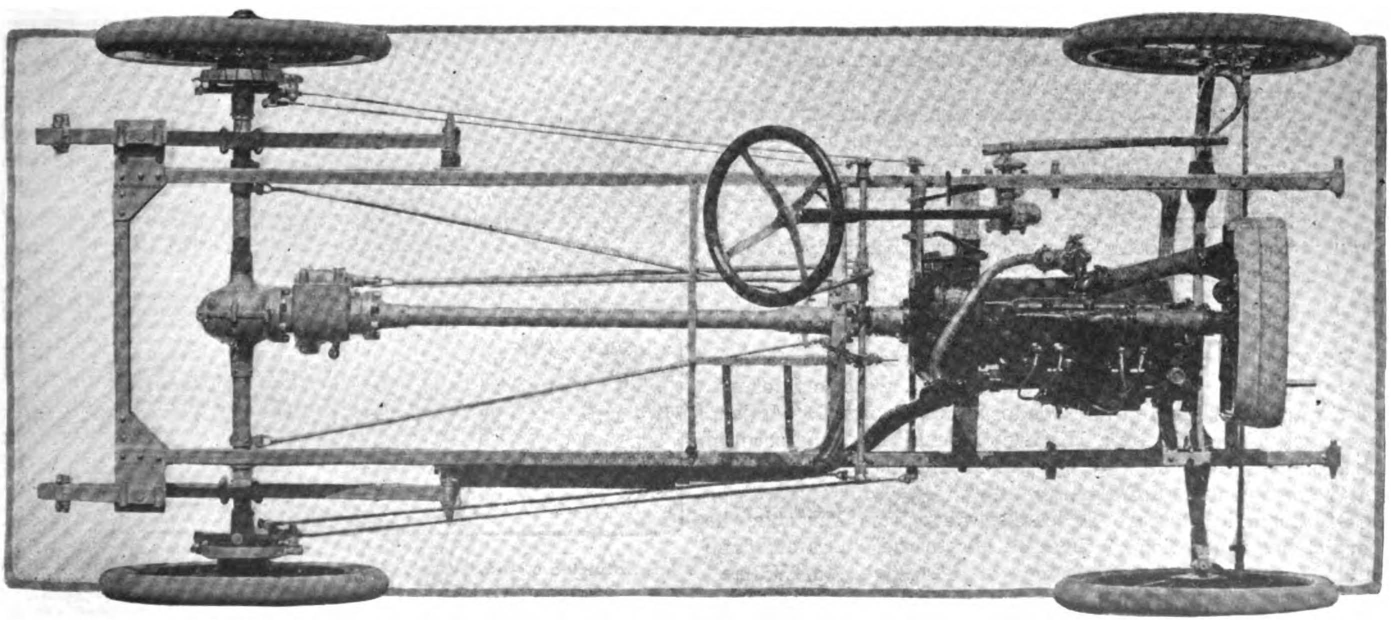
Low's Small High-Pressure Motor

(*Continued from page* 453)

a flexibility to the power output which can be compared only to that of a steam engine. Until lately the design of this valve constituted the principal difficulty in the construction, as it was exposed to very high temperatures. It has now in fact been replaced by a slide valve.

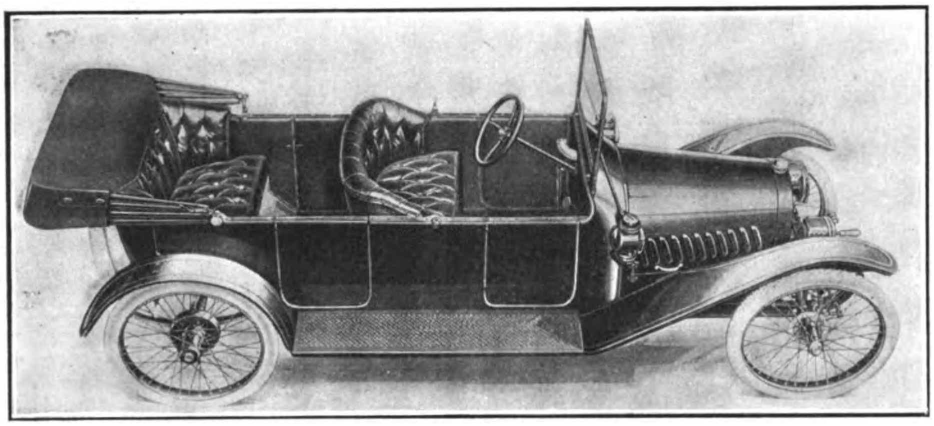
As soon as the motor works with full compression the ignition by magneto might be switched off, but it has been found that the greatest economy and the smoothest operation is secured by introducing the vapor gradually and maintaining the ignition by magneto throughout the explosion stroke. In this manner the expansion curve of a Diesel motor is obtained. Only the combustion chamber is watercooled.

[The report dwells further upon the claimed and very extraordinary economy of the motor and its very high power combined with small weight, but, as the mechanical description remains very fragmentary, all the statements should probably be accepted with much reserve.—Ed.]—From *Auto-Technik*, July 4.



Plan view of Pilgrim chassis, showing narrow radiator which leads into the tapering streamline form. Note simplicity of construction

New Woods Follows Big Car Practice



New Woods Mobilette showing tapering hood and streamline body

Sells for $380—Tandem Seating Continued—Streamline Body—Four-Cylinder Motor and Sliding Gearset

AN entirely new car has been announced by the International Cyclecar and Accessories Company, Chicago, as its product for 1915, this car to be known as the Woods Mobilette, model 3. It is featured by a four-cylinder water-cooled motor, body with tandem seating, 36-in. tread and selective gearset, and its price has been set at $380. The general appearance has been changed so as to make it entirely different, having long running boards, tapering hood, cowl fuel tank, streamline body and as an added feature under-overslung pressed steel frame.

The motor has a bore and stroke of 2½ by 3½ inches and is of L-head construction with the valve mechanism inclosed. The cylinder and upper half of type crankcase are cast as a unit, and the cylinder head is bolted to the top of the casting. The left side of the engine is clean except for the water inlet pipe. On the right side is the magneto, carbureter and oil pump. Cooling is by thermo-syphon system. The engine is suspended by three points from a pressed-steel frame which is of the under-over type. In this the front portion is suspended under the axle and the rear portion over the axle.

From the motor the power is taken by a leather-faced cone clutch with spring inserts and thence by shaft to a two-speed selective gearset incorporated with the rear axle. This is of the floating type. The rear springs are elliptic and underslung, while the front are semi-elliptic and hung above the axle. Propulsion is through the springs and torsion tube which surround the propeller shaft.

Wire wheels of 28 by 2¾ inches are regular equipment. The body is of sheet metal and accommodates two persons sitting tandem. The car's wheelbase is 102 inches and the tread 36 inches. Equipment at $380 includes two side oil lamps, taillight and set of tools, and added equipment, including top and windshield, is $15 extra. The body is interchangeable with a commercial body.

How to Go from Missoula to Spokane

For the information of automobile tourists who contemplate making a trip from Missoula, Mont., west to Spokane, or through Washington and Idaho points, George R. Metlem, secretary of the Montana Highway Commission, has secured the following data regarding road conditions now prevailing in the western part of Montana.

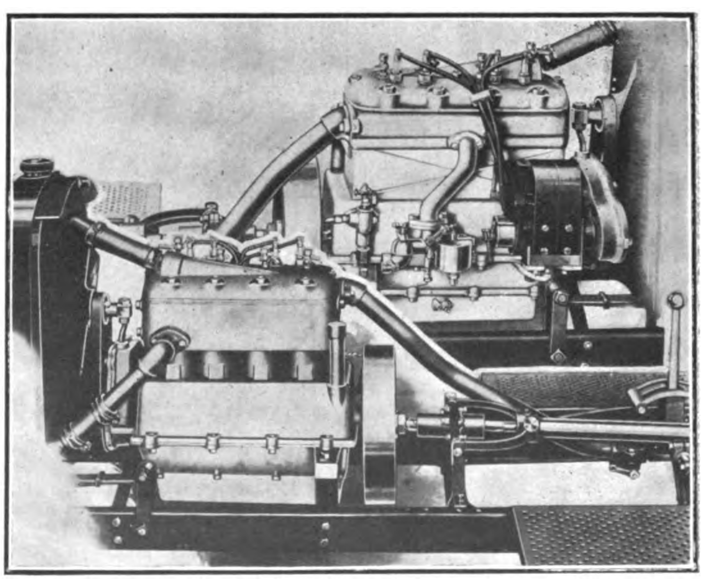
Of the main state roads leading west from Missoula the tourist has the option of three outlets to the states of Idaho and Washington, first, by way of St. Regis, to Wallace, Idaho; second, by way of Ravalli Plains, Thompson Falls to Spokane, Wash.; third, by way of Ravalli, Polson, Kalispell, Libby and Troy to Spokane, Wash.

It is true the grade just west of St. Regis is rather steep, but a new grade is being constructed, the work being in progress at this time, and when completed it will not exceed a 10 per cent. minimum at any place. At present cars that are unable to pull the old grade will be taken over without any charge by the teams working on the new grade.

Tourists taking this route will do well to replenish their gasoline supply at St. Regis in order that they may have a full tank for the grades.

The roads west of Wallace to Spokane, are in good condition. Leaving Missoula on the route by way of Thompson Falls, a good road has been constructed from Missoula to Ravalli and from that point the road leads down to Clark's Fork River. The best road from that point to Spokane follows the line of the Northern Pacific Railway, and is also in splendid condition.

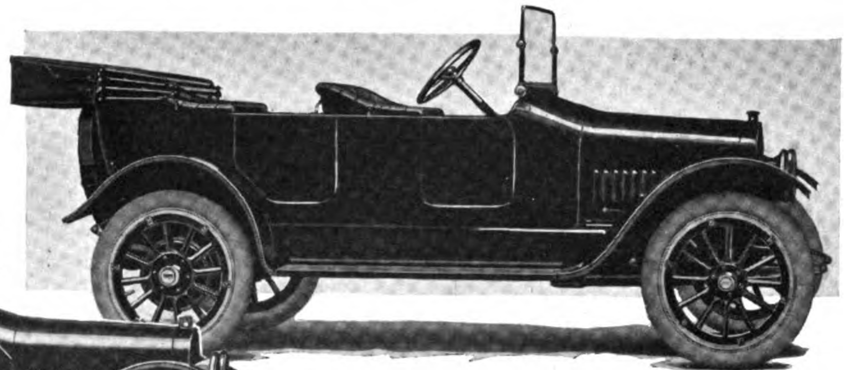
The third route, leaving Missoula west by way of Ravalli over the Flathead Indian reservation to the foot of Flathead Lake at Polson. Here the tourist should take the west side lake shore route via Dayton. This road is open to traffic at all seasons, and leads to Kalispell. From Kalispell west the outlet is over the old line of the Great Northern Railway to Marion and Jennings thence through Kootenai Canyon to Libby.

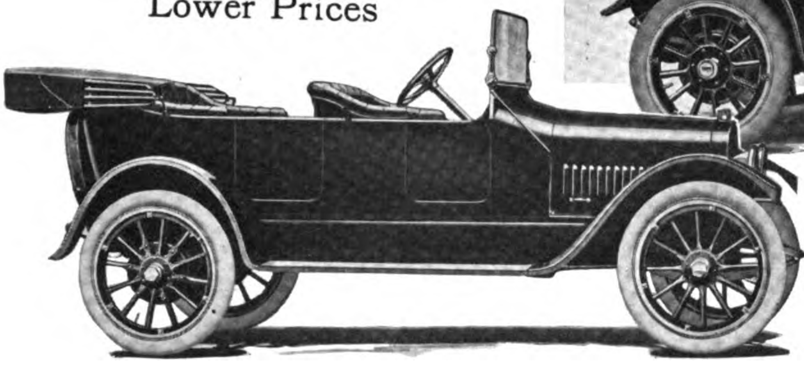


Two views of new Woods Mobilette motor. At top left is the right side showing the magneto and carbureter mounting, while at the lower right is the left side, showing the water piping and torque tube fastening

Two New Jacksons for 1915

New Streamline Four and Six Replace Former Three Models—Greatly Increased Values for Lower Prices





Above—Jackson Olympic 46 four-cylinder five-passenger touring car, which sells for $1,375, with complete equipment, or $10 less than the smaller four of 1914

At left—New Jackson 48 Six touring car, which sells for $1,650, a reduction of from $500 to $650, as compared with the corresponding five and seven-passenger models for 1914

THE big plant of the Jackson Automobile Co., Jackson, Mich., will be devoted to the production of only two models for 1915, instead of dividing its efforts between three types as in 1914. The new models are, quite naturally, a four and a six, and they are both of the trim, streamline design so much in vogue today.

Last season's Olympic small four, Majestic larger four and Sultanic six have really disappeared, and their places are filled by the 48 Six and the Olympic 46. The latter is mechanically somewhat similar to last year's Majestic, having about the same motor as that model used.

More Value for Less Money

Thus, not only is the four-cylinder Jackson of 1915 a more powerful car than that which carried the name Olympic last year, but it is also offered at a lower price—$1,375 with all equipment, as compared with $1,385 last season. This really is not a fair price comparison, for with nearly the same mechanical chassis features as the larger four of last year and with the same motor, it should be compared with that model in price. On this basis, the reduction has been very great, the 1914 Majestic listing at $1,885. The cut is therefore really $510.

The new Jackson six is also a much less expensive car than was the 1914 six. The price of the 48-Six is $1,650, as compared with the figures of $2,300 and $2,150 asked for the seven and five-passenger models, respectively, last year. This is a reduction of from $500 to $650. The new six is a lighter vehicle than its predecessor, but equally efficient and dependable.

Both Models Are New

Because the two new Jacksons are really not continuations of any previous models, it is hard to draw comparisons with former constructions. Nothing has been neglected to bring the cars up to the latest demands of the motorwise public and in appearance as well as mechanically they are in the front rank. They have the latest of appointments, smooth-sided bodies, clean running boards, hoods sloping gracefully into cowls and sloping bonnets which carry out the general lines.

As compared with the four-cylinder Olympic model of 1914, the new car bearing this title has a longer wheelbase, being increased by 2 inches to 117 inches, while the motor has fully 5 horsepower more, its rating by the maker being about 45 horsepower. This is largely due to the use of the 4½ by 5¼-inch motor in place of the 4⅛ by 4¾-inch type formerly used. The cylinders are cast in pairs and the unit power plant construction of three point suspended type is employed. All valves are on the left and inclosed by cover plates.

334 Cubic Inches Displacement

The cylinder dimensions give a stroke bore ratio of 1.17 to 1, and a displacement of 334 cubic inches. With its bore of 4½ inches, the A. L. A. M. formula accords it a rating of 32.4 horsepower. This naturally falls much below the true power of which the engine is capable.

Working parts are all well designed and aid in this power development. The crankshaft and camshaft, both of which are of drop forged steel, are supported by three main bearings each. Connecting-rods are also steel forgings, while pistons and cylinders are constructed of gray iron. Steel tubing is used for the making of the wristpins within the pistons. Valves are rather large and thus do their part to increase the power, their diameter being 2 1/32 inch. They are of tungsten steel and interchangeable. The pistons have three rings each.

Timing gears, housed at the front, are drop forged steel and iron, this combination being used to make them more silent, as steel running against iron is less noisy than iron against iron or steel against steel. These gears drive the camshaft and magneto shaft in the usual way.

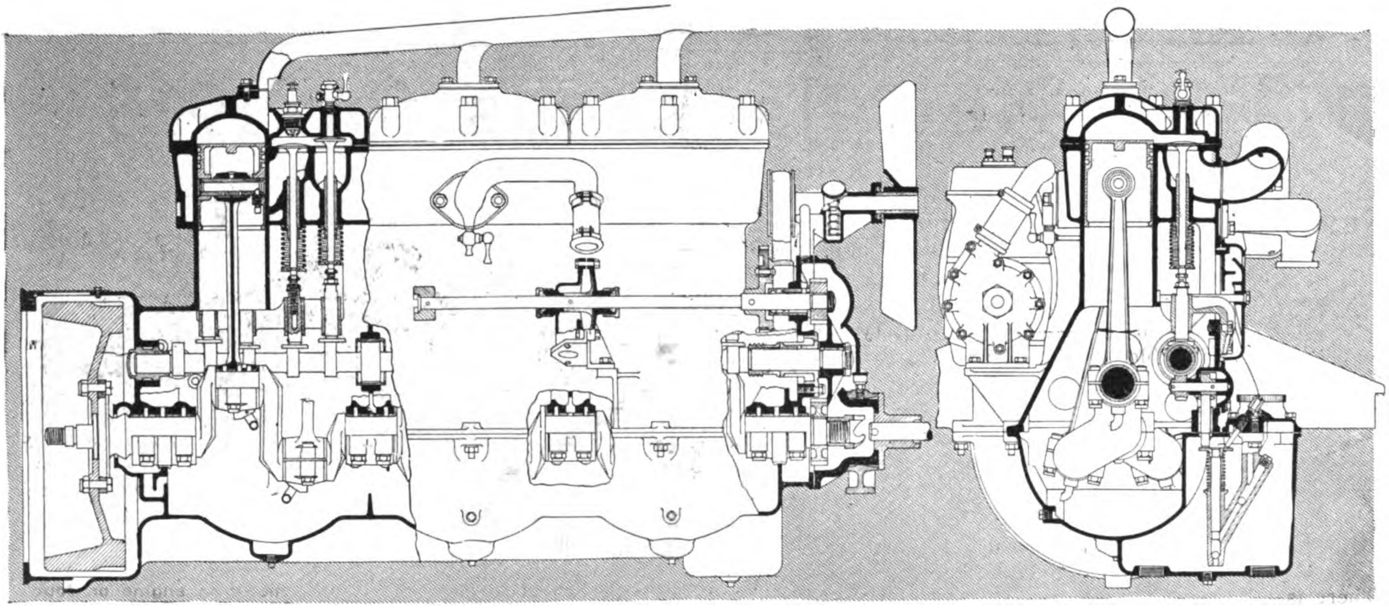
Some of the motor dimensions are given:

Crankshaft { Front bearing—1 7-8 by 3 7-16 inches.
Center bearing—2 inches diameter.
Rear bearing—2 1-8 by 4 1-2 inches.

Camshaft { Front bearing—1 by 1 27-32 inch.
Center bearing—1 by 2 1-8 inches.
Rear bearing—1 by 1 9-15 inch.

Connecting rod bearings—2 by 2 3-4 inches.
Piston pin bearings—1 1-4 by 2 9-16 inches.
Length of pistons—6 1-16 inches.
Length of connecting rods—10 inches.
Valves { Diameter—2 1-32 inches.
Length stem guides—3 13-16 inches.

Piston pin bearings are constructed of phosphor bronze



Left—Part sectional view of unit power plant used in the new Jackson 48 Six. Right—Front section through same motor

while connecting-rod and crankshaft bearings are made of die cast babbitt.

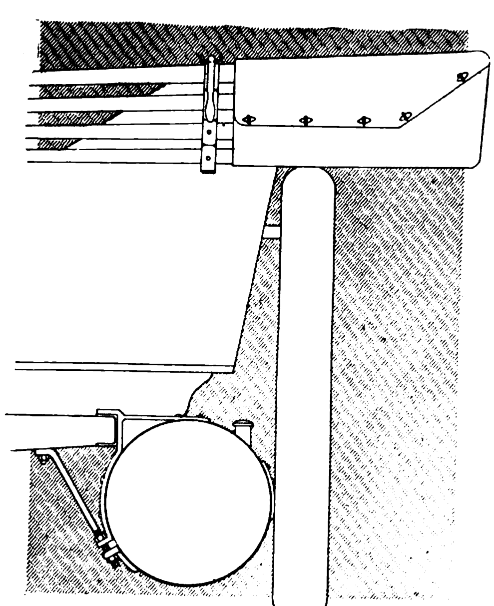
Force-Feed and Splash Oiling

The cooling system of this engine is of the positive type employing a centrifugal pump driven from a shaft on the right side. Back of the pump is the magneto and driven by the same shaft. Oiling is maintained by a force-feed and splash arrangement of conventional form. The oil is pumped from the reservoir at the bottom to the bearings and into the troughs from which it is splashed by the moving rod ends up into the cylinders and to the various other surfaces.

Auto-Lite Electrical System

As heretofore on its four-cylinder cars, the Jackson company uses Auto-Lite cranking and lighting on this car. The cranking motor is mounted in a rather unusual position at the forward end of the engine, as last year, and drives through an inclosed chain and ratchet construction. This electric motor really rests upon its end, its armature shaft being vertical instead of horizontal. The armature shaft carries a spiral gear which drives a sprocket on a countershaft through engagement with a gear on this shaft. The sprocket in turn connects with a sprocket on the crankshaft which sprocket carries one member of a ratchet clutch. When the starting switch is thrown in, the other sprocket member, which slides on the splined starting shaft, is mechanically brought into engagement with the sprocket member of the clutch, and the crankshaft is rotated.

The generator is placed on the right side of the engine on a bracket. It is driven also by a silent chain, and runs at a speed 2.5 times that of the crankshaft. The cranking speed is about 100 revolutions a minute. The system works at 6 volts, and there is a centrifugal governor to prevent overcharging of the battery or too high rate of charge due to high engine speeds. A Willard 120 ampere-hour storage battery placed under the rear floorboards is a part of the electrical system. In connection with the lighting arrangements, a dash lamp has been added, which is a refinement to be appreciated.



Rigid mounting of tire carriers to gasoline tank straps at the bottom and to an iron running within the body piece at the top on the new Jackson cars

Cone Clutch Is Continued

As already brought out, the gearset is an unit with the engine, and gets its power through the intermediary of a leather-faced cone clutch. There are three speeds forward and reverse, and the main shaft and jackshaft are carried on ball bearings. These shafts have a diameter of 1¼ inch.

Back of the gearbox, there is a universal joint, after which the drive shaft enters a torsion tube bolting through a flange construction to the rear axle housing, in accordance with conventional practice for such design. The axle used is a floating type made by Salisbury. It has a pressed steel housing, and Hyatt bearings are used in the differential and wheels. Thrust is taken by ball thrust bearings.

As with other Jackson designs, the new four uses elliptic springs both front and rear. This construction makes very easy riding, it is pointed out.

One change which marks a tendency of the times is the adoption of center gearshaft and emergency brake levers instead of the left position heretofore used. Drive continues on the left.

Although a cowl gasoline tank was incorporated on the fours last year, this has been removed entirely, and a vacuum system with tank at the rear has been adopted. The Webb-Jay type of vacuum device for lifting the gasoline automatically to the tank portion of the outfit on the back of the dash is used. From this small reservoir, it feeds by gravity to the carbureter.

Other minor changes are the adoption of much more rigid tire carriers at the rear which hold the spare casings without vibration. A rigid iron at the top runs through the rear portion of the body to the framework, while the lower supports are attached to the tank.

Tires are 34 by 4 inches, and as an added feature of equipment the rears are of the non-skid variety. A Brewster green finish has been adopted which is very attractive.

A three-passenger roadster is also offered on the four-cylinder chassis at the same price as that specified for the touring car type.

Although very similar to the four-cylinder Jackson in outward appearance, the new six is somewhat different mechanically. Built upon a wheelbase of 125 inches, this car still has all of the Jackson earmarks, however.

The motor is a 3½ by 5-inch Northway which develops the horsepower indicated by the model designation—48. Due to the small bore, the A. L. A. M. rating is low—29.4—but since the stroke is nearly twice the bore as shown by the ratio of 1.43, this large difference is readily understood. The piston displacement is 288.5 cubic inches.

The design is an L-head unit power plant type with the cylinders cast in one block. Valves are all on the left side, and the upper half of the crankcase is in unit with the cylinder casting, making a compact construction. There are three separate cylinder heads in this engine, each covering two cylinders. When removed these plates or cylinder heads expose the pistons and valve heads which is of great advantage. Heat-treated alloy steel bolts securely fasten the head pieces to the casting proper, and interposed between the two parts is a copper gasket, making a tight joint.

There is no departure from Northway standard design in this power plant. The lower part of the crankcase takes care of the oil reservoir, and at the front the spiral timing gears are completely housed. The centrifugal water pump is driven by shaft on the right side, and back of it is the Delco combination unit which will be spoken of more in detail later. The flywheel is completely inclosed, and at either side of its housing there is a crankcase arm integrally cast for supporting the unit. The front support is at the center of the front end.

Lightweight Reciprocating Parts

The moving parts are all constructed of recognized standard parts. Drop forged connecting-rods, camshafts and crankshafts are made as light as possible consistent with strength and their bearings are all of ample size. The crankshaft and camshaft are each carried on three bearings.

Some of the dimensions follow:

Crankshaft	Front bearing—1 5-8 by 3 7-32 inches.
	Center bearing—1 7-8 by 2 19-32 inches.
	Rear bearing—1 15-16 by 3 7-16 inches.
Camshaft	Front bearing—1 1-8 by 2 inches.
	Center bearing—2 1-8 by 1 inch.
	Rear bearing—1 by 1 3-4 inch.

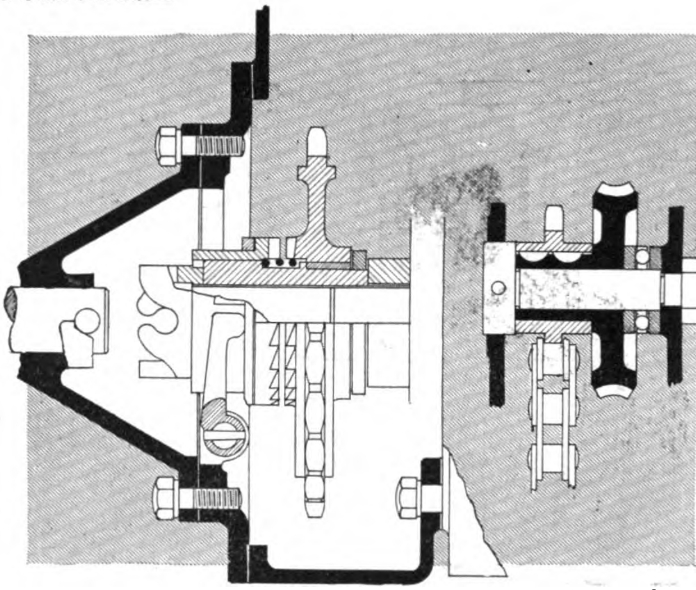
Connecting rod bearing—1 5-8 by 2 1-4 inches.
Piston pin bearing—7-8 by 1 7-8 inch.
Piston length—4 1-2 inches.
Connecting rod length—10 3-8 inches.
Valve diameter—1 23-32 inch.
Valve lift—5-16 inch.
Flywheel diameter—14 inches.

The oiling system of this engine is of the constant level splash type, and the reservoir is located on the left front side of the oil pan. A plunger pump operated by the camshaft pumps the lubricant to the crankcase, after which it runs from trough to trough, and the cylinder walls and other parts get it by the connecting-rod splash.

Delco Motor-Generator Unit

The standard Delco motor-generator unit is employed. This also takes care of the ignition through the use of a distributer. The unit is driven off the end of the pump shaft on the right rear side of the engine. Its gears mesh with those of the flywheel for starting purposes in the usual way, while when these are out of mesh, it drives from the pump shaft as a generator. It uses a Willard storage battery located under the rear floor boards as does the other car, and current from this is sent to the unit for cranking purposes when the motor-generator is temporarily operating as a motor.

Like the four, the new six uses a cone clutch and three speed gearset. The shafts and gears are of alloy steel and properly mounted on their bearing. Drive to the rear is through an open propeller shaft which is fitted with two universal joints, one at either end. A torsion member parallels the shaft and takes the drive. The rear axle is also a Salisbury floating type and is fitted with Hyatt roller and annular ball bearings.



Ratchet clutch attachment of cranking motor to engine on four-cylinder 1915 Jackson model

Like the four, the spring suspension is characteristically Jackson due to the use of elliptics all around. The frame is dropped to bring the car close to the ground.

Unlike the four, the six has its gasoline tank under the cowl with gravity feed to the carbureter. There is a supply tank at the rear, however.

Tires are 36 by 4 inches and non-skids are used in the rear. Dark blue is the standard body color.

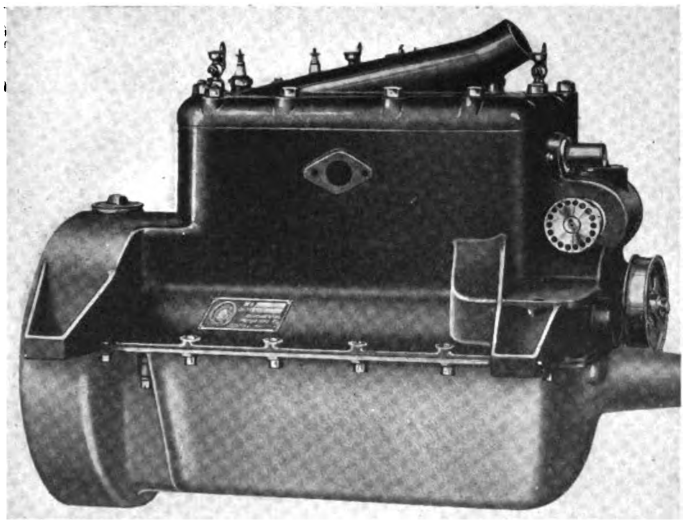
The Call of Mars

(*Continued from page* 437)

Hundreds of military automobiles were to be found on the road to the east of Brussels; these were taking ammunition and food to the main forces. The Belgians have not the same system as the French, and do not possess any subsidized motor lorries, but they have pressed into service every type of car and hundreds of private touring cars are engaged in transporting food. Near Diest and at the village of Haelen the results of actual fighting were to be seen. The previous day the German advance forces had attacked these two places, but had finally been driven off with loss. Dead soldiers were still lying on the roadside and in the fields. A very large number of dead German horses were lying around, many of them disembowled and causing a stench noticeable a mile away. Peasants were digging trenches into which the carcasses were dragged. If the legs protruded they were chopped off; a thin covering of earth was thrown over the dead animals. The village schoolhouse had been transformed into a hospital. As it could not hold all the wounded some of the German soldiers were put on mattresses under trees in the village street and were tended by the peasants.

After a Cavalry Charge

On one of the main, straight granite-paved roads a cavalry charge had been ordered. Belgian troops were in hiding behind the hedges and were fortified at the bottom of the road. At frequent intervals dead horses lay by the roadside, and at the bottom of the road they were piled up in a solid mass. Several of the German officers killed in this fight, and whose bodies still could be seen, had their pockets filled with gold.



Side view of the Continental engine showing carbureter opening

Continental Develops High Speed Motor

New Light Engine Follows Foreign Practice of Long Stroke and High Piston Speed

TO meet the demand for a small, high-speed, small-car motor, the Continental Motor Mfg. Co., Detroit, has lifted the curtain from its newest model which is the result of careful study of conditions both here and abroad.

This new Continental is the smallest motor which has emanated from the plant. The motor, designated Model U, is the same motor as contracted for by Morris-Oxford, Ltd., London, England. This English small car manufacturer placed its contract some months ago. Quantity production will be started the first of the year, and samples supplied in November or December.

It is a unit-power-plant type, adapted for any one of the standard makes of clutch and gearset units on the market. The cylinders, cast in a block, measure 2 3-4 by 4 inches. These dimensions give a S. A. E. horsepower rating of 12.1. On brake test the motor has about shown from 15 to 18 horsepower.

Outwardly the new motor has a distinctive appearance, in that the upper half of the crankcase is integral with the cylinder casting. The cylinder head is removable and is held down by steel bolts and allows for the exposing of all the valves, pistons and cylinders. The other main unit is the lower half of the crankcase which carries the oil pan. The motor is arranged for four-point support, integral arms extending outward for attachment to the side rails of a chassis, being a part of the cylinder block casting.

The valves are on the left together with the exhaust manifold, while the carbureter opening is on the right. A cored passage extends across within the cylinder block to the valve side where the gases are distributed internally to the four cylinders.

The magneto drive is transverse at the front end, there being a spiral gear mechanism driving the cross shaft to which the magneto is attached, it being carried on a bracket cast integrally with the cylinder block. Just ahead of the magneto and its drive, the fan is mounted and is driven by a belt. This arrangement of magneto and carbureter leaves the sides of the motor free from any complications, and accessibility is thereby gained. The lower half of the crankcase carries at its forward end the complete starting crank assembly, including the crank.

Thermo-syphon cooling is employed and in casting the cylinders and crankcase as a unit, the waterjackets are carried the full length of the cylinder bore. Large water connections also do their part.

The lubrication is in accordance with Continental practice, being a combined force feed and splash system whereby the oil pump supplies the individual trough under the cylinder maintaining a constant lever of oil in them. The ends of the connecting-rod dip into these troughs.

The moving parts are all of standard construction and in accord with Continental practice. The pistons have three rings each, and the crankshaft is carried on three bearings and the camshaft on two. The valves have standard form of tappet construction and adjustment.

The weight of the motor including the flywheel and regular equipment is 210 pounds.

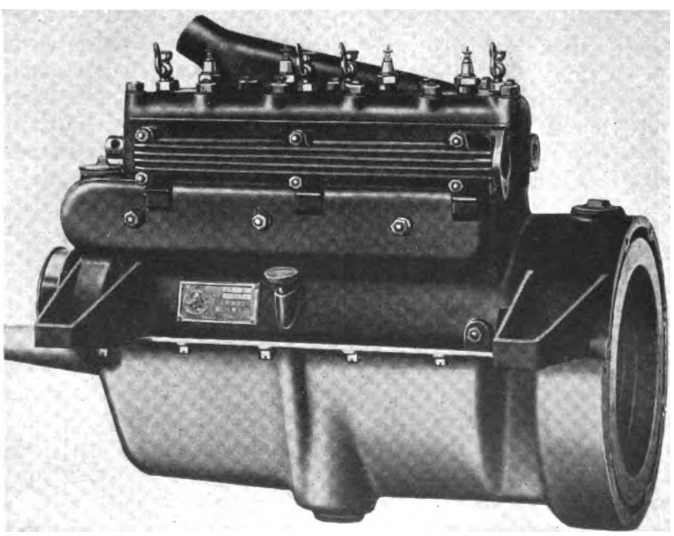
The principal specifications and dimensions are given below. Where two dimensions are given the first refers to the diameter and the second to the length.

	Inches	Millimeters
Camshaft diameter	1	25
Camshaft bearing, front	2x1 3-4	51x44
Camshaft bearing, rear	1 15-16x1 1-2	49x38
Connecting rod, length	7 1-2	191
Connecting rod bearing	1 3-8x1 1-2	35x38
Crankshaft bearing, front	1 1-2x2	38x51
Crankshaft bearing, middle	1 1-2x1 5-8	38x41
Crankshaft bearing, rear	1 1-2x2 7-16	38x62
Crankshaft extension	As ordered	
Piston length	3 1-8	79
Piston pin bearing	5-8x1 13-32	16x36
Piston rings (three in number), width	3-16	5
Valve diameter	1 1-2	38
Valve stem diameter	3-8	9
Valve lift	5-16	8
From supporting arm face down to center of crank shaft	1 1-2	38
From center to center of supporting arm bolts	20	508

A. C. A. Increases Its Laboratory Facilities

NEW YORK CITY, Sept. 1—The Automobile Club of America has increased its laboratory facilities considerably by moving the laboratory to a new position in the Club building, offering a greatly increased floor space. In line with the policy of the club to give efficient laboratory service to commercial concerns, a new dynamometer will be installed on which tests on the entire chassis may be carried out. This will be one of the Diehl rear wheel plants, in all probability.

Herbert Chase, who was recently appointed to the position of chief engineer of the club, has organized an efficiency scheme by means of which the cars of the club members are kept up to their highest standard. Mr. Chase's former position of Laboratory Engineer is now filled by Ferdinand Jehle, who was formerly engineer of the Commercial Engineering Laboratory, Detroit, Mich.



Valve side of the new Continental—the intake enters by means of a cored passage across the cylinder

War Should Increase Automobile Exports

Great Demand for Cars Among Warring Nations — South American and Colonial Trades Must Be Supplied by the United States

THE bearing of the war situation on the automobile industry has so many phases that it is impossible to trace the actual result on business as a whole, except to state that, taking the consensus of opinion, it cannot result except for good in this country.

Little is exported from the territory already affected by strife to the United States, and yet the little town of Liége, which was the scene of the first serious clash, is noted for its automobile and accessory productions. Here the Minerva cars and F. N. automobiles and motorcycles are manufactured and here is located the factory of the Englebert tires, one of the makes used to some extent in America.

Liége is but a single example. Throughout the entire country now overrun by the soldiery of Europe are industries closely allied to that of the manufacture of automobiles. The mines and steel works have abandoned their activities, and motor vehicles are being destroyed as rapidly as they were formerly manufactured.

Every Car in Use

The increase in the demand for horses which has always been the natural outcome of previous wars will naturally now be paralleled by the increase in demand for the new method of transportation. This has been demonstrated to the sorrow of many American tourists who found their cars confiscated for war purposes with the small recompense of a scrap of paper signifying that they were to be repaid out of the future war indemnity to be collected by the Government of that particular country should it be victorious.

In a word, Europe is now using every kind of motor vehicle that it can lay its hands upon and is using them in a service far more arduous than that for which they were primarily designed. On one hand, we read of the entire British expeditionary force estimated at 150,000 men transported by motor trucks at rates of speed which outdo the efforts of troop trains. On the other hand, reports reach us of charges by groups of armored motor cars carrying batteries of artillery. The lesson learned in recent maneuvers are now being made use of in actual warfare. Whole batteries of artillery are being towed at speeds averaging in the neighborhood of 20 miles per hour.

American trucks had been looked upon with favor for war purposes in European countries. This is due to the fact that they are of wide tread with good clearance and large wheels, making them adaptable to the worst mountain roads. It is not surprising to learn that one of the Detroit companies has already received a cablegram from one of the European nations now at war, asking how soon the factory could ship 100 motor trucks to its seaports. This is but a forerunner of a practically certain demand, as armies now operate at considerable distances from their bases and a vast supply of vehicles is a necessity.

Export Market Large

It is not alone in Europe that a shortage of cars will make itself felt, but as has been already completely realized by this country, nations to which cars were formerly exported from the Continental and British factories will demand the American product if only through sheer necessity. The passage of the shipping bill will put at the disposal of American manufacturers a greater tonnage than has borne the American flag for many years.

Still another phase which has been mentioned by the sales manager of one of the big production companies is that the cars which are temporarily held here, and that would otherwise be exported, would be of value in meeting the abnormal demands that are always made by dealers in the opening of a new season. Thus, the full attention of the factory can be concentrated on the supplying of the dealers' demands at its heaviest period and then, this demand satisfied, attention can be given to the newly-developed export field.

It is not only in the United States that America's chance to establish her commercial supremacy has been recognized. One of the foremost financial experts of Great Britain prophesies that the war will bring great wealth to American industries and an economic benefit to the people of the United States. He predicts that Americans will be able to sell their goods at prices which will give them a larger income than could possibly be realized had there been no war.

America—the Important Producer

America cannot be criticized ethically for taking advantage of the opportunity presented by the calamity which has befallen a large part of the civilized world. The sympathy of the people of this country has gone out to distressed nations in a way that history has never before recorded. Still, the enormous demand created by the fact that men who formerly gathered the crops of Europe are now shouldering guns in the defense of their countries must be met largely by this country. The United States, as one of the principal grain producing countries in the world, will exchange its products for the gold that Europe has hoarded for its war. The American farmer and the American manufacturer, the producers of the country, will gain, and they in turn, with the enormous purchasing power put into their hands, will carry with them every industry.

History has been made by the motor car in this war. Nothing has had as much to do with the speed of mobilization as the power driven vehicle. Independent of rails and capable of traversing parallel roads simultaneously, immense trains of motor trucks and even passenger cars, were one of the chief factors in making possible the rapid assembly of the huge armies of armed men. Cavalry and motor-towed artillery were the factors that made up the personnel of the almost unbelievably rapid German advance across the difficult country to Brussels. The entire tactics of war have been affected by the possibility of bringing heavy guns to the front almost as rapidly as light scouting parties of cavalry.

Officers have made important use of speedy passenger cars in keeping in touch with headquarters and the motorcycle brigades are recognized as one of the most important branches of scouting service. From the main base to the sub-bases the commissary departments of the various armies are making full use of vehicles that were formerly in commercial service. And even from the sub-bases to the points of distribution along the fighting front, trucks are used wherever the roads render them possible.

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War Truck Requirements

INTERCHANGEABILITY is one of the great factors in motor trucks for war purposes on the march, with motor trucks for commissary, for ammunition, for guns and for transporting infantry requires that the trucks used be as standardized and interchangeable as possible. If a front wheel of one is crushed it should be interchangeable with that of another.

Supply parts have to be carried for these trucks, and if two different pieces are carried for two trucks in place of one, the handicap on the army corps is correspondingly more. The French government has required that trucks for subsidy be standard in certain respects, but there is yet much to be done.

Some years ago more or less wonder was expressed at the army requirements that a motor be capable of using three different fuels, gasoline, benzol and alcohol with the same carbureter. The present war, with its shortage of fuel, has demonstrated how essential it is to be able to use one or the other. There are places in the zone of activities where only benzol can be had; at another place alcohol only is available; and at a third gasoline is on hand. It was a wise precaution that made it imperative that a motor be capable of using one or all of these fuels.

The performances of trucks with four-wheel drive is being watched and the reports from the front on the relative performance of trucks using all four wheels as drivers and those driving by the rear wheels only or front wheels only will have an important bearing on the purchases of our war department.

Used Car Standards

SO GREAT is the evil of over-valuing used cars by dealers taking them in trade on new machines that the dealers' association in Chicago is to be congratulated on its initiative in publishing the first volume of Central Market Reports on Used Cars, for the use of its own members as well as for distribution throughout the country.

Dealers from coast to coast have erred in allowing too liberally on old cars in trade deals. In some cases it was because of too great a desire to make a sale, and in other cases it was through ignorance. The Central Market Report should be a great aid. It is a guide to valuation by the dealer on cars other than those he sells. We have our weekly markets on iron and steel; we have our daily stock quotations; we have our markets on scores of commodities, and the institution of a market standard on used cars is but in line with an old-established custom.

How many buyers of iron or steel would think of making a purchase without consulting the market report? How often will a dealer in live stock make sales or purchases without looking over the markets? Then, why should not our motor car dealers be provided with a similar price list? There are many reasons why every dealer should have such a standard of used-car values close at hand. It is impossible for the dealer to carry in mind the actual market value of all makes of cars that he may be called upon to handle in a trade deal. The Central Market Report at once becomes his book of reference in these matters; in fact, it goes further, and becomes his guide.

The fact that the prices quoted in the Central Market Report are based on actual sales lends value to it, and puts it on a par with any other authentic reports. The values published for a certain make of used car are not fictitious but are actual. They give hard facts. They will have the effect of making the dealer conservative.

We should have the Central Market Reports for motor trucks as well as for passenger cars. The evil of over-valuation is present in the truck field as well as in the passenger car trade. Central Market Reports on trucks are needed even more than in passenger cars, because of the greater ignorance among dealers as to the actual selling values of used trucks. Many dealers are new in the truck industry. They have little actual knowledge of used trucks, and are consequently the more in need of some standards of value as furnished in the Central Market Reports. It is to be hoped that soon the price of used trucks will be incorporated in these reports and that the evil of over-valuation will be wiped out before it has done the injury to the truck dealer that it has done to the passenger car dealer.

N. A. C. of C. Holds Optimistic Session

Find That War Slowed Up Industry First 2 Weeks in August But Last 2 Weeks Show Increase of 2,401 Carloads Over 1913 in Car Shipments—Truck Convention Postponed

NEW YORK CITY, Sept. 2—Conservative optimism on the fall trade in automobiles prevailed at the directors' meeting of the National Automobile Chamber of Commerce, representing ninety-three automobile manufacturers at the New York headquarters yesterday. The European war resulted in an almost complete shut down of the automobile trade during the first 2 weeks in August, but reports received yesterday show that a reaction has taken place and shipments for the last 2 weeks were far ahead of the same period last year. It is believed that the trade this fall will be almost up to expectations.

Increase in Shipments Over 1913

The Traffic Department figures showed that during August, 1913, the automobile industry shipped 4,469 carloads, while last month the shipments were 6,870 carloads, most of which were made during the last 2 weeks of the month.

It was decided that the present was an inopportune time for a convention of commercial vehicle manufacturers and a date for holding one will probably be decided upon for late in the year.

There was a most interesting report from the Patents Committee relative to the automobile patent situation and also in regard to the proposed changes in the patent laws at Washington.

Resolution on Accessory Makers' Suits

The directors adopted a resolution expressing their disapproval of various accessory manufacturers having controversies among themselves on patent rights, bringing suits against the makers of motor cars. The resolution is as follows:

WHEREAS members of the National Automobile Chamber of Commerce have been annoyed and embarrassed by threats of patent infringement and by patent infringement suits brought against them or against their customers and users of their cars by certain manufacturers of automobile accessories and parts; and

WHEREAS it is unnecessary for such manufacturers of accessories and parts to bring suits against automobile manufacturers, vendors and users of motor cars in order to assert their rights under their patents, inasmuch as such manufacturers of accessories and parts have ample recourse against the infringing manufacturers of such accessories and parts;

THEREFORE, BE IT RESOLVED that the directors of the National Automobile Chamber of Commerce regard any such suits by accessory and parts manufacturers against motor car manufacturers, vendors or users of motor cars as being unwarranted, unfriendly and against the best interests of the industry; and be it further resolved that the Motor and Accessory Manufacturers Assn. be advised of the attitude of this Chamber on this subject with the end in view of giving all manufacturers of accessories and parts due notice of the attitude and feeling of the National Automobile Chamber of Commerce.

To Make Pope Car Parts in Hartford

HARTFORD, CONN., Sept. 2—*Special Telegram*—Announcement is made today of continuation of the manufacture of parts for Pope-Hartford passenger cars, trucks and fire apparatus to be conducted here. The purchase of this business in its entirety by the Pope-Hartford Co., of Connecticut, the new corporation, includes all the parts finished and in process, tools, jigs, fixtures, patterns, drawings, tracings, formulas, and everything pertaining to this important branch of the business. The repair and service department formerly operated by the Pope company will also be continued by the new company at the main works on Capitol avenue. This department will be manned by experts selected from the best men in the employ of the Pope Mfg. Co.

The Pope-Hartford Co. of Connecticut is composed of men who have been connected with the design, manufacture and sale of these cars since the production of the first model in 1902. The officers of the new company are: Wilbur C. Walker, president; Ralph A. Barkman, vice-president; Charles E. Walker, treasurer, and Joseph A. Taylor, secretary. The capital stock authorized is $200,000, divided into 200 shares, par value, $100. There is $60,000 of preferred stock and $140,000 of common stock. The amount of capital stock with which the corporation intends to begin business is $10,000. The incorporators are: W. C. Walker, Charles E. Walker, of Hartford and Ralph A. Barkman, of West Hartford.

To Handle Dodge Cars

The Hartford Motor Car Co. of Hartford, has filed a certificate of incorporation. It proposes buying, selling, and dealing in motor vehicles. The company is the Dodge representative in this section. The capital stock authorized is $50,000 divided into 500 shares, par value $100. The amount of capital stock with which the corporation intends to begin business is $10,000. The incorporators are: Frank M. Ridder, W. C. Walker, Charles E. Walker, of Hartford and Ralph A. Barkman, of West Hartford.

To Test Washington Anti-Glare Regulation

WASHINGTON, D. C., Aug. 22—New traffic regulations affecting motor car drivers went into effect here this week and met with general approval with the exception of the provision prohibiting the use of brilliant headlights with reflectors. The authorities hold that cars equipped with headlights with reflectors cannot be used at night unless the glass is covered with paint, cheesecloth or some similar material. The use of dimming apparatus is also declared to be illegal.

A test case was made this week when R. H. Martin, manager of the Buick Motor Co., was arrested for driving a car equipped with electric headlights on which there was a dimmer attachment. He was fined $10 and promptly noted an appeal to the court of appeals. It is expected it will be several months before the case will be reached by the higher court. In the meantime the district commissioners are being flooded with protests against the headlight regulation, the protestants pointing out that lights with dimmer attachment should be allowed. There is a possibility that the commissioners will so amend this regulation as to make the use of such lights legal.

Combination Rubber Takes Over Keaton Tire

NEW YORK CITY, Aug. 31—The Keaton Tire & Rubber Co. has been taken over by the Combination Rubber Mfg. Co., this city, which will continue the manufacture of special brand tires and tubes, and take over the business in its entirety.

H. A. Forbes, formerly general manager of the Keaton company is now connected with the Combination company as manager of its tire department, and F. C. Braden is now identified with the company as sales manager of the tire department.

Benham Mfg. Co. Asks for Dissolution

DETROIT, MICH., Sept. 2—*Special Telegram*—A voluntary petition for dissolution has been made by the Benham Mfg. Co., which has been making the Benham six, which was formerly known as the S and M. The petition was made upon the suggestion of the creditors' committee and the Union Trust Co. has been appointed receiver and will decide after verification of the concern's condition and the inventory, what the best policy will be concerning the future of the company. According to the latter's statement, the liabilities amount to $76,889 and the assets to $109,000.

Canada Buys Trucks—17 Go to War Camp

OTTAWA, ONT., Aug. 28—The Militia Department of the Canadian Government has supplied itself with motor trucks with the least possible delay. The government has purchased twenty-five, the idea being to have these trucks, all of 2-ton capacity, accompany the Canadian contingent abroad, there to be utilized for the hauling of supplies and other work which heretofore has been done with horses.

The details of the purchase were handed over to T. A. Russell of the Russell Motor Car Co. of Toronto by the Militia Department. The following well known manufacturers received the orders:

The Russell Motor Car Co., of Toronto, 8; the White Company, 5; The Packard Company, 4; The Gramm, Walkerville, 4; and the Reo, 4—twenty-five in all.

A stipulation of the orders was quick delivery, and how soon this was accomplished is illustrated in at least one instance. The White Company received its orders on Sunday, the 15th, and at 2:30 o'clock on the following Tuesday, the 17th, these five motor trucks were in Canada and on their way to Val Cartier where its troops are mobilizing.

Cars, Trucks and Accessories Contraband

NEW YORK CITY, Sept. 1—At a meeting of the New York Chamber of Commerce held last week a statement of information to shippers was adopted. This is of interest in view of the fact that motor vehicles, gasoline and lubricating oil have been declared contraband of war. The report states, that goods shipped to a neutral destination are exempt from capture whether carried in an American, neutral or belligerent bottom. The only exception to this rule is when goods, though shipped to a neutral port, are intended for a re-shipment to some point in the territory of the nations at war. The burden of the proof is then on the captor who must show beyond reasonable doubt that such re-shipment was intended.

The report further takes up the question of ordinary marine and war insurance, the difference between the two classes of contraband and upon what points the capture may be justified. A copy of this statement may be procured by addressing the committee on problems of foreign shipments, during the war, in care of the New York Chamber of Commerce.

Bosch Unaffected by War in Europe

LONDON, ENG., Aug. 31.—*Special Cable*—Editor THE AUTOMOBILE—The Bosch Magneto Co. informs me that it has supplies of magnetos available for all possible requirements. The plant is available if necessary for production. The general state of trade in this country is as reported in THE AUTOMOBILE for August 30.—J. S. Critchley, president of the Institution of Automobile Engineers.

Krit Has New Model for $850

DETROIT, MICH., Sept. 1—*Special Telegram*—To meet the demand for a lower priced car, the Krit Motor Car Co., Detroit, will bring out another model to sell at $850 with electric cranking and lighting.

This new Krit, designated as model O, has the same motor and chassis as the models selling at $995, but it is less of a de luxe proposition, though it is just as good from the standpoint of service. The motor has a bore of 3¼ inches and a stroke of 4 inches, and is an L-head type with block cylinders.

Though the body is a streamline type, it is not so refined; it has the familiar paneled edges which are absent on the other car and is a strictly manufacturer proposition.

To illustrate the equipment differences making possible this lowering in price as compared with the other Krit, the top is not of the one-man type, though it is of a good grade of mohair; there is no gasoline tank gauge; the fenders are not crowned, though preserving the popular curve. The Bosch magneto is not fitted, the new Disco combination electrical system taking care of ignition as well as lighting and cranking. A Schebler carbureter will probably be used.

Though not so refined as its running mate, it is pointed out that this Model O Krit is very good value, for it possesses many high-priced car features. For instance, there is the coped over radiator, tapered bonnet, left drive, rain-vision and ventilating windshield, leather-covered instrument board, Stewart speedometer, demountable rims, and tire carrier at the rear with the gas tank in the cowl.

It is probable that a large proportion of the Krit factory will be devoted to the making of this model, a schedule of about 6,000 of them being figured on. Due to the low price, this car is to be had only in stock form. No changes will be made in color, equipment or fittings. Both roadster and touring car are offered at $850. Deliveries are underway, the first carload going forward to-day.

Stutz Brings Out New Light Four

INDIANAPOLIS, IND., Aug. 31—A light four runabout selling at $1,450 has been announced for 1915 by the Stutz Motor Car Co. In addition another 1915 model is the Bull Dog which consists of a close-coupled four-passenger tonneau on the standard four-cylinder Bearcat roadster. This car sells for $2,250.

The new light four is standard in every way. It has a four-cylinder L-head block motor, 3.75 by 5 inches, made by the Wisconsin company. A cone clutch and the Stutz gearset and rear axle, combined in one unit, are continued. The wheelbase is 108 inches and 32 by 4-inch tires mounted on wooden wheels are used. The front axle is of Timken make and the springs are semi-elliptic all around. The Remy starting and lighting system has been adopted and carburetion is furnished by a Stromberg carbureter.

Right steering and right control are used, the steering gear being a Gommer. The equipment includes Hartford shock absorbers, Warner speedometer, Baker demountable rims, trunk and tire carrier and the body is ironed for a top.

The Bull Dog model is identical with the present Bearcat with the exception that Bosch ignition is used and the gravity tank has been displaced by a pressure system.

Apperson Light Four and Six Appear

KOKOMO, IND., Sept. 1—Apperson Bros. Automobile Co. has added to its line a light four and a light six streamline model. Both cars will be produced in quantities to sell at popular prices.

The building of these two models is an innovation for this company, for they have devoted years to the production of high-powered cars.

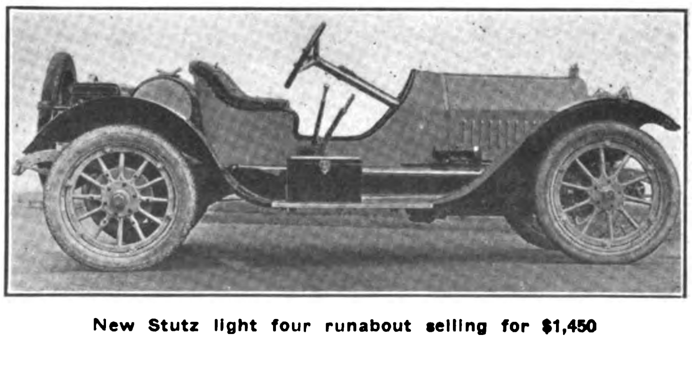
Like all Apperson cars, these two new models were designed by Elmer and Edgar Apperson. The price of the light six is $1,785, with full equipment; and the four is $1,485, fully equipped. The company builds in addition to these cars, other fours and sixes, ranging in price from $1,685 to $2,350.

Trucks Abused by Use of Trailers—C. of C.

NEW YORK CITY, Aug. 28—Inquiries addressed to members of the National Automobile Chamber of Commerce regarding the desirability and economy of using trailers with standard motor trucks have been answered in detail by the following twelve companies:

Avery	Kissel	Speedwell
Baker	Locomobile	Velie
Federal	Packard	Waverley
General Motors	Pierce-Arrow	White

The preponderance of opinion is decidedly against the practice except under very favorable conditions, such as level, smooth, hard roads, slow speed and proper handling. Given such conditions the standard truck may be used successfully for hauling trailers, but under no circumstances should a trailer be used without the consent of the manufacturer, as the guarantee does not contemplate such use. Under any other conditions the practice is of very doubtful economy; therefore truck manufacturers do not encourage the use of



New Stutz light four runabout selling for $1,450 trailers unless they examine the field of operation and know that their trucks can handle the work with trailers under the conditions.

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Low Gear, Non-Stop Test by Franklin Dealers

SYRACUSE, N. Y., Aug. 29—On Thursday, September 24, the Franklin Automobile Co., through its agents, will hold a nation-wide, 100-mile low-gear, non-stop cooling demonstration. The object of this test is to demonstrate the fact that the air cooling system used on the Franklin cars is adequate to take care of the needs of the motor under the most trying circumstances.

The test will be run in about the same manner as the fuel economy test which was made by the Franklin dealers on May 1, 1914, when ninety-four stock Franklin six-30 touring cars averaged 32.8 miles on 1 gallon of gasoline. Every Franklin dealer has been invited to enter the test with a Franklin six-30 car. The run is to be started at 8 a. m. on September 24, regardless of weather conditions and is to be supervised by two or more disinterested observers. The engine is to be kept running throughout the entire demonstration and the cooling system is to be left in its ordinary condition. It is expressly forbidden in the rules that extra oil be supplied either to the motor itself directly, or through the gasoline.

The hood is not to be raised during the run and before starting all the oil is to be drained out, and the fresh oil replacing it is to be carefully measured. The amount remaining in the car is also to be measured after the run to obtain information on the amount used. The number of gallons of gasoline used during the run are also to be measured, and the finish must be within 10 hours of the start.

A complete booklet instructing the agents in the methods of making the test has been issued in order that every agent will carry off the run in a similar manner. In going 100 miles on low gear in 10 hours, each cylinder fires the same number of times as in going 336 miles on high gear. At the conclusion of the run, the time consumed, weather and road conditions, oil and gasoline consumption, will be telegraphed to the company at Syracuse and following this an affidavit will be made out detailing the results of the test.

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Chandler Co. Developing Exports

CLEVELAND, O., Aug. 27.—"We have been shipping cars to countries outside of Europe ever since the war has been in progress," said sales manager C. A. Emise, of the Chandler Motor Car Co. "We are going after the trade in South America, South Africa and Australasia and believe that American manufacturers will in time get the biggest part of the automobile business done in those countries.

"American automobile manufacturers have been getting many automobile supplies and accessories from Europe: for instance, ball bearings, spark plugs, magnetos from Germany; silent chains from England; upholstering material from France; special alloys, steel, windshield glass, etc., from other European countries. The war now gives an unexpected opportunity to American manufacturers to supply some of these materials or supplies and it depends entirely upon them to have the demand become permanent for their goods.

"As far as our own company is concerned, I may say that we have a very large supply of all materials and supplies and accessories of European origin, and are in no way worried. We will make all the cars we have planned for 1915 and we are looking forward to a big business year."

—

Chalmers Reduces Light Six Price $200

DETROIT, MICH., Sept. 1—*Special Telegram*—The Chalmers Motor Car Co., Detroit, has reduced the price of its small six-cylinder model from $1,850 to $1,650. This cut of $200 means a sheer reduction of this amount, the car at its new price being identical in every respect as heretofore. This price reduction brings this small six into the price zone of small sixes the public has been observing closely for months past.

—

W. R. Chandler Gets Eastern Sparton Territory

NEW YORK CITY, Sept. 1—The Sparks-Withington Co., Jackson, Mich., is greatly increasing the scope of its retail activities. W. R. Chandler has been allotted a large territory in the East, including New York, Pennsylvania, Delaware and the District of Columbia, and has established headquarters in the U. S. Rubber building, Broadway and 58th street.

Big Rubber Stock for Goodyear—Tire Prices Hold

—

Some Companies Still Announcing Price Raises —Scarcity of Boats and Tight Exchange Cause Low Imports

NEW YORK CITY, Aug. 31—Tire prices have undergone no material changes this week. The Pennsylvania Tire Co. announced, however, it has increased the price on its vacuum tire 5 per cent. and an increase of 12½ per cent. on its plain tread stands.

Those tire prices which remain the same as before the war are as follows: Kelly-Springfield, Lee, McGraw, Michelin, Overman, Goodyear, Ten Broeck, and Swinehart. The following tire prices are increased: Empire, 12.5 per cent.; Federal, 12 1-2 per cent.; Firestone, 12 1-3 per cent.; Fisk, 15 per cent.; Goodrich and Diamond, 12 1-2 per cent.; Pennsylvania, 12 1-2 per cent.; Republic, 12 1-2 per cent.; United States, 12 1-2 per cent., and the Lee, 12 1-2 per cent.

The Goodyear Tire & Rubber Co. has obtained 1,500,000 pounds of rubber from the London market. This big supply is now nearly all on the way to the factory in Akron. The company has since taken other steps to insure a continuous supply.

The other companies have succeeded in getting a small lot of rubber, but the lack of ocean transportation facilities has greatly hindered them in getting even this small lot.

The demoralization of the foreign exchange market is giving fully as much trouble. As is well known, the principal sources from which crude rubber are obtained are Brazil and the Far East. In both cases the product is paid for through London. Unless the foreign exchange market improves substantially in the near future the buying of crude rubber will be on a reduced scale.

It is expected that 11 of the guayule rubber factories in Mexico will have resumed operations by September 5. Preparations are being made by the Intercontinental Rubber Co., which is composed of Aldrich-Rockefeller interests, to run all of its factories, including the large plant in Torreon, full time. Gangs of men have also been set to work cutting the guayule shrub upon the 2,000,000-acre Cedros hacienda in the State of Zacatecas, that is owned by the company, and a large supply of the raw product will be on hand at the different factories in a short time. It is stated that the recent advance in the price of rubber is stimulating activity in the guayule industry, and that there will be several other large factories established in the Torreon district and in the upper border region of Texas if prices continue high.

Notwithstanding the predictions made in the beginning of this year that, owing to the decrease in prices, crude rubber shipments from the Amazon Valley would show a falling off, variously estimated from 15 per cent. to 25 per cent., it would appear that the amount exported in the crop year of 1914-15 was only slightly less than the average for the last 5 years and but 9.4 per cent. below the record season of 1913-14.

For the crop year ended July 31, 1914, the exports of crude rubber from the Amazon Valley, by port of shipment, were:

Ports	Fine Pounds	Medium Pounds	Coarse Pounds	Caucho Pounds	Total Pounds
From Para to—					
United States...	8,196,315	1,838,690	9,450,145	5,191,535	24,676,685
Europe	15,002,880	1,157,495	1,779,625	4,901,965	22,841,965
From Manaos to—					
United States..	7,769,105	1,559,720	2,503,600	3,366,435	15,198,860
Europe	9,459,815	1,810.785	1,755,420	4,613,575	17,639,595
From Itacoatiara to—					
United States..	16,580	2,030	6,880	13,225	38,715
Europe	182,175	29,305	111,795	52,285	375,560
From Iquitos (Peru) to—					
United States...	219,560	16,020	79,300	707,405	1,022,285
Europe	1,103,750	58,600	373,110	2,315,030	3,850,580
Total to U. S...	16,201,560	3,416,460	12,039,925	9,278,600	40,936,545
Total to Europe.	25,748,620	3,056,275	4,019,950	11,882,855	44,707,700
Gr. total, '13-14.	41,950,180	6,472,735	16,059,875	21,161,455	85,644,245
Gr. total, '12-13.	45,927,905	7,134,340	19,308,010	22,154,810	94,525,065
Gr. total, '11-12.	45,931,105	7,839,635	19,808,530	16,378,140	89,957,410
Gr. total, '10-11.	37,873,210	6,318,450	15,095,050	14,640,895	73,927.605
Gr. total, '09-10.	43,783,800	7,720,585	19,006,050	15,668,250	86.178.685

There is no doubt that if prices continue to rule low it will affect shipments, but for the present at least the output will continue about as given above.

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DETROIT, MICH., Aug. 27—The directors of the Packard Motor Car Co., this city, have declared the regular quarterly dividend of 1¾ per cent. upon the preferred stock, payable on September 15 to the stockholders of record upon the close of business on September 5.

Big Trade Boom in Newark—Business Grows 73 Per Cent.

Cars Selling Under $2,500 Seem the Most Popular in 1914 Sales—Dealers' Reports

NEWARK, N. J., Aug. 29—Never before in their history have the automobile dealers in this city reported such remarkable sales. For the first 7 months of 1914, the average increase in sales is 73 per cent. The cars selling under $2,500 seem to be the most popular.

The Ford company again leads in sales, which number 900, an increase of almost 200 per cent. Philip Plaistridge, the new Ford dealer, expects sales to reach the 1,200 mark this year.

The following is a report in detail:

Velie and Briscoe—Sold seventy-one cars. No increase over 1913. Shipments have been prompt and their delivery immediate. Big 1915 advance in sales. During July and August twenty-eight cars have been sold. The five-passenger touring car is most popular.

Reo—Best year it ever had, with a 300 per cent. increase. Sold 499 cars, including wholesale and retail. Wholesale amounted to 317, its Paterson branch alone selling forty-two. Sold ten cars in last 9 days. Maintains its own service station with a monthly inspection of its customers' cars. Its August business was $9,000 more than the same month in 1913.

White—Reports good business, with a 15 per cent. increase.

Buick—Reports 52 per cent. increase over 1913 sales. The 1915 sales are 50 per cent. better than for the same period in 1913. Predicts the biggest fall business in its history. It is 6 weeks ahead of its factory allotment.

Oakland—Business on a par with 1913. 1915 sales are very promising.

Chalmers—Sales for 1914 were 35 per cent. better than 1913. Expects good 1915 sales. Its allotment is 30 per cent. larger this year.

Mercer and Chandler—Sold 44 cars in 1914 as against 29 for 1913, a 54 per cent. increase.

Pierce-Arrow—This concern did a remarkable business for 1914. Including its service-station work, its special painting department, its second-hand car department and its new car sales, the business amounted to approximately $1,000,000. The second-hand car business amounted to $185,000. Sales for the new series model are 50 per cent. ahead of last year for the same period. Truck business is about 60 per cent. ahead of the preceding year. Thirty per cent. of its passenger cars sales are in closed cars.

Stutz and King—This agency shows a 75 per cent. increase, its sales amounting to sixty-five cars.

National—Sold forty-seven cars in 1914 and thirty-five in 1913, a 34 per cent. increase. Its allotment will be about 40 cars this year. Touring cars are most popular.

Oldsmobile—Has increase of 25 per cent. Will have allotment of 250 of the small-car type and 40 big cars.

Overland—The rush for 1915 cars has brought the agency 3 days behind in its orders. Starting February 1, the sales during the first 5 months of this year have equaled the 12 preceding months. The sales for 1914 are approximately 100.

Locomobile—Sales were on a par with 1913.

Market Reports for the Week

The usual changes occurred in this week's market reports. Rubber rose to $0.77 at a gain of $0.22 over Thursday's quotations. Owing to the smallness of supplies on hand, nominal conditions prevail. It was reported that the London market was firmer for plantations, but no details as to prices were available. Petroleum prices are steady. Quotations on cyanide potash have stopped. An importation, however, was noted of 150 cases of cyanide. Sulphuric acid is steady at $0.90. Both Bessemer and Open-Hearth steels rose to $20.50 at a gain of $0.50 per ton. One interesting development in the steel market was the practical placing of an export order for 2,000 motor trucks and ambulances with an American manufacturer, who is in turn placing contracts for steel shapes to be used in the construction of the various parts. The contract price of the trucks is about $4,000 each, making the total $8,000,000 for the full contract. Copper exports in August amounted to 44,000,000 pounds, while the imports at Atlantic ports is estimated at 22,400,000 pounds.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.12	.12	.12	.12	.12	.11¾	— .00¼
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	......
Bessemer Steel, ton	20.00	20.50	20.50	20.50	20.50	20.50	+ .50
Copper, Elec., lb.	.12	.12	.12	.12	.12	.12³⁄₁₀	+ .00³⁄₁₀
Copper, Lake, lb.	.12½	.12½	.12½	.12½	.12½	.12½	......
Cottonseed Oil, bbl.	7.05	7.10	6.80	6.79	6.80	6.62	— .43
Cyanide Potash, lb.	.25	.25	.25	.25	..	..	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.93	.93	.93	.93	.93	.93	......
Lead, 100 lbs.	3.87½	3.87½	3.87½	3.87½	3.87½	3.87½	......
Linseed Oil	.60	.60	.60	.60	.60	.60	......
Open-Hearth Steel, ton	20.00	20.50	20.50	20.50	20.50	20.50	+ .50
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	.55	.75	.75	.75	.78	.77	+ .22
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	39.75	39.75	39.00	39.00	38.50	38.25	—1.50
Tire Scrap	.05	.05	.05	.05	.05	.05	......

Recent Trade Changes in Newark

NEWARK, N. J., Sept. 1—During the last few weeks, a number of the automobile agencies have made important changes in the way of the addition of new cars or the establishment of new agencies.

L. J. Wyckoff, for many years the Ford agent for this city, has taken on two new cars, the Oldsmobile Four and the Saxon. The taking on of the small Oldsmobile follows somewhat the plan of the New York City Oldsmobile dealer, who has established a number of agencies throughout the city for the small car. The Oldsmobile Co. of New Jersey, 254 Central avenue, will in the near future become the state agency for the Oldsmobile cars. It expects to establish about fifteen small car agencies throughout the state.

Hereafter all sales of Stevens-Duryea cars for this territory will be conducted at the New York City agency, 1875 Broadway. The Newark service station, however, will be maintained.

A $5,000,000 Overland Stock Increase

TOLEDO, O., Aug. 29—The Willys-Overland Co. was authorized on Thursday to increase its capital from $25,000,000 to $30,000,000. Overland officials stated that the increase will be used in declaring stock dividends. The common stock was increased from $20,000,000 to $25,000,000 which, with the $5,000,000 preferred stock outstanding, makes the total $30,000,000. During the present month the company has brought in $250,000 worth of preferred stock for retirement, in accordance with the terms of its charter which specifies that amount to be applied annually in the retirement of preferred stock.

Anderson Electric Conventions in Series

DETROIT, MICH., Aug. 28—Instead of holding one single convention for all their branch managers, dealers, salesmen, etc., the Anderson Electric Car Co., which makes the Detroit electric vehicles, has been holding and will still hold several conventions.

One of the first conventions held was that of factory salesmen. Then there was a convention of branch managers, one of Pacific coast dealers, another of Southern dealers, one of Central West dealers.

At these meetings, which were held at the big plant on Clay and Riopelle, about 160 co-workers of the Anderson company from all over the country have taken part. The 1915 models were thoroughly explained; sales methods and plans for selling campaigns were talked about; there were exchanges of views concerning the second-hand electric vehicle problem and concerning the garage systems and facilities.

"We are now employing 1,200 men," said A. C. Downing of the Anderson company, "and the outlook for 1915 is very satisfactory to us. We are planning to build 30 to 35 per cent. more vehicles than we did this year, the demand all over the country being larger than ever.

"There seems to be a general tendency to help the electric vehicle business as we notice that many other trades or industries or business which heretofore could have assisted the electric vehicle trade in becoming bigger and expanding more rapidly are now coming to the front and helping. Probably the biggest improvement in this connection is the assistance given by the electric light companies, which are not only giving more favorable rates but are employing electric vehicle experts to give advice to electric vehicle users."

Briscoe Branch in New York—Other Agencies

New York City, Sept. 1—Changes in automobile agencies in the city, either planned or accomplished, are many just now. One of the most important is the opening of the Briscoe Auto Co., of which Rudolph L. De Lisser is the head. This company, a direct representative of the Briscoe factory, will have a store on Broadway just above the northeast corner of 58th street, at 1794 Broadway.

James W. Gilson, advertising manager of the L. P. C. Co., has been here arranging for an agency for the Lewis Six. Another car that will probably be represented by an agent instead of a branch hereafter is the KisselKar. Negotiations are pending with one dealer to take the local retail end. C. H. McCausland will retain charge of the wholesale business of the Atlantic seaboard.

C. B. Derby & Co., local agent for the Abbott-Detroit and Westcott automobiles, has been appointed distributor in Brooklyn for the Oldsmobile. They have established offices and salesrooms at 1270 Bedford ovenue.

The Colt-Stratton Co., eastern distributor of the Cole car, has secured the distribution of the Dodge Bros. car for this territory.

The Greenhut Department Store has taken over the distribution of the Argo car for the Metropolitan district and all surrounding territory, including Long Island, Brooklyn, Staten Island, Westchester County and Fairfield, Conn. This department will be in charge of T. P. Ward. A service department will be installed, near the store, probably next door.

Northwest Dodge Allotment Snapped Up

Detroit, Mich., Aug. 27—A. C. Templeton, district manager for Dodge Brothers in Minneapolis, Minn., after a 6 weeks' tour through Minnesota, the Dakotas, Nebraska and Wyoming, has returned to Detroit, having closed contracts for 75 per cent. of all the cars which Dodge Brothers have provided for that section of the country. In some parts of the state visited by Mr. Templeton the crops have been much heavier than in any previous year and are also bigger than in other sections of the state, this being due to the fact that blight and the terrific heat has caused some damage to the crops in certain sections.

Splitdorf Charges Patent Infringement

New York City, Aug. 31—The Splitdorf Electrical Co. has brought suit against the Eisemann Magneto Co. charging infringement of patent No. 1,102,385 covering improvements in magneto mounting. The Splitdorf company is the assignee of Ernest W. Brackett, Newark, N. J., and claims that the Eisemann company made or sold or caused to be made or sold in the borough of Manhattan, magneto mountings embodying the invention of the patent. The plaintiff prays for a writ of injunction, as well provisional as permanent, and also for damages and costs of the suit.

The Eisemann Magneto Co. claims that the so-called invention described in the patent was manufactured and marketed by others for some years before the granting of the patent in suit. The Eisemann company will contest the suit on this ground.

Studebaker Demand Biggest in Years

Detroit, Mich., Aug. 27—According to first vice-president A. R. Erskine of the Studebaker Corp., the demand for Studebaker cars is the heaviest the corporation had in many years and at the present time the concern is more than 3,000 cars behind its schedule of deliveries.

"We are shipping 160 to 180 cars daily and doing our utmost to catch up with this unprecedented situation in our plants," said Mr. Erskine. "Anyone who thinks that the war in Europe will affect to any great extent the automobile business is mistaken. It seems to me from the reports I have received from all over the country that the farmers of the United States will buy more cars than in any previous year, while in most cities and towns the reports from agents, representatives and branches, are the most encouraging and indicate a bigger demand than ever before."

Reorganizes Standard Roller Bearing Co.

Philadelphia, Pa., Sept. 1—In conjunction with manufacturing and banking interests in Philadelphia, New York and other Eastern cities in the East, S. S. Eveland, former president of the Standard Roller Bearing Co., which went into the hands of receivers last year, has plans under way for a reorganization of the company.

At the headquarters of the Eveland Engineering & Manufacturing Co., Mr. Eveland could not be seen today, as it was said that he was attending an important conference bearing on the reorganization plan. It was announced, however, that such a plan was nearing completion, but until the preliminaries were cleared up it was not possible to get more than a mere outline of what was to be accomplished.

The only information forthcoming was to the effect that a substantial payment to the creditors' committee had been made to bind the bargain.

It is understood that the plan of reorganization contemplate the payment to the company of a large sum for working capital, and also the payment to creditors of a certain percentage of their claims, including debenture holders, banks and mercantile creditors, the balance to be paid gradually. All stockholders will retain an interest in the concern.

Receiver for American Voiturette Co.

Detroit, Mich., Sept. 1—*Special Telegram*—The Detroit Trust Co. has been appointed receiver for the American Voiturette Co. of this city, builder of the Car-Nation small car and the Keeton car. H. L. Stanton, who is in charge of the receivership, states that all creditors are being notified by circular letter of the situation and that work will be immediately begun on making inventory and issuing a statement of the assets and liabilities of the concern. The order of the appointment of the receivership was signed by Judge Sessions of Grand Rapids and the receivership is in the United States District court, eastern district of Michigan in equity. The application for the receivership was made by a creditor of the organization.

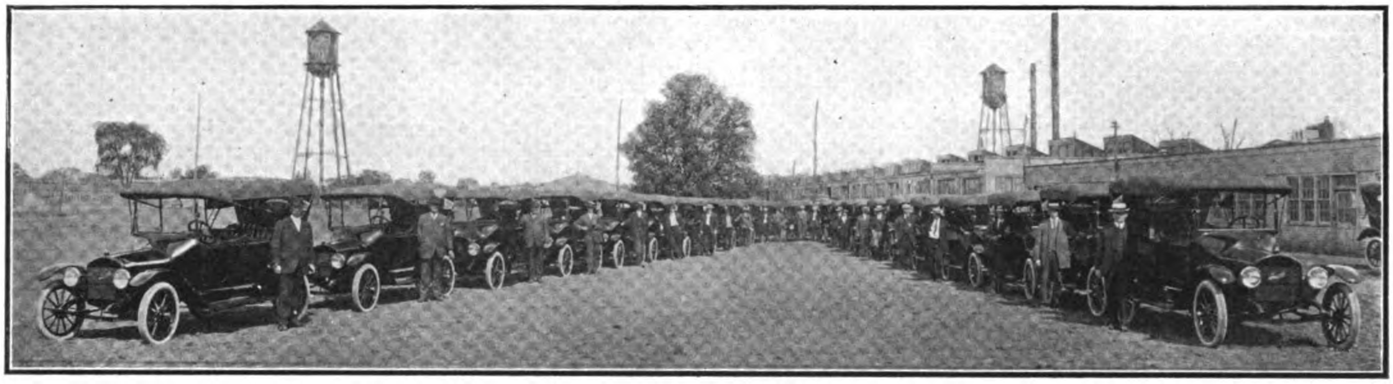
The receiver states that the liabilities according to the company's statement approximate $231,000. No statement of assets is made, but there is material for 600 Car-Nations on hand in construction and material for 100 Keetons. The receiver will carry on manufacture of these parts as soon as the inventory is taken. Since April 1 the company has manufactured 1,200 Car-Nations and has distributed these through more than a dozen centers. A representative of the concern makes the statement that the narrow tread, which has demonstrated its value on all kinds of roads has been generally criticized by all dealers selling standard tread cars.

Hoosier S. A. E. Prepares Winter Program

Indianapolis, Ind., Aug. 29—At a dinner and meeting of the Indiana branch of the Society of Automobile Engineers, at Crows Nest, near Indianapolis, a few days ago, plans for the winter meetings were discussed. One meeting will be held each month and an interesting program of technical papers and other features will be arranged for each meeting. A committee is now at work on a program for the first meeting, which will be held the evening of September 9 at the Claypool Hotel, Indianapolis. Efforts are to be made to increase the membership during the meeting.

Boston, Mass., Aug. 31—On motion of the creditors, Judge Dodge in the U. S. District Court today postponed the question of sale of the Walpole Tire & Rubber Co., until October 15.

Third annual outing of the Motor Truck Club, New York City



Twenty-five dealers from western New York State at the Maxwell plant taking delivery on new Maxwells

De Palma Will Drive at Brighton Beach Races

NEW YORK CITY, Aug. 27—The 2-day automobile race meet scheduled for Saturday, September 5 and Labor Day, September 7, at Brighton Beach track, will bring forth a few of the Elgin stars. Ralph De Palma will drive the same Mercedes with which he won the recent two Elgin road races, also the Mercedes with which he captured the last two Vanderbilt cup races and the Elgin road race in 1912. His brother, John De Palma, will drive one of these Mercedes cars in some events and possibly a Peugeot racer in others. Ralph Mulford is at present on his way from Elgin, driving his Peugeot over the roads.

Harry Grant will probably drive a Sunbeam. Jack Le Cain of Boston will drive one of the two Chevrolet specials entered; the other driver is not nominated as yet. Dickinson has entered a Stutz; Strang will drive a 120-horsepower Benz; Vail will be at the wheel of the old Ford 999. Armour Ferguson will probably drive his 160-horsepower Peugeot, while other entries are George Smithson in a Cole, Neil Whalen in the Greasy Bullet, and a Lozier, Fiat, Paige-Detroit, Isotta, National and a Mercer.

Race Meet at Boston, October 10

BOSTON, MASS., Aug. 31—In connection with the First Annual Light Car and Cyclecar Show to be held at Horticultural Hall, Boston, October 12 to 17, there will be a race meet on Combination Park's 1-mile dirt oval at Medford, Mass., on Saturday afternoon, October 10. The card of events as arranged by manager E. P. Blake calls for a 2-mile Class A race for cars up to 71 cubic inches cylinder displacement, a 5-mile race for Class B cars from 71 to 100 cubic inches cylinder displacement, a 5-mile Class C race for cars from 101 to 125 cubic inches and a 25-mile free for all race for all cars up to 125 cubic inches and 1,150 pounds chassis weight.

Postpone Wisconsin 3-Day Tour to Sept. 7

MILWAUKEE, WIS., Aug. 31—The fourth annual tour of the Wisconsin State A. A., scheduled for September 2, 3 and 4, has been postponed to September 7, 8 and 9 so that the run may start on Labor Day and contestants will actually spend only 2 working days on the road. When entries closed August 27, there were eight actual entries and five conditional entries, depending upon the arrival of 1915 models. To accommodate the uncertain entrants, the tour was set forward 5 days, and in the meantime additional entries will be solicited.

The cars already officially nominated are: Mitchell, Mitchell Automobile Co., Milwaukee; Franklin, Sanger Automobile Co., Milwaukee; Chevrolet, Olson-Pauly Co., Manitowoc, Wis.; Buick, Buick Motor Co., Milwaukee; Studebaker, Wolleager Automobile Co., Milwaukee; new R. C. H., Creek Motor Sales Co., Milwaukee; White, White Automobile Co., Milwaukee; Oakland, Creek Motor Sales Co.; Reo V, Curtis Automobile Co., Milwaukee; Jeffery 4, Reeke-Osmond Motor Car Co., Milwaukee. These ten cars will be supplemented by at least five others, making an entry list of 15 for the only reliability-economy tour to be run in the United States this year.

The tour will be run under grade 1 rules of the A. A. A., with supplementary rules framed by the W. S. A. A. to cover the economy feature of the run. It will be run in eight divisions, for economy purposes, the classification being according to price, as follows: Up to $450; from $450 to $800; from $800 to $1,200; from $1,200 to $1,600; from $1,600 to $2,000; from $2,000 to $3,000; from $3,000 to $4,000, and over $4,000.

There will be eight trophies, donated by *Wisconsin Motorist*, one for each class in the economy test; the *Milwaukee Sentinel*, $1,000 gold cup as a sweepstakes prize; the *Milwaukee Free Press*, cup for reliability, and the Emil Schandein cup for private owners. The Schandein cup class has already two entries, and officials of the W. S. A. A. say they will be satisfied to have a total list of 5 private owners. The tour will last 3 days and cover approximately 475 miles through the most thickly populated section of Wisconsin.

Races and Show at Michigan State Fair

DETROIT, MICH., Aug. 31—The chairman of the contest board of the American Automobile Assn. has informed the promoters of the 2-day race meet to be held on the Michigan state fair track September 6 and 7, that the ban upon the track has been lifted for those 2 days. Among the prominent race drivers thus far entered to drive in the races are: Bob Burman, Louis Disbrow, Johnny Rainey, Fred Horey, Charles Coey and Harry Davison.

Half Fees for Owners Alone in Ohio

COLUMBUS, Aug. 29.—The attorney general of Ohio has handed down an opinion in which he holds that the provision of law for half fees after September 1 refers only to automobile owners and not to chauffeurs, dealers or manufacturers. After that date the fees for registering gasoline cars will be $2.50; electrics $1.50.

State Registrar Shearer believes there will be 120,000 cars registered in the Buckeye State as the number is now 115,000.

Amateurs Win from Trade in Chicago Run

CHICAGO, ILL., Aug. 31—The fourth annual team match between amateur and trade members of the Chicago Motor Club for the A. J. Banta trophy took place Friday and Saturday of last week and resulted in a victory for the amateur team by a score of 181 for the victors and 251 for the losers. The trip was to St. Joe, Mich., and return, a journey of about 210 miles. The amateur team was made up of six cars, while the trade team had the same number. On the winning side L. H. Phiffer in a Velie, O. W. Hahn in an Overland and E. Turner in a Mercer made perfect scores. Captain J. Frank Meyer in a Ford drew 178 points, while L. M. Barr in a Peugeot was docked 1. On the losing side the clean scores were made by R. C. Cook in a Stearns-Knight and John D. O'Connor in a Buick. John A. Bell in a White and F. E. Sparks in an Oakland each drew 1 point. B. McSteele in a Scripps-Booth was the chief offender, drawing 222 points the first day.

Maxwell Dealers from Buffalo Region at Plant

DETROIT, MICH., Aug. 28.—Under the leadership of the Meyer Motor Co., Buffalo, distributor for the Maxwell cars in that city and vicinity, twenty-five dealers and sub-dealers from that territory came to the Maxwell plant this week to take delivery of their 1915 demonstrators. They were entertained by the Maxwell company at luncheon and were shown through the plant and given a talk about the new car and the company's selling campaign. The visitors returned to Buffalo by boat but took their new demonstrators with them and started for their home towns in them.

FORD Employs 9,031 Foreigners—A count was made recently among the workingmen at the Ford Motor Co., Detroit, Mich., to find out how many foreigners were employed and to what nationalities they belong. This resulted in finding that the 9,031 foreign workers belonged to twenty-two different nationalities. The Poles numbered 2,677; then came the Russians, 2,016; Roumanians, 750; Italians, 690; Germans, 606; Austrians, 388; English, 380; Syrians, 330; Hungarians, 269; Canadians, 226; Servians, 210; Irish, 148; Scotch, 133; Lithuanians, 73; French, 55; Hollanders or Dutch, 26; Danes, 21; Croatians, 13; Turks, 8; Belgians, 6; Japanese, 3; Australians, 3. Total, 9,031.

Entire Denby Organization in Plant—The entire organization of the Denby Motor Truck Co., Detroit, Mich., is now located at the plant, Dubois and Franklin streets. The general offices were up to the present in the Dime Bank Bldg.

Robie Co.'s Plant in York—The Robie Motor Car Co., which had temporary quarters with the Massnick-Phipps Mfg. Co., in Detroit, has moved to York, Pa., where it will manufacture a light car. No information has been given by the company, but an announcement is expected to be made within the next few weeks.

Mohawk Rubber's New Plant—A building permit has been granted to the Mohawk Rubber Co., Akron, O., for the construction of a $15,000 addition to its factory on Second avenue and River street. It is planned to construct another building of similar design and size during the Fall. Each of the buildings will be 100 by 61 feet and two stories high.

Wheel Plant for Rockton—The Great Northern Mfg. Co. organized to manufacture a new wheel for motor cars which will do away with the necessity of using pneumatic tires, has decided to build a factory at Rockton, a few miles south of Beloit, in Winnebago County, Ill.

Will Make Ford Tires—A new tire making concern is being organized in Toledo, O., and application for a charter will soon be made to the secretary of state. The concern will take for its name the Ford Tire Co., and will manufacture tires and tubes exclusively for Ford cars. It is said the company will be financed on the co-operative plan by Ford owners.

U. S. Truck Plant in Covington—For the purpose of taking over the United States Motor Truck Co., of Cincinnati, O., a new concern of that name was recently incorporated under the laws of Kentucky with an authorized capitalization of $25,000. The new company has located its plant in Covington, Ky., where it is turning out U. S. trucks in 2, 3 and 4-ton sizes. New 1 1-2-ton models will be announced shortly.

Additional Plant for Ball Bearings—Announcement has been made in Philadelphia that the Hess-Bright Mfg. Co. will add to its plant at Front street and Erie avenue in that city in view of the necessity put upon it by the war of manufacturing in this country ball bearings which have been manufactured heretofore in Germany. It is stated that plans have been made for the necessary additions and work will begin at once. Automatic machinery will be employed to the largest extent possible, the higher wage scale in this country furnishing a greater incentive to the use of such machinery than exists in Germany.

M. & M. Co. Enlarges—To take care of its increasing business the M. & M. Co., Cleveland, O., dealer in automobile supplies, has acquired addiitonal property and will erect a new plant. The M. & M. company of which J. C. McLean is general manager, recently took over the stock and good will of the Kinsey Mfg. Co., Toledo, maker of radiators and parts. This stock will be shipped to Cleveland to be disposed of.

Russell Co. May Add Men—The Russell Motor Car Co., Toronto, Ont., has announced its intention to keep its full staff on its books and is very optimistic regarding the stability of Canadian business. "We are endeavoring to keep every man employed, so that our workmen may not suffer to any considerable extent," said an official of the company, "We have no intention of laying off men or of closing down the works. We feel that Canadians will be fair enough to support a Canadian industry which at a time like this gives support to Canadian workmen." Both in the automobile and bicycle departments of their concern, the Russell company said that there has been no falling off in the number of orders and that they may have to hire additional men instead of discharging any. The company has enough work on hand, declared the official, to keep it busy for several months.

The Automobile Calendar

Sept. 4	Des Moines, Ia., Track Race, Iowa State Board of Agric.
Sept. 5-7	Brighton Beach Race Track Meet; Motor Contest Dealers' Assn.
Sept. 6-7	Detroit, Mich., Track Meet, J. A. Sloan.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7	Brighton Beach, N. Y., Track Meet, New York Motor Dealers' Contest Assn.
Sept	Denver, Col., Track Race, Overland Park Track, Denver Motor Club.
Sept. 7-14	Hartford, Conn., Show, Charter Oak Park.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 9-11	Convention Paving Brick Mfrs. Assn., Cleveland, O.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 12	Hamline, Minn., Track Meet, Minn. State Fair.
Sept. 15-16	Norfolk, Neb., Track Race, Norfolk Commercial Club.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 23-Oct. 3	Oklahoma City, Okla., Show, Oklahoma Automobile Association.
Sept. 26	Kalamazoo, Mich., 100-Mile Track, Inter-State Fair.
Sept. 27	Pleasanton, Cal., Track Meet, Alameda County Fair Assn.
Oct. 3-10	Cincinnati, O., Show.
Oct. 3	Fresno, Cal., Track Meet, Fresno Co. Agricultural Assn.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 5-12	St. Louis, Mo., Show, Forest Park Highlands.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 10	Medford, Mass., Track for Light Cars, Combination Park.
Oct. 10-17	Boston, Mass., New England Light Car and Cyclecar Show, Horticultural Hall.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1	Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Dec. 1-4	New York City, Annual Meeting of the American Society of Mechanical Engineers.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Automobile Show.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Mar. 7	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

Delaware

WILMINGTON—Postles Automobile Brokerage Co.; capital, $50,000; to transact a motor car brokerage business. Incorporators: G. P. Postles, L. A. Braidley and S. D. Townsend, Jr.

Illinois

CHICAGO—Eagle Cycle Car Co., under Massachusetts laws; capital, $250,000; to manufacture motor cars. Incorporators: J. Parker, U. B. Curtis and E. G. Lancaster.

CHICAGO—Modern Auto Parts Co.; capital, $20,000; to manufacture motor cars, parts, gasoline engines and parts thereof. Incorporators: E. S. Carr, W. R. Fetzer and E. A. Biggs.

Massachusetts

SPRINGFIELD—Hendee Mfg. Sales Co.; capital, $50,000; to sell motorcycles, motor cars, aeroplanes, etc. Incorporators: G. M. Hendee, Suffield, Conn.; F. J. Weschler, Springfield.

Michigan

DETROIT—McKenney-Devlin Co.; capital, $10,000; to manufacture and sell motor cars. Incorporators: George A. and Lyle A. Devlin and Paul R. McKenney.

DETROIT—Stoepel Co.; capital, $1,000; to deal in motor cars and supplies. Incorporators: H. Robert Stoepel, David M. Whitney and Nathan T. Viger.

New Jersey

CLIFTON—Lubricating Accessories Co.; capital, $25,000; to manufacture motor cars and lubricating specialties. Incorporators: J. Swanson, R. W. Haubner and P. A. Ott, all of Clifton.

New York

JAMESTOWN—Gabrielson Car Parts Mfg. Co.; capital, $35,000; to manufacture motor car parts, etc. Incorporators: John Gabrielson, Gustaf A. Lawson and Oscar A. Lenna, all of Jamestown.

ROCHESTER—J. Lawrence Hill Co.; capital, $10,000; general motor car business. Incorporators: J. Lawrence Hill, 40 Warwick avenue; James Jaffray, 45 Richard street; Joshua C. Harris, 327 Webster avenue.

NEW YORK—Saxon Motor Co. of New York; capital, $1,000. Incorporators: Harry W. Ward, 1305 Bellevue avenue; Lincoln R. Scafe, 173 Clairmont avenue; Laurence Moore, 473 Jefferson avenue; all of Detroit, Mich.

SYRACUSE—Reo Sales Co.; capital, $15,000; general motor car business. Incorporators: George E. Norris, 136½ Furman street; Harold N. DeWitt, Camden; Charles H. Norris, 28 James street.

Ohio

MASSILLON—Wagner Auto Garage Co.; capital, $10,000; to deal in motor cars and operate a garage. Incorporators: C. W. Wagner, F. M. Lore, G. A. Siebaneller, C. A. Wendling and C. M. James.

Pennsylvania

HARRISBURG—Cummins Motor Car Co.; capital, $25,000; to deal in motor cars and operate garages. Incorporators: O. O. Cummins, T. Y. Gregg and H. R. Walker.

PITTSBURGH—Motor Square Auto Dealers' Co.; capital, $5,000; to deal in motor cars. Incorporators: William H. La Fountain, Frank P. Blackmore, Lovell M. Johnson, C. P. Galanot and Frank Nichol, all of Pittsburgh.

GARAGES AND ACCESSORIES

Indiana

FRANKLIN—Parr Auto Shoe Co.; capital, $10,000; motor car supplies. Incorporators: W. A. Parr, G. E. Parr and William Feathergill.

GARY—Fifth Avenue Garage; capital, $5,000; general garage business. Incorporators: William Sykes, Ralph Sykes and Carlisle Dorman.

INDIANAPOLIS—Garage Owners' Association of Indiana; to improve conditions relating to public garages. Incorporators: W. N. Mitchell, A. L. Mitchell and George Pfleger.

INDIANAPOLIS—St. Clair Taxicab Co.; capital, $2,000; to conduct a motor vehicle business. Incorporators: B. G. Schwankhaus, Roger Kinney and C. B. Miles.

New Jersey

PATERSON—New Jersey Motorbus Co.; capital, $50,000; to operate motor buses, hacks, cabs, etc. Incorporators: L. Cramer, Sr., L. Cramer, Jr., and J. J. Purce, all of Paterson.

New York

LONG ISLAND CITY—Astoria Auto Trucking Co.; capital, $3,000. Incorporators: Philip Silliman, 192 Purdy street; Christopher Straub, East Elmhurst, L. I.; E. W. Ryder, 104 Taylor street, Brooklyn.

NEW YORK—Accident-Proof Tire Co.; capital, $250,000; to manufacture and deal in Cumberland tire filler and other motor car accessories. Incorporators: Kerr F. Albertson, 54 Morningside drive; James O. Hodge, 878 E. 23d street; Carl W. Stuart, Oriental Hotel; all of Brooklyn.

YONKERS—Frank X. Smith; capital, $1,000; to manufacture and deal in tires and rubber goods. Incorporators: Frank X. Smith, 312 New Main street; C. W. Reynolds, 188 Wadsworth avenue, New York city; Thomas F. MacMahon, 1400 Broadway, New York city.

Ohio

CLEVELAND—Ot-to No Air Tire Co.; capital, $100,000; general rubber manufactures. Incorporators: Frederick V. Roesel, Wallace B. Ott, George M. Ott, George N. Gilmore and Charles H. Frank.

ELYRIA—I. T. S. Rubber Co.; capital, $100,000; to manufacture all kinds of rubber goods. Incorporators: J. G. Tirrford, A. G. Smith, C. H. Ingwer, William C. Smith and C. H. Lewis.

Oregon

PORTLAND—Interurban Autocar Co.; capital, $10,000; to conduct a passenger and freight line. Incorporators: W. E., Henry M. and Helen M. Williamson.

CHANGE OF NAME AND CAPITAL

Michigan

DETROIT, Benham Mfg. Co., from $45,000 to $65,000.

Missouri

ST. LOUIS, George C. Brinkman Motor Car Co., from $5,000 to $50,000.

Ohio

AKRON, Marathon Tire & Rubber Co., from $100,000 to $500,000.

COLUMBUS, Twyman Motor Car Co., from $30,000 to $10,000.

Automobile Agencies Recently Established

PASSENGER CARS

California

San Francisco	Maxwell	The Pearson Motor Car Co.

Florida

Miami	Herff-Brooks	Belcher Auto Co.

Georgia

Atlanta	Dodge	The Pegram Motor Ca Co.

Illinois

Chicago	Herff-Brooks	Chicago Great Western Motor Car Co.
Clifton	Herff-Brooks	A. N. Grossaint
Clinton	Herff-Brooks	Arthur Shaw
Cropsey	Elk-Hart	John Popejoy
Deer Plain	Cole	R. L. Meyer
Jerseyville	Cole	Wm. Sheppard
Peoria	Herff-Brooks	Zoller Bros.
Springfield	Herff-Brooks	Baker & Baker
Sublette	Elk-Hart	C. J. Streit

Indiana

Vincennes	Cole	W. A. Miller

Iowa

Oelwein	Cole	J. C. Knapp
Shennandoah	Franklin	Franklin Car Co.
Sioux City	Herff-Brooks	Adams Auto Co.

Kansas

Fort Scott	Cole	Central Garage
Garnett	Cole	J. J. Anderson & Son
Manhattan	Cole	Hiner & Paige
Paola	Cole	C. C. Hoover
Yates Center	Cole	Stoll Bros.

Kentucky

Barbourville	Ford	W. H. McDonald
Louisville	Dodge	Southern Motors Co.
Williamsburg	Ford	Geo. N. Delaney

Louisiana

Blankston	Herff-Brooks	Hopewell Planting Co.
New Orleans	Ford	O. C. Pantall

Maryland

Crisfield	Elk-Hart	Crow Elk-Hart Motor Co.

Massachusetts

Boston	Mitchell	Fred. H. Lucas
Springfield	Winton	August Van der Wolk
Worcester	Cole	Thorvald Hanson
Worcester	Franklin	F. B. Williams

Michigan

Detroit	Briscoe	The Kininger-McHugh Co., Inc.
Detroit	King	The Monarch Hardware Co.
Lansing	Briscoe	A. W. Brown & H. L. Brown
Port Huron	Buick	George E. Yokum

Minnesota

Albert Lea	Franklin	Hellie Auto Co.
Duluth	Cole	Johnson Motor Car Co.
Mankato	Cole	Laurie Marx
Minneapolis	Oldsmobile	Bohn E. Fawkes
Minneapolis	Elk-Hart	Alex. R. Curtis
Princeton	Cole	S. P. Skahen
Rochester	Cole	West & Postier
St. Paul	Cole	Martin Motor Car Co.
Starkville	Cole	D. O. Slaughter

Mississippi

Starkville	Cole	D. O. Slaughter

Missouri

Columbia	Cole	Columbia Auto Co.
Drexel	Cole	C. H. Paulk
Eldon	Cole	Ed. C. Weeks
Kansas City	Allen	Jackson Motor Co.
Kansas City	Briscoe	Bond Motor Co.
Kansas City	Car Nation	Apple Motor Co.
Kansas City	Chandler	E. C. Eads
Kansas City	R. C. H.	Bruening Bros.
Kansas City	Saxon	Bond Motor Co.
Marshall	Cole	Blosser Bros.
Poplar Bluff	Cole	J. A. Quinn
St. Joseph	Studebaker	The Holliday Motor Car Co.
Versailles	Cole	Crewson & Monsess

Nebraska

Gering	Franklin	C. C. Hampton
Omaha	Elk-Hart	Nebr. Crow-Elk-Hart Co.

New York

Binghamton	Chandler	The Binghamton Motor Car Co.
Ithaca	Franklin	F. A. McClune
Little Falls	Cole	Nellis B. Bronner
Oswego	Herff-Brooks	Ontario Motor Car Co.
Utica	Buick	I. R. Gardinier

North Carolina

Asheville	Cole	The Enterprise Machine Co.
Raleigh	Elk-Hart	The Crow Motor Sales Co.

Ohio

Akron	Cole	Summit Auto Co.
Canal Dover	Chandler	The Dover Automobile Co.
Cincinnati	Packard	The Citizens Motor Car Co.
Cleveland	Dodge	Neighbors Motor Co.
Cleveland	Herff-Brooks	Brandt Motor Car Co.
Columbus	Buick	The Oscar Lear Motor Co.
Columbus	Maxwell	The Everitt Auto Sales Co.
Columbus	Oakland	Oscar Lear Motor Co.
Columbus	Premier	Edward Miller
Columbus	Allen	The Snyder Automobile Co.
Columbus	Cole	The Brasher Motor Co
Columbus	Krit	The Cummins Auto Sales Co.
Columbus	Paige	Central Auto Veh. Co
Columbus	Winton	E. J. Thornton
Coshocton	Allen	W. E. Layman
Coshocton	Oldsmobile	W. E. Layman
Dayton	Cole	C. W. Hoffritz Sales Co
Hillsboro	Ford	The Hillsboro Motor Co
Kenton	Grant	W. S. Snyder
Lima	Buick	The Independence Motor Co.
Lima	Chalmers	W. E. Rudy
Lima	Ford	Bertran & Friedley
Lima	Hudson	Baxter Bros.
Lima	Lewis	The Shappell Auto Sales Co.
Lima	Maxwell	Wilbur Miller
Lima	Partin-Palmer	The Shappell Auto Sales Co.
Lima	Studebaker	E. H. Hawisher
Lima	Cole	Thomas Motor Co.
Louisville	Herff-Brooks	G. F. Munk
Marion	Cole	Charles E. Miller
New Concord	Elk-Hart	F. C. Noble
Sandusky	Cole	W. C. Waterfield
Sebring	Cole	Sebring Auto & Repai Co.
Springfield	Cole	Ensign Motor Co.
Stockdale	Elk-Hart	O. E. Emory & Co.

Oklahoma

Tulsa	Cole	Chapple Bros.

Pennsylvania

Allentown	Cole	V. H. Steckel
Cressona	Herff-Brooks	I. A. Reber
Easton	Cole	Lafayette Motor Car Co.
Philadelphia	Herff-Brooks	Henry Hoopes
Pulaski	Cole	John M. Reed
Reading	Cole	The Park Auto Sales Co.
Snyders	Herff-Brooks	D. H. Henninger

Accessories for the Automobilist

ELK Terminal—John B. Stam & Co., 1789 Broadway, New York City, is making a spark plug terminal, Fig. 1, unique in construction. The terminal is attached to the electrode by simply snapping the jaws over it. No solder or special tools are used in fastening the terminal to the wire yet a solid joint is made. About 1-2-inch of the high-tension cable is bared and this is thrust into the end of the terminal, which consists of a hollow screw. When this is screwed up the wire is clamped solidly in place.

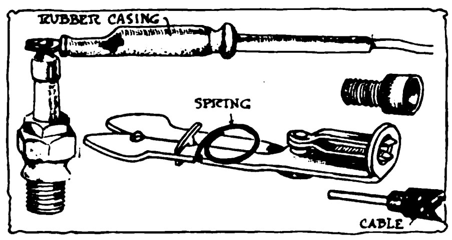


Fig. 1—Elk terminal. Right shows device assembled and at the left disassembled

Pneumatic Safety Clutch—Easy clutch engagement is automatically secured in the clutch, Fig. 2, manufactured by the Verges Mfg. Co., Fourth and Poplar streets, Milwaukee, Wis., by means of air displacement. It is a leather-faced, cone type which contains an air-chamber and a piston. When the clutch is released and the foot is removed from the pedal, the air resists the spring and will not permit the clutch to engage any faster than air is forced out of the chamber through the pet cock. The speed of engagement is regulated by the setting of this cock. Thus it is seen that it is impossible to make the clutch grab yet it is stated that the clutch engages rapidly enough for a quick start.

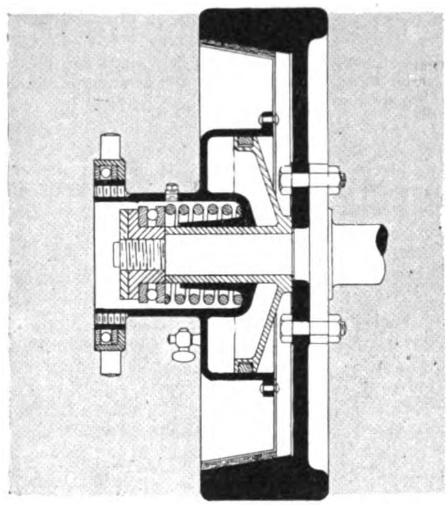


Fig. 2—Pneumatic safety clutch that cannot be made to grab

Clark Small Car Motor—A four-cylinder motor, Fig. 3, rated at 10-15 horsepower, and equipped with the motor, clutch and gearbox in unit, when desired, is manufactured by the Clark Engine & Boiler Co., Kalamazoo, Mich. The bore and stroke are 2.5 by 3.75 inches, giving a piston displacement of 74 cubic inches, which places the motor in the light car classification. The gearset is a two-speed and reverse sliding gear design.

The cylinders are cast in a block and are of the L-head type. The valves are fully inclosed and the push rods are adjustable. Access to the valves and piston heads is obtained by means of a detachable cylinder head. The valves are drop-forged, heat treated and ground to a close limit. Mushroom valve tappets, hardened and ground are employed and can be adjusted within .005 inch. The camshaft is a one-piece drop forging.

Two white metal bearings are used to support the crankshaft the one on the gear end being 1.625 by 2.5 inches, and on the flywheel end 1.625 by 3 inches. The crankpins are 1.625 by 1.875 inches. The gears are spirally cut to insure silence.

Ignition is supplied by a Schebler carbureter, and the Berling magneto is used. Constant-level splash lubrication has been adopted, the supply being maintained by a pump. All parts are hardened and ground and all bolts and studs are built according to the S. A. E. standard.

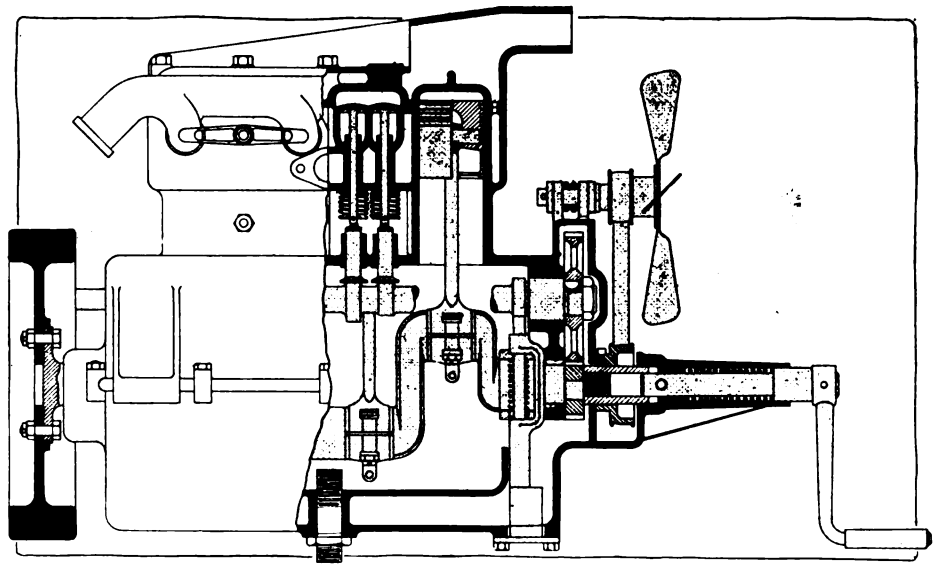


Fig. 3—Four-cylinder Clark motor of 10-15 horsepower. It can be equipped with clutch and gearset in unit when desired

Sangamo Ampere Hour Meter.—The Sangamo Electric Co., Springfield, Ill., is manufacturing a variety of types of ampere hour meters to meet the many conditions imposed by electric vehicle service, but in every case the meter consists essentially of a small electric motor device having the moving system completely immersed and floated in mercury, but with the containing chamber built in such a way that the mercury cannot be spilled. The revolutions of the little motor are proportional to the amount of current, taken from the battery or put into it from moment to moment, so that by recording the revolutions through a suitable clockwork dial, the ampere hours taken out or put into the battery can be shown as simply as the time is recorded by a clock.

The operating parts of the meter are enclosed in several forms of case. The one principally used on electrics has a dial large enough for easy reading. It is equipped with an aluminum base. The type generally used for a commercial vehicle service has an iron base with very heavy bottom connecting terminals.

The most highly developed type of ampere hour meter is that having the distant dial combined with a Weston ammeter.

The ammeter is useful on an electric vehicle to show the amount of current drawn at any time, thus indicating the condition of the tires, brakes, bearings, etc., and combined with the ampere hour meter the ammeter is a very useful instrument. Of the two, however, this concern claims, an ampere hour meter is more valuable, because a person driving an electric vehicle knows at any moment how much current has been taken from the battery and therefore the amount still available. Also, when charging, the ampere hour meter is the only device which will automatically give the necessary amount of overcharge for any type of battery, it is stated.

Swan Demountable Ford Bodies—Demountable coupe and limousine bodies, by means of which a Ford car can be converted from an open car into a closed one in 30 minutes are manufactured by the Swan Demountable Body Co., 4021 Payne avenue, Cleveland, O.

This type of body is placed directly over the touring body, making a cold and weather-proof construction. It is stated that it cannot rattle or squeak. The price of the limousine is $150 and the coupe body $90.

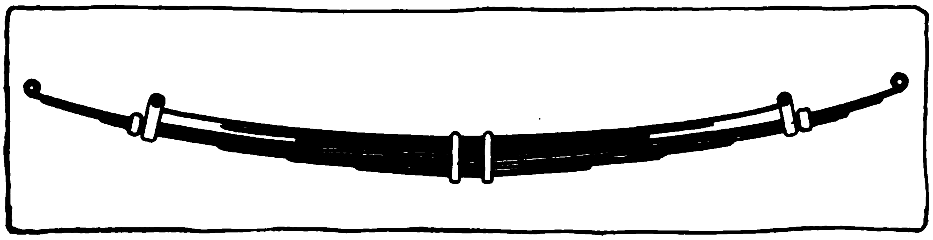


Fig. 4—Andersen auxiliary spring that is designed to carry light and heavy loads equally well

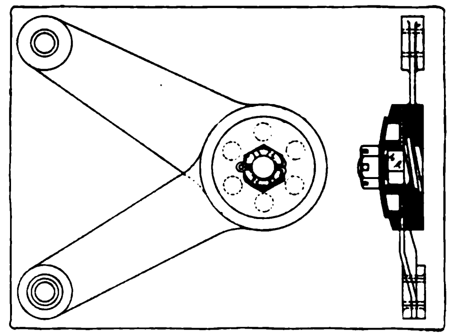


Fig. 5—La Porte shock absorber

Andersen Auxiliary Spring—A spring system is shown in Fig. 4 which, it is claimed will carry the light and heavy load equally well, that will take the light and heavy shock alike, that has scarcely any recoil, that needs no shock absorbers, and that is nearly unbreakable. The Andersen system is built in two sections; the lower consists of a light spring to carry the empty car only. The top section consists of a series of leaves built on the individual leaf plan, that is, every leaf is connected at the center but gradually separates toward the ends. This section is shorter than the lower section. From the end of the top leaf of the top section is a shackle which passes under the lower section. When the weight of the empty car is on the lower section there is no tension on the leaves of the top section. As you place the load in the car the lower section picks up the shackle which is fastened to the top leaf of the top section and engages as many leaves as is needed according to the load placed in the car. By this system if a five-passenger car has one passenger in it you have a five-passenger car with a one-passenger spring suspension. It is manufactured by the Andersen Spring Co., Detroit, Minn.

La Porte Shock Absorber—Charles La Porte, formerly chief engineer of the Aristos Co., New York City, has brought out a shock absorber that is designed to remain passive during the normal spring play and active only when required. This is the ideal action for a spring controller or shock absorber.

Referring to Fig. 5 it will be seen that this device is of the conventional scissors or V form, consisting of an upper and lower arm pivoted at the center. The top arm is machined to receive an acme threaded screw, which screw is worked in and out by the lower arm driving it. The action takes place when the screw, being turned radially, when the car springs close or open, thereby causes a lateral action of the two arms. On the down stroke of the car, the shock absorber has no effect on the springs, as the screw and nut move outwards, but on the rebound or opening of the springs, the screw and nut move towards each other, causing the lower arm, which slides on the screw, to move out against the rubber washer, which is held firmly by the outside nut, the amount of compression of this rubber deciding the resistance offered.

It can readily be seen that the slotted adjusting nut can set the pressure on the rubber washer to any amount desired. This feature permits any amount of normal spring action before bringing the device into its controlling action. This adjustment is made when applying on the car and need never be changed again, it is stated.

Buckeye De Luxe Shock Absorbers—For Ford cars only, the Buckeye De Luxe shock absorbers, Fig. 6, are of the well-known helical spring variety, but with the feature that perfect alignment with the car springs is obtained at all times by means of the knife-edge support of the spring seat. The spring seat is made of bronze. Two springs are used in each unit. The eye bolts are bushed. There are no holes to drill, and it is stated that anyone can attach them in an hour. A set of four is $15, and two, for either front or rear, are $8. The manufacturer is the Central Brass and Fixture Co., Springfield, O.

Universal Reel Light—A dash or gauge light and trouble lamp combined, which may be operated from any convenient source of current, is the Universal Reel Light, Fig. 7. Ordinarily it is used as a dash light, but when a trouble lamp is wanted, it may be detached from its case on the dash and the cord inside the case unreeled to any length up to 12 feet. When the cord is to be returned, it is wound up by means of a small handle on the front of the device.

By means of a ball and socket joint, the stem or handle which holds the light can be turned in any direction and may be fastened in any position by means of a small thumb nut. The reflector is also adjustable. It is made by Cummings Bros., Flint, Mich., and sells for $4.

Simplex Demountable Rim—Lightness is the particular feature claimed for the rim shown in Fig. 8. It will be noted that the rim is removed by backing up the bolts pinning it in place. Furthermore as there are no parts to be removed there are none to be lost on the road. No special tools are required, a monkey wrench being sufficient. It is stated that any type of demountable rim can be changed over into this type with little difficulty and small expense. The device is manufactured by the Simplex Demountable Rim Co., Milwaukee, Wis.

Krick Friction Transmission—The feature of the friction speed change, Fig. 9, manufactured by the Krick Co., East Fifty-fifth street and Dorchester avenue, Chicago, Ill., is the direct drive on high.

All the working parts are mounted on a steel frame which is attached to the vehicle frame by a three-point suspension, or rigid if desired, and the connection is made to the engine and the rear axle in the usual way.

The two friction wheels bear equally against the driving disc and on each side of the driving shaft. This does away with the side cramp which cannot be avoided with the single friction transmission and this with about one-half the applied pressure to the driving disc.

The two friction wheels slide on square shafts, with no keys to work loose or quickly wear out. All of the rotating parts are mounted on double row ball bearings of the self-aligning type. A special selected chrome nickel steel is used. The list price is $65.

Bryant Gearshift Lock—Due to a typographical error the price of the Bryant Gearshift lock made by the Bryant Sales Co., 422 Cuyahoga Building, Cleveland, O., was stated as $3, when $8 is the price, in the description which appeared in the August 20 issue on page 388.

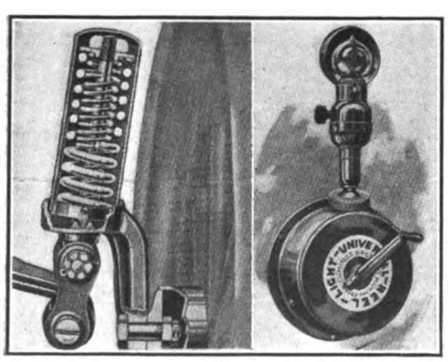


Fig. 6—Left—Buckeye DeLuxe shock absorbers for Ford cars only

Fig. 7—Right—Universal Reel Light which is a dash and trouble lamp combined

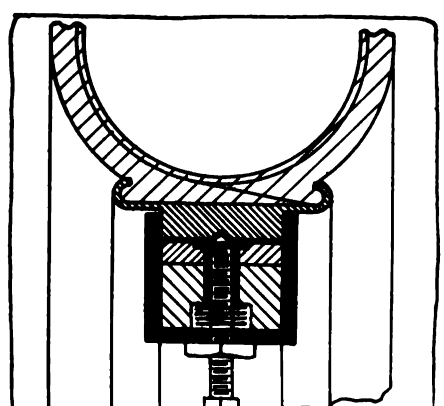


Fig. 8—Simplex demountable rim

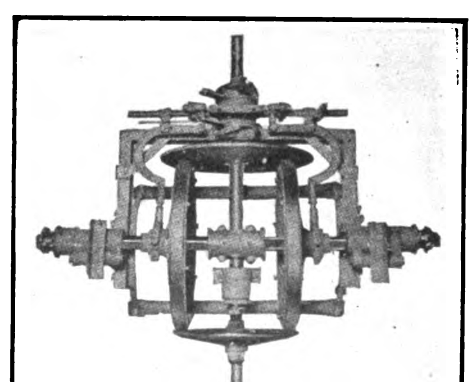


Fig. 9—Krick friction transmission

VOL. XXXI NEW YORK—THURSDAY, SEPTEMBER 10, 1914—CHICAGO No. 11

The AUTOMOBILE

France's Automobile Industry Under Army Control

Many Plants Being Used for Making Trucks, Aeroplanes, Cannons, Bombs and Cartridges

Touring Car Production Nil—May Ask Repeal of Non-Export Rule —Belgian Factories Closed

By W. F. BRADLEY

Special Representative of the Automobile with the Allied Armies

PARIS, Aug. 26.—Inquiries in the various automobile factories around Paris show that the production of touring cars is absolutely nil. In many cases important orders are in hand and a sufficient staff has been left to put work through if only permission could be obtained to export.

May Revive Export Trade

Efforts are now being made to obtain from the Minister of War a repeal of the order forbidding the exportation of automobiles and automobile parts, at any rate so far as regards allied countries. It is believed that the reasonableness of this request will be seen and that within a very short time it will be possible to send cars to England, and from there to other parts of the world. If this release is given it will allow the hundreds of chassis which are at the present moment lying on dock sides and in railway depots to be taken out of the country. The railway companies now appear to be in a position to undertake the transportation of goods; even if they cannot be relied on, manufacturers appear to be willing to undertake their own transportation as far as the coast. Even with the law against exportation repealed the volume of business can only be a mere driblet of what it was a month ago, owing to the lack of men in the shops.

A few of the factories have been militarized. In this case the original staffs have been retained, but the men are under military rule and work under the control of army officers for the army. Among these are Gnome, making aeroplane motors; Anzani, on the same class of work, and the aeroplane motor department of the Renault factory. The Blum-Latil factory, in which numbers of four-wheel-drive tractors are produced, is under military rule.

De Dion Bouton is under military law, with 1,000 men working on trucks, automobile cannon, and also on special work for the military arsenal at Puteaux.

Motobloc at Bordeaux is militarized.

Berliet is under military rule with 300 men working on trucks. The factory will deliver 180 trucks by the end of August and 250 by the end of September.

The Mors factory was militarized for a short time, but is no longer working for the army.

Saurer Busy Making Trucks

In addition to those firms directly responsible to the army authorities, several are working exclusively on army orders. Thus Saurer has been able to maintain a staff of 200 out of 800, which will be increased shortly to 400 or 450, all the men working on trucks or spare parts. This firm has 800 trucks on the fighting line.

Panhard is working almost exclusively for the army and navy making trucks and war supplies.

Renault has stopped the production of touring cars and is building trucks for the war department.

Peugeot has been able to keep all three factories open with very reduced staffs, the work done being for the army. Robert Peugeot is serving as a lieutenant in an artillery regiment at the front.

The Mercedes repair shops near Paris have been taken over by the war department and are used as an extension to the military arsenal at Puteaux. The stock of finished cars at the firm's showrooms in Paris has been requisitioned for army service.

Bayard-Clement is working with 150 instead of 1,500 men, all of them engaged on airships and trucks.

Making Bombs in Alda Plant

Delaunay-Belleville is doing nothing but military work, this including material for the artillery service. Instead of cars bombs are being manufactured in the Alda factory.

Alcyon has closed down all but its motorcycle department.

Delahaye has had its commercial vehicle section militarized.

All other factories appear to be closed entirely or are merely keeping the spare parts department going. The Unic people have kept on 200 men, who are producing for stock, the company having a sufficient number of orders in hand to expect a quick release when peace is declared.

The Darracq big erecting shop has been turned over to the war department and is now used for making cartridges. Only the spare parts department is running. Most of the foremen have been returned from the war, the authorities having more men than they need, but workmen and supplies are not obtainable.

Charron, Vinot, Dietrich, Delage, Hispano-Suiza, are all closed.

Brasier is working with one-quarter of the original staff, but having received army orders will take on more men shortly.

Belgian Factories All Closed

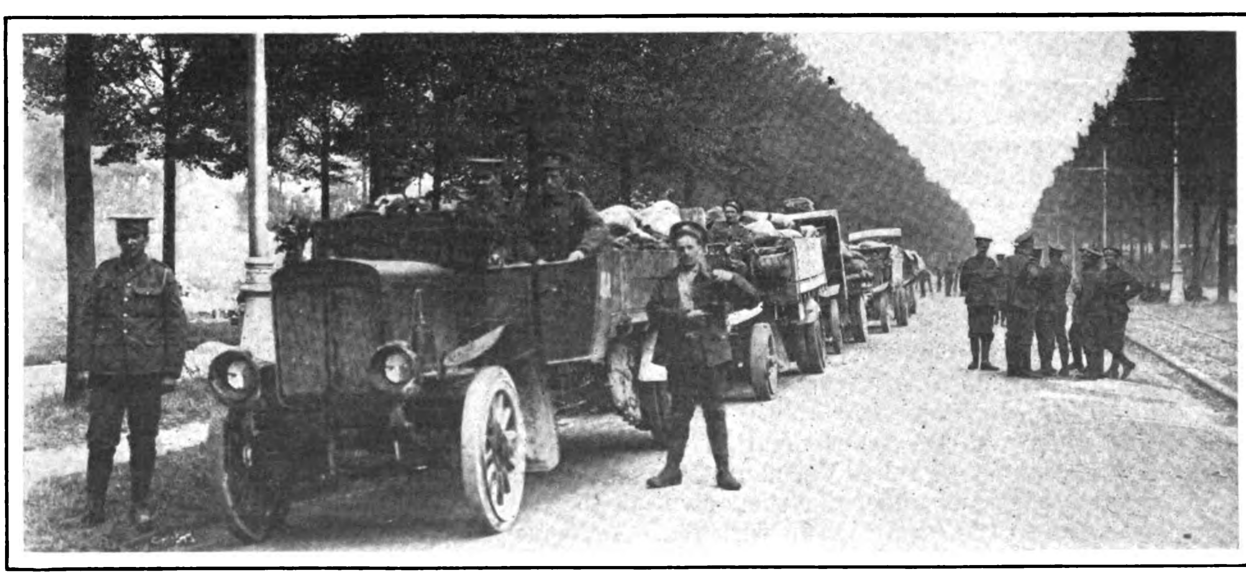
Although little news is available, it may be taken that not a single automobile factory is working in Belgium. The most important works are Minerva, Excelsior, Pipe, Nagant, Herstal at Liege, and the Derihon works, where the B.N.D. steel is produced. The Derihon factory is close to one of the forts on the outskirts of Liege, where the most desperate fighting has taken place. No news has been obtainable of the fate of the works, which contain most valuable machinery, and it is feared that they must have suffered very severely. The Derihon brothers have a second factory on the French side of the frontier, which up to the present has escaped injury.

Trying to Capture Herstal

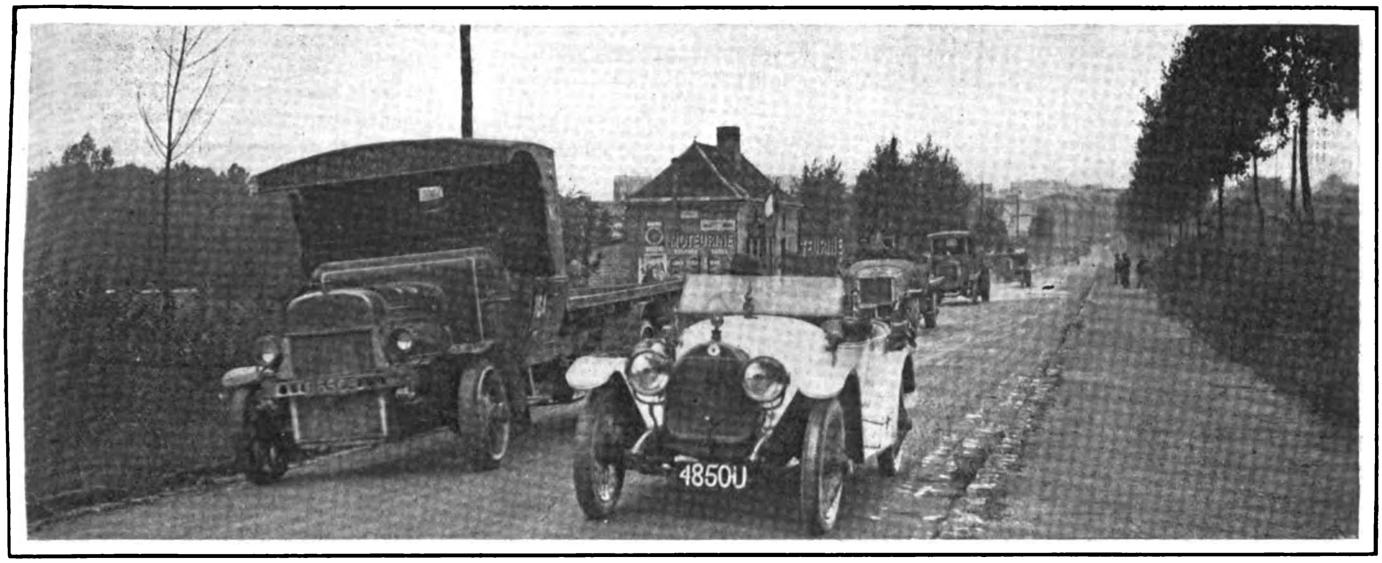
Herstal is also the small arms factory of Belgium. It is known that the Germans made a determined attempt to capture this, but when the last news came through they had not been successful.

No European Automobile Shows This Year

PARIS, Aug. 31—It may safely be assumed that there will be no automobile shows in Europe this year, even if the war is of short duration. Under the most favorable circumstances they could not be held until the early months of 1915, but the probabilities are that they will all be abolished. No official decision has been taken in Paris, for it is impossible to get together the committees responsible for the exhibition. Henri Cezanne, general manager of the Paris show, and also secretary of the Chambre Syndicale des Constructeurs d'Automobiles, is at the seat of war. Louis Renault, the president of this syndicate, is in Paris.



A convoy of British motor trucks with the English troops in France ready to start for the front. It is estimated that there are from 2,500 to 3,000 British moter trucks in service with the army. The trucks move in convoys of from six to a dozen, each convoy being accompanied by an officer in a touring car who sets the pace and a number of motorcyclists who keep full control over the convoy. The trucks used in the English army are mainly requisitioned among truck users and manufacturers as the English subsidy system has not as yet been developed very fully and the result is little uniformity and even inadequate equipment



A touring car passing British army motor trucks on the road near the frontier of the allied army in France

British Trucks with Army in France

Number in Service Estimated at 2,500 to 3,000—Vehicles Move in Convoys of Six to a Dozen—No Uniformity

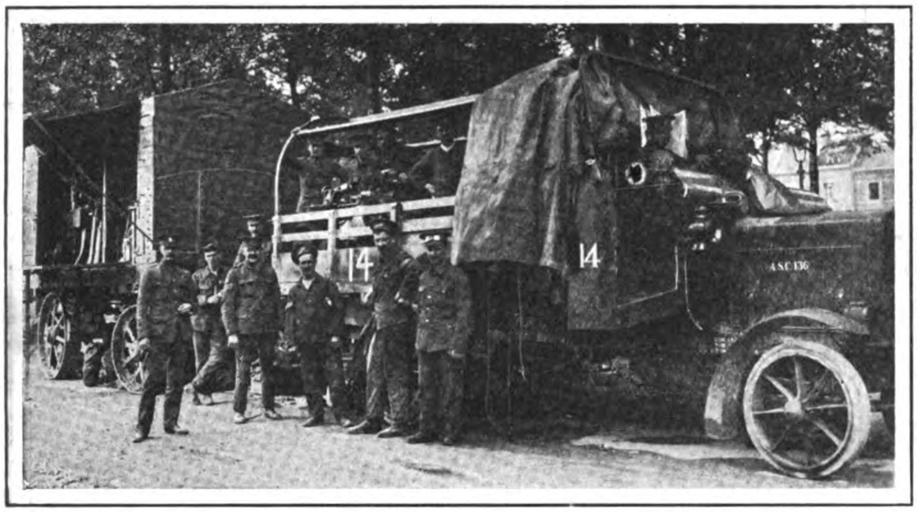
By W. F. BRADLEY

PARIS, Aug. 26.—For the first time in 100 years a great British army is operating on Continental Europe. It is recognized on all hands that the work of mobilizing the troops, carrying them across the intervening sea and moving them up to the fighting line has been a marvel of organization and precision. The work was done, too, with such secrecy that it is doubtful if a single person in Germany knew of it until the newspapers announced it officially on its completion.

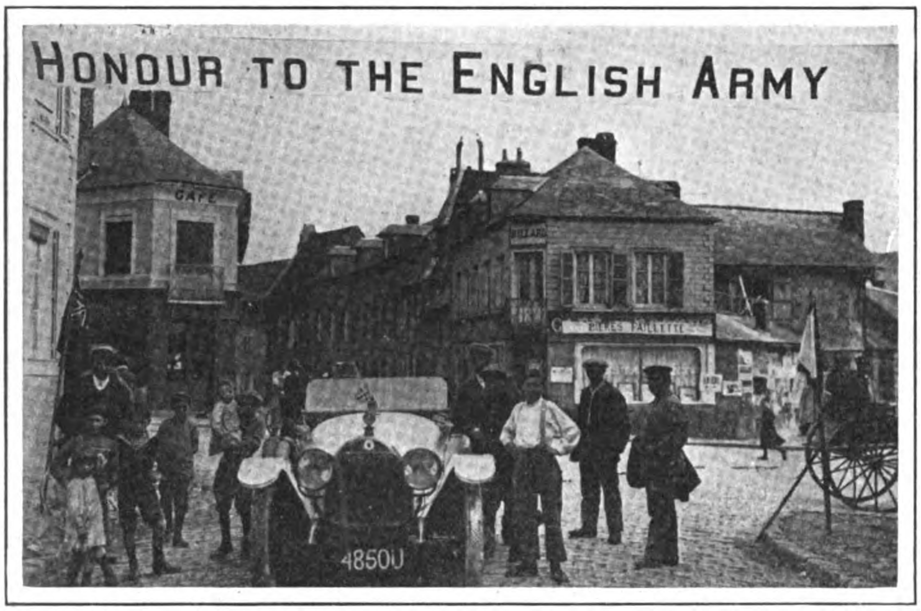
Motor vehicles have played an important part in this work. England is peculiarly situated. Being a small, thickly populated country, with closely set towns and a network of railways, it has never been necessary for her to develop an army motor system for work at home. The possibilities of military operations abroad were so remote and of such an unknown nature that it was difficult to decide what form to give to mechanical traction. In this connection she was quite at a disadvantage compared with France. This latter country knew where war was likely to be declared, could build its army lorries and other motor vehicles to suit those geographical conditions, and could even test them on the possible seat of war.

I have just been able to get in touch with the English army in the field, and particularly to examine the work of the motor corps. With regard to the movement of officers, it should be noted that they never travel by train, notwithstanding the fact that the whole railroad system of France is at the present time in the hands of the military authorities. All journeys from the fighting line to the base, and all trips from the front to the War Office, in London are done by automobile. English troops land at Boulogne, Dieppe and Havre; the headquarters staff is on the Belgian frontier—or rather is at the present moment; where it will be when this matter appears in print is another question. The distances are from 130 to 180 miles. Thus by the use of fast cars officers landing at any of these ports can be with the headquarters staff within 4 hours. In the great majority of cases English cars are being used for this work. I came across a few American cars, which had evidently been requisitioned, their driv-

An army officer's car and a subsidized motor truck traversing a grade crossing in France



One of the trucks with the English army in France. Behind it is a motor workshop



How the French villagers greeted English troops on their arrival on French soil

ers having volunteered with the cars. Not only are the roads most suitable for high speed, but there is no traffic other than that of military officers. In a trip of 400 or 500 miles I did not see more than a dozen cars which were not on military service.

It is estimated that there are at the present time 145,000 British troops in operation against the German forces. The number of motor trucks in service is not known with accuracy, but may be estimated at 2,500 to 3,000. This, of course, excludes touring cars. The automobiles were brought from various English ports: Liverpool, Bristol, Cardiff, Portsmouth, Southampton, Folkestone, and were landed at Havre or Boulogne, or in some cases were brought up the River Seine to Rouen. From this point they traveled east under their own power to the main supply depots at the back of the British army.

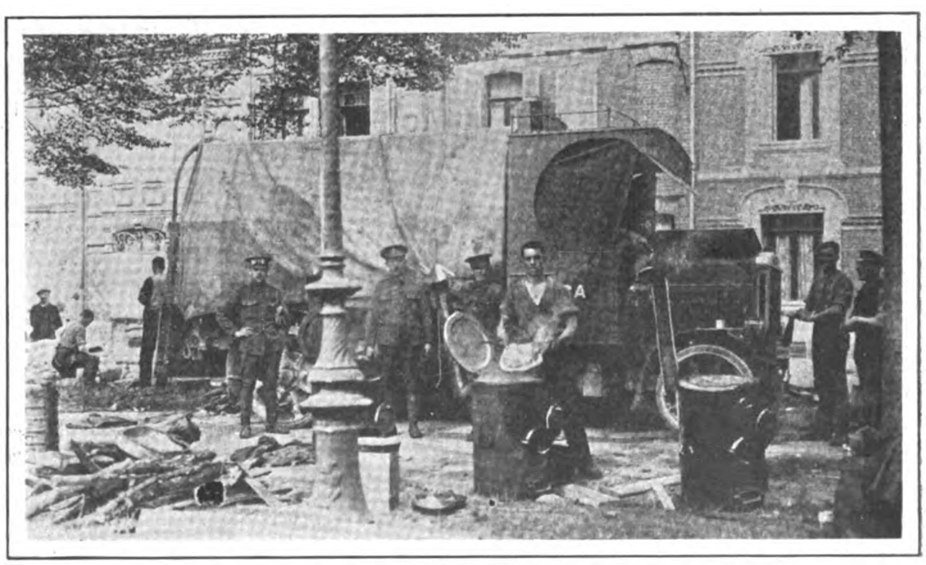
Nearly all the supplies are brought up from the ports to the central depots by means of the railroad. One of the most important of these depots is Amiens, about 65 miles from the present fighting line. Here there are about 1,500 motor lorries engaged in the task of carrying provisions and ammunition daily from the base to the front. It is not less than a 6-hour journey. The vehicles can make the round trip in a day, then spend the second day in loading up and verifying the condition of the vehicles. On the morning of the third day the same trucks are ready to start out again for the journey to the front.

Paced by Touring Cars

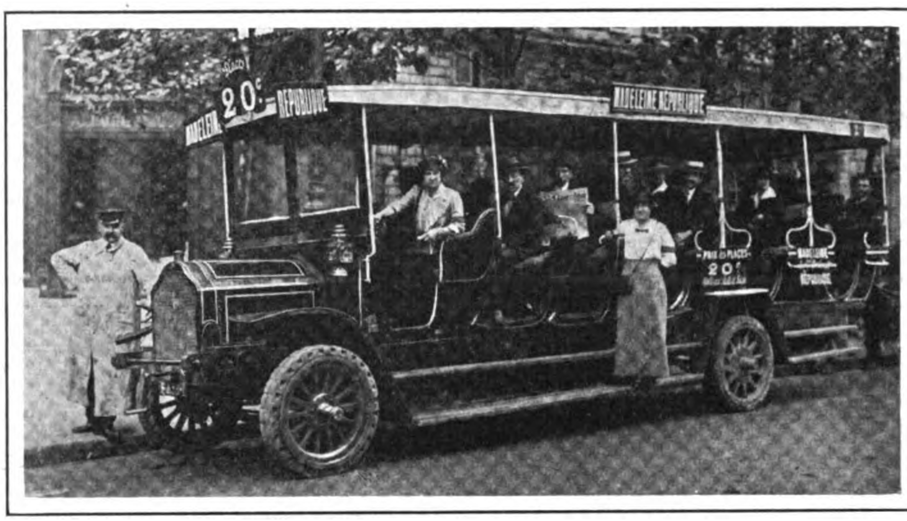
The method of operation is for trucks to move out in convoys of from six to a dozen, each convoy being accompanied by an officer in a touring car, who always keeps at the head of the procession and sets the pace, and by a number of motorcyclists. One or two of the motorcycle riders survey the road ahead and a couple bring up the rear.

As the British army owns but a small number of motor trucks and has not developed its subsidy system very far beyond the paper stage, it has to rely principally on requisitions among motor truck users and what manufacturers' stocks are available. This is the weak feature of the system. Although the individual vehicles may be good, they are of such diversified types that they are not suitable for working together in convoy formation. There are exceptions. Thus, on one of the roads leading to the frontier I came upon a splendid convoy of sixteen Daimler 5-ton trucks carrying ammunition. All the vehicles were alike and moved along with as much regularity as if they were all linked together.

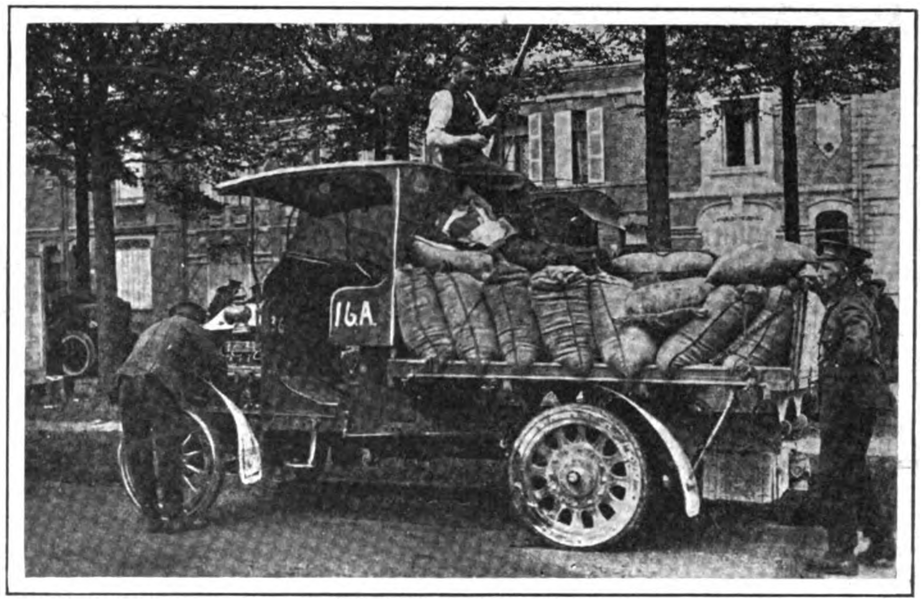
There were other convoys on the road with as many different makes as units, and with speed abilities varying from 7 to 17 miles an hour. Not only were they of different makes, but the bodies were of all kinds, for the trucks had been taken direct from private service, without even removing the ad-



English open-air kitchen at the army headquarters at Amiens, France vertising matter that was on them. While it was possible to keep up a certain speed on the level, as soon as hills had to be negotiated the slower vehicles and the defective ones dropped back, thus delaying the entire convoy. Hilly country also necessitated passing and repassing, which, of course, was an element of danger. Not a few radiators were smashed owing to cars running backwards on the hills through being unprovided with sprags. With a closely placed procession, a rear movement of a few feet would be enough to cause an accident. These defects were known to the officers in charge of the motor service, but, of course, there was no time to remedy them when war had been declared.



All Paris motor buses being at the war, this type of vehicle has been put into service. It runs on the main boulevards and has a woman conductor



One of the requisitioned motor trucks with the English troops in France

The French authorities have worked on this problem a sufficient length of time to have created what may be termed a model type truck in all the factories. Although these vehicles differ considerably in design, they are uniform in power, size, speed, load-carrying capacity, body, clearance, tire sizes, and in such details as sprag, towing hooks, radiator guard, magneto and carbureter.

Touring Cars Do Well

While traveling over French roads I have been able to see the strong and the weak points of the English motor service. Touring cars are giving very little trouble, despite the hard work and rough usage they are receiving. In 3 days' constant driving I saw two breakdowns, and one of these was repairable. Where the trucks were manufacturers' stock, the service was also excellent and serious breakdowns almost unknown. But where trucks had come out of private service and were set to work together with little discrimination, there was plenty of material for the repairman. On one stretch of road over which several hundred trucks had passed cripples were to be found every 2 miles. The story was the same in every case: the vehicles were satisfactory for service at home on well-paved city streets, but when they were put on the open road in company with more powerful and faster units they had to be pushed to the limit and the lubrication or cooling system became inadequate.

A fine fleet of Daimler trucks all loaded with ammunition on their way to the fighting line

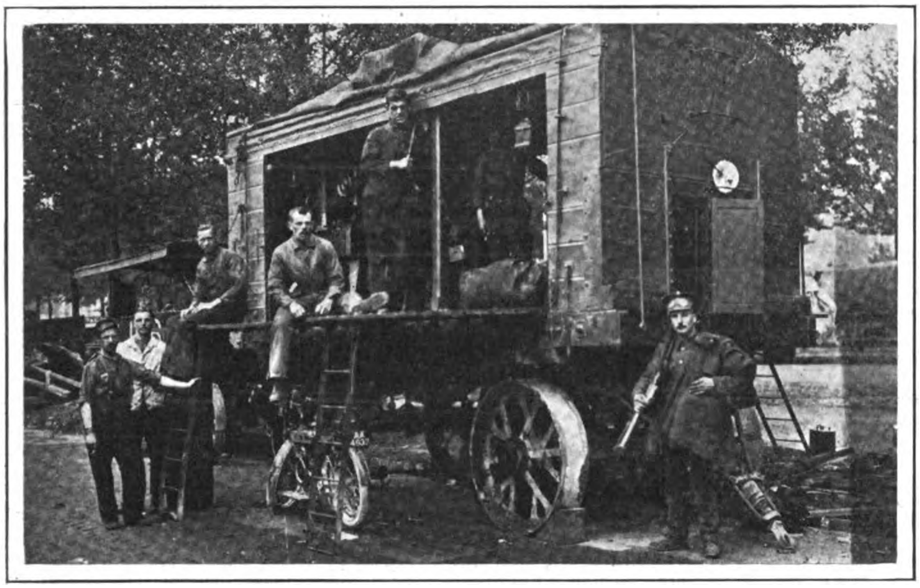
Motor Supplies from England

All supplies necessary for the British motor fleet have been brought from England. These include supplies of gasoline and oil. Thus although the trucks are at present working in a friendly country, they do not have to call upon the resources of that country. This is particularly important as regards the fuel supply, for although there is no shortage at present in France, the presence of a few thousand English vehicles requiring to be fed would have been an important matter. The general arrangements as regards the supplies not only for the motors but for the entire army, show the working of some master mind.

French War Trucks Superior to English

England Has More Vehicles But Lack of Uniformity and Preparation for Service Impairs Their Value

By W. F. BRADLEY



One of the British army motor workshops with the troops in France

FRANCE and England, fighting side by side against Germany, are both making extensive use of motor transportation for the feeding of their armies, the supplying of ammunition, and the removal of wounded. The governments of both countries have the power, in such times as the present, to requisition all types of motor vehicles, and both have made use of this power to the full.

Here the similarity between the Allies comes to an end. It is not a question of development of the commercial vehicle industry in the respective countries, or of the technical value of French and British vehicles, but of the adaptability of the vehicles as a whole to military purposes. In actual numbers of commercial motor vehicles in use, England is undoubtedly ahead of France; in technical development she is not inferior, but in the application of her fleets of motor lorries to military uses she is on quite a different plane from France. This is clearly seen now that the two nations are working side by side.

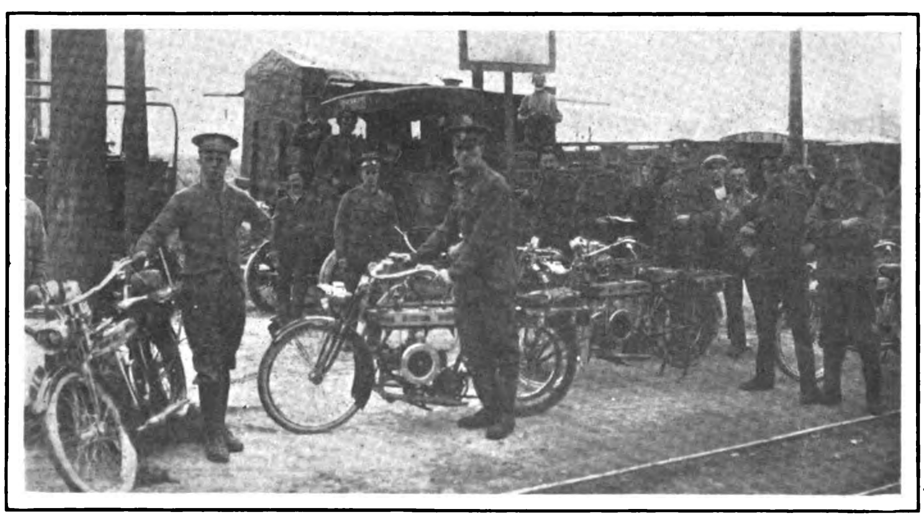
British Requirements

It is necessary to go back a considerable distance to understand the differences. England has developed motor transportation on purely commercial lines; she has developed it thoroughly, with a view only to the needs of the commercial user. When the British War Office became alive to the value of motor transportation, it had to deal with a well developed and highly specialized industry, the heads of which had been seeking to give the best possible value to the commercial user, unhampered by any consideration of military requirements. At a rather late date the War Office instituted a subsidy system and issued its own specification for army types. Manufacturers had to build to this specification, whether it was in accordance with their own technical program or not; they had to submit these subsidy types to special army tests, and finally had to convince purchasers that these new models were superior to the others.

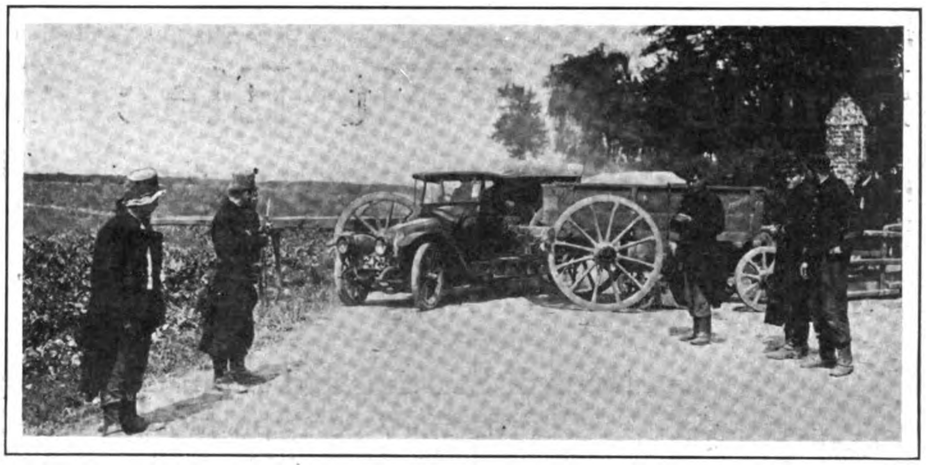
In itself the army specification was not unreasonable. It was based on the Leyland chassis, a vehicle which had given excellent service. But it practically said to manufacturers: "You must abandon your own design, however good it may be, and accept ours." It said to users: "If you want the subsidy you must do without the detail features you consider necessary for your particular trade, and accept our type of vehicle." Under the circumstances it was hardly surprising that the British subsidy scheme failed to arouse any enthusiasm and in many quarters met with opposition. As proof of the indifference with which it was received, the last British army trials united three vehicles. The last French army trials had 110 trucks.

France's Preparation

The history in France has been entirely different. At a very early stage, in fact before commercial vehicles were a commercial success, the army was interested in them and sought to adapt them to their own use. Under the subsidy scheme, which has now been in application about 8 years, the regulations were of such a nature that practically every manufacturer was able to enter



Motorcyclists attached to the British army motor corps in France with the types he then possessed. Unlike the English scheme, there was no preference for bevel drive over worm or chains, for a particular type or position of motor, or for a certain class of gearbox. The field was even left open to steam, gasoline, and gasoline-electric. All that was required at first was that the trucks should be capable of doing good work on the road individually and collectively. Year by year the regulations and tests became more stringent, without, however, interfering with general design. The result has been that throughout France there has developed a type of vehicle of a uniform size, power, weight, speed, body, clearance, etc. In other words, the whole of the French construction has given military requirements prior consideration. The result is that when the war broke out practically all the best trucks in France were subsidized types, whether the owners were drawing the subsidy or not. Evene at this early stage of the war the French system has justified itself. It has been shown that it is much more important that a dozen vehicles from a dozen factories should be able to travel together over varied country at a given speed than that they should have the same design of crankcase or the same diameter crankshaft. Some of the features on which the army has insisted, and which are generally of little importance to the private user, have found their justification in actual war service. They are the use of sprags, efficient clearance, radiator guards, uniform bodies, towing hooks front and rear, three fuel carbureters, and tanks allowing a big range of action.



All Belgian roads are barricaded in this manner to facilitate arrest of spies. Cars can pass through only at a walking pace

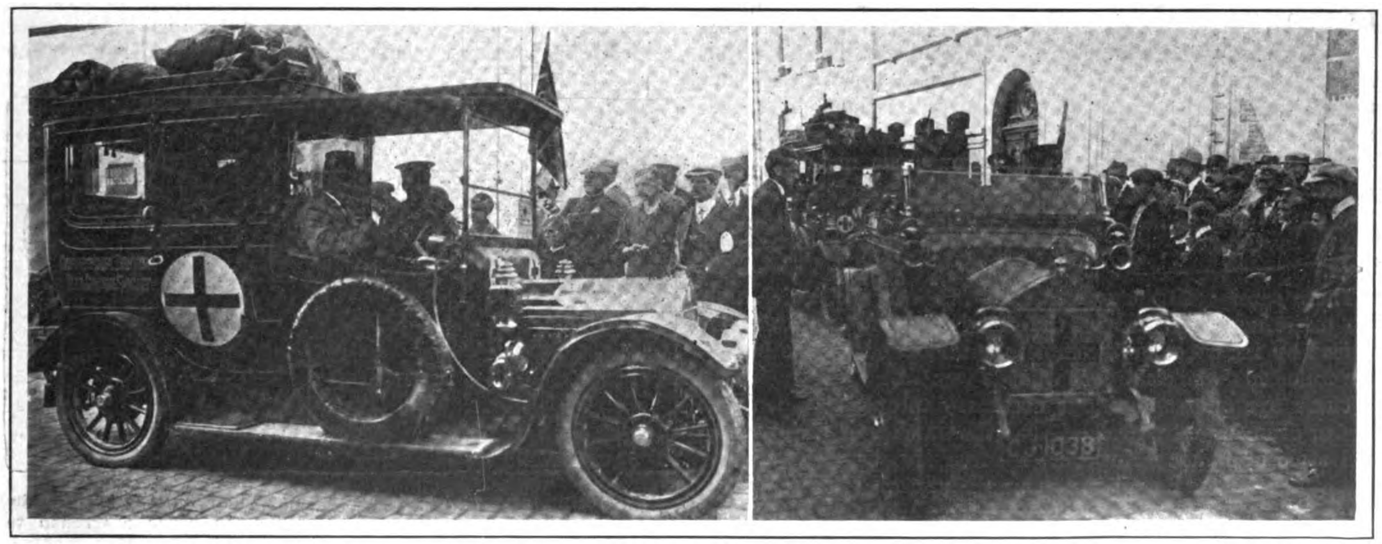
Special Provisions

In a few cases the British Army Service Corps has made arrangements to bring material direct from the ports to the fighting line. This appears to apply mostly to ammunition. It is at present too early to note what arrangements have been made by the English army for the use of trucks in carrying wounded soldiers away from the front Their vehicles do not appear to be capable of taking stretchers, and thus will practically be empty on return journeys. The French subsidy trucks, on the other hand, have a uniform type of body consisting of a platform with stout hoops over which a canvas cover is placed. The hoops have to be of sufficient strength to receive stretchers and wounded men; whenever there are men to be taken away the trucks are made use of for this purpose. If the English system is different from the French, it is because the medical service organization of the two armies is not the same. The English Medical Service Corps is equipped for the removal of wounded, and does not dovetail with the Army Service Corps.

Complete Motor Workshops

Each division has three or four motor workshops, which are kept in the open air garage at the depot town. At Amiens, where there were 1,500 automobile trucks, there were four workshops. These consist of a heavily built high-wheeled van with sides which can be hinged to open outwards so as to increase the floorspace. The roof is made to open and is covered by a waterproof canvas blind on rollers, serving to make the sides waterproof when the whole vehicle is closed up, or spreading out as a sunshade. The truck is drawn by a steam tractor. It is completely fitted with machine tools, lathe, forge, drills, saws, etc., and obtains its power from a single cylinder motor placed on the ground under the workshop and having belt connection through the floor. The French workshop is smaller, for it is an automobile chassis with a workshop body, the motor serving both to drive the vehicle and to operate the machinery.

A number of steam tractors have been brought over with the English army. Each one hauls a couple of trailers. The steam trucks are impractical for active work, however.



A Minerva limousine in the service of the British Red Cross Society in Belgium and France. Right—Red Cross touring car

Finds 12-Volt Electrical System Superior to 6-Volt

The Automobile Engineers' Forum

Engineer of Starting and Lighting System Manufacturer Claims 12-Volt Type Is Lighter, More Efficient and Easier to Install

NIAGARA FALLS, N. Y.—Editor THE AUTOMOBILE—Our experience with starting and lighting systems of different voltages has proved conclusively that the 12-volt is superior to the 6-volt system. We find it to be lighter, easier to install, more efficient, and to give better service.

Weight of 12-Volt System Is Less

The weight of a 12-volt starting motor is much less than a 6-volt motor designed to operate at the same speed, and to give the same torque. This is especially true in the case of a single unit system, that is, a combined motor and generator. There is also a saving in size and weight of the starting switch and wiring, which more than compensates for the difference in weight between a 12- and 6-volt battery.

The 12-volt system is easier to install, due to the greater flexibility of the smaller size of cable used, and to the reduction, in size of all accessory parts, such as switches, terminal posts and lugs.

The efficiency of both the motor and the generator is higher with a 12-volt system. The heavy current required by a 6-volt motor results in large losses in the wiring, switch contacts and brushes. The efficiency of the motor is thereby reduced and the cranking speed is cut down to such a low point that it is difficult to start on the magneto. In a 6-volt generator the brush contact and friction losses are much greater than in a 12-volt machine and consequently more power is required from the engine. In Europe, where fuel consumption is a very important factor, it is significant that 12 volts is the standard lighting voltage, and there the question of starting has never been seriously considered until very recently.

In service the car owners using 12-volt systems find that they have less trouble in keeping generators in operation, as dirty commutators do not interfere with the building up of voltage. The increased pressure is sufficient to overcome the resistance. The brushes have a longer life, saving trouble and expense of renewal. The 12- or 14-volt lamp that is now manufactured is as durable and strong as the service demands. Even higher voltage lamps are giving excellent service. Automobile electric lighting has become so universal that there no longer is the argument that nothing but a 6-volt lamp can be readily purchased.

12-Volt Systems Give Less Trouble

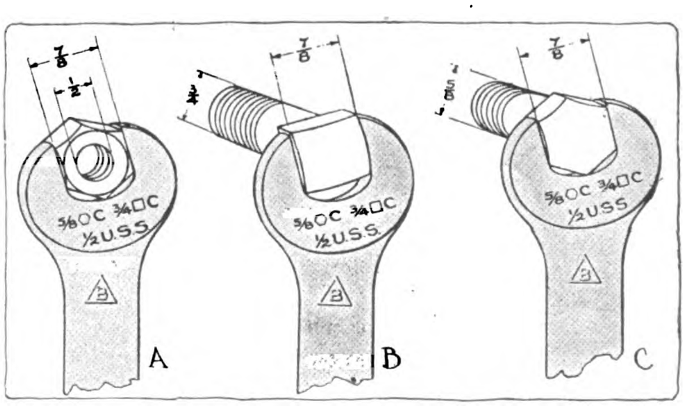
Together with the above advantages the 12-volt system permits the use of everything favoring simplicity in number and size of units, and in wiring. It is the best compromise between the advocates of high and low voltage and its more general adoption would do more than any other one thing to standardize the electrical system.—T. R. DU BOIS, starter department, United States Light and Heating Co.

In Ordering Wrenches Mention Number and Style of Finish

HARTFORD, CONN.—Editor THE AUTOMOBILE:—When a customer orders a wrench he probably wants it at the time of ordering, and wishes it to be delivered immediately. Under these conditions, if the dealer makes prompt delivery he will have pleased a customer who will remember where he can get his orders filled quickly. If the dealer is unable to fill the order by return mail because his customer has neglected to plainly specify what is wanted, everybody is sore on account of the delay, and trouble and expense is incurred by the necessity of writing to get complete specifications.

These same conditions often exist between the dealer and the manufacturer; that is, the delay in filling an order is caused by incorrect or incomplete specifications. The buyer has failed to make clear just what is wanted.

There are only two things necessary to specify when ordering drop forged wrenches, viz.: the number of the wrench and style of finish. However, it often happens that a customer has no catalogue handy and therefore tries to make clear his requirements by stating for what purpose the wrench is required. This is all right if the statement is properly and clearly put, which often times is not the case. For example—it often happens that the manufacturer gets an order for a wrench to take a ½-inch nut and fills the order accordingly with the result that he is asked to replace the



Illustrating several of the ways in which a wrench may be ordered wrongly. For instance, people often order a wrench to take a half-inch nut when they mean a nut with a half-inch opening. Square and hexagonal heads are also complicating features wrench with one that has a ½-inch opening to take the nut.

Nuts are designated by the size of the tapped hole, or the size of the bolt on which they are used. Bolts and cap screws are designated by the size of the diameter of body or shank of same, therefore a half-inch U. S. standard hexagon nut requires a wrench with an opening measuring ⅞-inch.

Standard lists of drop forged wrenches, as a rule, cover three styles of finish, namely: Unfinished, Semi-Finished and Finished, and prices vary according to the style of finish required. Therefore, it is essential that an order should plainly state the style of finish wanted.

The head or heads of wrenches are stamped so as to show for what purpose the wrench can be used, according to our system.

For example, if the wrench is for a 3/16-inch U. S. Standard nut or bolt, the opening measures 13/32 inch, and the head is stamped "3/16 U. S. S."

If the wrench is for a ¾-inch hexagon cap screw, the opening measures 1 inch and the head is stamped "¾ C." If the opening of the wrench measures ⅞ inch, the head is stamped "⅝ ○ C, ¾ □ C, ½ U. S. S.," showing that the wrench can be used for ⅝-inch hexagon cap screw or ¾-inch square cap screw, or a 1-inch U. S. Standard nut or bolt. Also, a ⅜-inch opening is stamped "⅜ set, 3/16 ○ C, ¼ □ C," showing that the wrench will take a ⅜-inch set screw, a 3/16-inch hexagon cap screw, or a ¼-inch square cap screw.

Thinks Over-Standardization in Car Design Means Stagnation

NEW YORK CITY.—Editor THE AUTOMOBILE:—Information is wanted on W. A. Swan's automo pill. Mr. Swan wants everything standard; but does he realize that that is to spell stagnation, but in another way?

It is not fair to say that the U. S. government is throwing away money when testing alcohol as fuel; it is now at least conclusively proven that alcohol as fuel is too high in price for a long time to come. Mr. Swan will have a self-starting motor. Why tantalize us, Mr. Swan, you probably know how to produce such a motor? To the rest of us it seems to be an impossibility, at least when clutches are not to be used, or their equivalent. Gears are not going to be used either; but are you not a bit behind the times there? There are no difficulties in the way of running cars without a gearbox; a larger motor will do that nicely, but the trouble is that such an engine becomes very heavy, costly, and will use a great deal of fuel, since it will be but seldom called upon to extend itself to its full capacity.

A Constantly Economical Motor

Strange to say, all things are best under but one condition and to produce a motor that will be equally economical under all conditions, that alone, Mr. Swan, will be a feat worthy of your best efforts. I am surprised to hear that when I thought it was well understood that of all the gear systems the internal gear was the least efficient. There is no difficulty either to drive each wheel independently; but, again, you must have excessively heavy motors to do so, else two sets of gearboxes and gears you do not want.

No carburetor, no radiator, no camshaft, and the motor still not to be a 2 cycle, i.e., a 4 cycle then. The only tangible thing standing out is that the motor will be a modification of the Knight type. The motor is probably not cooled at all.

And the fuel comes in pills. The pill idea is wonderful, but how about going up a hill? Big pills for big hills and little pills for little hills? The prophetic eye sees boxes with pills distributed by parcel post.—B. H. BRITT.

Recent Decisions of the Courts

Explosion Not Gasoline Dealer's Fault

By George F. Kaiser

A GASOLINE dealer was recently held blameless by the Supreme Court of Tennessee for an explosion which occurred while a gasoline tank was being filled.

In this case a father told his 17-year old son to take his automobile around to a drug store and have the gasoline tank filled. The son drove to the store after dark, stopped his car, gave an order for gasoline, turned down the rear light and walked off a short distance to talk to some boys. The tank was hung in the rear of the car and was about 24 inches above the tail lamp, which was lighted and had two glass sides but a metal rear through which the light did not show. Before going away the son turned the tail lamp down very low. The drug clerk brought out a 5-gallon can of gasoline and, not noticing the light, started to fill the tank, from which the cap had been removed. After he had poured in about 1 gallon the vapor reached the lighted lamp and an explosion resulted which injured the car. The owner thereupon sued the dealer for the damages but the Court held that the clerk had the right to assume that the son had put the car in a proper condition to receive the charge of gasoline and that the boy should have extinguished the light instead of turning it down, or else should have stayed by the car and warned the clerk instead of walking away. Judgment was therefore rendered in favor of the dealer.—*Grigsby & Co. vs. Bratton*, 163 *S. W.* (*Tennessee*) 804.

Bicycle Against Automobile

Where a bicyclist tries to shoot across in front of an automobile, he cannot sue and get damages from the motorist for his injuries, says Maine Court.

A bicyclist sued a motorist for injuries received in a collision between his bicycle and a motor car. He recovered a judgment of $39.55. The motorist carried the case to a higher Court and succeeded in having the bicyclist's case dismissed. The automobile was on the right side of the street and the bicycle was coming along in the opposite direction. There were lights on the automobile but none on the bicycle.

The Court held that, as the bicyclist wanted to "shoot right across to get clear of the automobile" when he could have turned the other way and gone behind the motor car, he himself was so guilty of negligence as to make a dismissal of his case proper.—*Robischaud vs. Spence*, 90 Atl. (Maine) 430.

Trolley Smashes Automobile

Minnesota Court says that a motorist cannot get back the money he spends repairing his car when it is smashed by a trolley if he does not stop on seeing the car 10 ft. away.

A motorist sued a Trolley Company to recover back the money he had paid for repairs to his car, which was damaged in a collision with a trolley. He testified that as he came to a crossing he looked for a trolley and the way was clear when he was 35 ft. away. When he was within 10 feet of the track he looked again and a car was "right on top of him." He turned to the right, pulled his clutch and put on his brakes but was hit.

The Court said that, as the motorist could have stopped his car but instead went on and took a chance, he was guilty of contributory negligence and could not recover.—*Batroot vs. St. Paul City R. R. Co.*, 146 N. W. 1107.

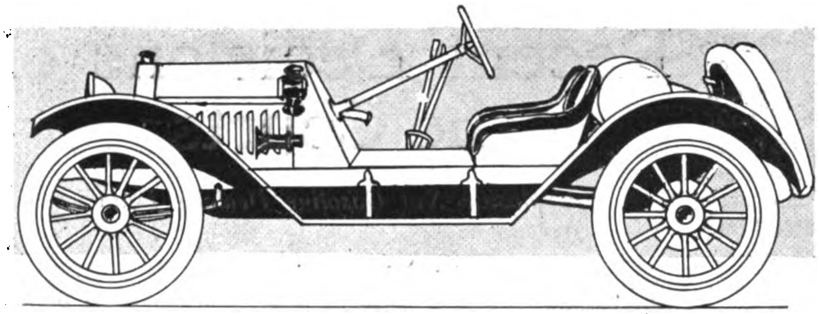


Fig. 1—Model 34 Buick with racy runabout lines

The Rostrum

Two-Stroke Cycle Ideal

EDITOR THE AUTOMOBILE:—The opinions of various readers, and some thinkers, on the two-stroke cycle is certainly an interesting feature of your magazine. A few ideas from another source may help those who are so fascinated with the valve or no valve problem as I am. When a traveler finds himself lost in a bewildering region and every trail leads to an unknown country, wisdom bids him retrace his steps to the fork of the roads on the mountain. Let us, also, go back to that fork on the mountain. At our feet lies the empire of the heat engine—to the east, the reciprocating engine is all-powerful; while to the west the Turbine kingdom lies. The light of knowledge has already risen on the east, so let our journey lie there. Whatever may be the thermodynamic cycle chosen, both four-stroke and two-stroke mechanical cycles can be invented to accomplish it. Wisdom again says, "Take the road of the two-stroke cycle, for it has the inherent advantages of simplicity and doubled power output." That these ideal features have not been successfully realized is a serious charge against our most capable engineers, who have spent time in developing the four-stroke cycle engine. I will say nothing about the numerous forks further down the road. I do say, however, that a mountain must be blasted—the volumetric efficiency must be greatly increased. The low volumetric efficiency and the fuel extravagance of the two-cycle are the results of poor design and the poorer inventive ability. Both conditions will be bettered by the same design. When the engineer breaks through to this region, he will see wonders of which we have never dreamed; torque as smooth as that of an electric motor; efficiency greater than that of a Diesel engine; silence made absolute and vibration wholly eliminated; weight reduced to a pound a horsepower. Being a mere man, he blinks his eyes and steps on his own foot—can he be in the land of the reciprocating engine—is this not the country of the turbine? My friends, he can believe his eyes and so will you very shortly. It can be done, it has been done, and without a make-up, too.

Providence, R. I. H. A. B.

Magneto Causes Miss

Editor THE AUTOMOBILE:—1—I have a car which starts badly. It has a four-cylinder, 4.25 by 5.5-inch motor, but only a magneto for ignition. It has not troubled me this way until recently. At the beginning I could start the motor with but a turn or two of the crank at any time. The motor works evenly and has lots of power when once under way. If it can be started rolling down a grade and then thrown into gear it starts readily enough. The carbureter adjustments have been changed, but the motor works so well it seems impossible that the trouble could be there. I use the dash adjustment for starting, but it does not help matters. Can you tell me the cause of this and suggest a remedy?

Canton, N. Y. H. S. S.

—Your magneto is probably causing the trouble, although it is well to make sure that the difficulty does not lie in the carbureter adjustment or is not due to leaky valves.

See that the spark plugs points are 1-32 inch apart, that all connections are tight, and that there are no short circuits. Then examine the breaker points on the magneto. File them until they meet squarely and then adjust them until the motor runs evenly at all speeds. The exact distance depends upon the magneto, but should be somewhere between 1/32 and 1/64 inch. If the points are too far apart the motor will not start or will miss at slow speeds, while if the points are too near together it will miss at high speeds. There is also a chance that the magnets are weak. If this is the case, there still will be difficulty in obtaining a spark at low motor speeds. Make sure that all the brushes are making good contact.

It is well to note that starting on the magneto will be facilitated by advancing the spark nearly all the way.

Cost of Raceabout Body Is $100

Editor THE AUTOMOBILE:—1—Could you advise me in the Rostrum how to cut down a model 34, 1912 Buick runabout, "A la Mercer"? Give a sketch if convenient.

2—What is the estimated cost of this car?

New York City. G. F. K.

—1—Fig. 1 shows how this car should look after being remodeled. The dash is slanted slightly, the bucket seats are placed directly on the frame and the gasoline and oil tanks, and tires are carried in the rear as shown. The steering post is dropped so that it will be in reach with the lower seat position. This is accomplished by loosening up the dash bracket that holds the steering column.

If you also desire to increase the speed of the car you should follow the directions given in the issue for August 27 in the Rostrum on page 406.

2—The cost will be anything from $100 up, depending on how well the body is finished and who does the work. It would be best to obtain estimates from several body builders.

New Use for Old Shoes

Editor THE AUTOMOBILE:—I have seen the idea advanced that when tires are rim cut and the treads are still good that the bead could be taken off and the remaining tire fitted over the casing of a good tire while deflated. Pump up the tire and you have a practical puncture-proof and-long-running tire. I want to know if any of your readers have tried this. Is sand liable to work between the two casings? Would there be enough friction to heat and harm the under casing?

Back Bay, Wis. W. B. DULING.

—There is a possibility that sand would work in and cause trouble. Some slight harm might also be done by heat. The experiences of our readers on these points would be interesting.

Lamps Out of Focus

Editor THE AUTOMOBILE:—I have a motor car equipped with the Gray & Davis electric lighting system. So far as the efficiency of this outfit is concerned, there is no fault to be found. The bulbs in the headlights are bright enough, but the light on the road is bad—simply a series of light and dark rings. However I may try to adjust the focus the result is the same, while the diameter of the circle of light on the road is only about 12 feet at a distance of 20 yards. Will you please tell me what is the matter, and how I may get rid of those rings?

Jamaica, West Indies. JAMES JOHNSTON, M.D.

—If the focusing apparatus is in proper working order and you are using the right size of bulbs, you should have no difficulty in eliminating the rings, as this trouble is due to lack of focus. The construction of the apparatus is shown in Fig. 2, where it will be seen that the position of the bulb is changed by a system of levers that is controlled by the nut at the top of the lamp. It is barely possible that a pin has dropped out or some other small derangement has occurred to prevent the proper focusing. It seems most likely, however, that the bulb is not the proper size.

Maker of First Automobile

Editor THE AUTOMOBILE:—1—Who made the first automobile? What year? Describe it.

2—How many factories in the United States to-day are making cars and trucks?

3—How many men are earning their living in these factories?

4—What particular improvements on cars gave them reliability?

5—What is the approximate number of cars and trucks in use to-day in the United States and their value.

Scranton, Pa. JOS. J. CURT, JR.

—1—This is a difficult question to answer, because self-propelled road vehicles appeared shortly after the invention of the steam engine, and as a natural consequence of it. The first one we have any record of is Cugnot's steam carriage, built in 1770. This is illustrated in Fig. 3. The boiler is carried in front and drive is through the front wheel. It was capable of carryng four people at a speed of 2.25 miles per hour on an ordinary road. As its boiler capacity was insufficient, it was not able to run more than 15 minutes before pausing to get up steam.

The kettle-shaped boiler is characteristic of the day; the fire and water tube boilers had still to be invented.

The single front wheel, which is of great strength and weight, is driven by two single-acting vertical cylinders 13 inches in diameter by 13-inches stroke. These two pistons are connected by a walking beam to which they are coupled by chains attached to levers mounted on the axle of the driving wheel. They alternately work the front wheels by pawls acting on two modified and reversible ratchet wheels. The distribution of the steam to the two cylinders is effected by a four-way cock, so arranged that in each position it opens one cylinder to the steam supply and the other to atmosphere. It is operated by a tappet motion from the piston rods. The rear part of the machine was connected by a vertical bolt to the front wheel, and by means of gearing from the driver's seat of the fore carriage can be turned through 50 degrees, thus enabling the driver to steer the carriage.

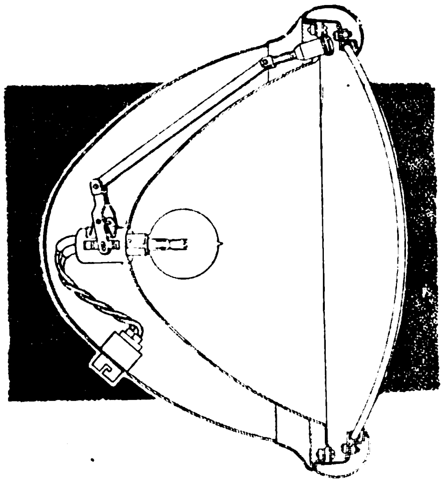


Fig. 2—Gray & Davis electric headlight, showing bulb focusing mechanism

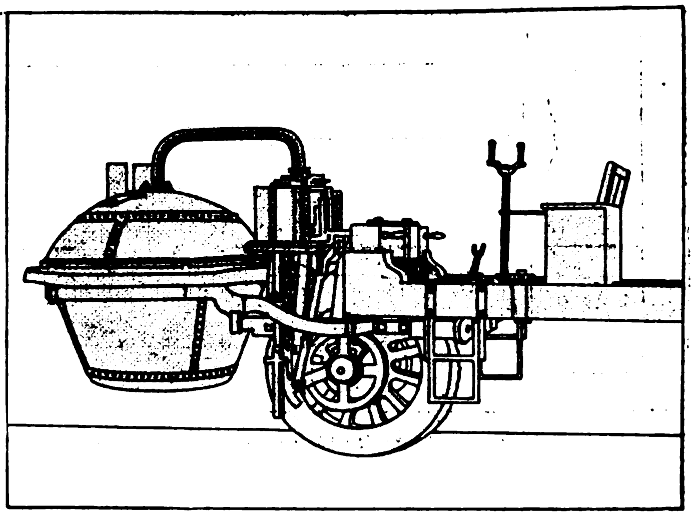


Fig. 3—Cugnot's steam carriage, built in 1770

2—The total number of manufacturers, according to the *Automobile Trade Directory*, is 436, distributed as follows: Gasoline pleasure cars, 171; electric pleasure cars, 24; steam pleasure cars, 2; cyclecars, 29; gasoline commercial vehicles, 188; electric commercial vehicles, 22.

3—This is unobtainable.

4—Reliability has been achieved mainly by the perfection of details, due to experience. Little by little, the proper materials, proportions and size of parts for best service have been determined. Reliability has not been obtained by changes in principle to any extent.

5—Slightly more than a million and a half vehicles were in use at the beginning of July. The total value is not known.

Motor Fires Irregularly

Editor THE AUTOMOBILE:—My motor does not fire regularly. Sometimes it misses on just one cylinder and then again two become affected. The missing skips around from one cylinder to another. The position of the gas and spark levers does not seem to make any difference, and the trouble is equally bad on both magneto and battery. The magneto is a Splitdorf. Every adjustment of the carbureter, which is a Schebler, has been tried, and other carbureters have been put on, but without success. The spark plugs have been changed.

The motor has been completely overhauled by a competent mechanic.

Earlhorn, Ia. GEO. PHILLIPS.

—There are many places where you might find trouble according to the symptoms you have described. Since the missing is not confined to one cylinder, however, the spark plugs must be in good condition. Probably, also, the valves do not need regrinding, nor is the trouble due to lack of compression from any other cause.

The missing is undoubtedly caused by faulty ignition or carburetion, and it seems more likely that the former is the cause.

First look for short circuits. Operate the motor in the dark, at a moderate rate of speed, and note whether any sparks jump from any part of the wiring to the motor or frame. Inspect the insulation of all the wires carefully for worn or broken spots, where a short circuit to the frame might be produced. Any such spots should be taped or the wires replaced. See that no exposed parts, such as terminals, are able to come into contact, even momentarily, with any metal parts that might ground the current.

Next examine the brushes on the magneto. Any that are worn on the ends should be smoothed off or replaced, so that a good electrical contact is obtained. The springs that force

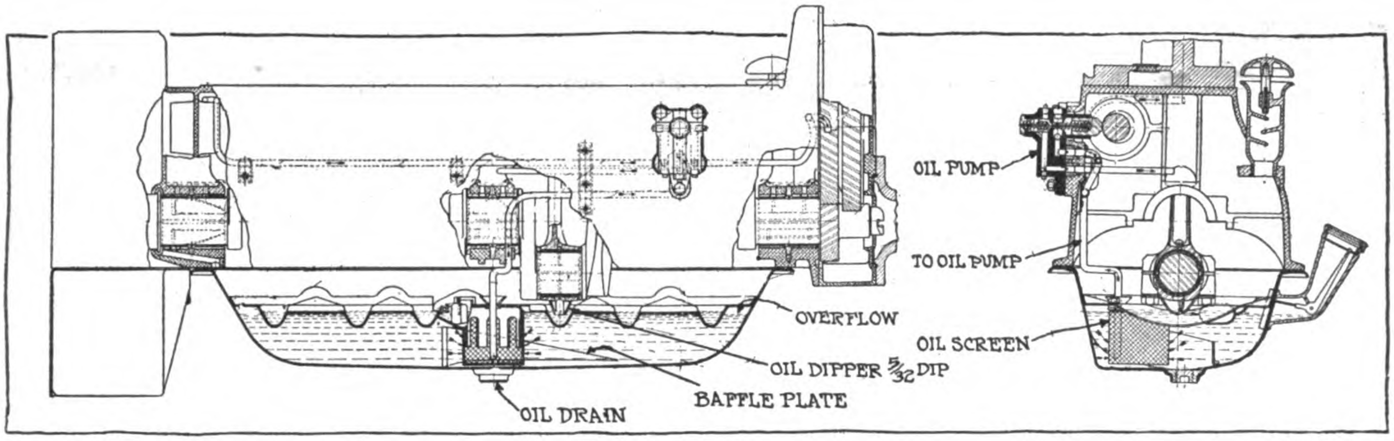


Fig. 4—Oiling system used on 3.75 by 5-inch Continental Six. A combination of splash and pressure feed is used

out, or feed, the brushes should have enough tension to make a good contact, and if any are too weak new ones should be substituted.

See that the breaker points are smooth enough to meet squarely and in adjustment—that is, the gap between them, when they are separated, should be between 1/32 and 1/64 inch. Also note whether the insulation in the breaker box is in good condition, and whether there is any possibility of a short circuit either due to this cause or dirt or oil. Wash the breaker mechanism well in gasoline before replacing. See that there is no dirt in the spark gap that might cause a short circuit.

Take the switch apart and examine the insulation and tighten up any loose parts.

Then, providing all electrical connections are tight, and the gaps of the spark plugs are adjusted to about 1/32 inch, the trouble must either be in the carburetion system or else is in the coil or magneto. In the latter case take your car to a Splitdorf service station.

Assuming that the carbureter adjustment is about correct, see that there are no air leaks in the intake manifold. This fact can easily be determined by running the motor and holding a cigarette at the various joints. If there is a leak the smoke will be sucked in. The trouble may be caused by a worn gasket or some of the flange bolts may be loose.

Look for dirt in the gasoline system and see that the float is not soaked with gasoline and that the needle valve and float valve or their seats are not worn.

Description of Continental Six Oiling

Editor THE AUTOMOBILE:—Will you please describe the oiling system used on the six-cylinder Continental motors?

St. Louis, Mo. E. H. K.

—Two oiling sytems are used; one is a splash system employing a gear pump, Fig. 4. This is found on the 3.75 by 5.25-inch motor, while a plunger pump is used on the 3.5 by 5-inch motor.

In the former, the pump, which is driven by spiral gears, forces the oil through three pipes which lead to the three main bearings of the crankshaft. The oil which is not used up here overflows into the splash pockets of the oil pan, where it is picked up by the connecting-rod dippers, thus lubricating all exposed bearing surfaces inside the motor.

On the larger motor a plunger pump operated from a single eccentric on the cam shaft is used, the oil being drawn through a single lead from the tank and forced through three separate leads to the main bearings.

Gasoline Consumption Is High

Editor THE AUTOMOBILE:—I have a two-cycle Elmore, model 36, and cannot get over 6 or 7 miles to the gallon of gasoline. Is there any attachment that could be connected to the carbureter that will increase the number of miles per gallon? It is a Schebler carbureter and the engine works all right in every other respect.

Greensburg, Pa. E. G. SHEETS.

—This consumption is not unusual for this particular make and model. You might improve it somewhat by adjusting the carbureter to give a very lean mixture, running with spark advanced as much as possible, and reducing the friction of all parts to the minimum. You might also attach a gasoline economizer.

Worn Cylinders Cause Smoking

Editor THE AUTOMOBILE:—I have a 2-ton truck which has only been driven about 7,000 miles and has had the best of care. It runs all right now with the exception that it smokes a great deal regardless of how little oil I carry in the crankcase. I am also very careful about the sight feed on the dash not feeding too quickly. I have been told to drill holes in the oil grooves near the bottom of the pistons to allow the excessive oil to pass down through the inside of the piston back to the crankcase. Do you think this will prevent further smoking?

New York City. E. A. C.

—The only explanation is that the cylinders are badly worn, either through abuse or accident. The best remedy is to rebore the cylinders and fit new rings and larger pistons, but relief can be obtained in the way you suggest, namely, by drilling holes in the oil grooves in the bottoms of the pistons.

Truck Should Ride Better Loaded

Editor THE AUTOMOBILE:—1—We are using a 3-ton Mack truck with a twenty-six-passenger body. We find that unless it is fairly well loaded, the car rides hard. We thought that by the use of shock absorbers we could make the car ride more easily. Do you think this is so?

2—Can you advise us where we can obtain absorbers suitable, at a moderate price?

Bath, N. Y. BUCHMASTER & MORRISON.

1—Shock absorbers should improve the riding qualities, but it is natural that the truck should ride harder when empty. The springs of this vehicle, the same as any other, whether it be a pleasure car or a buggy, are designed for the maximum load, and therefore the truck rides best when this load is applied.

2—We suggest that you write some of the following manufacturers of shock absorbers:

Connecticut Shock Absorber Co., Meriden, Conn.
Cox Brass Mfg. Co., Albany, N. Y.
Ernst Flentje, Cambridge, Mass.
Gabriel Horn Mfg. Co., 1407 40th street, Cleveland, O.
Hartford Suspension Co., 172 Bay street, Jersey City, N. J.
Martin Shock Absorber Corp., 1301 E. Slauson avenue, Los Angeles, Cal.

Clarence N. Peacock, 1790 Broadway, New York City.
Peteler Shock Absorber Corp., 1997 Broadway, N. Y. City.
J. H. Sager, 265 South avenue, Rochester, N. Y.
Westinghouse Air Spring Co., Smedley Bldg., New Haven, Conn.

Carbureter Causes Missing

Editor THE AUTOMOBILE:—I have a 1913 runabout, and it has a miss somewhere. At low speed it runs very well, but every 10 or 15 revolutions it seems to have an extra exhaust, and when attempting to speed up the motor one or more cylinders will miss until the speed gets high, and then they will all hit. It does the same thing on the road. I have rewired from the magneto to spark plugs and changed spark plugs several times. Do you think it is the fault of the carbureter? If so, what would you recommend?

Somerset, Ky. ROY J. MCDANIEL.

—You seem to have carbureter trouble. Adjust your carbureter carefully, and if you do not understand how to do this properly take your car to a competent repairman. If the motor still misses it would be well to install another carbureter.

It is possible, also, that the breaker points on the magneto are out of adjustment, or that the magneto is at fault elsewhere. See the answer to George Phillips' letter in this issue, page 489.

Spark Plug Pump All Right

Editor THE AUTOMOBILE:—I have been informed that the use of an impulse pump for inflating tires will in time cause a noticeable knock or pound in the motor. If so, would you kindly explain?

Sayre, Pa. J. W. G.

—There is no reason why a spark plug pump should cause a knock in the motor. It is entirely separate from the motor, as far as its moving parts are concerned. Only the lower end comes in contact with the cylinder, and this has no more effect on the motor than a spark plug. The movement of the piston in the pump is produced by the compression pressure. There is mechanical connection between the pump and the motor.

How Car Drives Through Springs

Editor THE AUTOMOBILE:—Please explain the meaning of the phrase, "Car drives through springs."

Milwaukee, Wis. W. F. BREHM.

—This expression is almost self-explanatory. It means that the driving force exerted on the car body by the wheels is transmitted through the springs instead of through a torque-tube or radius-rod construction.

The three methods of driving are illustrated in Fig. 5. At the left is shown how the drive is taken by the springs. The forward thrust of the wheels, which is exerted first on the axle, is transmitted to the body through the front ends of the springs. No force can be applied at the rear ends of these springs because of the shackle construction. The forces are indicated by the direction of the arrows.

The use of radius rods to transmit the driving effort is illustrated in the center. It will be noted, in this case, that the springs merely carry the load and that all the strain of propelling the car falls on the radius rods. These are pivoted to the frame by means of ball and socket joints and are fastened to the axles by collars which allow full radial movement.

In the torque tube construction, at the right, the driving force is transmitted to the car through the pins P. In principle this is the same as the radius rod just described, but this member has another function also. Since the tube is fastened solidly to the axle, any tendency of the axle to rotate when the driving torque of the wheels is applied, is resisted by this member.

Breaker Points Too Near

Editor THE AUTOMOBILE:—I have a 1913 touring car which is not working satisfactorily of late and would like to know the reason for this.

I had the car overhauled recently on account of valve trouble with two cylinders. Had new piston rings installed, and also other parts which were necessary. The car now has good compression on all cylinders, but does not pick up and take the hills the way she should. I have tried this with the spark lever in different positions, but with no improvement. I also had the carbureter, which is a Rayfield, overhauled and adjusted. The car throttles down satisfactorily on high speed, almost to a walk, but on a long, steep hill she will slowly decrease in speed until engine is just turning over, necessitating changing to a lower speed.

Brooklyn, N. Y. PETER KAMINSKI.

—Possibly the motor is merely stiff and that after the new parts are worn in the car will accelerate properly. Also, it may be that in reassembling the motor the timing of the valves or magneto was incorrectly done. More likely the former, because the motor would either overheat or knock if the setting of the magneto was much out of the way. There is some chance too that the points of the breaker are too near. Make certain that the brakes are not dragging.

Relative Power of I and T-Head Motors

Editor THE AUTOMOBILE:—Will you kindly tell me what percentage of horsepower an overhead valve motor will develop over a T-head motor of same bore and stroke?

Sturgeon Bay, Wis. C. C. DONA.

—The exact increase, if any, with the overhead-valve construction depends on so many things that it is impossible to give definite figures. The exact design of the combustion chamber; the size, lift and timing of the valves; the shape and size of the intake and exhaust manifold, and the position of the carbureter all have their effect.

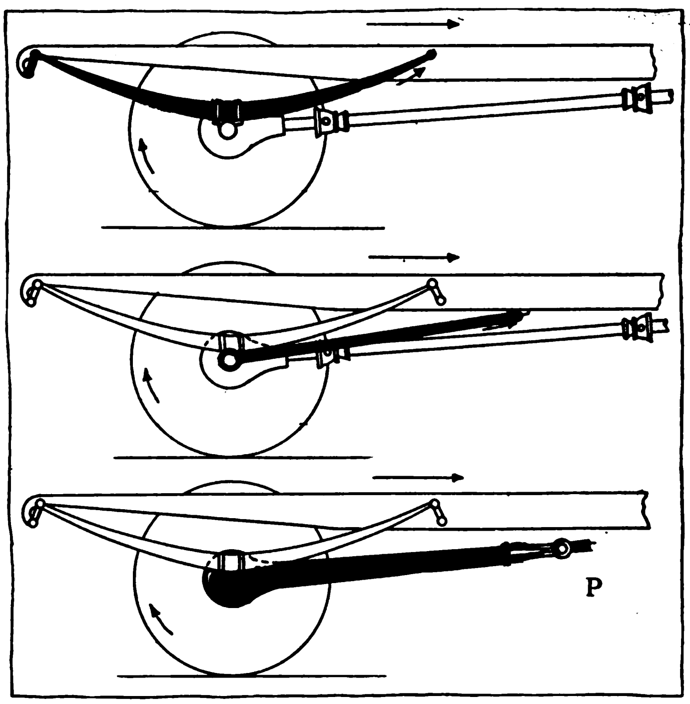


Fig. 5—Diagram showing the three methods of transmitting the driving force from the axle to the frame. The top one shows how the drive is taken through the springs, the middle one by radius rods and the lower one by the torque tube. The blackened member in each case is the one carrying the stress

The Engineering Digest

For What Speed Should a Motor Be Designed to Give Maximum Power For Its Weight?

A BRITISH ARGUMENT FOR AMERICAN MOTORS

CONSIDERING that it is usually taken for granted that a motor with small cylinders and capable of being operated at very high speed—giving its maximum power somewhere close to 3,000 revolutions per minute, for example—can be much lighter per horsepower than a motor designed to develop maximum power at 1,500 revolutions, an argument to the contrary of this assumption offered by *Engineering*, of London, in its issue of August 21 will be found of interest. The reasoning is expressly intended to account for the popular liking shown for American automobiles in Europe and to suggest that European builders would do well in going back to relatively slow-speed motors in lightweight car constructions. It runs substantially as follows:

Where the Weight Lies

In any comparison equal standards of durability must of course be assumed. It is first to be remembered that the weight of the cylinder barrels is not the most important item in the upright automobile motor. Valve seatings and boxings usually weigh more. Crankchamber, crankshaft and bearings make up a very large part of the total. The sizes of these parts depend upon the pressures and can therefore be made lightest where the pressures are smallest. The greatest weight-saving from reducing cylinder size is obtained in the aeroplane motors with cylinders radiating in one plane, because in these the number of cylinders is large while the weight of shaft and casing are relatively small.

Up to a certain point lightness is no doubt most readily secured by small cylinders and high speed, as the explosion pressures are reduced with the size of cylinders, but, even if these pressures alone are considered, the weight reduction is not in proportion to the increase in number of revolutions, because valves and valve gears must remain the same for a given power, whatever the speed, and the rubbing speed of journals is increased, so that their areas cannot be reduced in proportion with the load reduction. Moreover, the length of these bearings largely determines the length of crankshaft and casing.

At really high speeds—that is, beyond the limit within which a gain in lightness is after all secured—the question is complicated by the growth of the pressures due to inertia of the moving parts. These go up at the square of the speed and come to exceed the explosion pressures. They cannot be cushioned by a constant application of the power, as in high-speed steam engines. The crankshaft and other parts must be enlarged to take these stresses, and the bearings must be increased in area. As the rubbing speed is greater, the bearing pressures per square inch must be lower, and the area of bearings must therefore be increased at a ratio above the square of the speed; and there will be a point beyond which the increase in weight will be greater than the increase in horsepower.

The compression used also affects the results. In a high-speed motor high compression must be used in order to get the charge burned in the available time. And, while the mean pressure during the working stroke is not materially raised by a very high compression, the maximum explosion pressure is raised considerably and must be provided for.

Calculated Forces in Three Cases

The relative effects of the explosion and the inertia forces in three motors of the same power, but of different speeds and with cylinders of different sizes, are scheduled in Figs. 1, 2 and 3, in all of which A represents the shaft of a low-speed motor, B that of a medium-speed and C that of a high-speed motor. Different sets of stresses are represented by the inscribed figures, which have been calculated from the supposed data of the three motors. Motor B may be supposed to run at 1,500 revolutions, developing 40 horsepowers, and to have cylinders with 4-inch bore and 5-inch stroke. A and C are to produce the same power—A at 750 and C at 3,000 revolutions—and for convenience it may be assumed that they all have the same stroke. In this case A will have a bore of 5.66 inches and C one of 2.83 inches. The reciprocating parts of A, B and C may be taken to weigh 7, 3½ and 1¾ pounds, respectively, and the rotating parts are estimated at 6 pounds in all three cases, including the connecting-rod knuckle with bushings, 50 per cent., and the crankpin and portions of the cheeks the other 50 per cent. The explosion pressure can be assumed to be 300 pounds per square inch in every case. These supposed data come near enough to realities for purposes of comparison.

Fig. 1 gives the forces acting on the crankpins to produce bending stresses on the shaft and pressures on the main bearings. In the low-speed motor A the maximum force on the pin is 6,836 pounds, due to the explosion pressure. In B this is reduced to a maximum of 2,047 pounds, partly owing to the reduction of the piston area and partly to the increased inertia of the parts which act against the explosion pressure. But in C the maximum acting on the shaft is 5,242 pounds and is due to the inertia forces at the end of the exhaust stroke.

The size of shaft necessary for strength depends on these forces and the distance between main bearings, and the latter depends largely upon the required length of the connecting-rod bushings. The pressures upon these bushings—by which their length is dictated—are given in Fig. 2, where it is indicated that the crankpin pressure maximum is 6,957 pounds in A and is due to the explosion pressure, is 2,531 pounds in B, but rises to 3,306 pounds in the high-speed motor C by reason of the inertia forces. In considering the effects of the pressures it must be remembered that the areas should depend not only on maximum values but also on the mean or average values by which wear is largely determined. The inertia pressures are to be sustained at three out of four stroke reversals, so far as those due to the reciprocating parts are concerned, and all the time in the case of the centrifugal forces, while the explosion pressures occur only at the working strokes. The mean values are thus much higher in the C type.

It must also be remembered that in the C type the very fact of adding to the size of the knuckle and crankpin bearings, in order to meet the stresses, adds to the weight of the revolving parts and therefore to the centrifugal forces, and that a larger area for the unit of load should be allowed in this type on account of the higher rubbing speed.

All considered, it is seen that the knuckle bearings will have to be very much longer in C than in B and probably quite as long as in A. To keep the stresses uniform, the shafts will have to be much in the same proportion. Owing to the extra weight of crankpins and knuckles, the actual pressures on the main bearings of C will be greater than shown by the figures. The middle bearing has to carry very heavy pressures at the bottom of the stroke of the two middle cylinders, the two end-bearings having corresponding upward pressures, and these conditions are reversed, of course, each half revolution. This explains the great length always given the middle shaft bearing in a motor of the C type with three bearings.

From all of these considerations it is at least evident that there is a very definite speed which will give the lightest motor. To ascertain what this speed is the conditions should be carefully studied and the probable weight of all parts determined with fair accuracy. Curves of the pressures and stresses could then be laid out which would give the desired information, but the best speed will, of course, always depend largely upon the general design of the motor and upon the standard of durability desired. It is noticed that successful builders of aeroplane motors, though the standard of durability for these is not high, keep revolutions below 1,500.

Throttled Running Emphasizes the Moral

In the argument, the effect of the flywheel has so far been ignored and the motors have been considered as running at full power only. It seems probable that in the case of single-cylinder motors for motor cycles high speed is necessary for lightness by reason of the need of keeping the flywheel size within bounds. With regard to motors for automobiles two fresh factors come into play. The fact that a wide range of motor speeds is required—in order to take hills on high gear—favors the high-speed motor, as a large flywheel is wanted to make a very large motor run slowly. On the other hand, the fact that the motor is mostly run throttled favors the slow-speed type, from the fact that explosion pressures are reduced while the inertia forces remain the same. In a car with a fair reserve power the motor usually works at perhaps a quarter of its possible power, and while the explosion pressure does not fall quite in proportion to the mean pressure, it is probably below 150 pounds per square inch most of the time in a 40-horsepower motor. Hence Fig. 3 shows the forces on the crankpin, and therefore those on the main bearings, at this pressure. In this case the maximum for A is 3,136 pounds, for B 1,653 pounds and for C 5,242 pounds. Further, the mean pressures for C are enormous, while in A they are very low. It is therefore probable that the A type, with a speed of 750 revolutions, could be built very nearly as light as the B type of 1,500 revolutions and a great deal lighter than the C type of 3,000 revolutions—durability even.

Conclusions

It is evident that motor speed should be as low as consistent with lightness, as all the practical advantages lie with the low-speed motor, particularly in the matters of maintenance, noise and price. Probably 1,500 revolutions should give the maximum power, which would mean that the motor in ordinary automobile practice would be run at about 1,000 revolutions, in order to have a reserve. This matter is of great importance, in view of the very great extension of the American motor car trade. Price is only one factor of their sales, the really important point being that their cars are light for their power and quiet; both these advantages coming largely from the use of moderate-speed motors.

Dimensions of Valve Control Organs in Automobile Motors—Calculations and Formulas

A SERIES of formulas for determining the dimensions of valve control organs in automobile motors is presented with brief reasoning by the German engineer, A. G. Von Loewe. Their value lies largely in the suitable choice of the factors which are considered as known and by which those sought are determined, this choice rendering it possible to apply the formulas directly to different designs of motors, independently, for example, of variations in the valve timing. The subject comes in several divisions; namely, (A) dimensions of intake channel, (B) dimensions of valve springs, (C) forms and sizes of cams, (D) adjustment of cams (valve-timing), (E) tappet rods and rollers and (F) camshafts.

In the following the notations used are boxed to facilitate the reading.

Notations

c = mean piston speed, in meters per second, m/sec.
v = mean gas velocity in suction channel, in m/sec.
d = cylinder bore, in centimeters, cm.
d_1 = diameter of suction channel, in cm.
f = sectional area of suction channel, in square centimeters, cm^2.
F = piston area, in cm^2.
d_2 = mushroom valve diameter, in cm.
d_3 = valve stem diameter, in cm.
l = valve stroke, in cm.

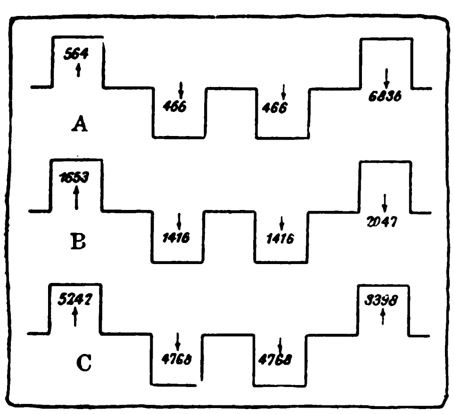


Fig. 1—Maximum forces producing bending stresses of crankshaft and pressures in shaft bearings

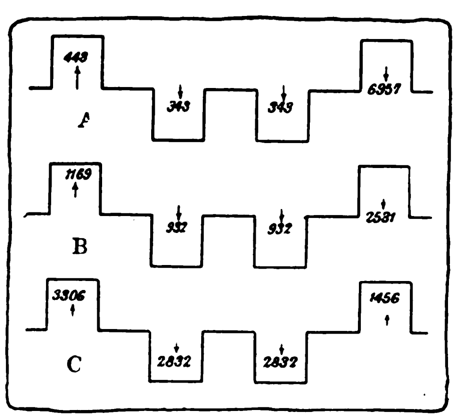


Fig. 2—Maximum stresses upon crankpins on bushings of connecting-rod knuckles

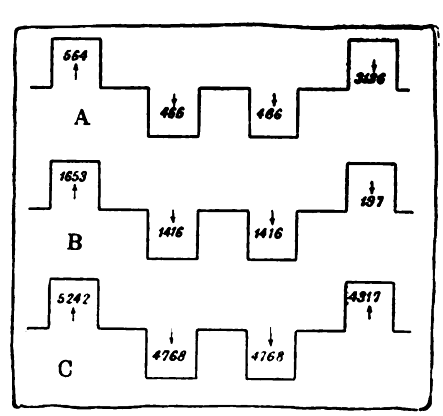


Fig. 3—Forces acting on crankshaft (as in Fig. 1) when motor is throttled to ¼ power, though running at full speed.

As f and F, and therefore also the squares of d_1 and d, must be inversely proportionate to v and c, one has

$$\frac{d_1^2}{d^2} = \frac{c}{v} \text{ or } d_1 = d\sqrt{\frac{c}{v}} \text{ and also } f = F\frac{c}{v}$$

Taking for v a gas velocity of 50 meters per second [which should be considered a minimum—Ed.] the following values are obtained:

Sectional area of suction channel $= f = .02\ Fc$ and

Diameter of suction channel $= d_1 = .14\ d\sqrt{c}$ (1)

The stereometrical relations or the standard formulas on the subject give further:

Diameter of mushroom valve $= d_2 = 1.2\ d_1$ (2)

Diameter of valve stem $= d_3 = .1\ d_2 + .4$ cm. (3)

Valve stroke $= l = \frac{f}{\pi d_1} = .32\frac{f}{d^2}$ (4)

Valve Springs

The valve springs must be capable of resisting the depression occurring in the cylinder when the motor is operating with the throttle closed. This is a minimum requirement.

Notations

p_0 = pressure at beginning of suction stroke.
v_0 = volume of gas at beginning of suction stroke.
p = pressure at end of suction stroke.
v = volume at end of suction stroke.
p_1 = depression; P_1 = depression acting upon intake valve, in kilograms, kg.
e = volumetric compression; P = spring tension with valve closed, in kg.

One has $\frac{p}{p_0} = \frac{v_0}{v}$, as pressures and volumes are inversely proportionate; therefore $p = \frac{p_0\ v_0}{v}$, and as $p_0 = 1$ kg. per square centimeter and $\frac{v}{v_0} = e$, being the volumetric compression, then $p = \frac{1}{e}$. The depression $p_1 = 1 - p$ and therefore

$$p_1 = \left(1 - \frac{1}{e}\right) = \frac{e-1}{e}, \text{ in kg/cm}^2.$$

The force of the suction to be resisted is further specifically dependent on d_2, the diameter of the valve, and thus

$$P_1 = \frac{\pi d_2^2}{4}\cdot\frac{e-1}{e}, \text{ in kg.}$$

In practice this minimum should be exceeded, say doubled, in order to accelerate the closing of the valve with sufficient vim. Figuring with $e = 4.25$ [which stands for a high compression and a small combustion chamber if the opening of the intake valve is delayed 45 degrees, for example, beyond low dead center—Ed.], the spring tension may therefore be calculated as

$$P = 2P_1 = \frac{\pi d_2^2}{2}\cdot\frac{3.25}{4.25} = 1.2\ d_2^2, \text{ in kg.} \quad (5)$$

Other Notations

P_2 = tension of entirely compressed spring, in kg.
P_3 = tension of spring when valve is entirely open, in kg.
L = length of spring with valve closed, in cm.
L_1 = length of entirely compressed spring, in cm.
L_2 = length of spring with valve entirely open, in cm.
L_3 = length of released spring, in cm.
f = deflection of spring by tension P, in cm.
f_2 = deflection of spring by tension P_2, in cm.
f_3 = deflection of spring by tension P_3, in cm.
d = diameter of the spring wire, in cm.
r = mean radius of spring coil, in cm.
i = number of fully effective coils of spring.
d_2 = diameter of valve; l = valve stroke.

To introduce a factor of safety against snapping of a spring, it may be assumed that the spring with the valve closed is deflected only one-half of its total stroke, this meaning that $f = .5\ f_2$ and $P_2 = 2P$.

The radius r is determined by constructive relations and may be taken as a known factor. We can thus apply to P_2 the standard formula for maximum pressure of a coil spring with round wire, so that

$$P_2 = \frac{\pi d^3}{16r}\cdot \text{kd}$$

in which kd is the admissible maximum torsional load, and if kg. is taken at 4,500 kg. per square centimeter, this being the accepted figure for hardened machinery steel of good grade, there is obtained for d, the diameter of the wire, the value

$$d = .13\sqrt[3]{P_2 r}, \text{ in cm.} \quad (6)$$

For f_2 the standard formula gives the value

$$f_2 = \frac{4\pi i r^2}{d}\cdot\frac{\text{kd}}{G}$$

in which G is the modulus of torsional elasticity. If the value of G is taken at 750,000 kg. per square centimeter, being the accepted figure for good hardened machinery steel as before, the formula for f_2 becomes

$$f_2 = .075\frac{ir^2}{d} \quad (7)$$

The derived values of interest are readily seen to be as follows:

$$f = .5\ f_2$$
$$L_1 = (i + 1)d$$
$$L = L_1 + f$$
$$L_2 = L_1 + f_3$$

With the valve fully opened:

$$P_3 = P\left(\frac{l}{f} + 1\right)$$
$$L_2 = L_3 - (f + l)$$
$$f_3 = f + l$$

(To be continued)

Electro-Magnets for Scrap Removal

Detroit, Mich., Sept. 2—A huge electric magnet that carries 3,000 pounds of steel as easily as the five-cent variety will pick up a needle, is one of the modern means of transportation to be seen at the plant of Dodge Bros. in Detroit.

Electro-magnet dumping scrap in Detroit

From the forge and stamping rooms a constant procession of scrap iron and steel emerges, and in order to remove this quickly, the magnet plan was adopted. The crane is operated by a man seated in the cage at the left, and travels on an overhead track 400 feet long, leading to a railway track.

Fifteen Makers Get War Premium

On March 31, 1913, Germany Had 825 Commercial Vehicles Subsidized for War Purposes

IN 1913 the German government had a law passed the Reichstag whereby motor vehicles could be purchased and premiums allowed for them if they came up to the specifications and requirements of the German war department. In other words, the army was allowed to supply itself with vehicles owned or operated by the industrial establishments in Germany and the owners were given a subvention and allowed a premium.

On March 31, 1913, it was 5 years since the law had been passed and on that date, according to the official records, there were 825 motor vehicles at the service of the army; that is, vehicles for which subventions had been paid and premiums allowed, while there were 400 more vehicles in the empire which came up to the military requirements and could be used. Thus only 1,225 automobiles suitable for military purposes, according to the army regulations, were owned in Germany in March, 1913.

825 Vehicles Accepted by the Army

The 825 vehicles accepted by the army were made by fifteen German manufacturers and 165 of them, or 20 per cent., were Daimlers or Mercedes-Daimlers. H. Bussing, probably the oldest exclusive commercial vehicle builder of Germany, was second on the list with a total of 137 or 16.6 per cent. The N. A. G. company of Berlin followed with 108 or 13 per cent., and Benz came fourth with 103 or 12.5 per cent. In the case of Benz it must be mentioned that it ought to be the Gaggenau company, which was purchased a few years ago by the Benz works. The exact number of vehicles secured by the army department each of the first 5 years on record is given in the accompanying table, while the second chart shows in which industrial enterprises or business the 825 vehicles had been used.

The subvention allowed by the government amounts to 3,000 marks, or $750, for an army truck with one or several trailers, and 1,800 marks, or $450, for an ordinary truck. This subvention is what might also be called the purchase price, but during the succeeding 4 years the owner receives as a premium 1,200 marks, or $300, annually in the case of an army train—truck with a trailer or several—and $200 annually for an ordinary truck.

Many Conditions to Fill

In order to be acceptable for military use the vehicle must fulfil many conditions, among which the following are the most important: The army train trucks, with two men aboard and their regular equipment and supplies of water, gasoline, oil, spare parts, must be able to carry a load of 4,000 kilos, or 8,800 pounds, and pull a trailer carrying a man and a load of not less than 2,000 kilos, or 4,400 pounds. Thus fully equipped, the army train must be able to climb grades of 1 in 7 and travel at an average speed of 16 kilometers, or 10 miles an hour. Trailers fully equipped must not weigh more than 2,500 kilos, or 5,500 pounds, and must carry a load of at least 2,000 kilos, or 4,400 pounds. Fully loaded, the weight of a trailer must not be over 7,500 kilos, or 16,500 pounds. Army vehicles must be fitted with rubber tires. As for those vehicles having no trailers, they must not weigh over 9,000 kilos—19,800 pounds—when loaded, and under no circumstances must the weight carried upon the rear axle be more than 6,000 kilos, or 13,200 pounds. The weight carried upon 1 centimeter or .393 inch width of the rim may not be over 150 kilos, or 330 pounds.

It has been proven by the army experts that 50 per cent. of the vehicles which have been used either by the war department or by their owners during the period of 5 years were found still in very good condition after those 5 years and that after 6 years 30 per cent. were still serviceable for army purposes.

Subsidized by German Government During 5 Years Ending March 31, 1913

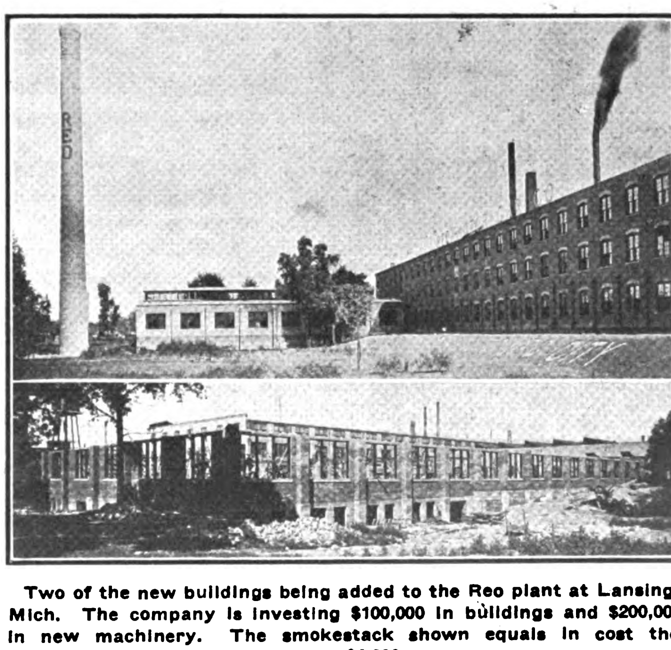
VEHICLE	MADE IN	1909	1910	1911	1912	1913	Total
Daimler	Marienfelde	61	46	19	23	16	165
Bussing	Braunschweig	50	29	20	22	16	137
N. A. G.	Berlin	25	27	19	21	16	108
Benz	Gaggenau	20	22	18	24	19	103
Mannesmann	Aachen	6	11	12	9	9	47
Mulag Durkopp	Bielefeld	..	12	9	9	9	39
Eisenach	Eisenach	..	11	9	7	9	36
Dixi Norddeutsche	Bremen	..	7	9	11	9	36
Lastwagen E. Nacke	Coswig-Saxony	..	10	9	6	5	30
P. H. Podeus	Wismar-i-M.	..	3	6	5	5	19
Stoewer	Stettin	4	7	6	..	..	17
Ehrhardt	Zella-i-Thur.	..	..	4	5	5	14
Deutsche	Dusseldorf	..	..	..	2	5	7
Last-Auto Ansbach	Ansbach	2	12	7	7	7	42
Joseph Rathgeber	Moosach-b-Munchen.	..	10	5	5	5	25
Fifteen manufacturers		175	207	152	156	135	825

Reo Adds $330,000 Equipment

LANSING, MICH., Sept. 7.—The Reo Motor Car Co., which last week declared a dividend of 15 per cent. in connection with a 10 per cent. dividend declared by the Reo Motor Truck Co., is adding $100,000 worth of buildings and $200,000 worth of new machinery. New boilers and coal and ash handling machinery will cost $30,000 more. One of the new buildings will be a three-story construction which will house the trim shop, top department, gear paint shop, and various assembly departments, and will add 4.5 acres of floorspace to the company's factories. Another smaller building is to be devoted exclusively to the methods of heat treatment devised and adopted by the Reo engineers.

Another addition in the shape of a building 95 by 600 feet is being made to the general machine shop which is expected to increase the efficiency of that part of the plant at least 50 per cent.

The 1914 production was double that of previous years and even the 25 acres of floorspace which the company now has at its disposal will probably soon have to be increased.



Two of the new buildings being added to the Reo plant at Lansing, Mich. The company is investing $100,000 in buildings and $200,000 in new machinery. The smokestack shown equals in cost the selling price of four Reo cars, or $4,800

New Books for the Engineer

Works Include Dictionary of Mechanical Movements and Harper's Gasoline Engine Book

ONE of the most interesting books, to those who like mechanics or want information on mechanical movements and devices, is the work by Gardner D. Hiscox, M.E., entitled Mechanical Movements, Powers and Devices. Harper's Gasoline Engine Book on the other hand is for the man who is anxious to learn the principles of motor car construction and operation. It is simply written in non-technical language. There are many other books of iterest.

MECHANICAL MOVEMENTS, POWERS AND DEVICES. Fourteenth edition. By Gardner D. Hiscox, M.E., the Norman W. Henley Publishing Co., 132 Nassau street, New York City. Cloth, 410 pages with 1,800 engravings, $2.50.

This edition is enlarged and improved in form. More than 160 up-to-date mechanical movements and devices have been added, including many straight line movements, thus making it a useful book of reference for those engaged in mechanical studies and pursuits, notably inventors and designers of machinery, in fact for all those who are interested in mechanics.

An enumeration of the subjects covered is impossible for reasons of space but it is sufficient to note that every conceivable mechanical device from valve movements to electric time clock transmission, is illustrated.

HARTNESS FLAT TURRET LATHE MANUAL, 1914. Published by Jones & Lamson Machine Co., Springfield, Vt.; 180 pages; cloth; liberally illustrated.

While this is published by a manufacturer of machine tools, it is in no sense a catalogue. It is intended as an aid to flat turret lathe operators in acquiring a true understanding of the machine and should be of value to anyone interested in machine tool work. Directions on speeds and feeds to use in doing different kinds of work are given and the operation of several types of turret lathes described.

HARPER'S GASOLINE ENGINE BOOK. By A. Hyatt Verrill, Harper & Bros., New York City, 293 pages with many engravings, cloth, $1 net.

The purpose of this book is to serve as a simple, practical, and complete guide for all those who own, use, or operate gas and gasoline motors. In its preparation every effort has been made to do away with technical terms and names and to adapt the book to the requirements of those who possess little or no knowledge of engineering or mechanics.

As far as possible all the principal and distinct types have been included and described as well as the more important or useful accessories, appliances, and fittings used in connection with motors.

In this book the marine, stationary, vehicle, and aeroplane motors have each been treated and described in separate chapters in addition to the clear and simple description of the principles, operation, and construction of motors in general.

The reader interested in some particular kind of motor can at once turn to the chapter dealing with this form without being obliged to read through the text relating to motors of other types.

Aside from the explanatory descriptions of the principles, operation, and construction of motors a great deal of space has been devoted to motor troubles and repairs. By its alphabetical arrangement this part of the book has been greatly simplified, and by referring to it almost any ordinary trouble may be located and remedied by an amateur.

The illustrations are nearly all original, the object being to furnish diagrammatic cuts which will clearly and simply accentuate the more important points described in the text.

PHYSICAL AND CHEMICAL PROPERTIES OF THE PETROLEUMS OF CALIFORNIA. By Irving C. Allen, Walter A. Jacobs, A. S. Crossfield, and R. R. Matthews. Published by the Bureau of Mines, Department of the Interior, 36 pages.

The pamphlet begins with an account of where the petroleum samples for analysis were obtained and a detailed description of how the samples were taken. Then the methods used in determining the physical properties are given, the specific gravity, flash point, burning point, viscosity, calorific value determinations being described in order. Then follows an account of the method used in fractionation, or separating each oil into its crude commercial components. At the end of the pamphlet several pages of tables giving the composition of various oil throughout the state are appended.

MASSACHUSETTS HIGHWAY COMMISSION. Twenty-first annual report for the fiscal year ending November 30, 1913. Wright & Potter Printing Co., 32 Derne street, Boston, Mass. Cloth, 220 pages.

This is a complete financial report of the money expended on the road for the year. The condition of the roads in various parts of the state before repairs were made is described and then the work done on them, and the manner in which it was accomplished, is told. There are chapters on maintenance and resurfacing, traffic and maintenance and suggestions are given for road legislation.

HARDENING, TEMPERING, ANNEALING AND FORGING OF STEEL. By Joseph V. Woodworth, the Norman W. Henley Publishing Co., 132 Nassau street, New York City. Cloth, 288 pages, 200 illustrations, $2.50.

A new work treating in a clear, concise manner all modern processes for the heating, annealing, forging, welding, hardening and tempering of steel, making it a book of great practical value to metal working mechanics in general, with special directions for the successful hardening and tempering of all steel tools used in the arts, including milling cutters, taps, thread dies, reamers, both solid and shell, hollow mills, punches and dies, and all kinds of sheet metal working tools, shear blades, saws, fine cutlery and metal cutting tools of all descriptions, as well as for all implements of steel both large and small. In this work the simplest and most satisfactory hardening and tempering processes are given.

The uses to which the leading brands of steel may be adapted are concisely presented, and their treatment for working under different conditions explained, also the special methods for the hardening and tempering of special brands.

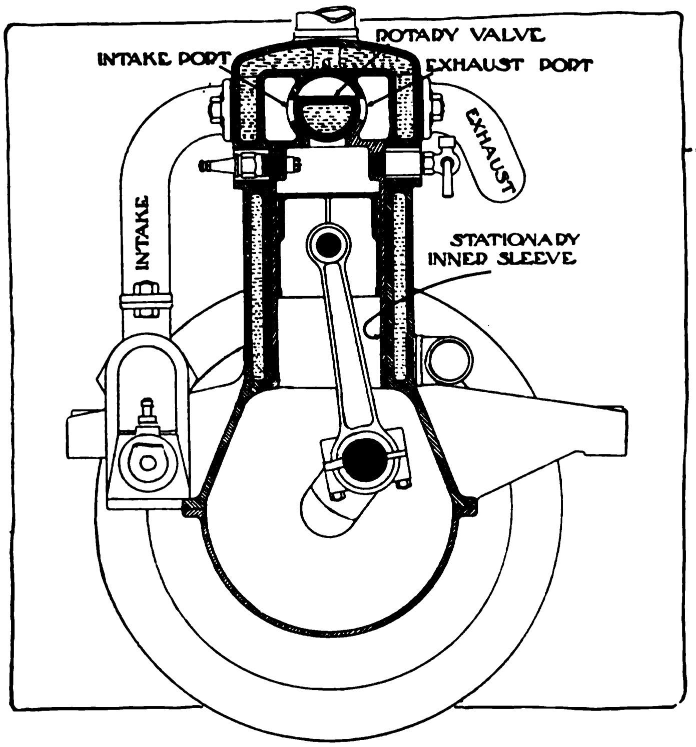
A chapter devoted to the different processes for case-hardening is also included, and special reference made to the adoption of machinery steel and tools of various kinds.

THE MOTORIST'S WORKSHOP. The Temple Press, London, E. C. 140 pages; cardboard; illustrated; 25 cents.

This is a handbook for amateur mechanics describing all essential operation in connection with metal working from the point of the motorist. The choice of a workshop is given consideration, and then materials and tools are discussed. Following this, are chapters on laying out work and drilling. Soldering, brazing and hardening are taken up and the operations described in detail. The remainder of the book, about half, describes the overhauling of the car.

WHO'S WHO IN THE AUTOMOBILE, 1914. J. R. Burton & Co., 1 Madison avenue, New York City. Paper, $2.

This book is an official directory of the state of New York containing the lists of permits issued, numerically arranged with the names and addresses of the owners and the names of the makes of the cars.



Transverse cross section through the Van Keuren rotary valve motor

New Rotary Valve Engine Is Simple Type

A NEW development of the rotary valve engine has been brought out by Henry P. Van Keuren, engineer in the Bureau of Highways, Philadelphia, Pa. There is a single rotary valve mounted directly over the top of the combustion space of the engine. This valve serves a dual purpose of intake and exhaust for all cylinders. It operates in conjunction with a common port in the center of the cylinder head. As shown in the illustrations, the valve is made of one piece, having a hollow center and extends the length of the engine. One of the odd features of this engine is the manner in which the rotary valve is kept sealed.

Extending downward into the cylinder casting, there is a sleeve which acts as the bearing surface for the piston and which has a cover acting as the bearing surface for the rotary valve. This sleeve is free to move in a vertical direction within the cylinder and although it remains practically stationary as far as the action of the engine is concerned, it acts as the means of sealing the valve port from the cylinder. The method in which this is accomplished is simply by the pressure of the gases within the combustion space. This pressure exerts itself equally on all parts of the combustion space and hence forces the sleeve tightly against the rotary valve.

No Valve Grinding

Of course, during the exhaust and intake strokes the pressure exerted by the inner sleeve against the valve is diminished and thus a virtual clearance is given between the valve and its housing. This permits the lubricating material to find its way along the surface of the sleeve oiling the working surface. The designer claims that during the life of the motor, the valve never requires grinding, as its wear is compensated for by the pressure of the sleeve against the valve.

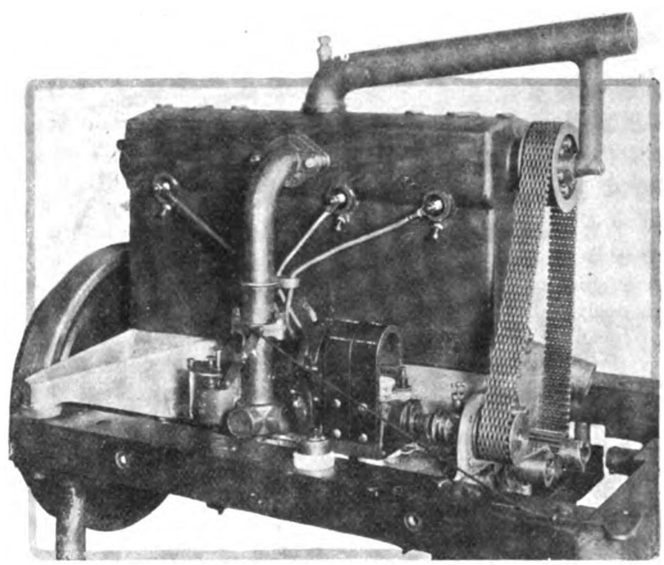
The valve is driven by a silent chain off the front end of the crankshaft. The same chain also drives the magneto. An idler pulley is inserted in the drive to maintain the correct adjustment on the chain. There is no sliding action in the entire valve mechanism of the motor, and its simplicity renders it of exceptional lightness. The rotary valve is driven at one-half the speed of the crankshaft and with the absence of reciprocating parts and spring returns in the valve action, a high rotary speed can be maintained with absolute precision in the valve action.

Oil Is Fed with Gasoline

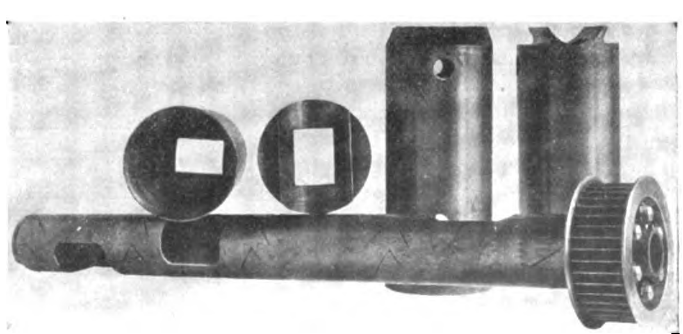
The size of the experimental motor is 4 by 4.75. It is lubricated by a splash system in the crankcase and the sleeve and other working parts are supplied with oil which is fed through the carbureter along with the gasoline.

In this motor the maximum port opening, or, in other words, the area of the common port is 17.6 per cent. of the piston area. While the inner sleeve is free, or rather a free sliding fit within the cylinder casting, there is no reciprocating motion of the sleeve. It remains constantly in contact with the valve itself. The makers of the engine at first supposed that the sleeve would drop from its uppermost position when the force of explosion in the cylinder had spent itself and the pressure of the gases dropped to atmospheric. Provision was made for this supposed motion of the sleeve in the form of an adjustable suspension by a set screw making contact with a shoulder or plug to which the priming cocks attached. This arrangement proved to be unnecessary.

The advantages claimed for the motor are silence and simplicity. On this particular design it is claimed that there are no small parts to be adjusted or inclosed. The line of simplicity is carried out to the cooling and lubrication systems in that a thermo-syphon system of circulation is employed with induced cooling through the center of the rotary valve. This valve is kept constantly full of water and since all parts of the valve are in contact with the cooling agent, the danger of unequal expansion and a cracking of the valve is eliminated.



Silent chain drive of the rotary valve at one-half crankshaft speed



Disassembled view of the valve mechanism of Van Keuren motor

Master Carbureter Has Multiple Jets

Rotary Throttle Shuts Off Jets for Varying Mixture

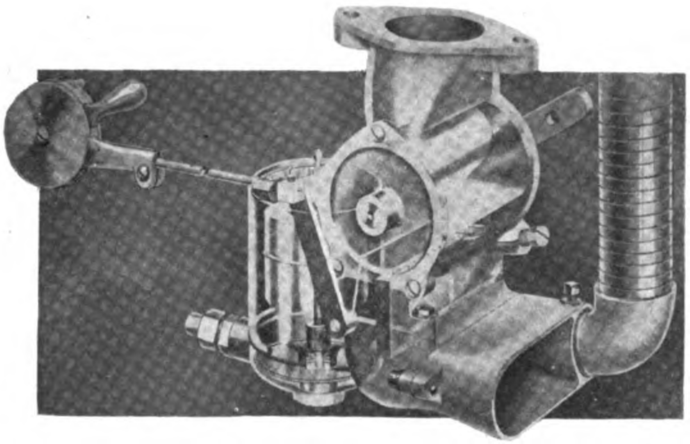


Fig. 1—Phantom view of Master carbureter made by Master Carbureter Corp., Los Angeles, Cal

THE Master Carbureter Corp., Los Angeles, Cal., which recently began manufacturing operations in Detroit in order to market its product in the heart of the automobile field, in addition to continuing its manufacturing for the Pacific Coast States in the California city, produces a simple type of mixing apparatus with no adjustments, which is perhaps not as well known to the eastern and mid-western automobile public as some of the carbureters which have been made in this section for some time.

Three Moving Parts

The Master carbureter, which is shown sectionally in Fig. 2, and a phantom view of which is seen in Fig. 1, differs from the conventional carbureter in that it has a rotary throttle and a multi-jet fuel distributer. These are seen at T and J in Fig. 2. There are three moving parts to the instrument, namely, the throttle, the air damper which serves to shut off a portion of the air coming through the air intake when it is desired to enrich the mixture, and the float. The flow of gasoline from the supply to the float chamber is controlled in the usual way by means of a metal float controlling the position of the needle valve with respect to its seat.

These carbureters are furnished in all sizes from 3-4 inch to 2 1-2-inch manifold connection.

In this carbureter both the fuel and the air are positively regulated, the amounts of each being apportioned mechanically by the rotary throttle. Fig. 3 shows the relation of the throttle to the multi-jet distributer. The throttle T is mounted horizontally on bearings and within the outer body of the carbureter and directly above the fuel distributer. It has openings in its upper and lower sides which are so shaped as to expose more and more of the jets along the length of the distributer as the throttle is rotated by the operation by the driver of the accelerator or the throttle lever. As the additional jets are exposed, more opening to the intake manifold is made, due to the upper aperture in the cylinder. Thus the amount of carbureter opening is in proportion to the jet opening.

When the throttle is fully open there are no restricted passages and the full gas charge is admitted to the combustion chamber, with minimum resistance, supplying all cylinders with equal quantities of gas. All the jets are then open.

To regulate the amount of air flowing up through the air passage and passing the series of jets, an air damper, extending entirely across the passageway and paralleling the fuel distributer, is provided. This is simply a rigid plate, rotating about its lower edge, and controlled from the dash. This damper is shown in Fig. 3 and also at D in Fig. 2. It may be regulated to restrict the air passage on its side of the jet as much as desired, shutting off entirely if desired. This gives a richer mixture for starting purposes, the most economical running position being when it is swung over against the side of the mixing chamber and giving free passage for the air. For ordinary normal running it should be set at about mid-open position, but, of course, this depends entirely upon atmospheric and other conditions.

Throttle Cannot Become Worn

Mechanically, the Master is well designed. The rotary throttle cannot become worn since it does not touch the throttle chamber in which it rotates. Neither does it come into actual contact with the distributer. It operates entirely upon the rather large journals at either end. As a precaution against dirt getting through and into the jets, a double filtering through screens of fine mesh is employed. One screen is below the intake needle valve at the bottom of the float chamber and the other screen, of tubular shape, is inserted in the float chamber and through it the fuel must pass before entering the multi-jet distributer.

As shown in the detail, Fig. 3, the fuel gets to the series of jets in the distributer through a main duct running horizontally along the lower part of the distributer. This connects with the passage to the float chamber.

Semi-Hot-Air Intake

The Master carbureter is, in standard form, fitted with a semi-hot-air intake. At one side of the part which connects through flexible tubing to a hot-air scoop fastened to the exhaust pipe is the opening to the air. It may also be fitted for all hot-air intake if the installation requires it.

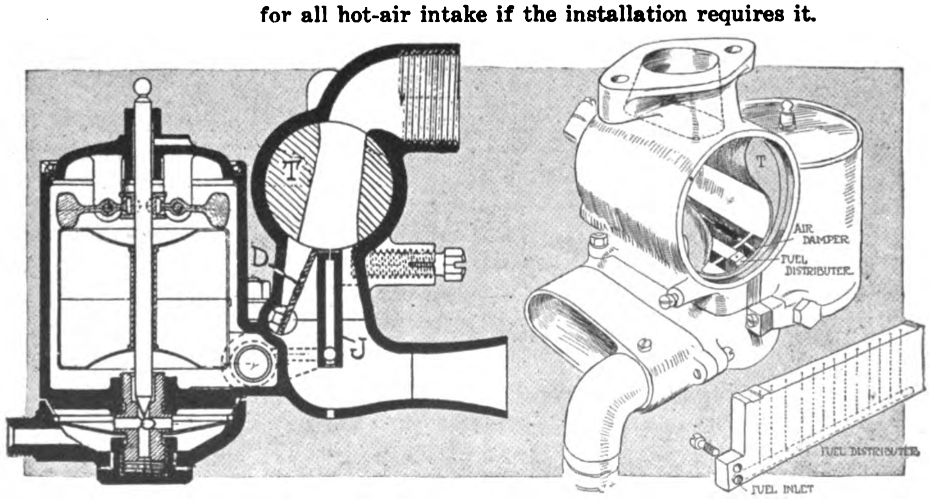
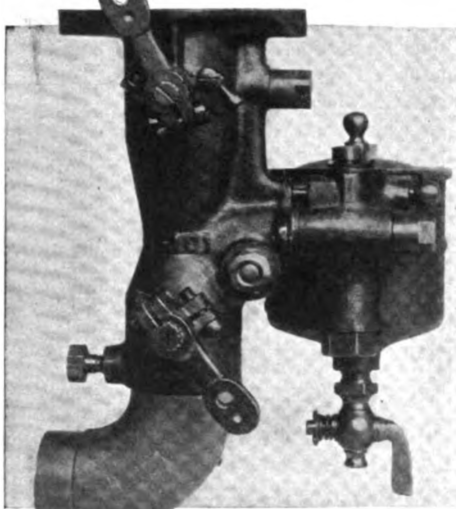
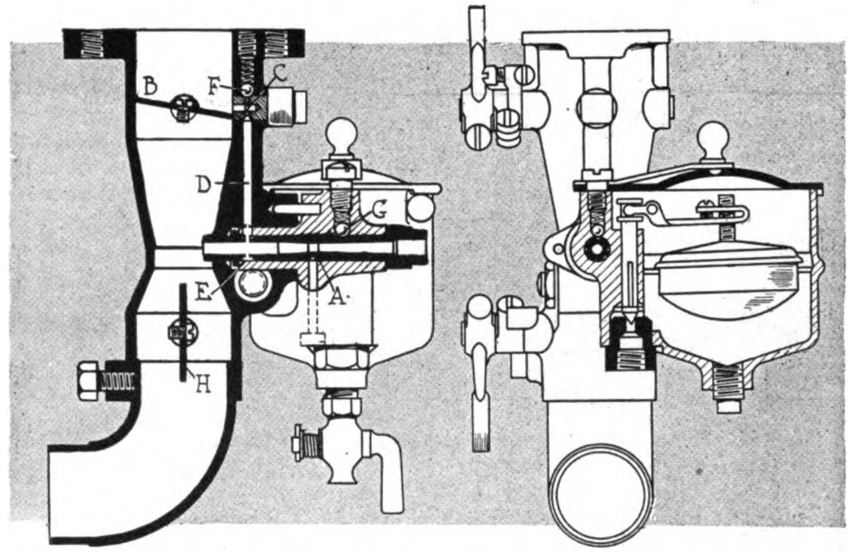


Fig. 2—Left—Section through Master carbureter. Right—Illustrating rotary throttle and location of multiple distributing jets. Fig. 3—Detail—Removable multiple jets





Left—Zephyr carbureter with vertical venturi. The nozzle tubes are plainly visible. Right—Section of carbureter showing nozzle tubes at the left and float mechanism at the right

Zephyr Carbureter Has Adjustable Jets

No Auxiliary Valves or Springs—Venturi May Be Horizontal or Vertical—Easy To Take Apart

SEVERAL notable features are found in the new Zephyr carbureter brought out by George A. Breeze, Detroit, Mich. No air valves, springs or weights are used, but perfect carburetion at all speeds is obtained, it is claimed, by the use of a low and high speed jet.

On open throttle the gasoline on flowing from the float chamber is sucked through the atomizer A, where the fuel is mixed with air flowing in through the jet tube as indicated by the arrow. The fuel is broken up and thoroughly atomized at this point so that when it mixes with the main column of air at the throat of the venturi tube a dry, homogeneous mixture is formed, it is stated.

When the throttle B is closed the mixture is greatly enriched by the major part of the atomized fuel, which is produced at A, being transmitted to the other side of the throttle butterfly by passing through the throttling jet C, which connects with the atomizing tube by means of the passage D and the orifices E. Thus a very rich mixture is delivered to the motor through the throttling jet and but a small amount of fuel passes out to the venturi where it is picked up by the small quantity of air flowing up past the throttle.

Adjustment by Changing Jets

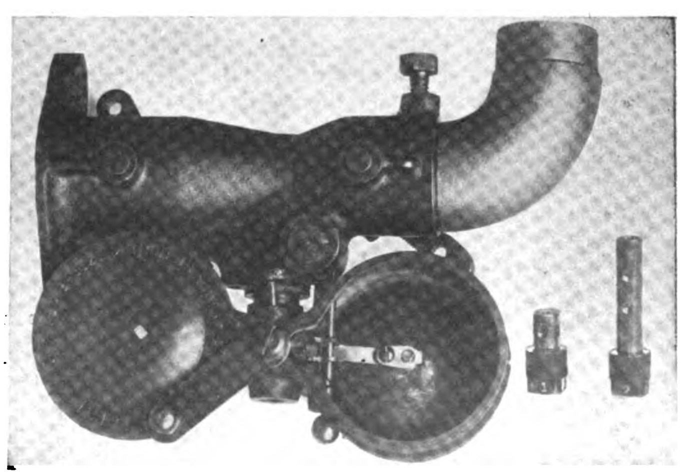
The adjustment of the carbureter is accomplished in a unique manner, the throttling tube C and the atomizing tube A are provided with four jets of different sizes placed at right angles to each other; only the bottom jet, however, is operative as it is the only one registering with the fuel passage. But any jet may be brought to this position as the tubes can be rotated, the outer end of each tube being squared to take a wrench. The tubes are normally held against rotation by means of the spring-engaged ball locks indicated by F and G. The jets in the atomizer are designated by the numbers 1, 2, 3, and 4, the latter being the largest, and the openings in the throttling jet are told by the letters A, B, C, and D. The throttling tubes are made in different sizes, the smallest jet in one tube being the same size as the largest jet in the next smallest tube. The difference in the variation of the throttling jets need not be so close as with the atomizer jets as they regulate mixture and not pure fuel. Easy starting is secured by closing the shutter H, which increases the suction on the jet.

A feature of the Zephyr is that the float feed mechanism can be inspected while the motor is in operation by removing the cover to the float chamber. This is done by merely rotating a small arm, which holds the cover in place. The three moving parts of the float mechanism can be instantly removed for inspection by pulling out the pin that carries the float arm. A line in the casting shows the proper fuel level. Removal of water or dirt is accomplished by opening the pet cock at the bottom of the float chamber. Complete inspection and thorough cleaning can be accomplished in less than 3 minutes, it is stated.

The atomizer gives a range of adjustment sufficient for all temperatures and grades of fuel but cannot be set so far out of adjustment that the engine will not run.

The Zephyr is so arranged that the venturi can be placed

(*Continued on page* 503)



Birdseye view of carbureter with venturi in horizontal position and float exposed. The low and high speed tubes are seen at the right

Purity Electric truck with two-speed sliding gearset

Purity Electric Truck Has Two Speeds

Made in Minneapolis, It is Designed for Snow and Sand — Motor, Sliding Gearset and Rear Axle in Unit—Has Worm Drive

A TWO-SPEED sliding gearset placed between the motor and the rear axle is the most notable feature incorporated in the Purity electric truck, built in capacities of 1 and 2 tons. These vehicles were especially designed to conform to the weather conditions of the Northwest, the lower gear being for the heavy snowfalls and sandy stretches of road which render the ordinary electric unsatisfactory.

The two-speed gearset is a unit with the electric motor and the rear axle, the latter being a floating design equipped with worm drive. The unit is carried on a triangular subframe which is attached to the axle at two points and pivoted to a cross-member of the frame at the apex, by a single globe joint.

These machines have been constructed by the St. Paul Bread Co., St. Paul, Minn. Although primarily intended for the use of the Purity company the shop equipment will enable it to accept outside orders. The designer is H. R. Kelly, formerly with the Studebaker Corp.

The frame is of pressed steel of uniform section, bottlenecked in front and braced rigidly. It is suspended from the Timken front axle and the worm-driven rear unit by four semi-elliptic springs. Both sets of brakes are on the rear wheels, and solid tires are employed.

The control is by a steering wheel on the left side, two pedals for the two sets of brakes, a lever in the center to operate the controller, and a lever to the left for the gearset. The dash carries the switch and Sangamo ampere-hour meter. The controller is located beneath the floor, and the electric horn directly beneath the battery box, bolted to a cross-member of the frame.

The battery trays are located under the driver's seat and a low box just behind it. Both brake and driving torque and propulsion are taken by the sub-frame which carries the motor and gearset, and are transmitted thereby directly to the middle cross-member of the frame, so that all portions share these stresses.

Both vehicles have 102-inch wheelbases, 36-inch Schwartz wheels, 40 by 2¼-inch front springs and 46 by 2¼ rears, both pairs being made of Vanadium steel, Westinghouse four-speed controllers and Ross steering gears.

Both are built for a 20 per cent. overload. The worm runs on Hess-Bright radial and thrust bearings, and the wheels on Timkens. The motors operate at 1,500 revolutions per minute at 35 amperes 70 volts.

Six-Ton Doane Truck Has Low Platform

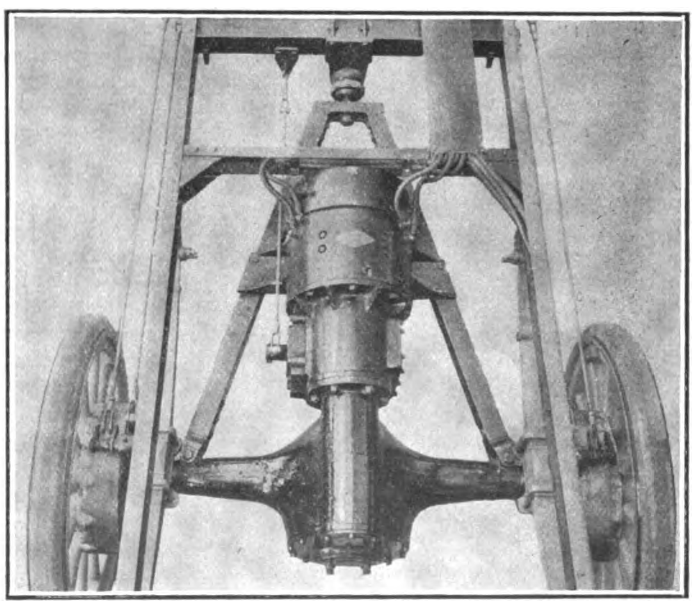
LOW-PLATFORM trucks especially designed for the hauling of heavy material, such as stone, machinery, structural steel, boilers and tanks, etc., are built by the Doane Motor Truck Co., San Francisco, Cal.

The frame is just high enough from the ground to provide sufficient clearance for ordinary conditions, thus permitting the platforms, built directly across the frame members, to be within easy lifting height from the ground. The frames are suspended by springs in the usual manner, clearance over the axles being obtained by deep drops in the axles and underslung springs. The drive is by double chains, the front sprocket centers being somewhat lower than the axle centers.

But one chassis model is made, this of 6 tons capacity. It has a total overall length of 20 feet 9 inches, and has a 14-foot loading platform. This platform overhangs the rear axle 4 feet, and without load it is 24 inches from the ground. Under load, the springs depress to bring it to within 22½ inches from the ground. The load distribution is 80 per cent. over the rear wheels and 20 per cent. on the front wheels.

The frame is of I-beam rolled stock with channel cross-members, made up rigidly, and, although horizontally straight throughout its entire length, it is bottle-necked in front to provide steerage-way for the front wheels.

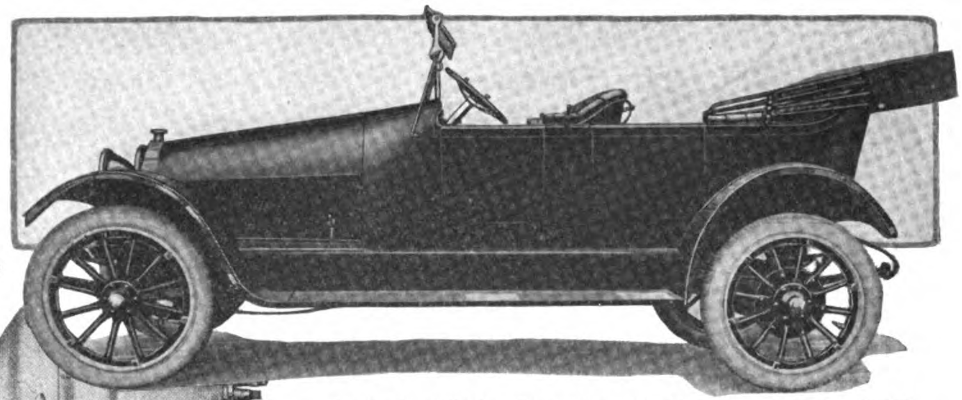
The front springs are shackled, but the rear springs bear on friction pads. The wheelbase is 14 feet 9 inches, with a 68-inch front tread and a 98-inch rear tread. Tires are 38 by 6 both front and rear, the rear tires being dual. The exceptionally wide tread in the rear gives a loading platform between the wheels of approximately standard width.



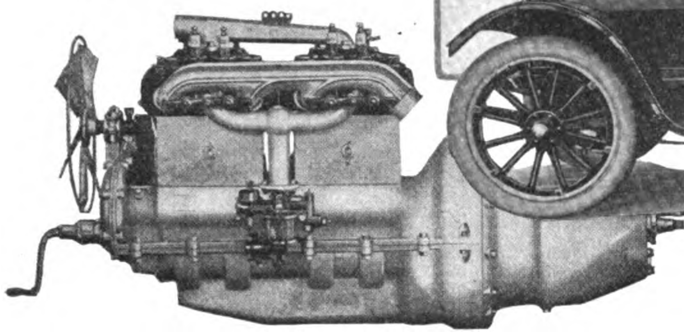
View of Purity rear construction showing the motor, and gearset in unit with the rear axle. Note triangular construction and worm drive

1915 Meteor Six Sells for $1,375

Has Five-Passenger Body—Four Sells for $1,050—Standard Parts Throughout Both Models



New six-cylinder five-passenger Meteor selling for $1,375



Unit power plant used in four-cylinder Meteor

THE feature of the Meteor line for 1915 will be a light six, rated at 45 horsepower and selling for $1,375. It is equipped with a five-passenger body and has a 126-inch wheelbase. Accompanying this model will be a light four, rated at 32 horsepower and listing at $1,050. Both have very full equipment, including an electric starting and lighting system. These cars are made by the Meteor Motor Car Company, Piqua, Ohio.

The only change of note in either of these models is a reduction in the bore of the four-cylinder motor from 4 inches to 3.75 inches, but as a higher speed motor is now used no reduction in power but rather a slight gain is claimed.

With this change the bore and stroke of both motors are the same, 3.75 by 5 inches, and all parts, except the crankcase, camshaft and crankshaft, are interchangeable. The motors are of Beaver make.

The general body lines of both cars are the same, the differences being due to variation in size of the two models. Several minor improvements are noted in these bodies. The running boards have been cleared and the body lines are more truly streamline than heretofore. To gain this end a sloping hood is used which forms an unbroken line with the cowl. A divided windshield of the clear vision type is fitted.

Left Drive Center Control

Left side drive with center control is found and all instruments are neatly mounted on the cowl. The finish of the body is dark blue with black fenders and hood. The metal parts are enameled black and trimmed in nickel. Deep turkish upholstery is employed and the top and dust cover are made of mohair. An electric headlight dimmer is a feature of the equipment, and an electric horn is fitted. The weight of the four is 2,350 pounds and the six weighs 2,950 pounds. The wheelbase of the former is 114 inches and the latter 126 inches. Thirty-two by 3.5-inch non-skid tires are standard equipment on the smaller car, while the larger one has 35 by 4-inch tires.

800 Miles Per Gallon of Oil

The L-head type of motor is found on both models, the cylinders being cast in pairs. This is in unit with the clutch and gearset and the whole is suspended on three points. The valves are inclosed and are situated on the left. The oiling system is a combination splash and pressure feed, a gear pump forcing the oil to each of the main bearings from whence it overflows into the connecting-rod troughs to be splashed by the connecting-rods to the cylinders, pistons and camshaft bearings. From these troughs the lubricant flows back to the reservoir, where it is again put into circulation by the pump. It is claimed that it is possible to go 800 miles on a gallon of oil under average conditions and that as high as 2,000 miles have been covered.

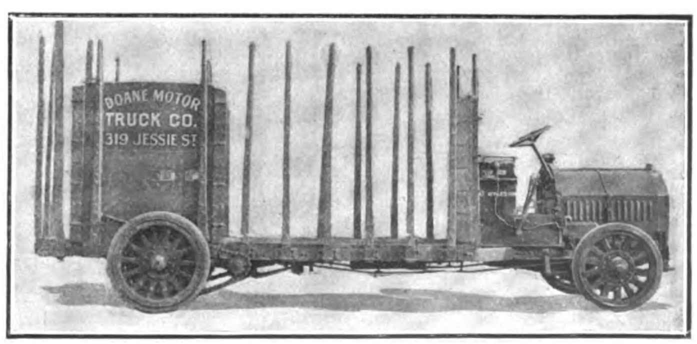
Ignition is supplied by an Atwater Kent system and the carbureter is a Stromberg. The Apple starting and lighting system is used. Cooling is maintained by a honeycomb radiator and a centrifugal water pump.

Clutch Is a Single Disk

The clutch is a single disk type, faced with Raybestos, and running in oil. A feature is the lightness, the whole rotating mass only weighing 8 pounds, therefore gear shifting is greatly facilitated. The clutch is housed in the flywheel, which in turn is inclosed in a bell-shaped extension of the crankcase. The gearset is bolted to this member. There is a hand hole in the top of the clutch case to enable inspection and adjustment. The clutch and gearset are manufactured by the B-T-K Gear and Engine Co. The universals are of Acme make and Salisbury axles are used at both front and rear. The springs are of Sheldon manufacture and Salisbury wheels are used. The bodies are from the factory of the Union City Body Co.

Seventeen New Indian Refining Stations

NEW YORK CITY, Sept. 4—By September 1 the Indian Refining Co., New York City, completed seventeen new stations. Indiana has the greatest number of them, there being seven recently completed in the "Hoosier" state. Illinois ranks second—there are five new stations in Illinois. New York and Minnesota have two each, while Kentucky has one.

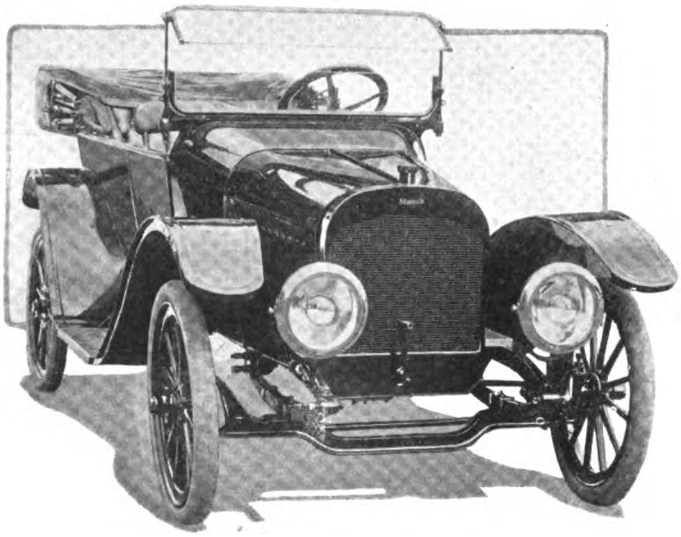


Six-ton Doane truck with low loading platform

Monarch Adds Light Four for $675

New Car Has Four-Passenger Streamline Body—One Folding Front Seat—No Rear Doors—20-Horsepower Block Motor—Electric Starter $25 Extra—Novel Fan Drive

THE Monarch Motor Car Co., Detroit, which has for its head R. C. Hupp, well-known in automobile circles of the motor car city, has added a four-cylinder light car to its line. This is a four-passenger machine of unique seating arrangement which has been priced at $675 with full equipment except electric cranking. The latter feature may be had also at an additional cost of $25.



Front view of streamline four-cylinder Monarch

Streamline Body

The body is a full streamline type and has creditable unbroken smoothness from front to rear. Outwardly it possesses somewhat the same appearance as its larger brothers of this make, though considerably smaller, of course. However, there is ample seating accommodation for four passengers.

There are no rear doors to the body, and the right front seat is made so that it will fold up and allow room for passage into the rear compartment. The left front seat which the driver occupies is stationary, however. This arrangement is rather unusual, but is nevertheless very meritorious in a small car.

Standard Construction Throughout

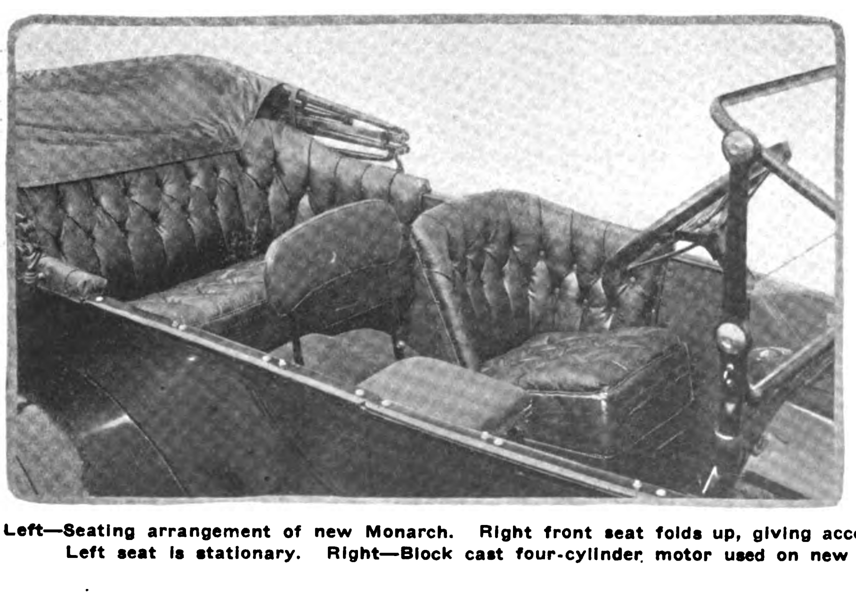
The wheelbase is 103 inches and with standard tread of 56 inches the car conforms to standard mechanical construction throughout the chassis. The motor is a thermo-syphon water-cooled block cast four of 2 3-4 inches bore and 4 1-2 inches stroke. These dimensions give it a horsepower of about 20 which is ample for the car weight—in the neighborhood of 1,300 pounds.

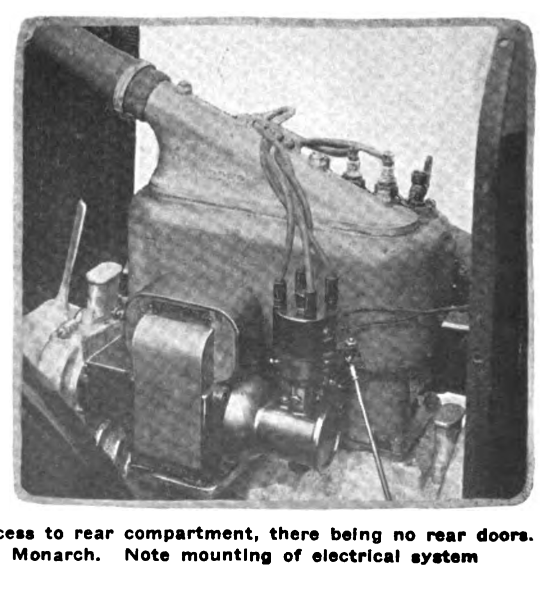
The power plant is of the unit type, incorporating the gearbox as a component part. The whole is three-point suspended, having the single support at the front end on a cross member and the rear two supports by means of a 1 1-4-inch steel tube running through the crankcase just ahead of the flywheel housing and ending in brackets on the side members of the frame. This gives a light and strong support.

The crankcase is of the barrel form and the cylinder block bolts to it. A plate at the bottom gives access to the connecting rods and bearings. Valves and manifolds are on the right side, and two cover plates inclose the tappets and springs, which are of conventional construction. Crankshaft and camshaft are of drop forged steel and each is supported by a large main bearing at either end. The timing gears are completely housed at the forward end.

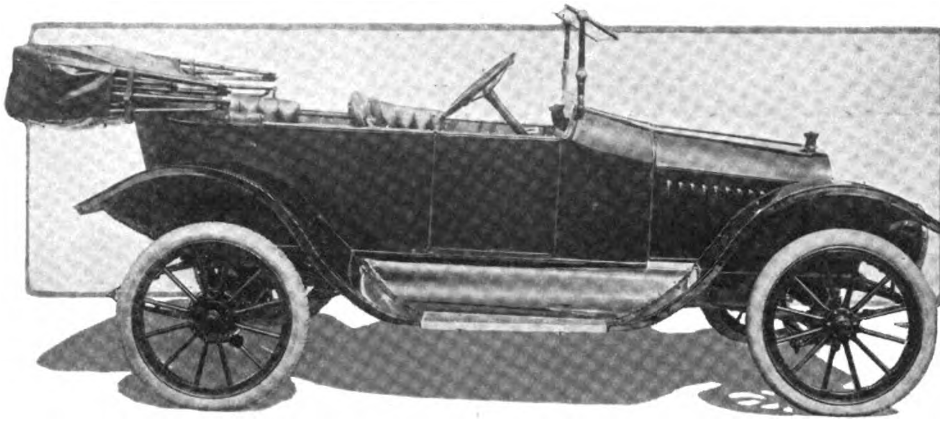
New Type of Fan Drive

An uncommon feature in connection with the front gears is the drive of the fan. This is by inclosed gear also, the idler gear shaft being extended through the case, and on it the fan is mounted. This does away with any kind of external belt drive for the fan and, since there is no extra gear used for the fan drive, makes a very good construction without complication.





Left—Seating arrangement of new Monarch. Right front seat folds up, giving access to rear compartment, there being no rear doors. Left seat is stationary. Right—Block cast four-cylinder motor used on new Monarch. Note mounting of electrical system



Side view of new four-cylinder Monarch light touring car. Note absence of rear doors, gasoline tank and cowl and streamline body

The lubrication of the motor is of the splash type with the level in the troughs under the connecting-rods maintained by the automatic method, the air seal within the crankcase preventing more than the required amount of lubricant being drawn up from the reservoir and delivered to the troughs.

The carbureter, a float feed Zephyr make, is mounted high on the right side of the cylinder casting, having a very short intake pipe. There is only one opening into the casting, the distribution to the various cylinders being taken care of within the casting itself. The carbureter position is made possible, due to the placing of the gasoline tank in the cowl, assuring direct gravity feed. The tank has 8 gallons capacity with a 2-gallon reserve.

The Auto-Lite generator with which the new Monarch is regularly equipped is placed on a bracket on the left side of the engine and drives through gear at the front end. The ignition distributer is in unit with this generator and is of Connecticut make. Its current comes from the storage battery.

Ward Leonard Starter $25 Extra

The cranking motor is of the Ward-Leonard make, and is arranged to gear to the flywheel through a Bendix drive. That is, when the current is thrown on, the pinion automatically engages with the flywheel teeth, and as soon as the motor operates under its own power, automatically disengages again. The electric motor, which has a reduction of 15 to 1 as compared with the crankshaft speed, turns the latter about 130 revolutions a minute. The storage battery is a Willard. In instances where the car is ordered without the starting motor, it is pointed out that the engine is so arranged that this cranking feature may be added at any subsequent time since the battery is amply large to take care of the starter.

Three Speeds Forward

The gearbox, bolting to the flywheel housing, has three forward speeds and reverse and power comes to it from a multiple disk clutch within the flywheel. This has its disks alternately of steel and Raybestos lined. The drive shaft is open and has two universal joints. The drive is of the same form as used on the other Monarchs in that torsion members parallel the shaft on either side from a mid-cross member back to the axle housing.

Gearless Differential Used

The rear axle is light and strong. It is of the gearless differential type. That is, instead of having the usual spur differential gears within the bevel ring gear, there is a member of the gearless differential at either rear wheel. These members are fitted with a form of roller clutches which have the same action as the usual gears in allowing one wheel to turn faster than the other for rounding corners or under other circumstances. However, these roller clutches insure positive drive to both wheels in accordance with their traction. The gearless differential has been described on a number of occasions and has proven very successful in a number of installations on different cars.

Brakes are of conventional type and act on 8-inch drums. The wood wheels used are of twelve-spoke type and carry clincher rims on which 30 by 3 tires are mounted, the rear pair being safety treads.

Steer and Center Control

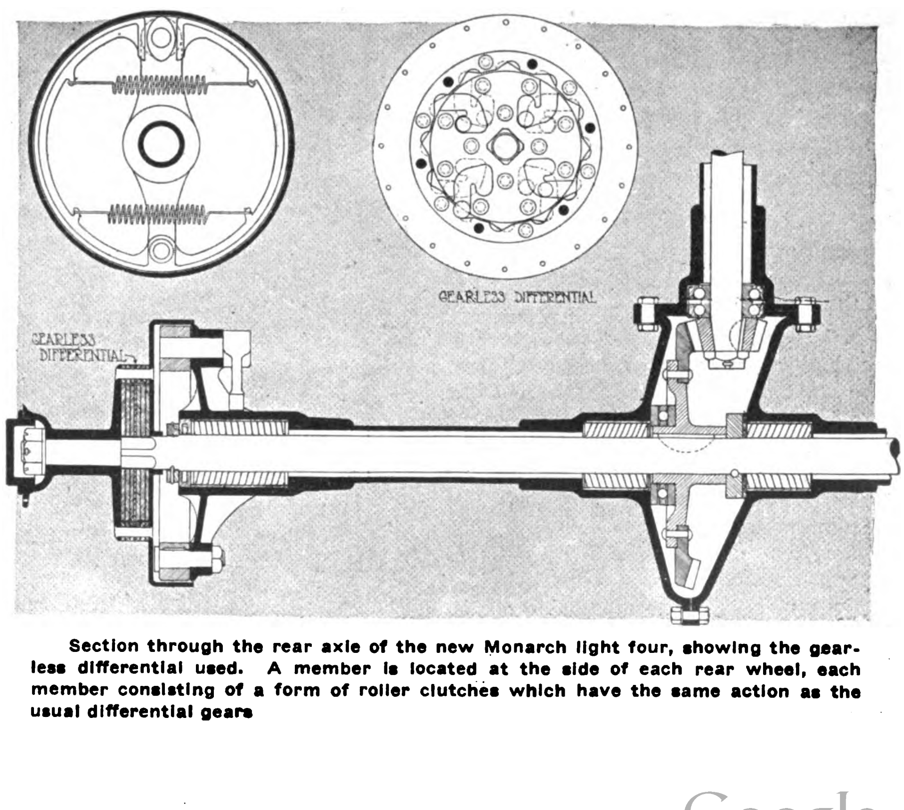
Steering is on the left and control in the center. There is nothing departing from the standard in the operation of the car. Even the usual quadrant above the wheel with spark and throttle levers is found.

The pressed steel frame is suspended by half elliptic springs in front and elliptics in the rear. These latter are swiveled on both axle and frame, and their free action tends to easy riding. The leaves are 1 1-2 inches wide, and lengths are 33 and 38 inches, front and rear, respectively.

Equipment in addition to that already mentioned includes one-man top and curtains, envelope, electric horn, rain vision windshield, Stewart speedometer, tools, repair kit, pump and jack.

International Races at Corona Thanksgiving Day

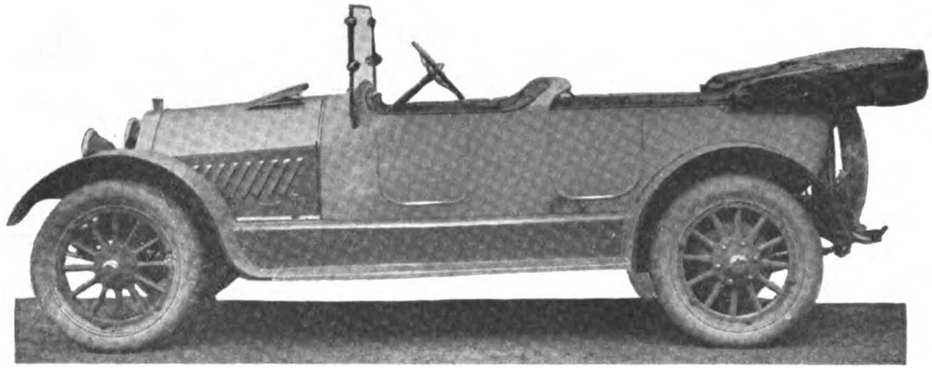
CORONA, CAL., Sept. 4—Definite plans were made recently for holding the international automobile races here on Thanksgiving Day. Purses amounting to $17,000 will be offered in the 250-mile and 30-mile races.



Section through the rear axle of the new Monarch light four, showing the gearless differential used. A member is located at the side of each rear wheel, each member consisting of a form of roller clutches which have the same action as the usual differential gears

McFarlan Sixes 300 Pounds Lighter

Two Motors—One Chassis—Wheelbase 4 Inches Longer—Stewart Gasoline Feed Adopted—New Arrangement of Control Levers



New McFarlan six with hood ventilator, and clean running boards

SEVERAL important changes have been made in the 1915 models manufactured by the McFarlan Motor Car Co., Connersville, Ind. As heretofore, two chassis will be built, or rather one chassis with two sizes of motors, the larger having a bore and stroke of 4.5 by 6 inches and the smaller, 4 by 6 inches. The former sells for $2,900 and the latter for $2,590, both equipped with open bodies.

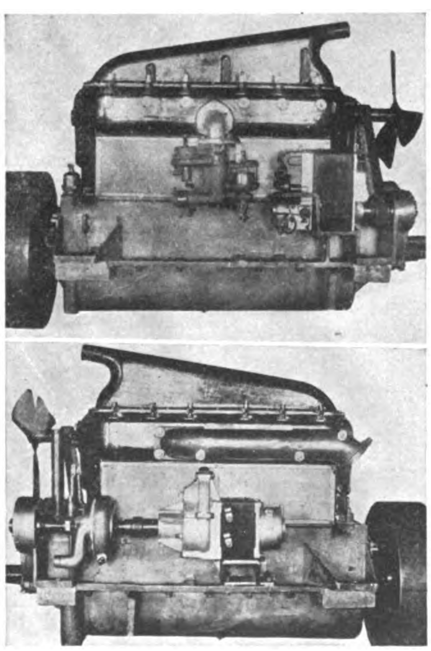
The most important changes which have been made include a lengthening of the wheelbase by 4 inches to 132 inches; a reduction of 300 pounds in weight; the adoption of the Stewart vacuum gasoline feed; a new arrangement of the gear shift and brake levers; the adoption of Westinghouse electric lighting and engine starting equipment; a new cone clutch; new body lines and a new tire carrier. As heretofore, equipment is complete.

In appearance, the new models will be quite a little different from their predecessors, the principal change being due to the lengthened wheelbase. The bodies are longer, as a matter of course, and now are set lower than heretofore. The upholstery does not project above the body lines at any point and the top line extends clear around practically without a break. Another distinctive feature is the addition of a miniature cowl at the back of the front seats. In addition to affording a measure of protection to those who occupy the tonneau, this cowl also serves a practical purpose in that it houses a small compartment suitable for goggles, gloves, etc. At the same time, the extra seats in the tonneau fold down beneath this compartment in such a way that no part of them projects into the doorway.

Few Mechanical Changes

Mechanically, not a great number of changes have been made, the more important ones being the adoption of the Westinghouse electric lighting, starting and ignition system and the substitution of a light cone clutch for the multiple disk member that has been used in the past. Although the Westinghouse apparatus now is standard equipment, the McFarlan pneumatic starter will be fitted where specified.

The two units of the Westinghouse system are mounted on opposite sides of the motor, the generator being on the intake side and the motor on the exhaust side; both are in accessible positions. The generator unit carries the distributer for the ignition system.



Two views of McFarlan six motor. Note high mounting of the carbureter

All of the wiring of the electric system has been thoroughly enclosed in flexible conduits; there is not an exposed wire on the car; these conduits are both dust and oil-proof.

The adoption of a cone clutch marks quite a departure from previous McFarlan practice and has been done with three objects in view: To simplify the chassis; to lighten the weight; and to provide greater holding surface.

The new member is a 16-inch leather-faced cone, the face being 4 inches wide. Beneath the leather there are twelve flat springs which are adjustable.

In the arrangement of the gear shift and emergency brake levers McFarlan engineers have solved a problem that long has existed. The placing of these two levers in the center of the foot board has not been easy because one is likely to interfere with the other. In the McFarlan arrangement, however, there can be no interference.

The gear shift lever is placed directly between the front seats and does not extend above them. Thus, it can never be in the way. The brake lever is quite separate and is set well forward where it, too, is out of the way though it is instantly available.

Although the weight of the car has been reduced by as much as 300 pounds, this has not been done by sacrificing the factor of safety. The chassis has been practically unchanged. Instead, the improved body construction throws part of the strain upon the metal parts of the framework, with the result that bodies now are much lighter than heretofore.

Another little change in construction, designed for the convenience of the owner, is the adoption of a new style tire carrier. As heretofore, the spare tires are carried at the rear of the body but instead of being held by four straps which must be loosened, but one is used.

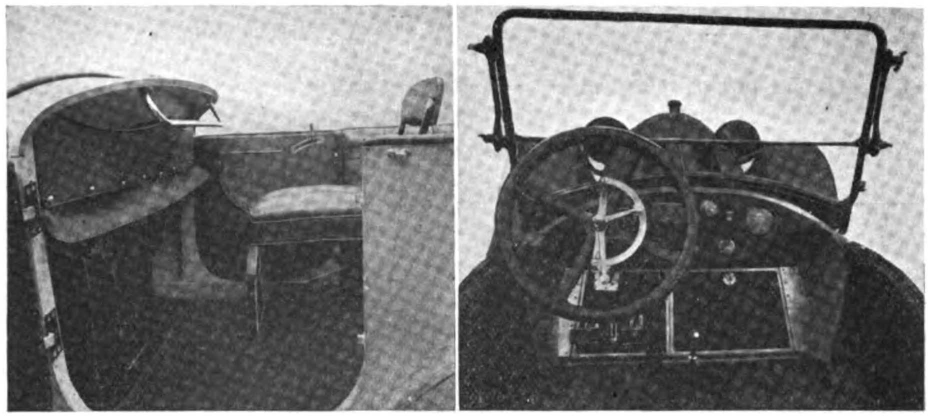
The two motors differ only in size. The cylinders are T-head block castings. The intake is on the right and the exhaust on the left. The intake manifold is noticeable in that it is nothing more than a short L-shaped fitting that connects with the carbureter and the cored passage in the cylinder casting. Thus the position of the carbureter is high and accessible. The exhaust manifold is separate from the casting. Water circulation is by a centrifugal pump situated on the left and the system is distinguished by the large size of the water manifolds.

The gearset is located on the back axle, the latter being a full-floating design. The drive shaft is housed in a torque tube which is reinforced by triangular rods running to the ends of the axle housing. Access to both gearset and rear axle is obtained by the removal of cover plates.

The tires are 36 by 4.5 inches all around and the frame is suspended on half-elliptics in front and three-quarter elliptics in the rear. The frame is heavily reinforced at the corners with gusset plates and is slightly narrowed in front to give increased steering radius.

The equipment is complete, including not only the usual top, curtains, and windshield, but also Hartford shock absorbers, Warner speedometer, power tire pump, headlight dimmer, cigar lighter, Klaxon horn, detachable rims, tools, etc.

Three body colors are offered, blue black, emerald green, and golden brown. Four different bodies are placed on each chassis, the prices being as follows for the smaller and larger cars respectively: Touring car and roadster, $2,590 and $2,900; 4-passenger coupe, $3,300 and $3,610; limousine, $4,000 and $4,310.



Left—Tonneau, showing compartment into which auxiliary seats fold. Right—View of cowl and control showing the arrangement of the levers—the brake lever is set forward out of the way and the ball-handled gear lever is placed between the seats

Zephyr Carbureter Has Adjustable Jets

(*Continued from page* 497)

horizontally or vertically, as is desired. The air intake fitting can be put at any angle also.

The adjustment of the carbureter is simply accomplished by setting the atomizer and throttling jet tubes so that the nozzles A and C, respectively, are in operation. Then regulate the throttle stop screw until the motor idles as low as desired.

If the motor misses or stops, provided that the trouble is not mechanical or electrical and there are no air leaks in the manifold connections, the jet is too small. But if the motor misses and loads up, the jet is too large.

After the motor is warmed up, try driving with larger and smaller jets in the atomizer and use the adjustment found to be best.

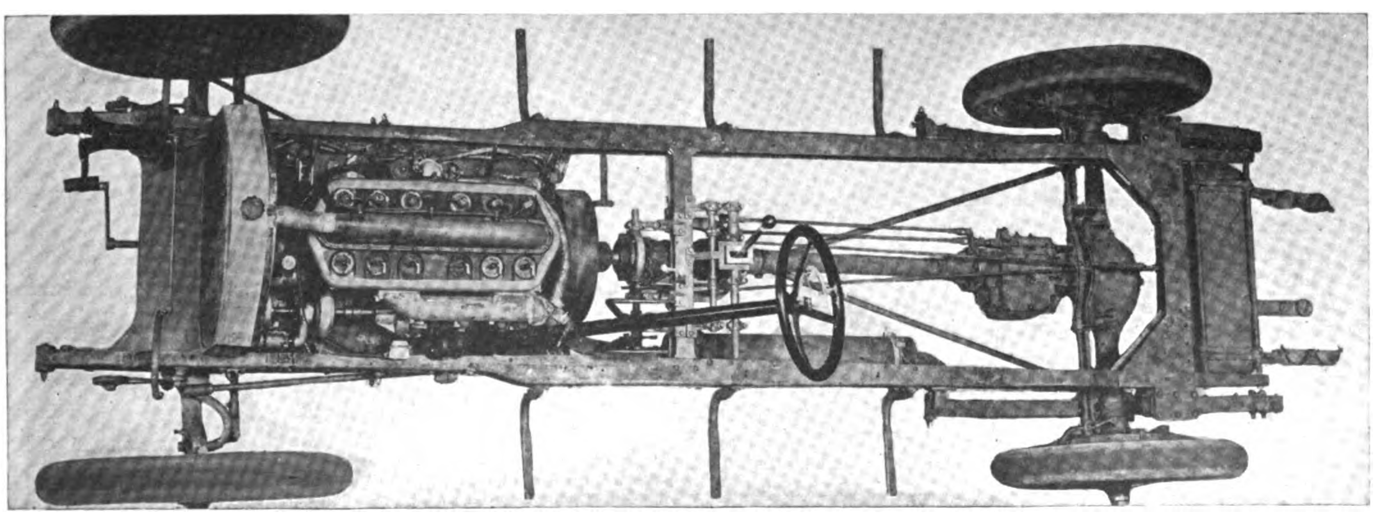
When no setting makes any apparent difference in this, look for manifold leaks, spark plug or magneto trouble.

A steering column control of the starting shutter is furnished when desired.

Farmers Own One-Third of Wisconsin's Cars

MILWAUKEE, WIS., Sept. 7—Thirty-six per cent. of the 50,000 odd motor cars owned in Wisconsin belong to farmers, while 64 per cent. are in the hands of persons living within the limits of incorporated cities and villages, according to a compilation made by Ex-Gov. W. D. Hoard, editor of *Hoard's Dairyman*, Fort Atkinson, Wis. The basis of the calculation is the schedule of assessors in forty-one counties in Wisconsin which are considered agricultural districts, and does not include Milwaukee county because of the preponderance of city population over rural population, which is in the ratio of 97 to 3. Governor Hoard's figures show that one city family in every twelve and one farm family in every twenty-two owns a motor car. In Milwaukee county the ratio is 1 to 16 city families and 1 to 15 farm families. The richest farm county from the standpoint of number of cars is Walworth, in which one farmer in every nine owns a machine. The number of machines has a close relation to farm values. In Walworth county, for instance, farms have an average value of $13,000, while in a northern county like Shawano, where there is one machine to each thirty-seven farms, the average farm value is $6,000.

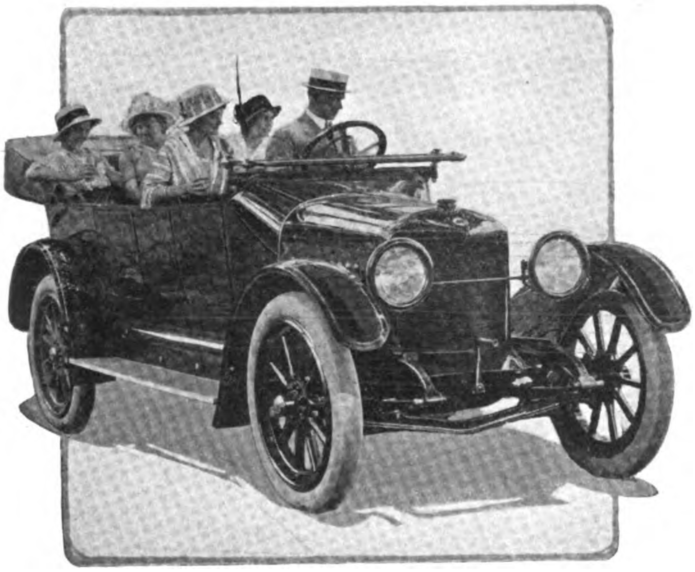
WASHINGTON, PA., Sept. 7—The plant of the Croxton Motor Car Co. has been sold to the Angldile Computing Scales Co., Elkhart, Ind., for $52,500. The new company, as soon as possible, will remove its equipment here.



Plan view of the chassis showing the general arrangement of the units. The frame is narrowed at the front and the corners gusseted

Streamline Bodies on Premier-Weidely

Six-Cylinder Weidely Type Unit Power Plant Continued Practically Unchanged—Three Bodies



Three-quarter front view of 1915 five-passenger Premier-Weidely six

FOLLOWING practically the same design as for the 1914 season, the 1915 Premier-Weidely has been continued with a few detail changes. This motor which made its appearance in December, 1913, excited immediate comment because of the fact that it employed the advantageous valve-in-the-head design and at the same time eliminated the rocker-arms and push-rods which are generally incorporated with this type of valve action.

Unit Power Plant Is Simple

For this season the Premier-Weidely will be made in five- and seven-passenger touring models and a roadster design of body. The price on all three styles is $2,700. While the bodies employed are the latest type in design and equipment, it is in the power plant that chief interest centers in this car. The motor has six cylinders, cast in a single block with a bore of 3.625 and a stroke of 5.5 inches. The valves are all located in the head and are driven by an overhead camshaft. They are without cages and are operated by the single camshaft which is located above the cylinders and which is driven directly from the crankshaft by a vertical shaft and a worm gear. The entire cylinder head is a single unit as well as the cylinders proper. This cylinder head carries the valves and the camshaft and is provided with an additional cover plate which forms an oil-tight housing for the valve mechanism. By this scheme of completely inclosing the valve action, the entire drive can be copiously lubricated and, in fact, runs in a bath of oil.

A glance at the exterior portion of the motor shows it to be of remarkably clean lines. Even the water pipes have been eliminated and the radiator bolted directly to the motor, making the two units an integral part. The intake manifold is cast in a unit with the cylinders and the carbureter bolts directly against this unit manifold, giving it an extremely high and accessible position. This method of construction makes a motor of very simple and clean appearance.

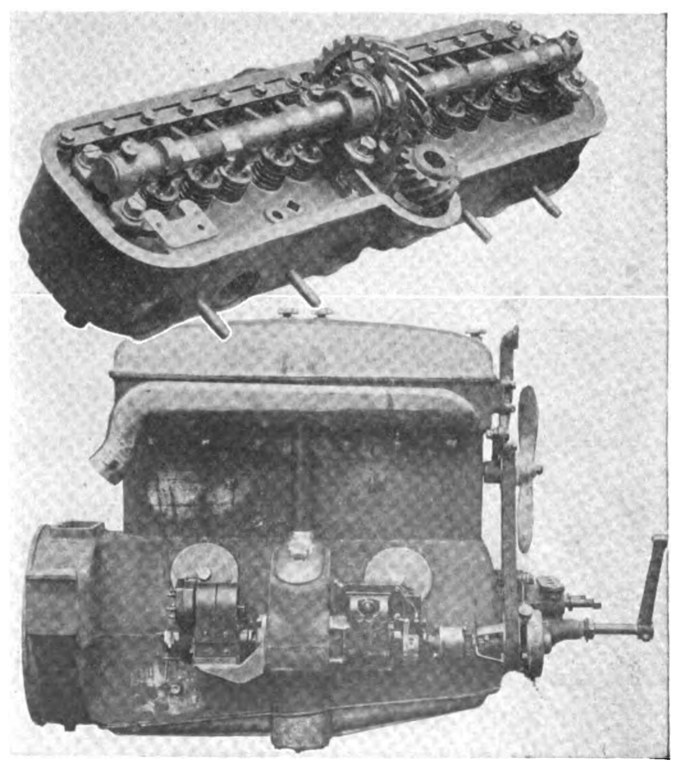
Overhead Valves of Large Diameter

Considering their location in the head, the valves are of large size, having an outside diameter of 1 15-16 inches and a diameter in the clear of 1 21-32 inches. The valves seat directly in the head casting and each valve overhangs the cylinder bore slightly so that in the event of a stem breaking, the valve could not fall into the cylinder. There are no rocker arms used. The camshaft is directly above the valve and the cams act on a light steel follower pivoted at one end. This finger lever transmits the motion of the cam directly to the valve. There is an adjustment by means of a nut on the follower which permits of taking of the wear on the valve mechanism. This corresponds directly to the usual valve stem adjustment.

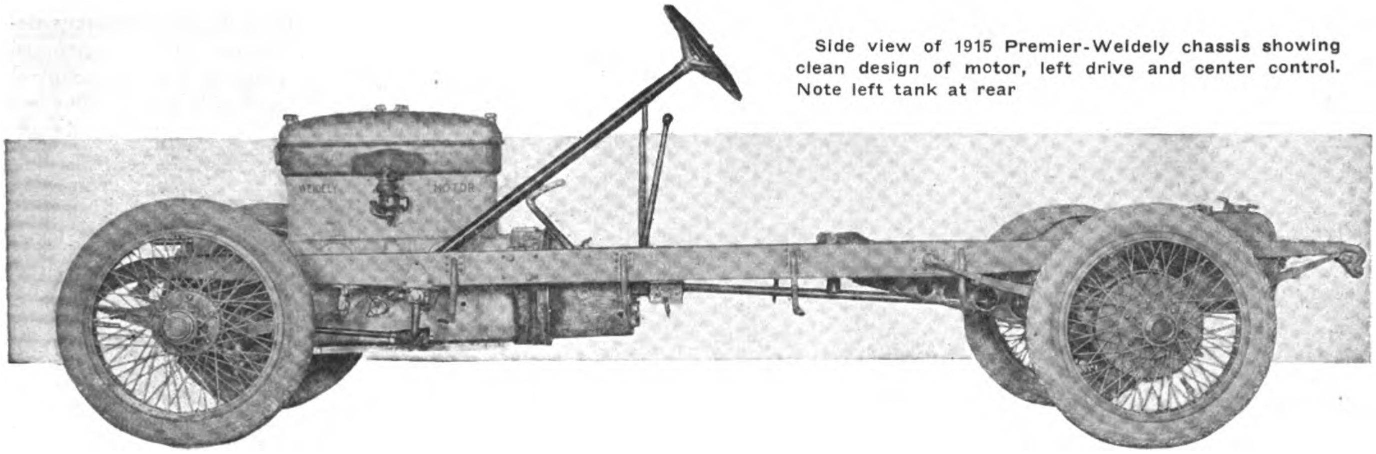
Valve Mechanism Is Unusually Light

The lightness of this valve mechanism is its special feature. By this construction it has been possible to make the valve springs 20 pounds weaker than in the ordinary type of engine. Another advantage gained by the light construction is the noiselessness of operation. To further increase the factor of silence, the complete oil-tight housing and the bath of lubricant also play their respective parts.

The vertical shaft by means of which the drive is taken from the crankshaft to the overhead camshaft is located at the longitudinal center of the engine. This position of the half-time gear gives it a balance which it would not possess if located at one end of the motor. Side thrust is also eliminated by the use of the pivoted finger which transmits the drive from the cam to the valve.



Weidely type of motor used in Premier cars. Above—Detachable cylinder head, showing operation of the overhead valves by a single camshaft driven by gear from the vertical shaft shown at the side of the motor



Side view of 1915 Premier-Weidely chassis showing clean design of motor, left drive and center control. Note left tank at rear

The Weidely motor is distinguished by the cross-head type of piston. This design is so arranged that the part taking the pressure of the gas is separate from that which acts as a guide. As will be seen in the cross sectional view, the piston-head and rings are formed as usual, but there is a slot .25 inch wide between the head and skirt of the piston. The piston boss is connected to the head by means of two crescent-shaped webs. By this arrangement, little or no heat can be transmitted from the head of the piston to the skirt and the head proper is kept cooler. With this piston a clearance of but .0015 inch can be used.

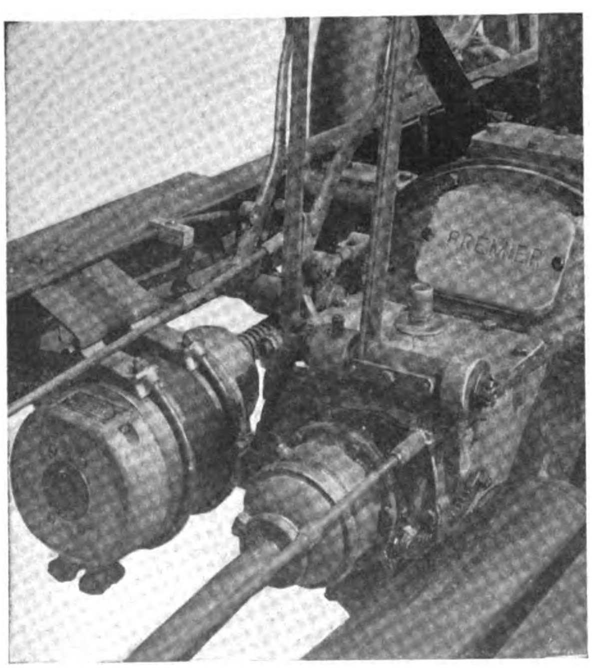
Four-Bearing Crankshaft

The crankshaft is carried on four bearings, the two middle bearings being between the third and fourth cylinders. All the main bearings are 2 inches in diameter, the length being 2 9-16 for the front, 1 5-8 for the center ones, and 3 3-4 for the rear. Connecting-rod bearings are 2 inches in diameter and 1 3-4 inches in length. The gear in driving the vertical shaft is fastened on a flange formed integrally with the crankshaft. The two central main bearings support the crankshaft on either side of this driving gear. The running thrust on the vertical driveshaft is taken by a Timken taper roller bearing.

The camshaft bearings are all solid bushings. There are four of these bearings, supporting the 1 3-16 inch shaft. The end bearings are 1 1-4 inches in diameter and 1 3-4 inches long. The center ones which are mounted on either side of the driving gear are 1 3-4 inches in diameter by 1 5-8 inches in length. A hole 3-8 inch in diameter is drilled throughout the entire camshaft and carries oil to the cams and end bearings.

All Drives Balanced

As for last season the Premier car of 1915 will be fitted with Remy starting and lighting and Eisemann magneto ignition. Following the system of balancing all drives throughout the car, the electric generator for the starting and lighting system is mounted on one side of the vertical shaft which drives the valve mechanism, while the Eisemann magneto is mounted on the other side. On this same shaft, which runs parallel to the crankshaft of the motor, the fan belt pulley is mounted.



Mounting of Remy starting motor on left frame member alongside gearbox. Note center control

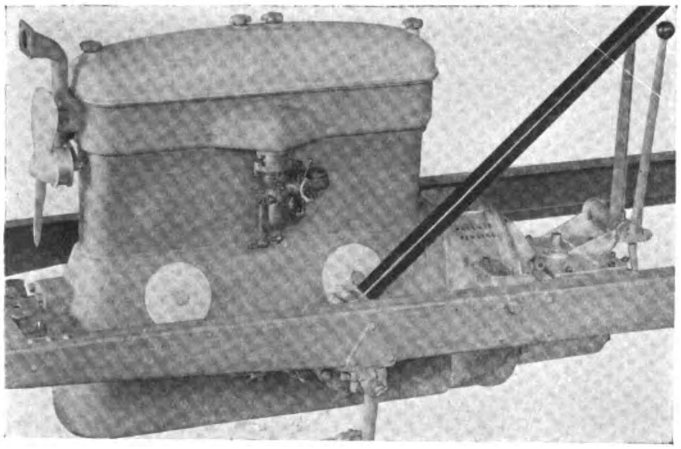
The oiling system of the new motor is a combination of pressure and splash, the oil being circulated by a gear pump bolted to the crankcase and driven from the bottom of the vertical shaft. The oil is distributed by a rotating sleeve on the top of the pump. Equal parts of the oil are sent to each of the six troughs into which the connecting-rods dip through a passage cored in the bottom plate. One part of the oil is carried to the valve mechanism. The camshaft bearing and cams are lubricated by means of the hollow camshaft above mentioned. The entire valve mechanism is bathed with oil by streams that issue from the backs of the cams. The oil is then drained toward the center of the cylinder head and falls back to the crankcase through a hole in the casting. In the center of the cylinder head casting is a well in which the camshaft gear revolves. The oil from the camshaft bearing keeps this filled so that as the gear revolves it is constantly oiled.

Superfluous Parts Eliminated

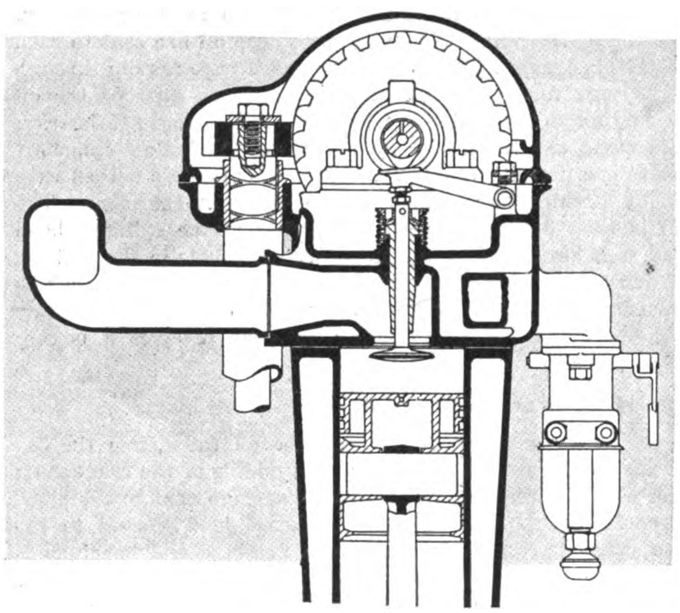
On the way to the crankshaft the oil falls from the top of the motor, strikes the gear in the middle of the crankshaft and also fills the two middle main bearings next to the gear. Troughs on the side of the crankcase lead the oil to the end crankshaft bearing. Leakage at these end bearings is prevented by an oil thrower ring which clears the shaft of lubricant by centrifugal force, sending the oil by a drain back to the main pump, whence it is re-circulated.

One of the striking features of the motor is the elimination of a number of parts by making one member discharge a number of distinct functions. An instance of this is the water pump housing which also serves the purpose of the connecting medium of the radiator to the pump, the pump to the motor, the starting crank bearing support, the radiator support, front motor support and holds the adjustable thrust bearing at the forward extremity of the crankshaft.

The upper water connection has likewise a variety of functions to fulfill. This casting, beside taking care of the water circulation, has a downward projection which supports the fan and provides an adjustment for the fan belt tension. The radiator is supported only by the top and bottom water connections and there is no



Illustrating the clean design of the Premier-Weidely unit power plant. Note the detachable cylinder head and also the high mounting of the carbureter, which is attached directly to the cylinder casting



Cross section through Premier-Weidely cylinder head, showing overhead valves operated by a single camshaft driven by the vertical shaft at the left

rubber hose. The radiator thus has a two-point suspension and is a solid unit with the motor. In fact, the unit idea is carried throughout the entire design of the power plant. It not only incorporates the motor, clutch and gearset but takes in the radiator as well.

22 Miles Per Gallon of Fuel

One of the claims of the Premier company is efficiency for this new type of motor. They state that by the elimination of about 40 per cent. of the moving parts, the motor has been silenced to a large degree and the efficiency increased to a marked extent. It is claimed that the number of miles per gallon secured with this type of motor is in excess of that generally obtained with a six-cylinder car. On a test held through the city streets on a touring model, when the motor was first brought out, an average of 22 miles per gallon was secured, showing the economy possibilities.

Outside of the engine, the Premier-Weidely does not differ greatly from the other Premier designs which have been previously described in these pages. The multiple-disk clutch is continued and the gearset employed has three-speeds with the control lever in the center in combination with left drive. The remainder of the chassis is exactly like the poppet design Premier with the exception that the rear springs are one-half elliptic instead of three-quarters. This has been done to reduce the side sway. The frame has a slight kick-up over the rear axle and is tapered, being 6 inches narrower at the forward end than at the rear to provide a narrow turning radius.

Three Streamline Bodies

The three body designs which are fitted on the standard cars are of streamline design and this, coupled with the V-radiator, gives the car a distinct appearance. The fenders are crowned and the fuel tank is located at the rear, pressure feed being necessary with the high carbureter. The hood is sloping and, being exceedingly short for a six, permits the designer to use the 132-inch wheelbase to advantage in securing space in the body. The tires are 36 by 4.5 inches, the spare being carried in the rear on a support rigidly connected to the side members of the chassis frame.

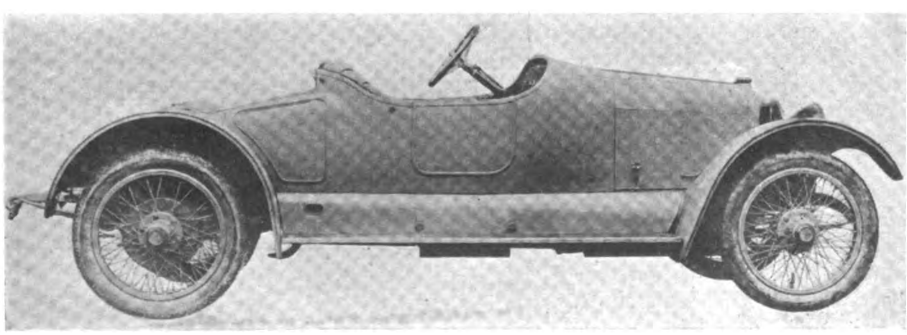
Overland Factories Rushed—Willys Optimistic

NEW YORK CITY, Sept. 8—Since returning from the war zone, John N. Willys, president of the Willys-Overland Co., has been making conservative estimates of automobile business in America and states that the Willys company is working its entire force all of the time and on a full-pay schedule. The company has 1,000 more unfilled orders than were on its books at this time a year ago, this in spite of the fact that daily shipments are fifty more cars than last year. On September 3 the company had shipped twice as many 1915 cars as it had shipped 1914 models a year ago.

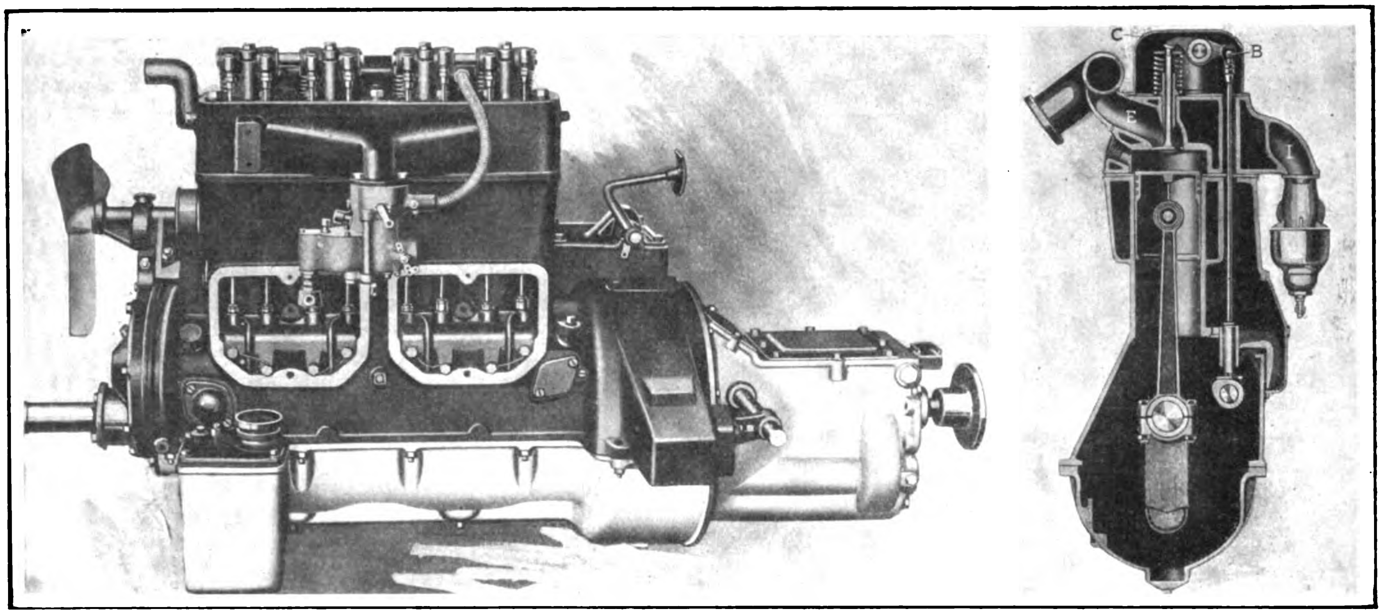
In looking over the country the retail business is generally improving. New York City shows 100 per cent. increase, and large gains are shown in Philadelphia, Boston, Washington, Baltimore, Rochester, Syracuse and many other eastern points.

From other sections of the country good retail reports have been received. There is added business from the grain belts, and while business is poor in the cotton section, notwithstanding the bumper cotton crop, the average conditions throughout the country are particularly favorable.

In speaking directly on conditions in the war zone, Mr. Willys says: "Nearly all of the large automobile factories in Europe were entirely unmanned soon after the opening of hostility. Few cars will be built until these hostilities cease. In the meantime the entire field is open to the American manufacturer. For a time lack of transportation facilities will hamper foreign business, and abnormally high insurance rates will make shipping almost prohibitive. The seas are being rapidly cleared and soon export shipments will increase."



Streamline design used for 1915 Premier-Weidely roadster



Light four-cylinder Oldsmobile motor, showing a transverse section through the cylinder

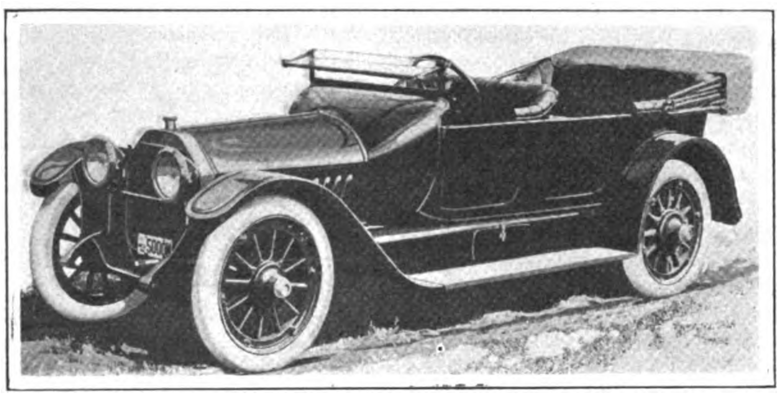
Oldsmobile Continues Four and Six

Cuts Price $60 on Small Car and $175 on Six —Wheelbase Lengthened on Smaller Car

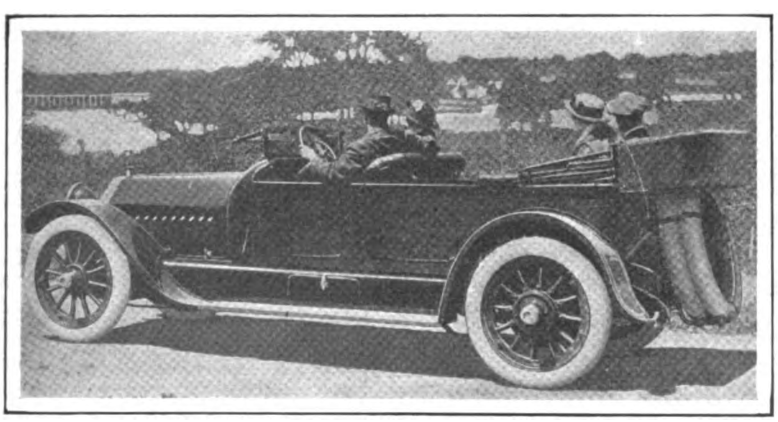
As regards the models which it will produce for 1915, the policy of the Olds Motor Works, Lansing, Mich., is to continue the light four and the big six with very slight change mechanically, though body design, finish and refinement have been brought to an even higher standard and prices have been cut somewhat.

The light four, which made its appearance earlier in the year as the consort of the big six, has been reduced from $1350 to $1285, and besides the touring model, a roadster type has been added to sell at the same figure.

The big six, which formerly was offered in both five and seven-passenger touring types, may be had only in the seven-passenger form now. The old prices were $3150 for the car with seven-passenger and $2975 with five-passenger body, and on the new basis, the seven-passenger type is to sell at the figure which purchased the five-passenger model last season. Thus it is really reduced $175.



Four-cylinder five-passenger touring model



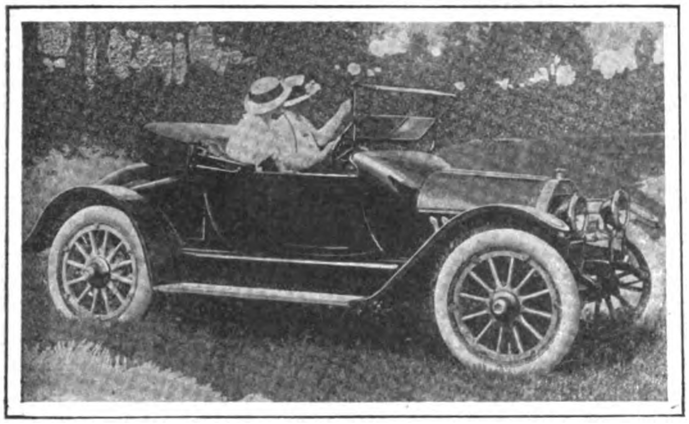
Six-cylinder seven-passenger Oldsmobile

The light four still continues to be a light car *De Luxe*, for its finish and appointments leave nothing to be desired. They are really just as fine and elaborate as accorded the big car. Outwardly the light car appears to be a reduced copy of the six; its lines are about the same, it has the same distinctive panelling along the upper edge of the body, and the hood and radiator have the same general shape on a smaller scale.

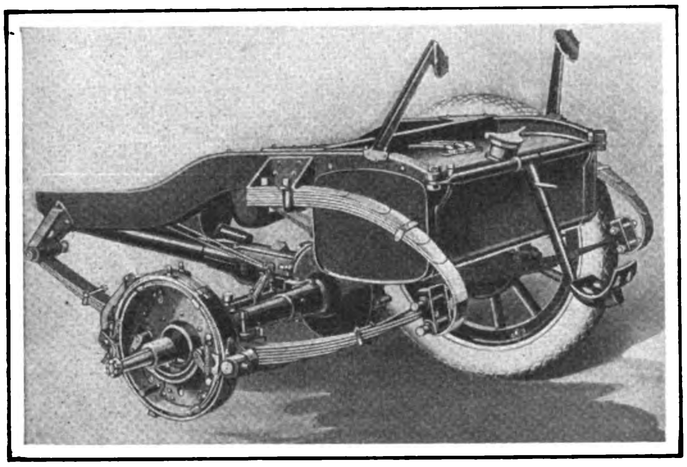
The Light Four Model 42

The principal difference between the light Olds four of today and that brought out earlier in the year is the wheelbase. It has been lengthened 2 inches to 112 inches. This has not affected the body size, but the front axle has been carried forward so that it now is in line with the radiator which formerly was 2 inches ahead of the axle. In addition, the front springs have been lengthened 1½ inches and are now 35½ inches between bolt centers, making a very easy riding car due to this length.

There has been no



Two-passenger roadster body mounted on the four-cylinder chassis



Rear suspension of gasoline tank on the Oldsmobile light four

change in the motor, which is a specially designed valve-in-the-head type by Northway for this car. It is a block-type which together with the gearbox forms a unit power plant of very neat design, compactness and lightness of weight being particularly noticeable.

The cylinders are 3½ by 5 inches, and, though the S. A. E. formula would not indicate it, give the engine a brake horsepower of 30. The piston displacement is 192.33 cubic inches and with these dimensions, the motor has ample power to give all the speed any owner could desire, it being able to turn up close to 60 miles an hour if given a chance. The motor might really be classed as a high-speed type as it develops its maximum power at about 2300 r.p.m.

Perhaps the most unusual feature of this over-head-valve motor is that no part of the long push rods or of the rocker arms, valves or springs, is exposed.

When the aluminum plate is in place over the valve mechanisms and rockers, it is hard to distinguish this motor from one of the conventional L-head types, and this housing of all valve parts also has the advantage of silence.

Delco Electrical System Used

The electrical equipment of the light four has undergone no changes save those minor detail improvements which the Delco concern has deemed advisable for greater reliability, with one exception. This is the addition of the automatic spark advance feature.

The Delco unit which combines the functions of cranking, lighting and ignition is located on the right side of the motor and as a generator it is driven by the same shaft as that which operates the water pump. The ignition distributer is in unit with the motor-generator. As a cranking motor, the unit connects through a train of gears to the teeth in the flywheel rim in the usual way. The reduction between engine and motor is 24 to 1, and the engine is cranked under average conditions at 100 revolutions a minute. As a generator, the apparatus begins to charge at 15 miles an hour. The system is a 6-volt type which uses an Exide storage battery of 60 ampere-hours capacity. This is located under the seat in a special steel container.

Lubrication of the motor is of the splash type with an individual splash trough under each cylinder. The oil is pumped from a reservoir on the side of the crankcase to the oil gauge on the dash and then feeds by gravity down to the troughs and to crankshaft and camshaft bearings. The connecting-rod ends dipping into the troughs throw the oil up into the cylinder walls and to the other bearings.

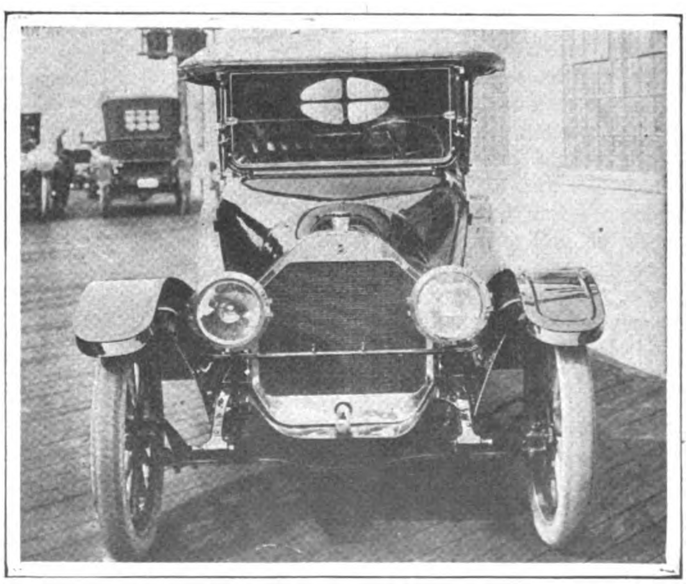
As in the motor unit, no change is apparent in the upper transmitting mechanism nor in the other chassis members. The clutch, which is housed with the flywheel, is of the cone type 12½ inches in diameter with a 2½-inch face and a cone angle of 11 degrees. From here the power goes to the three speed gearset of conventional type which bolts through flange construction to the rear of the flywheel housing and which is arranged for center control. The shaft is mounted on large ballbearings and transmit the power efficiently.

The propeller shaft is inclosed within a torsion tube, and is fitted with a universal joint at its front end. The rear axle is of floating type in which the driving shafts carry no part of the car weight. New Departure ball bearings and Hyatt roller bearings are used in the rear axle construction, the latter carrying the axle shafts and differential and the former taking the thrust. The shafts, of nickel steel, have a diameter of 1⅛ inch, while the main shaft is 1¼ inch diameter. Brakes, of conventional internal expanding and external contracting type, are 14 inches in diameter and have a width of 1⅞ inch. The braking surface is therefore ample.

The front springs are over the axle while the rears are underslung from it. These springs are 35½ and 48 inches long, respectively, and the width of all is 2 inches.

As has already been mentioned, nothing has been spared to make this light Oldsmobile a highly finished job. The cowl dash, for instance, is highly finished of Circassian walnut with compartments to right and left just as on the big car. The upholstery is of the best and equipment leaves nothing to be desired.

One slight change has been made in the body in that the back of the front seat has been made 2½ inches higher to add to comfort and appearance, the running boards are of aluminum and have mud scrapers at the doors. A refinement is the tool compartments which are concealed in the aprons at the sides. These are amply large for all paraphernalia.



Front view of the light four model 42

A rain-vision, ventilating windshield, demountable rims carrying 33 by 4 tires front and rear, clock, Stewart speedometer, one-man top, Jiffy curtains, are some of the equipment features.

The car weighs 2615 pounds with tanks filled and extra tire on rear.

The Big Six—Model 55

The biggest change in the outward appearance of the six-cylinder Oldsmobile is the sloping of the cowl to meet the hood which is also somewhat sloped. However, the body is still along the same general lines as it was, and the same is true of the bonnet and radiator.

This car has a wheelbase of 139 inches which admits of an exceedingly roomy body for seven. It is in every way highly refined and distinctive in appearance.

The chassis has been hung so as to be 2½ inches lower than it was which is advantage from the standpoint of appearance as well as stability. This has been accomplished by dropping the yokes of the front axle spindles and by making the kick-up over the rear axle higher.

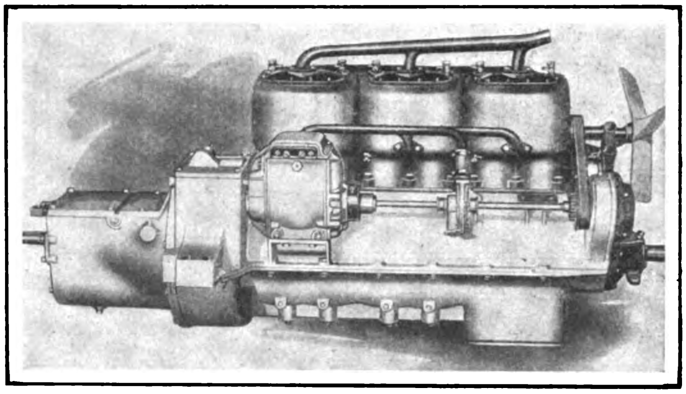
Another important change is the shifting from right to left drive, while the control has also been brought from the right to the center.

The motor is practically the same as it was except that the water jackets have been increased in size while the radiator depth has been made 4 inches instead of 3 1-2 and the cooling fan has come in for an increase of 4 inches in diameter, now being 18 inches. Thus the entire cooling system, which incorporates a centrifugal water pump, has been made more efficient.

Like a number of other cars of the year, the new Olds six has vacuum fuel feed using the Webb Jak vacuum tank which is mounted on the back of the dash. This causes the fuel to be drawn from the tank at the rear of the chassis which is still of 22 gallons capacity and has the same mounting.

A Marvel carbureter has replaced the formerly used make, while the engine-driven tire pump which is standard equipment is also of a new make—a Stewart. As an added refinement, Truffault-Hartford shock absorbers have appeared at the front.

Like the four, the motor is a Northway, although of an entirely different design, being an L-head type with cylinders cast in pairs. The valves are all on the left and intake and exhaust manifolds are separate units. The usual form of two-piece crankcase is used, it being split into two halves so that the upper half carries the crankshaft and camshaft bearings. Like all other Northways, it is a three-point sus-



Side view of the motor employed in the Oldsmobile six

pended type which has the gearbox in unit with the motor.

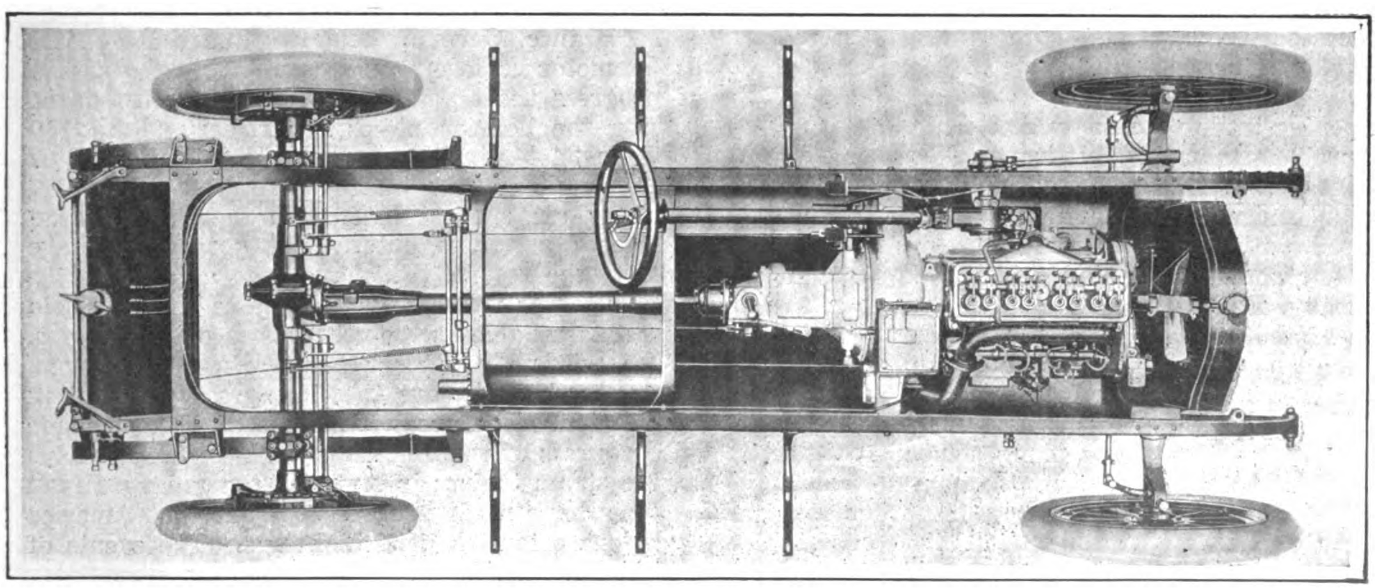
The bore is 4¼ inches and the stroke 5¼ inches, the piston displacement 447 cubic inches and the horsepower at 1600 revolutions is 50.

Like the four, the six uses the standard Delco ignition, lighting and cranking combination. In this case, too, there is the automatic spark advance feature, and the battery—also an Exide—is larger for its heavier work.

Unlike the four, the drive shaft of the six is not enclosed, but the torque and drive are taken by a pressed steel triangular torque arm, which parallels the shaft, and which is spring buffeted at its front end from a frame cross member. The drive shaft is of tapered section and is fitted with universals at either end. The tires are 36 by 5 inches.

Oldsmobile Power Plant Dimensions in Inches

PART	FOUR	SIX
Valve diameter	1 5-8	1 49-64
Valve seat	1-16 by 45 deg.	1-16 by 45 deg.
Valve stem diameter	3-8	3-8
Valve lift	5-16	11-32
Piston length	4 1-2	5
Connecting-rod length	10 3-8	11
Diameter piston pin	7-8	1
Length piston pin bearing	1 7-8	2 1-4
Connecting rod bearing length	2 1-4	2 1-4
Connecting rod bearing diameter	1 5-8	2 1-8
Front crankshaft bearing length	3 7-32	3 5-32
Front crankshaft bearing diameter	1 5-8	1 7-8
Center crankshaft bearing length	2 3-8	2 1-2
Center crankshaft bearing diameter	1 7-8	2
Rear crankshaft bearing length	3 7-16	3 15-16
Rear crankshaft bearing diameter	1 15-16	2 1-4
Diameter camshaft	1	1 1-4
Front camshaft bearing length	2	2 3-16
Front camshaft bearing diameter	1 1-8	1 1-4
Center camshaft bearing length	1	1 9-16
Center camshaft bearing diameter	2 1-8	2 3-16
Rear camshaft bearing length	1 3-4	2
Rear camshaft bearing diameter	1	1 1-4
Diameter flywheel	14	16 1-4
Flywheel face width	4 3-16	3 7-8



Plan view of the Oldsmobile light four-cylinder chassis, showing layout of the motor mounting and drive

The Automobile

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The South American Method

AMERICAN automobile manufacturers should not imagine that because the doors of Europe are temporarily closed to South America that that continent will stampede to American markets and that the people of that continent will embrace all of our systems of doing business and accept our methods of merchandising without a murmur of dissent. One maker in this country imagined that all he needed to open his South American trade was a catalog in Spanish and some pictures of his factory.

Opening trade with South America today is a bigger problem than this. It is a harder problem now than it was 4 months ago, although to many it may appear easier. Before our trade can be well developed, without the aid of Europe, we must establish our financial arrangements there. England, Germany, France and Italy have their banks well represented in the big cities in South America. America has not. We have had to do our business through London, Berlin or Paris.

The South American business man has been accustomed to do business along somewhat different lines than those followed by many American automobile companies. The buyer in Argentina has generally purchased on 90 or 120 days. The dealer there has done business as follows: The merchant in London shipping goods to Buenos Ayres, when shipping time arrives, delivers his invoices and bills of lading to his London banker and gives him at the same time a draft at 90 or 120 days for the value of the goods. These documents are forwarded by the banker to his South American branch or representative. On arrival in South America the banker notifies the local buyer that the invoices, etc., have arrived. The merchant calls on the banker, who before surrendering the shipping documents, requires him to accept the draft, to write the word "accepted" on it as well as adding his signature. At the end of the 90 or 120 days the banker collects, and failure to meet such collections is, according to the South American laws, equivalent to putting the concern in bankruptcy.

Will American business houses not have to follow the present methods of doing business in South America, for a time at least? Today many of our concerns are practically unknown to the Latin business people in South America. We should first show them that we have enough confidence to do business with them in the ways they have been doing business for years. Thus we get acquainted. Once the business is opened, opportune times will come to introduce our methods of doing business, if the present ones do not prove satisfactory.

Highways and War

HORSE-PACE in war is practically unknown in the European campaign today—in its place are motor-pace methods. The horse is little used compared with former wars, except in the cavalry and branches of the artillery service, where there are not enough motor vehicles to meet the requirements and where the needs of the hour cannot be satisfactorily met with the present type of motor vehicle. *This is the first great motor war, with motors dominating every arm of the service.*

Nothing stands out more prominently in the use of motor vehicles than the great speeds as compared with horse systems, and when you add to these the aeroplane and the wireless systems, you have a combination that has revolutionized the methods of warfare. Were it not for the wonderful roads of Belgium, France, Germany and England this general use of motor vehicles would be impossible. Instead of progress there would be stagnation; instead of moving the heavier pieces of artillery 90 to 120 miles in 24 hours, there would be miles of motor vehicles stalled in the bad roads and complete movements of army corps halted—in fact, the general scheme of activities upset. But good roads have come to the rescue, they have been as essential as reliable motor vehicles, as reliable as the new field pieces, as reliable as the other arms of the service.

The wisdom of Cæsar has again been proven, roads, good roads, are the first great essential in civilization. The great highways of Europe made the progress of those lands possible before the days of the steam trains; in America the great railroad systems have made progress possible, but America lacks one essential, good highways. The events of the present would tend to prove that even today good roads are one of the country's greatest assets.

De Dion Plant Under Military Control

Staff of Workmen Reduced from 5,000 to 1,000, All Being Paid by the Government

NEW YORK CITY, Sept. 8.—Emanuel Lascaris, manager of the DeDion Bouton selling interests in America, returned Sunday from Paris, where he has been at the DeDion factory since July 25, 5 days before war was officially declared. Mr. Lascaris says that previous to the declaration of war that 5,000 men were regularly employed in the DeDion plant but that since war started only 1,000 men have been working. At present these are engaged entirely on the manufacture of commercial vehicles.

The DeDion factory, since August 1, has been under the control of the government. All of the workmen instead of wearing overalls wear soldiers' uniforms; the workmen are paid by the war department; and General Manager Sansonnens, who is a lieutenant of artillery, has been appointed military governor of the factory, which is, in short, a huge war camp under the control of the government.

The scenes around the factory on Saturday, August 1, the day on which war was declared, were stirring in the extreme. At 4 p. m. the factory was running full force when a messenger arrived from Puteaux announcing that the mobilization orders had been signed by the government. The factory whistle was blown, all men laid down their tools, received their money and left. The majority of them were in different parts of the army service and knew exactly where they were to report. The factory doors were locked and soldiers placed in control. The soldiers in charge, however, were generally those who have been associated with the factory and are now doing their military duty by working for the government in the production of motor trucks.

On that date, August 1, the government took possession of all cars that were on hand, and the eight DeDion army trucks which were competing in the army trials were taken.

Mr. Lascaris in describing the mobilization scenes around Paris on Sunday morning, August 2, says that the work was carried out with the greatest organization and quietness. On Sunday morning there were 1,000 motor buses and trucks in the Champ de Mars, one of the public squares in Paris which was a great military camp. By Monday, all of these buses were gone, having carried their loads of soldiers to the front. In many other parts of the city similar scenes were being enacted. He thinks that there are at present upward of 80,000 passenger cars and trucks in the service of the French army. All officers use high-powered touring cars. Horses are not used except in the cavalry. The English army has gone somewhat further than the French in the use of motor cars. The English army has taken chassis and used these for hauling the artillery. A fifth-wheel device is mounted on the rear of the chassis and to this the heavy artillery carriage is attached. With this arrangement the artillery can be moved 90 to 100 miles in one day.

Only Four Tires Remain at War Scare Prices

Plenty of Crude Rubber Now in Stock in This Country, Large Shipments Having Arrived

NEW YORK CITY, Sept. 8—Tire prices in general have come down to normal conditions. Five tire companies have reduced prices to those in effect before the war started, including the Firestone, Pennsylvania, Lee, Empire and Federal. Only four companies are now selling their tires at advanced rates. These are as follows: Fisk, 15 per cent.; Goodrich and Diamond, 12½ per cent.; Republic, 12½ per cent., and the United States Rubber, 12½ per cent. It is expected, however, that one or two of these companies will reduce their prices in the near future.

A letter has been sent to the various rubber industries asking them to take up, through their respective senators and representatives, with the State Department at Washington, the matter of getting exemption for cargoes of raw material, that might be afloat in ships that left their ports before the declaration of war.

According to the Custom House, port of New York, 11,534,864 pounds of India, Balata, Gutta percha and Gutta jelutong rubber was imported during July. On July 23, the St. Louis left Southampton with a consignment of 67,000 pounds of plantation rubber for the Goodyear Tire & Rubber Co. On July 27 the *Minnewaska* left London with 95,000 pounds of plantation rubber for the same company. The B. F. Goodrich Co. has 150,000 pounds of plantation rubber on the *Chalister*, which left Singapore on July 30. It also has 150,000 pounds more of plantation rubber on the *Indrania*, which left Singapore on August 12. The Goodyear has 85,000 pounds of the same kind of rubber on the *Olympic*, which left Southampton, August 5, and also 33,500 pounds on the *New York*, which left the same place on August 10. All have arrived. The *Minnehaha* has arrived with over 600,000 pounds of crude rubber for the Goodyear company. The *Minnetonka* arrived September 7 in this port. On September 9, the Goodyear company expects to send by rail to Akron, O., thirty-five cars full of crude rubber. This is supposed to be the largest single shipment of rubber ever made from this city.

The Finance Minister of Brazil contemplates dispatching to the United States several vessels carrying rubber from Para, to bring back food and other products.

"America's Chance to Reach Its Zenith"

NEW YORK CITY, Sept. 4.—That an understanding of the characteristics of the South American people is essential before making progress in a business way in the Latin American continent is the opinion of Edward V. Douglass, secretary of the American Manufacturers' Export Association. This association, which is devoted to the fostering and promotion of the business and commercial relations between American manufacturers and foreign nations, has among its members many concerns which are either directly or indirectly interested in the automobile industry. Among its members may be mentioned the Ford Motor Co., Joseph Dixon Crucible Co., General Electric Co., Indian Refining Co., Standard Oil Co., Studebaker Corp., and the Willys Overland Co.

Speaking of South American people, Mr. Douglass said:

"Broadly speaking, there are but two classes of people throughout South America, the wealthy and the poor. There is not the enormous middle class that we find in the United States, and hence there can never be considered the large percentage of car buyers throughout these countries that we find in this country. Here there are no distinct class of people. Those of different incomes cannot be distinguished from one another.

"It is this condition in South America that gives rise to the fact that the cars that are bought are of the higher priced variety. The South American loves to make a show.

"Now is the opportunity, however, for America to step in. New York is the logical financial center of this hemisphere and since the war has shattered Europe, there seems to be no reason why there should not be a sharp increase in trade between the two continents. Every country has its period of rise and fall and this seems to be the opportunity for the United States to reach its zenith."

DETROIT, MICH., Sept. 9—S. A. Douglas has resigned from the Johns-Manville Co. and together with H. W. Kane will act as factory distributors for the following concerns: Simmons Mfg. Co., Doehler Die Casting Co., Standard Rolling Mills, Wisconsin Aluminum Foundry Co., and the Pontiac Drop Forgings Co., with sales offices in Detroit and Chicago.

Gasoline Free of War Influence, Says Standard Oil Official

Plenty of Crude Oil in Sight for at Least 2 Years with More Chance for Slight Decline Than Raise in Price

NEW YORK CITY, Sept. 8—That the international war which is tearing at the vitals of foreign countries will have no effect, either now or in the near future, upon the price of gasoline and lubricating oil is the expressed opinion of an official high in authority in the Standard Oil Co. The price of gasoline may even go down a fraction of a cent, he says, and in the next 2 years it will not increase more than 1 cent a gallon and probably not that much.

According to this official, who is in a position which gives him opportunity to survey the oil field, there is plenty of crude oil now in sight to last during at least two years, during which time it is extremely unlikely that there will be any appreciable change in existing prices.

Speaking of conditions in the oil industry, he said:

"Of course it is impossible to state positively what the next two years may bring forth, but there is nothing in sight now which leads us to think that there is any likelihood of a shortage of crude within that period, or, in fact, for a much longer period.

"The only effect the war situation can have is to decrease the demand for gasoline and lubricating oil in the foreign field. It is obvious that Europe will not employ motor cars as extensively as has been the case in the past and naturally the demand will be tremendously decreased.

"That being the case, and if the price is influenced by supply and demand, why will there not be a lower figure than at present?" was asked.

"Because the existing price is about the lowest that gasoline can be sold with a profit to the refineries," was the answer. "Take New York, for example, where an enormous amount of gasoline is used. The Standard Oil Co. receives from 9 to 11 cents a gallon from garages and private tank stations, the difference in price being due to transportation costs. Some deliveries cost us more than others. We cannot sell our product for much less and realize a living profit."

May Change Special Box Car Sizes

NEW YORK CITY, Sept. 8—As a result of the work of the Traffic Department of the National Automobile Chamber of Commerce, the American Railway Assn. has now under consideration a change in the plan for special box car dimensions that will make more convenient the shipment of motor cars.

The Railway association has been considering that special equipment should not exceed inside dimensions of 40 feet 6 inches length, 8 feet 6 inches in widtht and 9 inches in height. As the automobile industry requires 40- and 50-foot cars, 10 feet high inside for a very considerable portion of its shipments, a formal protest was sent to the Railway association and is now being considered.

The Chamber will have a representative in attendance at Chicago on September 16, when the Western Classification Committee holds a hearing on a number of matters pertaining to the classification of autombiles and parts.

No Lower Rates for Light Cars

The Chamber has been notified that the Official Classification Committee has refused the application of light car manufacturers for a lower minimum on machines of that type than applied on other automobiles.

In its conference with the Official Classification Committee, the Traffic Department has arranged that instead of enforcing the rules that bodies for freight vehicles be boxed or crated for shipment, there will be a modification so that after October 1, bodies for platform, stake or dump trucks or wagons not lettered may be shipped without being boxed or crated.

Germany Dominated 1913 Motor Trade with England

LONDON, ENG., Aug. 29.—At the present juncture it is interesting to note the extent of the trade done in motor cars, chassis, and parts between Great Britain and Germany. It will be seen from the following figures, which are taken from the last Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions, compiled in the Statistical Office of the Customs and Excise Department, that Germany stands to lose a much greater volume of trade than Great Britain in this particular branch of industry. The total value of the imports of cars, chassis, and parts (including tires) from Germany to Great Britain last year was £1,355,974, which was an increase of £148,819 upon the figures of the previous year, following a gradual increase since 1909. Great Britain's exports of motors, chassis, and parts to Germany, however, only amounted to £113,435 in 1913, a figure to which they had gradually grown since 1909, when they only amounted to £11,838. Great Britain's exports to Germany of foreign made cars, chassis, and parts, which are first imported into Great Britain and then re-exported, have not shown any very material expansion during the 5 years under review, as they stand now at only £39,109, against £21,315 in 1909.

The following are the details bearing out the general statements just made:

IMPORTS OF CARS, ETC., FROM GERMANY TO GREAT BRITAIN

	1909 Pounds	1910 Pounds	1911 Pounds	1912 Pounds	1913 Pounds
Complete cars	25,577	66,747	102,237	124,451	90,963
Chassis	114,421	153,900	192,508	217,973	135,998
Parts	685,497	772,041	753,235	864,731	..
*Rubber tires and tubes	..	..	..	..	929,755
Other parts	..	..	..	..	199,258
Totals	825,495	992,688	1,047,980	1,207,155	1,355,974

*Tires are now classified separately from "other parts."

It will be seen that there is a great falling off in complete cars and chassis. The increase in the value of parts imported from Germany is probably due principally to tires, the value of which for 1913 exceeded by £65,024 the total value of parts of all kinds imported during the previous year, although some portion may be owing to the use of German made magnetos.

Great Britain's export trade in motor cars, chassis, and parts with Germany is not very large. Indeed, as far as complete cars are concerned, during the past 5 years the number was apparently not sufficiently large to be separately entered in the returns. British made chassis and parts sent to Germany during the past 5 years were as follows:

EXPORTS OF BRITISH CHASSIS AND PARTS TO GERMANY

	1909 Pounds	1910 Pounds	1911 Pounds	1912 Pounds	1913 Pounds
Chassis	740	8,573	25,136	12,990	10,767
Parts	11,098	32,506	52,725	75,278	..
*Rubber tires and tubes	..	..	..	..	30,994
Other parts	..	..	..	..	71,674
Totals	11,838	41,079	77,861	88,268	113,435

*Tires are now classified separately from "other parts."

A certain number of cars and parts of foreign and Colonial manufacture imported into Great Britain are re-exported. With Germany Great Britain's trade under this head is represented by the following figures:

EXPORTS OF FOREIGN AND COLONIAL CARS, ETC., TO GERMANY

	1909 Pounds	1910 Pounds	1911 Pounds	1912 Pounds	1913 Pounds
Complete cars	6,524	7,796	13,225	17,628	13,059
Chassis	8,005	10,738	11,691	5,798	7,035
Parts	6,786	14,200	11,709	12,551	..
*Rubber tires and tubes	..	..	..	..	13,364
Other parts	..	..	..	..	5,651
Totals	21,315	32,734	36,625	35,977	39,109

*Tires are now classified separately from "other parts."

—From *The Autocar.*

File Claims for Commandeered Cars

WASHINGTON, D. C., Sept. 4.—Americans whose automobiles were commandeered by military authorities in some of the European countries have begun filing claims with the State Department.

Most of the tourists were given receipts for their cars with the promise that they would be reimbursed.

Critchley Directs Britain's Motor Transports

LONDON, ENG., Aug. 29—J. S. Critchley, President of the Institution of Automobile Engineers, has been appointed by the War Office an inspector of mechanical transport. This position carries rank as an officer in the Army Service Corps.

Many 1915 Models at Detroit and Indianapolis State Fairs

Governor Ralston Opens Indianapolis Debut of New Season's Cars, Under Huge Tent

INDIANAPOLIS, IND., Sept. 7—Governor Samuel M. Ralston at 2 o'clock this afternoon formally opened the fall motor show of the Indianapolis Automobile Trade Assn. at the Indiana State Fair. This is the second show the association has given this year.

The show is being held in a tent at the fair ground, near the Coliseum. The tent contains 39,800 square feet of space, of which 30,000 square feet is available for exhibits. There are fifty-one exhibitors.

Special exhibitors are the Indianapolis Motor Speedway, the Hoosier Motor Club, the Howe Engine Company and Charles H. Black who is showing a gasoline car he built in 1891 and which he claims is the first successful gasoline car built in the United States.

Briscoe Touring Car Is Now $785

DETROIT, MICH., Sept. 8—*Special Telegram*—The Briscoe Motor Co. has reduced the price of its touring car from $900 to $785 while the price of the roadster remains $900. These prices are for cars fully equipped with electric starter. Thirty cars are being made now daily and production will be greatly increased from October on.

Imperial Line to Be 1 Four, 2 Sixes

DETROIT, MICH., Sept. 8—Three models instead of four will constitute the Imperial line for 1915. In place of two fours and two sixes, there will be one four and two sixes. One of the latter is an introduction to the Imperial line, being a light six model.

The model 64 four-cylinder car in both roadster and touring car bodies, sells for $1,085 for the 1915 season in place of $1,500 last year. This car has a 3.75 by 5 inch motor fitted with a Stromberg carbureter, Gray & Davis starting and lighting system and battery ignition. The wheelbase is 115 inches and the tires 32 by 3.5 all around. This car is equipped with left drive and center control.

The model 56 six-cylinder is a larger edition of the four cylinder model, having the same size cylinders as the four. It is fitted with a Splitdorf magneto, Stromberg carbureter and a North East starting and lighting system. The wheelbase is 130 inches and the tires are 36 by 4.

The Imperial light six will be shown for the first time at the Chicago show. It will cost $1,535 for a seven-passenger body. It will be fitted with a Continental block engine of 3¾ inch bore and 5 inch stroke. It will have the Gray & Davis starting and lighting, Stromberg carbureter, wood wheels and 34 by 4 inch tires.

New Paterson Four on View in Detroit

DETROIT, MICH., Sept. 8.—A new Paterson four-cylinder car is being shown in Detroit. Its price is $1,085 instead of $1,200 as asked for the 1914 model. It has Northway block motor, of 3.5 bore by 5-inch stroke, Delco starter and lighting system, Schebler carbureter, 112-inch wheelbase and 33 by 4-inch tires. The axles are Weston-Mott, semifloating. The standard color will be blue and the bodies of streamline design. There will also be a new six-cylinder but this is not ready for announcement at the present time.

$860 for Chevrolet Roadster, Complete

FLINT, MICH., Sept. 8—The 1915 Chevrolet line consists of the Baby Grand model, four-cylinder touring car selling at $985 with electric starter and lighting system and the Royal Mail roadster selling at $860 with full electric equipment.

Both cars have the four-cylinder block Mason motor having a bore of 3 11/16 inches and a stroke of 4 inches. The Zenith carbureter will be fitted as standard equipment. On the cars that are specified to have an electric lighting and starting system, the Auto-Lite company's product is employed. Where electric lighting and starting is not used, the price is $875 for the Baby Grand model and $750 for the Royal Mail. In this case the Simms magneto is standard equipment.

The wheelbase remains at 106 inches and the tires are 32 by 3.5 all around. The wheels are wood. Left steering with center control is also continued. The axles are the Walker-Weis semi-floating type and the color is gun metal on the regular stock cars.

Price Cuts in 1915 Abbott-Detroits

DETROIT, MICH., Sept. 8—Abbott-Detroit 1915 cars will be much the same as the 1914 models except that there will be a cut in price and new streamline designs of bodies. The six-cylinder roadster model G will sell for $100 less than it did in the 1914 model, being now $2,190. The six-cylinder seven-passenger model F remains at $2,290 and the four-cylinder seven-passenger model L at $2,885. The four-cylinder five-passenger model K will sell for $1,785.

Six 1915 Detroit Electrics Announced

DETROIT, MICH., Sept. 8—The complete 1915 line of the Anderson Electric Co., makers of the Detroit electric, consists of a cabriolet roadster selling at $2,650, a rear-drive brougham selling at $2,850, duplex-drive, $3,000, forward-drive, $2,950, large rear-drive brougham, $2,950, small rear-drive brougham with bevel gear, $2,600. Wire wheels are optional.

Gasoline Tax To Yield $20,000,000 Yearly

WASHINGTON, D. C., Sept. 9—The first draft of the emergency revenue bill, which is to be passed in accordance with the recommendation of President Wilson, was completed today by the Democratic members of the Committee on Ways and Means.

One of the essential details of the bill, which will be submitted to the House the latter part of this or early next week, is the tax on gasoline of $0.02 per gallon, which it is claimed will yield about $20,000,000 a year.

Clayton Bill Passed—Hits Patent Monopoly

WASHINGTON, D. C., Sept. 3—The Clayton bill, the second and last of the administration trust measures to be considered at this session, passed the Senate by a vote of 46 to 16. The Senate struck from the House bill sections, 2, 3 and 4 relating to unfair trade practices, and substituted section 4, known as the Walsh amendment, intended to prevent the patent monopoly, which the Supreme Court is supposed to have recognized by its decision in what is known as the Dick mimeograph case.

Columbus Dealers Wroth at Fair Conditions

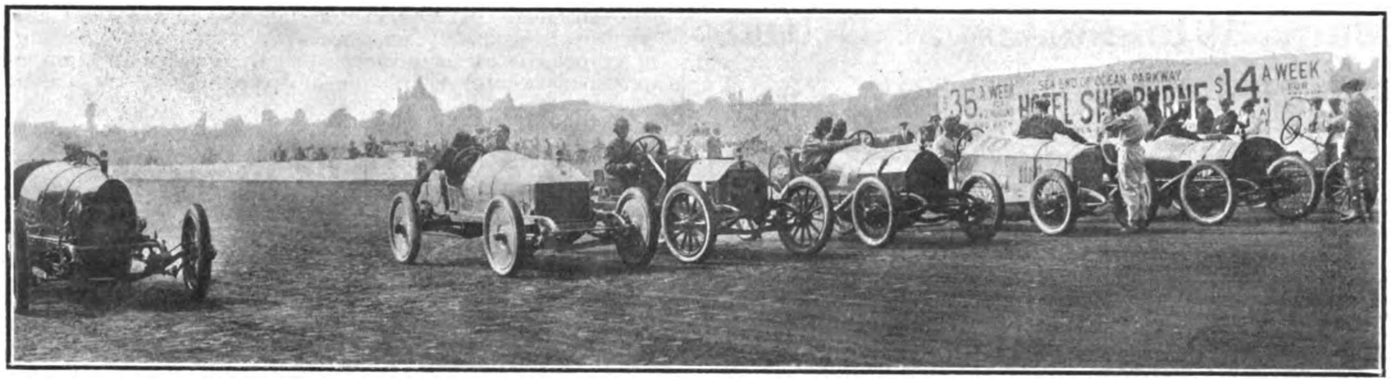
COLUMBUS, OHIO, Sept. 7.—The Columbus Auto Trades Assn., an organization composed of agents in central Ohio territory, has adopted resolutions in the form of an ultimatum to the board of managers of the Ohio State Fair. The ultimatum protests against the charging of an admission of 50 cents for each and every one connected with the automobile exhibits, without pass out checks and also against the location of the automobile displays. It is claimed that many of the displays were placed near stone crushers and thereby ruined by the dust. The roofs of buildings leaked and damaged cars on exhibition also. It was agreed that no displays of automobiles be made by Columbus dealers at the next state fair unless the conditions were remedied.

Hup Dealers Convene in Minneapolis

MINNEAPOLIS, MINN., Sept. 7—The Hupmobile dealers' convention in Minneapolis Sept. 8-9-10, with entertainment features by the R. W. Munzer & Sons Company, was attended by factory officials who drove up in a 1915 five-passenger car. They were President J. Walter Harris, Commercial Manager F. A. Harris, General Sales Manager F. J. Mooney, and Factory Superintendent S. H. Humphreys. A dinner was given Thursday night at which W. E. Lee, one of the candidates for governor in Minnesota, and Mayor W. G. Nye spoke.

Mercer Discontinues Racing Temporarily

TRENTON, N. J., Sept. 7—Following the unfortunate accident in the Elgin road race August 22, when Spencer E. Wishart was killed, and his mechanic, John C. Jenter, later died from injuries, the Mercer Automobile Co. has decided to discontinue racing for the remainder of this year at any rate.



Line-up of cars preparing to start in 50-mile event on Saturday. DePalma in No. 10 won this race

De Palma Draws 15,000 to Brighton

NEW YORK CITY, Sept. 8—Ralph De Palma, piloting a Mercedes, was the bright particular star at the 2-day race meet staged by the Motor Dealers' Contest Assn. at the Brighton Beach seaside track, Saturday and Monday, September 5 and 7.

With only two exceptions, De Palma won every event in which he started, the only races which he lost being the two free-for-all handicaps in which he was unable to overcome the advantage of those who were pitted against him. Not only did he win the 100-mile Labor Day Sweepstakes, which was the feature event on Monday, forcing his Mercedes 100 times around the mile circuit in 1:40:15, but he won the 50-mile "warming up" trip which was run off on Saturday and was the feature event of that day. In this race his time was 50:42 2-5. In several of the races better time was made than ever before on the old Brighton Beach track.

During the 2 days of racing there was one unfortunate incident. When Frank Dearborn was driving his Peugeot in second place in the 50-mile feature event on Saturday the right front tire blew out, precipitating the car, after a long skid, through the outer fence on the grandstand turn. Later it developed that Dearborn had sustained a fractured skull and internal injuries, and that Harold McCarthy, his mechanician, was quite seriously injured internally.

At the hospital it is reported on Wednesday morning that Dearborn died at about midnight; he had remained unconscious since the accident. McCarthy, however, who was less seriously injured, a splinter of one of his ribs having punctured his lungs, has greatly improved and quite likely will recover.

At the time of the accident Dearborn was in his 41st mile and was racing to make up time which he had lost because of a stop for tires. Throughout the race, up to this point, it had been a see-saw affair between De Palma, Dearborn and Le Cain. De Palma won, his time being 50:42 1-5.

Of the other events on the program on Saturday the 10-mile class C race, which was won by De Palma in 10:20 3-5, proved the most exciting. For 9½ miles De Palma and Morton, in a Mercer, raced practically wheel to wheel; only at the finish line did De Palma forge ahead, winning by inches. Otherwise there was practically no competition, the winner in each case running away from his field. In the 25-mile free-for-all De Palma bettered his own time of 24:35, made last year with a Mercer, by covering the distance in 24:08 2-5.

Reversing his previous practice of driving only fast enough to beat out his nearest competitor, De Palma early assumed the lead in the 100-mile Labor Day Sweepstakes, and at the finish had opened a gap of 5 miles between himself and Bergdoll in his Erwin. The absence of Dearborn and his Peugeot robbed the contest of much of its interest, for next to De Palma's Mercedes the Peugeot was undoubtedly the fastest car on the track. The summary:

Saturday, September 5

CAR	DRIVER	TIME
10 Miles, Class C, 161-300 Cu. In.		
Mercedes	DePalma	10:20 3-5
Mercer	Morton	
Chevrolet	LeCain	
10 Miles, Class C, 301-600 Cu. In.		
Peugeot	McCarthy	10:34 4-5
Stutz	Morgan	
25 Miles, Class E, Free-for-all.		
Mercedes	DePalma	24:08 2-5
Chevrolet	Jessop	
Erwin	Bergdoll	
10 Miles, Class D, Free-for-all Handicap		
Peugeot	Dearborn (10s)	9:02 4-5
Chevrolet	Le Cain (40s)	
Mercedes	DePalma (scratch)	
50 Miles, Class E, Free-for-all		
Mercedes	DePalma	50:42 2-5
Chevrolet	LeCain	
Marquette	Galvin	
Chevrolet	Jessop	

Monday, September 7

CAR	DRIVER	TIME
10 Miles, Class C, 161-300 Cu. In.		
Mercedes	DePalma	10:00 4-5
Mercer	Morton	
Erwin	Bergdoll	
10 Miles, Class C, 301-600 Cu. In.		
Stutz	Dickinson	11:02 2-5
Buick	Galvin	
Lozier	Geblin	
10 Miles, Class D, Free-for-all Handicap		
Chevrolet	LeCain (40s)	10:14 1-5
Mercedes	DePalma (scratch)	
Mercer	Morton (20s)	
100 Miles Labor Day Sweepstakes		
Mercedes	DePalma	1:40:15
Erwin	Bergdoll	
Chevrolet	Jessop	

Disbrow Fast at Michigan Fair—Show Also

DETROIT, MICH., Sept. 8—The 2 days' race meet at the Michigan State Fair held September 6 and 7 was probably the best attended ever held in Detroit, 10,000 people being present both days. Louis Disbrow, driving the Simplex Zip, was the big winner of the meet, taking six firsts. His car made the fastest time, covering 1 mile in 50 and 2/5 seconds. His time of 9 minutes 16 2/5 seconds in the 10-mile race is claimed fastest ever made in open competition on circular track.

Bob Burman was forced out on the first day owing to a broken piston rod on his Peugeot and again on Monday. The finish in the 10-mile race Monday ended in a dead heat between Hearne in a Case and Raimey, also in a Case, in 9 minutes 42 seconds.

At the motor car exhibition at the State Fair, local agents or branches are showing the 1915 Maxwell, Overland, Regal, Mitchell, Krit, Studebaker, Buick, Hupmobile, Jackson, Premier, Oldsmobile, Grant, Detroiter, Haynes, Oakland, Peterson, Imperial, Chevrolet, Hudson, Ford, Cartercar, Reo, Detroit electric. Among the commercial vehicles exhibited are the Federal, Commerce, Standard and Kelly-Springfield.

Races Save Iowa Fair from Deficit

DES MOINES, IA., Sept. 7—A day of automobile races saved the Iowa State Fair this year from what promised to be a financial deficit and from showing a heavy loss in attendance. The final day of the exposition was given over to the races in which several drivers of note participated and the crowd

Starter Wagner flagging Peugeot winning 10-mile race at Brighton attracted for the automobile events saved the day for the state fair. The receipts of the final day were enough for the fair to show a profit of over $20,000 and to cut the loss in attendance as compared with last year to only 8,000.

Nearly 25,000 people attended the races. The big feature was the final free-for-all in which Louis Disbrow drove his Simplex Zip across the tape with its nose projecting by inches only beyond that of Johnny Raimey's Case. Another feature was a race between Eddie Rickenbacher, winner of the Sioux City race, and Lincoln Beachey, the aviator. Beachey negotiated the half mile track four times while Rickenbacher went around thrice. Disbrow was a winner from the start. In the 1-mile test he made the two laps in 1:09 1/5 and Raimey was second in 1:10 1/5 while Rickenbacher was third in 1:10 3/5. O'Donnell's Duesenberg was first in the 3-mile event in 3:45 3/5. Disbrow cut the mile record of 1:08 4/5 to 1:08 3/5.

Home Talent in Washington Fair Races

TACOMA, WASH, Sept. 1.—Automobile races under the auspices of the Northwest Automobile Assn. were the feature August 30 at the Southwest Washington Fair at Centralia.

Jim Parsons, the favorite Northwest driver in the Romano Special, won four out of the five races on the program, in spite of having his car go through the fence prior to the start of the day's races.

The first race was for a mile against time from a flying start. Parsons won in 1:10 1-2; Joe Krause second, Velie, 1:15 1-2; Fred Hess, Ford, 1:17 1-2; C. Latta, Lozier, 1:18 1-2; Ray Lentz, Farco, 1:19, and Earl Staley, Studebaker, 1:24 1-2.

The second race was won by Staley in a Studebaker. The third race was for five miles between the three fastest cars in the first race and was won by Parsons in 6:36. The Velie's time was 6:37 and the Ford's 6:44 1-2.

The fourth race, a 10 mile free-for-all, was all Parsons' again, won in 13:14. The last event, an Australian pursuit race, was won by Parsons in less than three miles by passing the Ford and Velie in order. Over 3,000 was the attendance. Track was in good condition. Races were under the personal direction of Robert A. Hiller and were a success.

Entries Open in Los Angeles-Phoenix Race

LOS ANGELES, CAL., Sept. 2.—The first entry for the Los Angeles-Phoenix-San Diego Exposition road race is that made by Don Lee, who entered a Cadillac, to be driven probably by Harry Ham. A second Cadillac will probably be entered by Louis Nikrent.

The classification of the race is given as class E, free-for-all. The entry fee is $200 up to October 8 and $300 after that day up to October 22.

The size of the purses will depend entirely upon the number of entries. For instance, if there are 40 cars entered the six purses will be $3,500, $2,250, $1,750, $1,250, $1,000 and $500. If there are 30 entries the purses will be $3,000, $2,000, $1,750, $750, $500 and $250. If there are 25 entries the five first to finish will receive respectively $3,000, $2,000, $1,500, $500 and $250. If there are only 20 entries there will be only four purses, of $2,500, $2,000, $1,500 and $500. Should there be 10 entries only then first prize will consist of $2,500, second $1,500 and third $500.

The course will be practically the same as last year except between this city and San Diego, as Riverside is to be placed upon the route this year.

Four Perfect in Light Car Run

NEWARK, N. J., Sept. 8—Four cars out of nineteen contestants, who started from this city on September 5 on the 300-mile reliability light car run of the Cyclecar Club of N. J., to Atlantic City and return, returned last night with perfect scores.

The four cars were the sole survivors of the run. For the last 2 days the tour was a battle royal between G. A. McLaren, of this city, driving a Twombly, and C. A. Coey, of Chicago, driving a car of his own manufacture. Not only did McLaren and Coey finish in the same time which they had at Atlantic City the day before, but two other Jerseyites, Harry Seward, of Rutherford, and E. W. H. Riepel, of Ridgewood, in a Zip, also secured a perfect score.

Most of the competing cars averaged 35 miles to the gallon of gasoline, while Coey went through the trip without a puncture.

Elmer Thompson to Direct Parade

NEW YORK CITY, Sept. 5.—It was decided to proceed with plans for a great motor car pageant at a luncheon of the New York Commercial Tercentenary Commission yesterday. The luncheon was in the rooms of the Automobile Club of America.

Elmer Thompson, secretary of the automobile club, was unanimously chosen chairman of the automobile auxiliary committee.

According to tentative plans which have been adopted there will be a mammoth motor car parade, which, it is proposed, will be divided into four sections, industrial, floral, grotesque and electrical. In each division there will be separate prizes for the winners selected by the judges. In addition there will be a grand prize. This probably will be a large gold medal.

The parade is to take place during the evening of Wednesday, October 24, and it was announced that already the Colgate company and the makers of the Thermos bottles have entered floats. An appropriation of $10,000 has been made for the purpose of illuminating the line of march.

More than 40 guests were present, among them:

Alfred Reeves, National Automobile Chamber of Commerce; A. G. Batchelder, American Automobile Association; Fred Wagner, Vice-President George F. Kuntz, Tercentenary Commission; William C. Poertner, Poertner Motor Car Co.; George H. Duck, Motor Truck Club of America; Elmer Thompson, Secretary Automobile Club of America; Secretary De Forest, of the Harlem Board of Trade; Secretary E. H. Hall, Tercentenary Commission; Harvey Robinson, Electric Vehicle Association of America; M. L. Downs.

Eight Cars Start in Wisconsin Tour

MILWAUKEE, WIS., Sept. 7—*Special Telegram*—Eight cars are contesting in the fourth annual Wisconsin Trade Tour which started from Milwaukee this morning and which reached Green Bay, Wis., tonight with every car showing a perfect score.

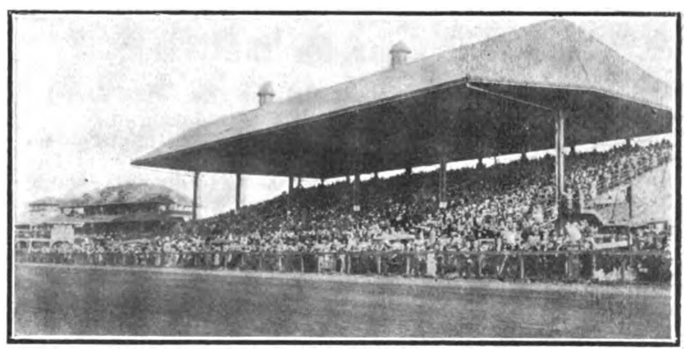
In the dealers' division are Buick, Jeffery, Franklin, new R. C. H., Studebaker and Chevrolet, while in the private owners' division are J. B. Babcock, Franklin and O. H. Stenzel, while the run for the last 3 days covered 483 miles.

The tour is under grade one rule with special regulations framed to cover the stock car angle; both reliability and fuel economy figure in the rules.

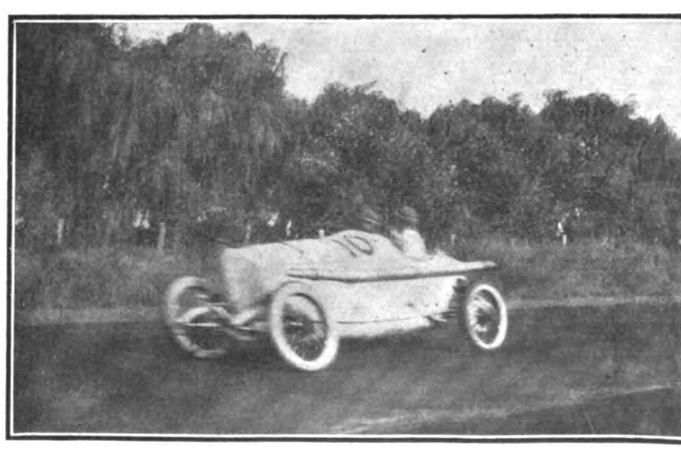
"Keep Money in Circulation"—Mitchell Branch

MILWAUKEE, WIS., Sept. 7—The Milwaukee branch of the Mitchell Automobile Co., 528-532 Broadway, has just issued a letter to its customers which reads:

"The business conditions of today and for the immediate future are largely what you and I choose to make them.



Crowd in grandstand on Labor Day at Brighton races



De Palma speeding on the back stretch in Brighton races

Each one of us can help boom things by forgetting the hole in the doughnut and forging ahead as though nothing unusual was happening on the other side of the pond.

"We have reason to be optimistic. The Mitchell factory in Racine was never before so busy at this season of the year. Why shouldn't this be the case, with good crops all over the country for which growers are receiving the highest prices in history?"

Maxwell Plant Entertains 100 Dealers

INDIANAPOLIS, IND., Sept. 8—About 100 Maxwell dealers attended a meeting in Indianapolis September 1 and were the guests of R. L. Malkin and G. H. Williamson, district salesmen for the Maxwell Motor Sales Corp. for Indiana and eastern Illinois. There was an exhibition of motion pictures, showing the manufacture of the Maxwell 25, a luncheon and a number of interesting talks.

Bonnell To Handle Dodge in Newark

NEWARK, N. J., Sept. 9—The Bonnell Motor Car Co., this city, has been incorporated with a capital of $100,000, to handle the Dodge car in this territory. The incorporators are Horace A. Bonnell, Jacob W. Mason and A. M. Bonnell. A salesroom will be opened at 273-275 Halsey street.

Houpt Handles Mitchell in Five States

NEW YORK CITY, Sept. 8—Harry S. Houpt has taken on the Mitchell line for New York State, New Jersey, Pennsylvania, Delaware and Maryland, embodying a population of over 15,000,000.

He will also continue to handle the Lozier. He has at present agencies in this city, Brooklyn and Philadelphia. He will establish new dealers in those communities where the Mitchell is not represented.

William Wield has been appointed wholesale manager. A stock of $160,000 in repair parts is being carried.

Chalmers' Earnings for Fiscal Year, $1,121,929

NEW YORK CITY, Sept. 4—The Chalmers Motor Co.'s balance sheets as of June 30, 1914, shows its assets as follows: Cash, $1,039,491; notes and accounts receivable, less reserve, $939,703; merchandise inventories, less reserve, $3,473,162; prepaid expenses, $23,759; stock of other companies, $527,599; sales branches, $30,961; plant and equipment, $2,113,278; good will, $1; total, $8,147,958.

Liabilities—Current merchandise accounts, $560,860; deposits, dealers' contracts, $93,408; accrued accounts, $32,278; reserves, $200,881, preferred stock, $1,319,300; common stock, $5,000,000; surplus, $941,229; total, $8,147,958.

According to these figures, $180,700 of the preferred stock has been retired, or $5,700 more than is required per year.

Adding this retired preferred stock to the surplus, $941,229, the company would have earned $1,121,929.

Extra 2 Per Cent. Firestone Dividend

AKRON, O., Sept. 4—The Firestone Tire & Rubber Co. has declared a quarterly dividend of 3 per cent. and an extra dividend of 2 per cent. on the common stock; also a regular quarterly dividend of 1¾ per cent. on the preferred stock. All the dividends are payable October 15 to stock of record of October 1. The previous declaration on the common stock was 2½ per cent.

The common dividend represents an advance in the rate from 10 per cent. to 12 per cent. per annum. The extra dividend has not been declared heretofore.

The gross sales of the company, in the fiscal year ended July 31, 1914, exceeded $19,000,000 against $16,600,000 in the previous year, $11,500,000 in the fiscal year 1912, $7,500,000 in the 1911 year and $5,000,000 in the year ended July 31, 1910.

The company has $3,000,000 common and $1,000,000 preferred stock outstanding, so that earnings, which amount to approximately $3,000,000, are at the rate of nearly 100 per cent. on the common after the 7 per cent. cumulative dividends on the preferred stock.

Market Reports for the Week

This week's markets saw the usual changes. Tin dropped $2.75 per 100 pounds, the arrival of a large amount of that product at the Atlantic ports, having a depressing effect with a small demand from domestic consumers for spot and nearby positions. Copper underwent no material change last week. The demand for this product was light. It was reported that 3,520 tons of copper was exported from Atlantic ports for Europe. In the rubber market consumers are holding aloof from the market pending developments. It is reported that no further auctions will be held in London until after the close of the war.

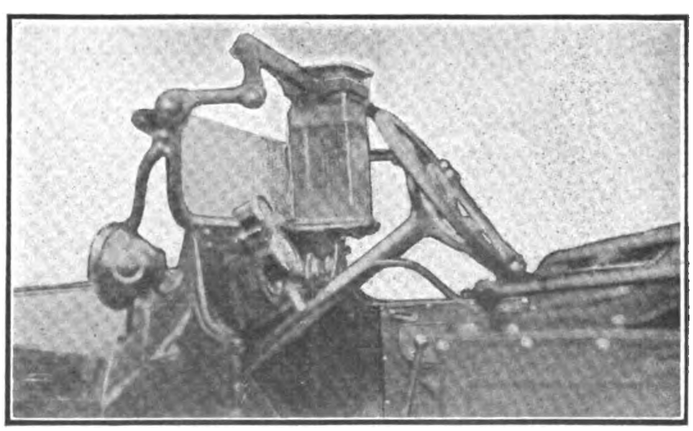
Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.11¾	.11¾	.11¾	.11¾	.11¾	.11¾	......
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	......
Bessemer Steel, ton	20.50	20.50	20.50	20.50	20.50	20.50	......
Copper, Elec., lb.	.12	.12	.12	.12	.12	.12 8/10	+.00 8/10
Copper, Lake, lb.	.12½	.12	.12	.12	.12	.12⅖	—.00 1/10
Cottonseed Oil, bbl.	6.15	6.20	6.02	6.02	6.02	5.85	—.30
Cyanide Potash, lb.	..	..	..	..	..	..	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.93	.93	.93	.93	.93	.93	......
Lead, 100 lbs.	3.87½	3.70	3.70	3.70	3.70	3.85	—.02½
Linseed Oil	.60	60	.60	.60	.60	.60	......
Open-Hearth Steel, ton	20.50	20.50	20.50	20.50	20.50	20.50	......
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	.77	.75	.75	.75	.75	.75	—.02
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	37.50	37.00	36.00	36.00	36.00	34.75	—2.75
Tire Scrap	.05	.05	.05	.05	.05	.05	......

1 Gallon Drives Chevrolet Roadster 27.9 Miles

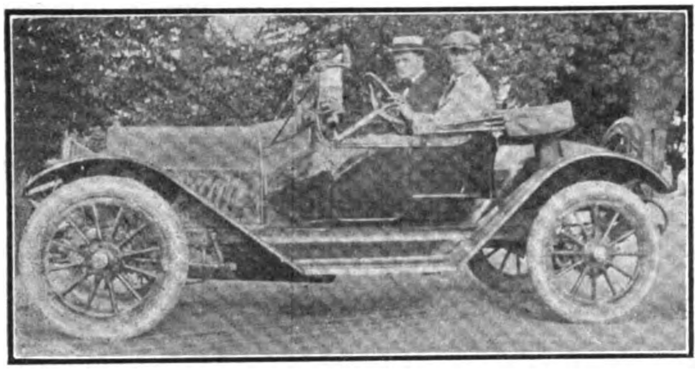
NEW YORK CITY, Sept. 3—A Royal Mail model Chevrolet roadster under test over the roads of Central Park in this city ran 27.9 miles on a measured gallon of gasoline. The car tested was a standard stock model taken from the Broadway sales room and fitted with regular equipment except that the generator was disconnected at the time of the test and the carbureter fitted a one inch Stromberg model-K with a 64 needle. A hot air attachment was fitted.

The test was observed by J. E. Schipper of THE AUTOMOBILE and was carried out under strictly touring conditions. The average speed maintained was 21.6 miles per hour. The brakes were used frequently owing to traffic conditions along the course which was all in Central Park, traveling north on the west drive, and south on the east drive. The carbureter was adjusted for service conditions and did not have the gasoline cut down any more than would be done on the average car. In fact on the same adjustment the car climbed the Abbey hill on direct drive at a minimum speed of 16 miles per hour. This is a gradient which averages approximately 8 per cent.

During the test, the car was declutched on the steeper hills allowing it to coast with the motor idling, and the interconnection which is generally used between the clutch and brake operating on the same pedal, was removed for coast-



Method of mounting graduated tank on Chevrolet test car



Fred Tucker, Stromberg company, left, and Paul Dean, Chevrolet company, driving Royal Mail Chevrolet used in economy test

ing freedom. The clutch slipped slightly when the car was quickly accelerated. The weight of the car complete with two passengers, was 2585 pounds. The tires were Goodyear, 30 by 3.5 Allweather, non-skid tread all around with the rear tires inflated to 70 pounds and the front to 60 pounds. Gasoline was .71 Beaume at 60 degrees Fahrenheit. The odometer was a Stewart-Warner, checked by measurement around the circumference of the wheel. The gear ratio on direct was 4 to 1.

The Chevrolet, Model H-2, 4-cylinder engine used on the Royal Mail roadster, has its valves in the head. It has a bore of 3 11/16 inches and a stroke of 4 inches. In this instance the car was operated with the windshield in one-half position and the certified gallon measure was carried on a bracket on the top of the windshield. One gallon of fuel was placed in this, and after the gasoline in the connecting tube had been exhausted the car was run until it stopped through lack of fuel.

July Exports from New York Decrease $249,915

NEW YORK CITY, Sept. 5.—Exports of automobiles, commercial vehicles and their parts from the port of New York during the month of July amounted to $947,147, against $1,197,062 for July, 1913, a drop of $249,915.

The imports for July, 1914, amounted to $116,837, as compared with $82,133 for that month in 1913, a gain of $34,704.

June exports were a little higher than those of July, amounting to $1,399,125, or a gain of $451,978. The imports during that month amounted to $108,579, or $26,446 lower than July.

The total figures for the month of August have not been completed as yet. The following figures will give the number of cars and commercial vehicles exported and imported during June and July of 1913 and 1914:

JULY EXPORTS

	1914 No.	1914 Value	1913 No.	1913 Value
Cars	840	$638,452	1,183	$1,037,680
Trucks	32	72,102	12	18,344
Parts	..	236,593	..	141,038
Total		$947,147		$1,197,062

JULY IMPORTS

	1914 No.	1914 Value	1913 No.	1913 Value
Cars	9	$17,384	30	$71,543
Parts	..	99,453	..	10,590
Total		$116,837		$83,133

Bakelite Commutator Breaks at 9,060 Revolutions

AN interesting test on the new Bakelite commutator recently adopted by the United States Light & Heating Co. of Niagara Falls, N. Y., has just been completed in the laboratories of this concern. The method by which the test was made was one which served to show a comparative value of the Bakelite moulded insulation as compared with those used previously.

Stress Equal to 15,230 Pounds

The commutator with the improved type of insulation was speeded up to 9,060 revolutions per minute, or 24,600 feet per minute peripheral speed before going to pieces. The chief engineer of this department of the U. S. L. company states that the disrupting forces at this speed figured out to 15,230 pounds at which point the commutator failed by centrifugal strains. As the maximum speed at which such a commutator would be operated in service is only 3,500 revolutions per minute, the factor of safety in the above instance would be 6.7 since the centrifugal force tending to break the commutator varies as the square of the speed.

Made to Stand 10,000 R.P.M.

It is interesting to compare this test with previous ones made by this company on commutators made up of brass and steel rings with mica between the rings and bars. While these constructions prove to be strong enough in practice, the brass commutator went to pieces at 6,000 revolutions per minute, while the steel commutator would stand only approximately 8,000.

Minor alterations made in the design of the new Bakelite commutator have resulted in an increase of strength so that the engineers of the U. S. L. company are of the opinion that these commutators will not stand the stresses imposed upon them at 10,000 revolutions per minute.

The commutator tested is shown in the accompanying illustrations. A part sectional view is given in Fig. 1, showing the construction of the copper segments with the steel rings and the Bakelite insulations. This type of commutator when complete weighs 8.6 pounds and has an outside diameter over the forks of 13.375 inches. When tested the forks were removed, leaving a net weight of 7.06 pounds and an outside diameter of 10.375 inches. This is the diameter at the commutator face.

Tested Under Service Conditions

In order that the commutator while being tested would approach service conditions at the temperature, it was heated to 265 degrees Fahrenheit before testing. This temperature is many degrees more than would occur in practice. In working out the calculations showing that the disrupting force amounted, as stated, to 15,230 pounds, or about 7 tons per square inch, it was shown that since this was resisted by the tensile strength of the steel rings and the Bakelite, the holding power of these components of the commutator is evidently equal to this figure.

It is stated that in addition to having the high tensile strength for commutator insulation, that Bakelite possesses the important qualification of having a high dielectric strength. That is, it resists electricity to a high degree. It will not soften under heat up to at least 400 degrees Fahrenheit and is impervious to oil and moisture.

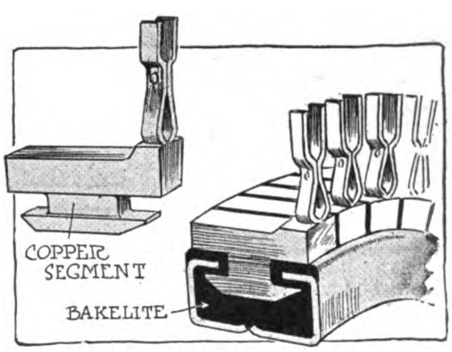


Fig. 1—Section through the Bakelite commutator adopted by the U. S. Light and Heating Co.

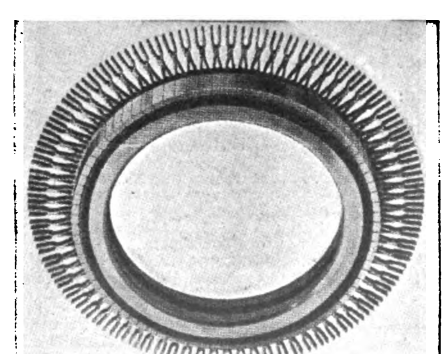


Fig. 2—Assembled view of the complete comutator recently tested up to a speed of 9,000 revolutions per minute

Factory Miscellany

Gear Co. Working Overtime.—The New Process Gear Corp., Syracuse, N. Y., reports that it is working overtime to keep up with a volume of business larger than any heretofore handled. An additional building is now being erected, and the capacity of the case-hardening and heat-treating departments are again being doubled. The total production of the plan in spur, spiral and bevel metal gears and New Process noiseless gears and pinions will, after January 1, 1915, be in excess of 1,000,000 per year. A large part of this output is already contracted for.

Wants Factory Equipment—J. A. Hill, Essex, Ont., is ready to purchase the equipment for a factory to manufacture cycle cars.

Covert to Erect—Covert Motor Vehicle Co., Lockport, N. Y., will erect a $50,000 addition as soon as switching facilities can be adjusted.

Canadian Top Will Enlarge—The Canadian Top Co., Tilbury, Ont., manufacturer of automobile tops, contemplates enlarging its present plant.

McQuay-Norris Moves—The McQuay-Norris Mfg. Co., St. Louis, Mo., manufacturers of leakproof piston rings, has removed into its new quarters, 2208 Locust street.

Tire Plant in New Orleans—The York Co-operative Tire & Rubber Co., New Orleans, La., plans to erect a tire manufacturing plant. Leslie Dunnis is president and W. Cooke, vice-president.

Radiator Plant for Jamestown—Jamestown, N. Y., men, headed by John Gabrielson, have chartered the Gabrielson Car Parts Manufacturing Co., with $35,000 capital, and will build a plant at Jamestown to manufacture automobile radiators.

Splitdorf Ready for All Orders—The Splitdorf Electrical Co., Newark, N. J., states that it is ready to fill all orders for ignition units. All the units of its output are made in America and it has sufficient raw material on hand to effect all deliveries.

Avon Tire Co. Increasing—The Avon Tire Co., Lynn, Mass., has secured the buildings formerly used by the Sagamore Rubber Co., East Saugus, and has moved into them, increasing its force to more than 200, which is turning out solid tires that have a good sale.

Lambert Co.'s New Plant—The Lambert Mfg. Co., Anderson, Ind., has acquired a 6-acre site at El Segundo, Cal., and will erect a plant for the manufacture of motor tractors. The plant will be 60 by 200 feet. S. J. Smith is manager and J. W. Lambert, president.

Auto Products May Move—The Board of Trade has succeeded in negotiations whereby the Auto Products Co., Canton, O., will remove to Canal Dover, O., as soon as $20,000 worth of 7 per cent. preferred stock can be sold. It is planned to begin operations within 60 days as soon as negotiations are completed.

Want Plant in Neenah—The Neenah (Wis.) Advancement Assn. is in negotiation with the Rayfield Cyclecar Co., Christman, Ill., with a view to inducing the removal of the plant to Neenah. The Rayfield people are asking that Neenah capital subscribe to $20,000 worth of its stock.

Cooking Outfits for Automobiles—A factory for the production of cooking outfits designed especially for motorists is being established in the former Reliance Engine Co.'s foundry at Racine, Wis., by John Dean and G. M. Prentiss, who have secured ample financial backing to organize a $50,000 corporation for this purpose.

Rhineland's French Factory Running—The Societe Francaise des Roulements a Billes, Ivry Port, Paris, France, the foreign plant of the Rhineland Machine Works Co., New Britain, Conn., is running. The American factory, the Fafnir Bearing Co., New Britain, is running full force, and has a supply of imported steel and balls to last for many months.

Dayton Cyclecar Plant in Joliet—The Dayton Cyclecar Co. of Ohio has concluded negotiations for the opening of a branch factory in Joliet, Ill. It is planned to construct 3,000 of these cars during the coming year. Thomas Donovan, representing the Dayton company, has been in Joliet for several davs conferring with the Chamber of Commerce regarding suitable quarters.

Standard Welding's Big Rim Contracts—Rim contracts secured so far this season by the Standard Welding Co., Cleveland, O., indicate that more than 150,000 automobiles of the 1915 stamp will have Stanweld detachable or demountable rim equipment. And this quantity does not include the plain clincher type rims, of which the Standard company manufactures approximately one and a half million a year.

Maxwell's Memphis Branch Plant—The Maxwell Motor Co., Detroit, plans to establish a branch plant at Memphis, Tenn. It will be used for manufacturing light parts and for assembling work. A considerable amount of machinery will be needed. The building will be six stories, and with its equipment will cost $200,000. A site has already been leased. Vice-president Charles Gould is in charge of locating the branch, which will serve the Southern and Southwestern trade.

The Automobile Calendar

Sept. 7-14	Hartford, Conn., Show, Charter Oak Park.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9-11	Convention Paving Brick Mfrs. Assn., Cleveland, O.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 12	Hamline, Minn., Track Meet, Minn. State Fair.
Sept. 15-16	Norfolk, Neb., Track Race, Norfolk Commercial Club.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 23-Oct. 3	Oklahoma City, Okla., Show, Oklahoma Automobile Association.
Sept. 26	Kalamazoo, Mich., 100-Mile Track, Inter-State Fair.
Sept. 27	Pleasanton, Cal., Track Meet, Alameda County Fair Assn.
Oct. 3-10	Cincinnati, O., Show.
Oct. 3	Fresno, Cal., Track Meet, Fresno Co. Agricultural Assn.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 5-12	St. Louis, Mo., Show, Forest Park Highlands.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 10	Medford, Mass., Track for Light Cars, Combination Park.
Oct. 10-17	Boston, Mass., New England Light Car and Cyclecar Show, Horticultural Hall.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1	Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 26	Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4	New York City, Annual Meeting of the American Society of Mechanical Engineers.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Automobile Show.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Mar. 7	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

The Week in  the Industry

Motor Men in New Roles

MORGAN FORD'S Newark Booster—Gaston Plaintiff, the New York City manager for the Ford Motor Co., has arranged with W. J. Morgan to become connected with the Newark, N. J., branch as a sort of general booster, his principal work being in the sales department and also in local publicity.

Eib Frisco Oakland Manager—C. C. Eib will hereafter control the sales of the Oakland car in San Francisco.

Johnston Sales Manager—J. E. Johnston has been named sales manager for the Hennepin Truck Sales Garage, Minneapolis, Minn.

Haskins Branch Manager—C. B. Haskins has been appointed branch manager of the Walker-Bin Co., 239 Michigan avenue, Detroit, Mich.

Landman Sales Manager—A. E. Landman has been appointed sales manager for the Don Lee Co. in Los Angeles, distributor of Cadillac cars.

Dowse with Kelly-Springfield Tire—R. P. Dowse, who was general sales representative of the Goodyear Tire & Rubber Co., Detroit, Mich., is now with the Kelly-Springfield Tire Co., Akron, O.

Lay Joins Dodge Bros.—R. P. Lay, assistant chief engineer of the H. H. Franklin Mfg. Co., Syracuse, N. Y., has resigned his position and September 1 took up his duties with Dodge Bros., Detroit, Mich.

Clough Resigns—C. Roy Clough has resigned as manager of the Brasher Motor Car Co., Columbus, O., to accept a position as sales manager with the Broad-Oak Automobile Co., also of Columbus.

Stewart Abbott Sales Manager—C. D. Stewart has been appointed sales manager of the Abbott Motor Co., Detroit, Mich. He was formerly the Abbott company's branch manager in Harrisburg, Pa.

Moore Resigns from J.-M.—F. L. Moore has resigned as city sales manager for the Indianapolis sales branch of the H. W. Johns-Manville Co., to take a similar position in that city with the Lyons-Atlas Co.

Myers Connects with Cole—W. D. Myers has become associated with the sales department of the Cole Motor Car Co., Indianapolis, Ind. Until recently Mr. Myers was general sales manager for the Stutz Motor Car Co.

Earle Lozier Wholesale Representative—R. D. Earle, who formerly was head of the American Automobile Co., Philadelphia, Pa., has become associated with Harry S. Houpt, Inc., 250 North Broad street, the local Lozier agency, in the role of wholesale representative.

Everitt Hayes Body Manager — The Hayes Mfg. Co., Detroit, Mich., announces that B. F. Everitt has been appointed manager of its body building department. Mr. Everitt is well known in the automobile trade having been connected with the E-M-F, Wayne and Everitt automobile companies.

Packwood Briggs-Detroiter Sales Manager—F. B. Packwood, formerly in business in Lincoln, Neb., where he was distributor for the E-M-F, Everitt, Krit and Winton cars, has been appointed western sales manager of the Briggs-Detroiter Co., Detroit, Mich., with headquarters in Lincoln.

Williams Resigns from Franklin.—W. M. Williams, who for the past 2 years has been advertising manager of the Franklin Automobile Co., Syracuse, N. Y., has resigned his position and leaves the automobile field. He became identified with the International Liberty Union of Covington, Ky., on September 1.

Sutton Succeeds Packham—N. F. Sutton, for almost a year a member of the sales force of the General Motor Truck Co., has been promoted to the managership of the St. Louis (Mo.) branch. Mr. Sutton, who previously was connected with the Mitchell branch at Dallas, Tex., succeeds C. M. Packham, resigned.

Burns Joins Providence Co.—J. E. Burns, formerly manager of the Lee Motor Car & Supply Co., New Bedford, Mass., and later factory branch representative for the Jackson cars in Boston, has become identified with the Davis Automobile Co., Providence, R. I., which recently took the agency for the Regal cars.

Flagg Joins Standard Welding—Howard A. Flagg has become associated with the selling forces of the Standard Welding Co., Cleveland, O. Mr. Flagg has been connected with the seamless tubing industry for the past 15 years. At one time Mr. Flagg was sales manager of the steel tubing department of the Standard Welding Co.

Motsinger Rayfield Representative—N. H. Motsinger, Jr., is the latest addition to the Rayfield Carburetor organization. He formerly represented the Schebler Co. in Chicago, being Chicago branch manager for a number of years. Mr. Motsinger will serve the Findeisen & Kropf Mfg. Co., Chicago, Ill., in the capacity of factory representative.

Recent Changes in Seattle—Numerous changes have recently been made in the force of the Waterhouse-Sands Motor Co., Seattle, Wash. Earl Staley will hereafter be superintendent of the mechanical department, Will Culberson assistant to Mr. Sands in charge of the office. A. B. DeCasteline has recently joined the sales staff of the Gerlinger Motor Car Co., Seattle, taking charge of the Oldsmobile sales.

Winchell Retires—E. R. Winchell, well known Portland, Ore., dealer and formerly at the head of the Oregon Motor Car Co., has decided to retire from the automobile business in Portland. Mr. Winchell has sold his share to his associates, F. C. Riggs and W. C. Garbe. The management of the business will be under the supervision of W. C. Garbe, assisted by D. C. Warren. Mr. Winchell will tour through Oregon and California before announcing his plans.

Henshaw Gets Dodge in Boston—The uncertainty relative to the agency for the Dodge car in Boston was settled last week when the announcement was made that Charles S. Henshaw was to market the car. He has been in the motor industry since 1890, and a few years ago was manager of the E. R. Thomas branch in New York, going from there to the Alvan T. Fuller Co. Boston, to sell Packards. He has formed a company and will begin business October 1.

Tway Heads Haynes Branch — The Haynes Automobile Co., Kokomo, Ind., has opened a branch in Birmingham, Ala., at 400 South 21st street, in charge of Charles W. Tway and D. B. Williams, as assistant manager. From this branch all the business in the states south of the Ohio River and the West Indies is now being looked after or controlled. Here will be the headquarters of the traveling men and service mechanics for the entire territory controlled by the branch.

Join Studebaker Staff—To link more closely the factory sales organization with its force in the field, Sales Manager Ollier of the Studebaker Corp., has appointed the following staff of special representatives: New England, G. N. Jordon; South Atlantic, Edward A. Haybell; Central West, J. M. Opper; Southwest, L. A. Tilley; Pacific Coast, B. O. Willebrands. D. R. Murrell and R. C. Bridge have been promoted to be district representatives with headquarters at Norfolk, Va., and Salt Lake City, respectively.

Garage and Dealers' Field

"Sleuth" Looks for Bad Tires—"Follow Up" as it may be applied to the automobile tire business is demonstrated by a firm of dealers in Birmingham, Ala. This company sends a scout about town to note when any of the Ajax tires, which it handles, are showing signs of being worn so that a new casing is likely soon to be necessary. From his reports solicitation of business follows by telephone, call and letter.

Banquet for Maxwell Dealers—Dealers in the Maxwell in Ohio were given a banquet at the Southern Hotel, Columbus, August 28 as the guests of the company. The company was represented at the dinner by L. S. Smith, manager of sales in central Ohio; John G. Paine, manager of sales in northern Ohio, and W. D. Paine, supervisor of sales in the East. W. D. Paine acted as toastmaster. One of the features of the banquet was a moving picture show entitled "From Molten Steel to Automobile."

Hupmobile Makes Good Run—The Messrs. Card & Brown, of the Central Iowa Motors Co., which handles the Hupmobile in Des Moines, Ia., made a rather fast trip in their 1915 demonstrator from Detroit to this city. Leaving the Michigan automobile metropolis at nine o'clock Wednesday morning of last week, they reached that city at 9:37 p. m. on Friday, having covered a distance of 760 miles in 29 hours. The car consumed, all told, 2½ gallons cylinder oil and averaged 19¼ miles to the gallon of gasoline.

Automobile Agencies Recently Established

PASSENGER CARS

Arkansas

Malvern	Maxwell	J. W. Alexander

California

Leemors	Haynes	Valley Garage
Stockton	Haynes	White Garage
Vallejo	Haynes	Acme Garage, Inc.

Canada

Berlin, Ont	Regal	E. L. C. Browne
Mildmay, Ont	Regal	Geo. Kuneman
Port Arthur, Ont	Saxon	Central Garage
Sault Ste. Marie, Ont	Regal	G. P. Black
Toronto, Ont	Regal	Regal Motor Sales Co.

Colorado

Denver	Apperson	Wm. Thorney Auto Co.
Denver	Dodge	Tom Botterill
Denver	Regal	Mid-West Auto Sales Co.

Connecticut

Danville	R-C-H	John P. Agan
E. Norwalk	R-C-H	Reddy & Ayers

Delaware

Wilmington	Haynes	Delaware-Touraine Co.

District of Columbia

Washington	Haynes	Briscoe Sales Co.

Florida

Tampa	Regal	E. E. Cone

Georgia

Atlanta	Haynes	Pegram Motor Co.
Macon	Haynes	Geo. R. Napier
Savannah	Haynes	Arthur H. Hadden

Illinois

Albany	Saxon	J. W. Dineen
Johnson City	Saxon	Colp Mercantile Co.
Olney	Saxon	Auto Supply Co.
Peoria	Haynes	Automobile Exchange of Peoria
Pontiac	Haynes	J. P. Cook & Co.
Princeton	Haynes	Alpaugh Bros.
Ramsey	Haynes	L. F. Strobel

Indiana

Angola	Haynes	Hendry & Elston
Portland	Haynes	Fred Foltz
Redkey	Saxon	Redkey Garage
Valparaiso	Haynes	Wheeler Elam Co.

Iowa

Clinton	Saxon	Andrew Payson
Clinton	Saxon	Saxon Motor Co.
Clinton	Vulcan	Andrew Payson
Corydon	Haynes	Wayne County Auto Co.
Des Moines	R-C-H	Holsman Sales Co.
Des Moines	Regal	Means Automobile Co.
Grinnell	Haynes	W. P. Watson

Kansas

Wichita	Regal	Regal Motor Co.

Massachusetts

Boston	R-C-H	D. Houston
Meridian	Haynes	John H. Semmes Motor Co.
Northampton	R-C-H	T. J. Collins

Michigan

Detroit	Detroiter	The McKenney-Devlin Co.
Detroit	Monarch	Owen-Schoeneck Co.
Detroit	R-C-H	E. W. K'Burg
Howell	Buick	C. B. Atkin
Jackson	R-C-H	Weber Bros.
Marquette	Regal	Asire & Palmer
Traverse City	Regal	S. O. Sawyer

Minnesota

Minneapolis	R-C-H	Choate Auto Co.
Minneapolis	Regal	Regal Motor Co.

Missouri

Kansas City	Chandler	The Chander Six Co.
Springfield	Regal	Sam Herrick & Son
St. Louis	Davis	The Cherokee Auto Co.
St. Louis	Wagenhals	Wagenhals Motor Co.

Montana

Anaconda	Regal	Frank M. Osborne
Bridger	Haynes	Dowdle & Hough
Glendive	Saxon	David Leidehl

Nebraska

Fremont	Haynes	Leslie L. Whitcomb
Schuyler	Haynes	Douglas Grotluschen

New Jersey

Elizabeth	R-C-H	Franklin Auto Co.
Swedesboro	Haynes	H. F. Hunter

New York

Albany	Hupmobile	The Stutz Auto. Co.
Buffalo	R-C-H	Geo. C. Barone
Fulton	R-C-H	Geo. M. Ives
Rochester	R-C-H	A. V. Hart
Watertown	R-C-H	A. E. Lawyer

North Carolina

Kinston	Saxon	Kinston Garage

Ohio

Archbold	Haynes	Haynes Auto Sales Co.
Bellefontaine	Saxon	Hornsberger Garage
Cedarville	Allen	Magley Bros.
Cleveland	Hupmobile	The Richardson Motor Car Co.
Columbus	Cadillac	Curtin-Williams Auto Co.
Columbus	Chalmers	Broad-Oak Automobile Co.
Columbus	Crescent	Craighead Motor Sales Co.
Columbus	Detroit	F. E. Avery & Son
Columbus	Empire	S. W. Schott
Columbus	Mitchell	G. E. Thomas Co.
Columbus	Packard	F. E. Avery & Son
Columbus	Pierce-Arrow	Broad-Oak Automobile Co.
Columbus	Oakland	Oscar Lear Motor Co.
Columbus	Saxon	Broad-Oak Automobile Co.
Convoy	Saxon	W. G. Campbell
Marietta	Ford	The Marietta Motor Car Co.
Spencerville	Haynes	American Motor Sales Co.
Springfield	Allen	The Eaton Motor Service Co.
Toledo	Haynes	Wm. Wheaton
Toledo	R-C-H	E. W. K'Burg

Oklahoma

Blackwell	R-C-H	J. D. Winfield
Hinton	Regal	Jas. A. Knox

Pennsylvania

Easton	Haynes	Keifer & Steele Motor Co.
Philadelphia	Hupmobile	Tioga Auto Co.
Philadelphia	R-C-H	Colonial Motor Co.

Rhode Island

Providence	Elk-Hart	A. O. Poirier
Providence	Cole	Cole Motor Sales Co.

South Carolina

Abbeville	Cole	A. M. Stone
Charleston	Cole	King Auto & Repair Co.
Clio	Cole	T.G.Covington Auto Co.
Columbia	Haynes	The Haynes Motor Car Co.

South Dakota

Fargo	Kissel	Ball Auto Co.

Tennessee

Nashville	Buick	Nashville Motor Car Co
Nashville	Overland	Union Motor Car Co
Nashville	Ford	Hartsfield Auto Co.
Nashville	Ford	Mitchell Burton
Nashville	Mitchell	Burton Auto Co.

Texas

San Antonio	Studebaker	Collins-Clem Auto Co

Virginia

Clifton Forge	Haynes	W. G. Mathews
Fredericksburg	Saxon	W. A. Richards, Jr.
Gig	Haynes	Chas. J. Hitchens
Harrisburg	Haynes	Kavanaugh Garage
Monterey	Haynes	Kyle Garage Co.

Washington

Dayton	Haynes	W. K. Bloome
North Yakima	Haynes	Central Auto & Supply Co.
Spokane	Chevrolet	Moylan-Reilly Auto Co.
Spokane	Elk-Hart	The Ward Symington Co
Walla Walla	Haynes	G. G. Sohneller

West Virginia

Charleston	Haynes	Wm. Hoferer & Son
Huntington	Haynes	Walter L. Robinson
McMechen	Alter	W. R. Baumberger
Newburg	R-C-H	J. T. Logsdon
New Cumberland	Regal	Scott Bros.
Princeton	Haynes	Princeton Motor Garage Co.
Wheeling	Overland	The Auto Sales Co.

Wisconsin

Green Bay	Cole	Washington Garage
Milwaukee	King	The Schreiber-Boorse Motor Car Co.
Milwaukee	Regal	Regal Motor Co.
New London	R-C-H	New London Hardware Co.
Prairie du Chien	Saxon	Harris Auto Co.
Seymour	Saxon	Otto Motor Co.
Sheboygan	Cole	The Struebing Garage

COMMERCIAL VEHICLES

Alabama

Gadsden	Koehler	Etowah Warehouse Co.
Montgomery	Koehler	Patterson & Ingalls

Connecticut

Hartford	Selden	Keeney Garage Co.
Hartford	Vim	Keeney Garage Co.

New York

Bergen	Koehler	Geo. E. Parish

Ohio

Wooster	Koehler	Rice & Wacker

Pennsylvania

Philadelphia	Flint	D. Walter Harper

South Carolina

Honea Path	Koehler	McKenzie & Monroe

Texas

Austin	Koehler	S. E. Kinney
Belvidere	Koehler	Harry Searles
Dallas	Koehler	W. T. Keaton
San Antonio	Koehler	C. H. Dean

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

Connecticut

HARTFORD—Colonial Auto Co.; capital, $20,000; to deal in motor cars. Corporators: William M. and Hazel O. Turnbull, both of Hartford; David A. Turnbull, Willimantic.

NORWALK—Norwalk Supply Show; capital, $5,000; to deal in motor cars. Corporators: John A. and Sarah L. Mills and M. A. Gregory, all of Norwalk.

Illinois

CHICAGO—Ideal Automobile Co.; capital, $1,000; to manufacture and deal in machinery, motor car parts and accessories. Corporators: Archie A. Gross, S. Abrahamson, Arthur C. Dunning and Leonard L. Cowan.

Indiana

JEFFERSONVILLE—Jeffersonville Motor Car Co.; capital, $10,000; general motor car business. Corporators: Don Williams, Fred D. Deitrich, William Kilgus and others.

Massachusetts

HAVERHILL—Renton Motor Car Co.; capital, $2,000; to deal in motor cars. Corporators: Lester T. Wolff, Ralph W. Renton and Francis W. Johnson.

New York

NEW YORK—Arthur J. Myers; capital, $3,000; motor car business. Corporators: Harold M. Greenbaum, William P. Roley and Augusta E. Eubin, all of 2 Rector street.

NEW YORK—Taft-Rich Auto Co.; capital, $10,000. Corporators: Roland Richensteen and Royal R. Richensteen, both of Rockville Center, and Augusta Taft, 44 Ely avenue, Long Island City.

Ohio

CINCINNATI—Cincinnati Automobile Dealers; capital, $2,500. Corporators: Harry C. Brunton, Edgar A. Kruse and Frank H. Miller.

TOLEDO—Toledo Cadillac Co.; capital, $20,000; motor cars and accessories. Corporators—T. H. Towell, William H. Marlott, R. G. Morrison, F. H. Pelton and J. B. Wood.

Pennsylvania

SCRANTON—Scranton Automobile Co.; capital, $100,000; to manufacture motor cars. Corporators: H. R. Shaw, T. Prevost and L. G. Stark, all of Scranton.

GARAGES AND ACCESSORIES

Massachusetts

BOSTON—International Sales Organization; capital, $50,000; motor car supplies, metal polishes and general manufacturing business. Corporators: L. Taylor and R. Taylor, both of Stamford, Conn.; E. W. Brown, Boston.

New York

ROCHESTER—J. Lawrence Hill Co.; capital, $10,000; to deal in storage batteries. Corporators: J Lawrence Hill, J. Jaffrey and J. Hill.

Ohio

CLEVELAND—Limou Curtain & Equipment Co.; capital, $1,000; to deal in Limou curtains and motor car accessories. Corporators: A. P. Fischley, Beatrice B. Fischley, C. Albracht, Jessie L. Albracht and C. M. White.

CHANGE OF NAME AND CAPITAL

Michigan

DETROIT—Scripps-Booth Co., from $50,000 to $100,000.

Ohio

TOLEDO—Willys-Overland Co., from $25,000,000 to $50,000,000.

Wisconsin

MILWAUKEE—Bugett & Co., from $15,000 to $25,000.
MILWAUKEE—Stanley Steamer Co. to Bugett & Co.

Accessories for the Automobilist

UNIVERSAL Piston Valve Motor—A new type of piston valve motor, Figs. 1 and 2, in which the valves open and close very quickly and with absolute silence, is announced by the Universal Mfg. Co., Minneapolis, Minn. In other respects the motor is like any conventional poppet valve design. It is an L-head type with block cast cylinders. The valves are operated by the connecting-rod and crank mechanism shown. The quick opening is obtained by the peculiar curve of the member that engages the valve crankshaft.

The construction calls for the intake and exhaust headers being placed on the top of the motor, as shown, the high position of the intake manifold giving a very accessible carbureter location, and there is no chance for missing, caused by condensation, to occur.

In this engine the intake valve opens 5 degrees after top dead center and closes 45 degrees after bottom dead center. The exhaust valve opens 35 degrees before top dead center and closes 10 degrees after top dead center. The quick opening and closing of the valve give added power for the weight, it is claimed, and the small percentage of power absorbed by the valves and the valve mechanism is said to make the engine desirable for motor car service. It is a simple motor from a manufacturing point of view and can be fitted with almost any type of ignition. In the lubrication of this motor there are two reservoirs, one for the valve mechanism and the valves and the other for the remaining parts. Splash is employed throughout and when the valve oil supply rises too high there is provided an outlet into the main motor reservoir.

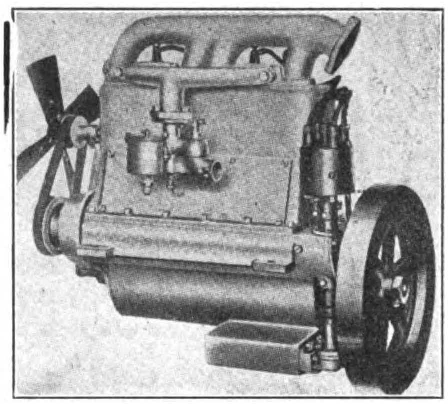


Fig. 1—Universal piston-valve motor

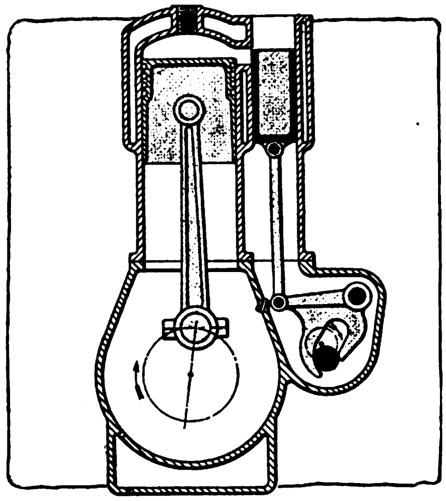


Fig. 2—Section through Universal motor

New Air Starter—An air cranking system, Figs. 3 and 4, which is somewhat similar in its general operation to the units of an electric starting and lighting system has just been brought out by the Auto Air Appliance Co., Baltimore, Md. Its operation is like that of an electric system in so far as it generates its own power in the form of compressed air, while the gasoline engine is running and later uses this stored energy to crank the engine. It consists essentially of a four-cylinder compressor-motor connected by silent chain to the engine crankshaft, this compressor pumping air to a tank. When desired for starting the air from the tank is sent back through the compressor, which turns over the engine. The entire apparatus necessary for this installation consists of the compressor, which is 12 inches long, 9 inches high and 5½ inches wide; a storage tank, 42 inches long; gauge, valves and an automatic governor for controlling the flow of air to and from the compressor, its functions being analogous to that of an automatic cutout in an electric-lighting system.

Fig. 4 shows the arrangement of the parts when installed. It will be seen that the compressor-motor is attached to the crankshaft of the engine by chain, and from the compressor lead two pipes, both terminating in the storage tank. One pipe sends air to the tank and the other is a feed pipe for air from the tank to the compressor. When the gasoline engine is started the compressor starts pumping air to the tank to a predetermined maximum pressure, and when this pressure is reached an automatic governor disengages the compressor clutch, thereby stopping further flow of air to the tank. When the pressure in the storage tank drops to a predetermined minimum the compressor again starts sending air to the tank. This arrangement then is similar to electric starting systems in which an automatic cutout is used for connecting and disconnecting the generator from the battery circuit, only in this case a governor disconnects and connects the compressor to the air line.

In order to crank an engine with this device it is necessary only to press the starting button shown in the illustration, this operation admitting air to the four-cylinder compressor, and the compressor, being connected with the engine crankshaft, turns it over, but the moment the pressure on the button is released the compressor ceases to be a motor and starts pumping air to the storage tank. The release of the starting button puts the governor in operation to perform this function.

When acting as a compressor, only two of the four cylinders are in use, and according to a statement from the company, the tank can be filled with air to a maximum pressure of 250 pounds in 5 minutes if the car is operating at a speed of 30 miles per hour. This is decreased to 15 minutes should the car be traveling 10 miles per hour. A test by the maker has shown that with air at 235 pounds pressure in the tank a 30-horsepower engine can be started thirty-five times without exhausting the tank. The turning speed of the gasoline motor is 200 r.p.m.

The compressor-motor is built like an ordinary gas engine. The cylinders, pistons, rings, etc., are iron castings, the crankcase aluminum and the connecting-rods drop-forgings. Oiling is by splash.

It is obvious that with a storage tank

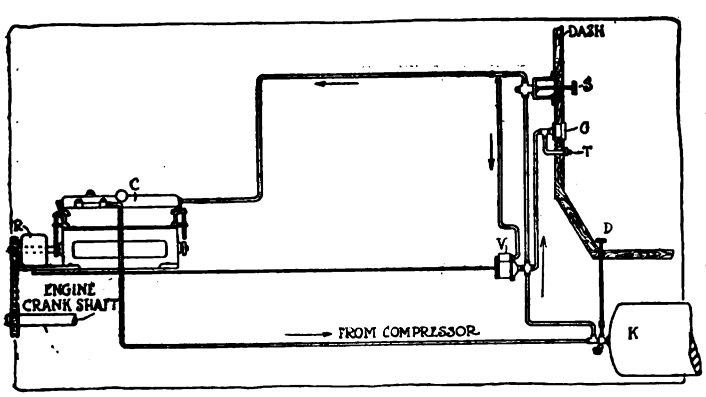
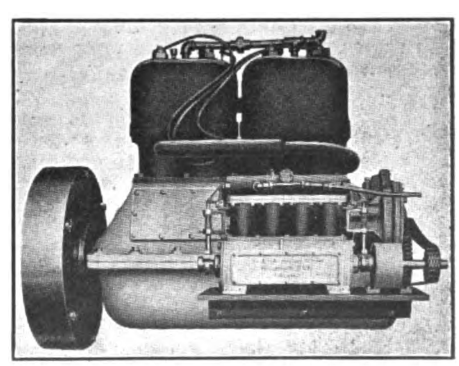


Fig. 3 — Right—Auto air appliance starter attached to motor

Fig. 4—Left—Starter piping layout, showing connection to motor and tank, and dash control



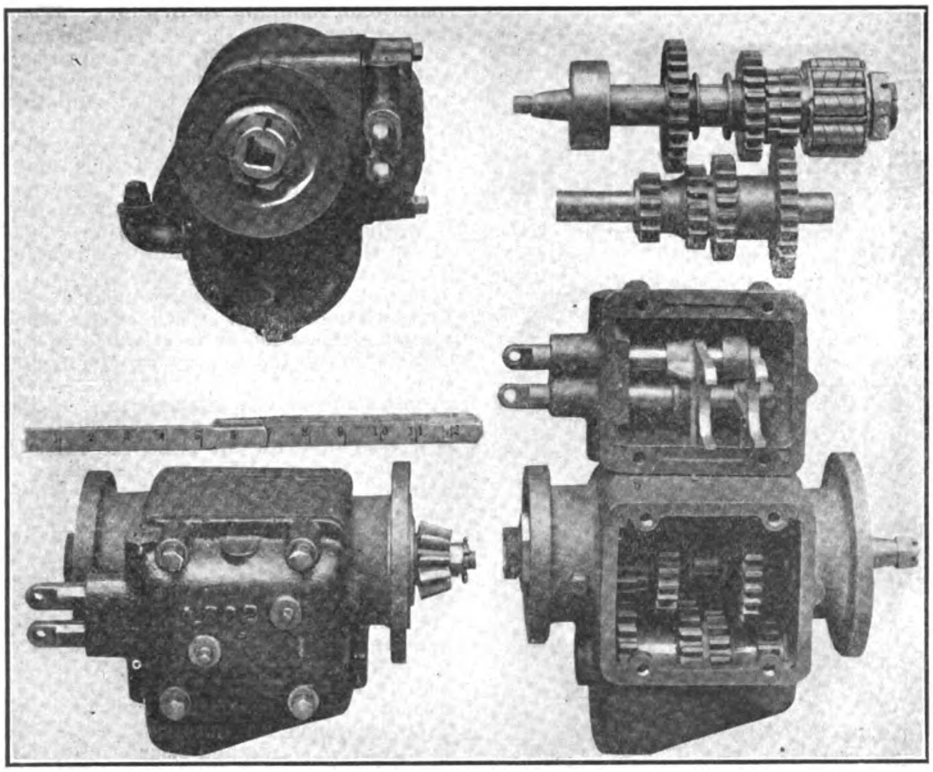


Fig. 5—Northern small car gearset. This model is for attachment to the rear axle. Another type is made for unit power plant constructions

with 250 pounds air pressure, some of this can be used for purposes other than cranking, and the device just described uses surplus air for inflating tires and for cleaning.

Northern Small Car Gearsets—Two types of three-speed sliding gearsets are manufactured by the Northern Engineering Works, Detroit, Mich., for small cars. From 12 to 18 horsepower can be transmitted. One is for attachment to the rear axle and the other is for use in connection with a unit power plant construction. The former is shown in Fig. 5.

With the exception of the details noted both gearsets are identical. The gears have ⅝-inch face, seven to nine pitch and all the principal gears are cut from 3.5 per cent. At the front, Hyatt roller bearings are employed, while at the rear double-row ballbearing bearings are found. The case is made of cast iron, and the shifter rods are assembled in the cover, providing both accessibility and compactness. The ratio on second is 1.73 to 1, on low 2.98 to 1, and reverse 3.64 to 1.

Fowler Flex-Spring Shock Absorbers—A new type of shock absorber for Ford cars is indicated in the device illustrated in Fig. 6, and which is manufactured by the Fowler Lamp & Mfg. Co., 57 East 24th street, Chicago, Ill. The price complete with studs and grease cups is $8 per set.

Highway Tire Straps—To prevent skidding, tire wear, punctures and blow-outs, a flexible leather and steel tire covering has been brought out by the Bukolt Mfg. Co., Stevens Point, Wis. The name of the device, Fig. 7, is Highway Tire Straps, because it consists of a series of straps linked together. The device may be easily and quickly removed when desired. The price for a 28 by 3 shoe is $8.80 and for a 38 by 5 $22.

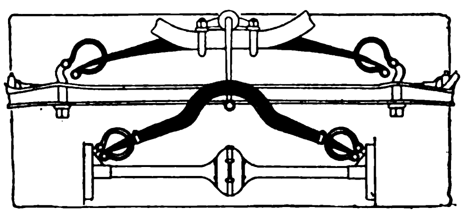


Fig. 6—Fowler Flex-Spring shock absorbers

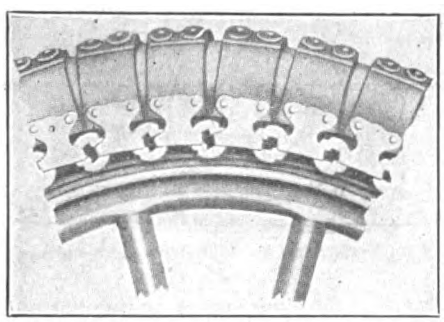


Fig. 7—Highway tire straps

Curtis Auto Trailer—The trailer shown in Fig. 8 is a two-wheeled device in which the springs are mounted on an underslung frame and in which a special form of hitching tree is used so that the trailer may be clamped to the back of any car. This device permits the car to turn at any angle and yet the trailer will follow directly in its track. The body is 41.5 inches wide and 7 feet 3 inches long. Its capacity is 1,000 pounds. The price with steel tires and 1,000-mile axle is $60; with rubber tires and 1,000-mile axle, $75, and with roller bearings and rubber tires, $90. It is manufactured by Alex R. Curtis, 1405 Hennepin avenue, Minneapolis, Minn.

Sheldon 3-Ton Axle—The 3-ton worm gear axles now being delivered by the Sheldon Axle Co., Wilkesbarre, Pa., follow the same general design of the previous models.

The worm is made of special heat-treated steel and ground by special machinery. The worm wheel is cut from special formula bronze and by special machinery for this work. The worm and worm wheel are carried in a worm carrier—a very substantial casting machined by special jigs and fixtures to receive the worm and worm wheel in perfect alignment. The methods employed in machining the worm carrier insures positive adjustment at all times and renders the assembly unit absolutely fool-proof.

Ball bearings are used throughout, giving the truck buyer a worm gear axle in which there is absolutely nothing to get out of alignment.

The top of the worm gear carrier is drilled and tapped for an eye bolt to facilitate the removal of this unit, which contains the worm, worm wheel, radial bearings, thrust bearings and differential bearings. The differential thrust bearings are mounted in the axle housing proper.

All differential gears and pinions are 3½ per cent. nickel steel, heat treated. The differential spider is drop-forged and 3½ per cent. nickel steel, heat treated and ground to size.

The axle shafts are 3½ per cent. nickel steel, heat treated, and accurately proportioned to insure uniform stresses throughout.

Special attention has been given the subject of brakes on this axle, with the idea of securing the proper brake area, and at the same time using 36-inch diameter wheels and securing proper clearance between the brake parts and the skid chains. The axle is equipped with 20-inch brake drums and has four 2½-inch wide internal brakes. This design gives ample brake area and at the same time permits the use of 36-inch wheels with anti-skid chains, without interfering with any of the brake parts. This design also has the added advantage of protecting the brake drum and lining from mud and dirt, which works much damage with these parts.

No provision is made for radius or torsion rods. The braking and driving torque are taken through the springs.

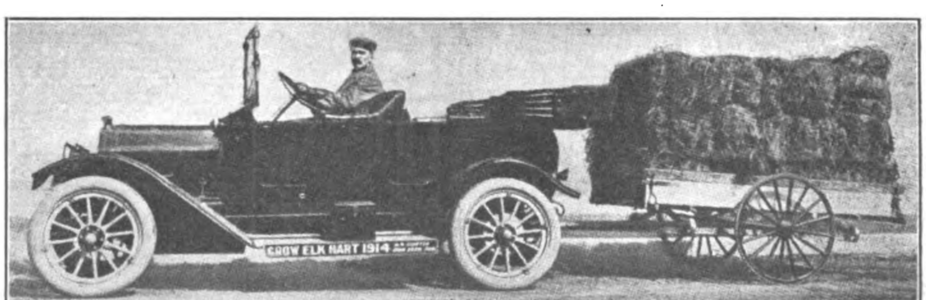


Fig. 8—Curtis auto trailer hauling a load of hay

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The AUTOMOBILE

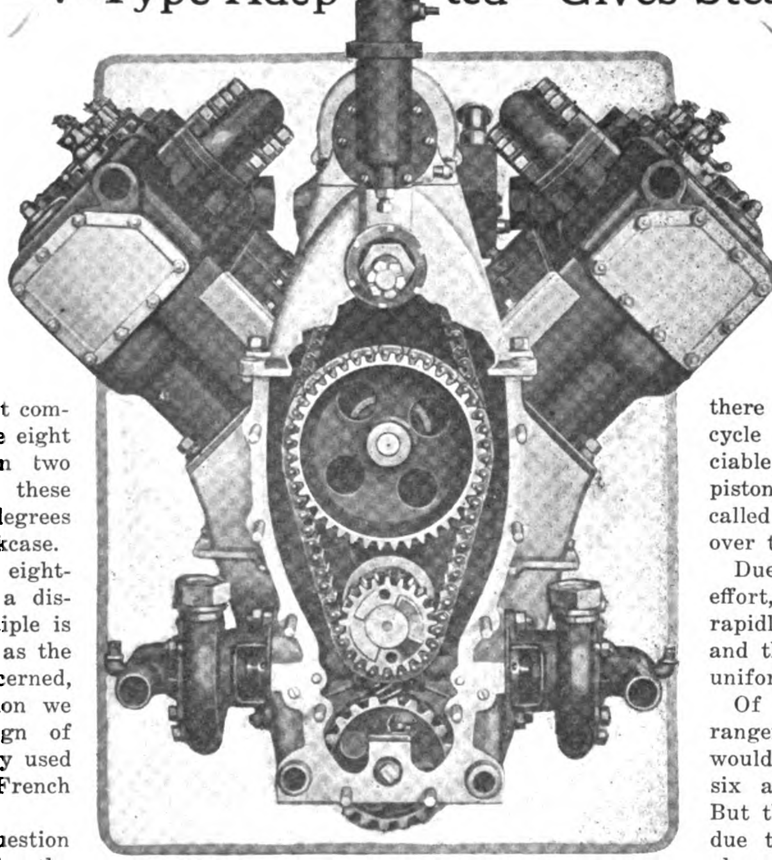
Eight-Cylinder Motor for 1915

Cadillac Introduces French Motor Design as Stock for Next Year—V-Type Adopted—Gives Steady Torque

FOR next year the Cadillac Motor Car Co. is using an eight-cylinder motor as its stock equipment, this marking the début of this type of motor in the stock-car field in America. The motor is what has been known as the V-type developed some years ago by the DeDion Bouton company in France, and marketed since then by that company as stock models. The eight cylinders are arranged in two groups of four each, and these groups are mounted at 90 degrees to each other on the crankcase.

Although an American eight-cylinder motor comes as a distinct innovation, the principle is now new, not even so far as the automobile industry is concerned, and if we turn to aviation we will find that this design of motor has been successfully used by one of the best known French makers.

Naturally, the first question which will be asked is why the addition of two cylinders will make such a justifiable difference in performance as compared with a six. In the eight there are eight power impulses during each complete cycle of two crankshaft revolutions; that is, there is a power impulse every quarter turn of the crankshaft and thus there is no intermission between them, but rather an overlapping so complete that the turning effort is practically constant. In the six there is a power impulse every one-third revolution of the crankshaft, and though there is always a turning effort upon the crankshaft, it has more fluctuation due to the longer interval between impulses. In the four-cylinder engine an impulse occurs every half revolution, and there are obviously periods in the cycle when there is no appreciable force exerted by any of the pistons. The flywheel is then called upon to carry the shaft over these power lapses.

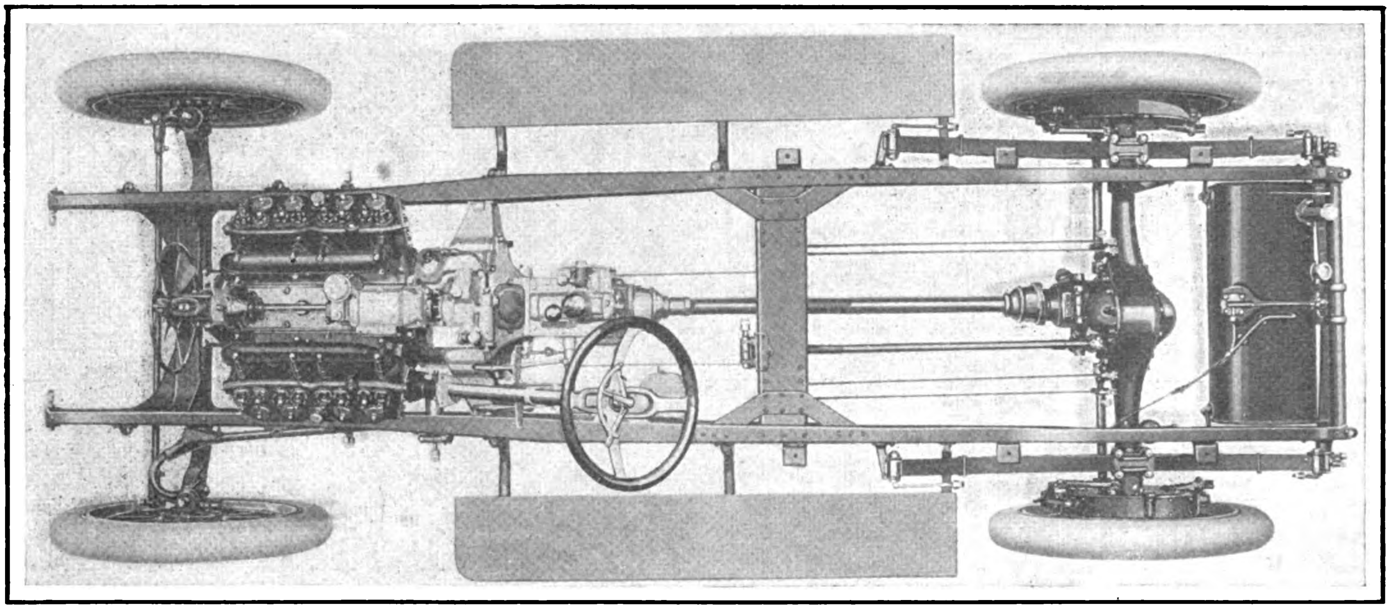


CADILLAC EIGHT-CYLINDER MOTOR FOR 1915

This photographic reproduction shows the front end of the new Cadillac eight-cylinder motor, which the company will use in its 1915 cars. There are two groups of cylinders, each a block casting of four cylinders, mounted at 90 degrees to each other. The cylinders are 3 1-8-inch bore and 5 1-8-inch stroke. The piston displacement is 314 cubic inches; the horsepower rating is 31.28. In dynamometer tests the motor shows 70 horsepower at 2400 r.p.m. The crankshaft is identical in design with that used in a four-cylinder car, and the camshaft carries the same number of cams as in a four-cylinder design. This new motor weighs approximately 60 pounds less than the four-cylinder Cadillac engine used this year. There is but one carbureter used

Due to this continuous turning effort, the six-cylinder motor has rapidly come into prominence, and the eight has an even more uniform torque.

Of course, the simplest arrangement of eight cylinders would be all in line just as the six are arranged or the four. But this would be impracticable, due to the extreme length and also to the abnormally long crankshaft which would be necessitated, while the crankcase for such an engine would be very heavy. To eliminate these difficulties the cylinders are arranged in two sets of four opposite to each other at an angle of 90 degrees, the same angle as it would be necessary to set the two series of four crankshaft throws were the cylinders arranged all in line. This placing of the cylinders in



CADILLAC CHASSIS FOR 1915, SHOWING EIGHT-CYLINDER MOTOR WITH UNIT GEARBOX

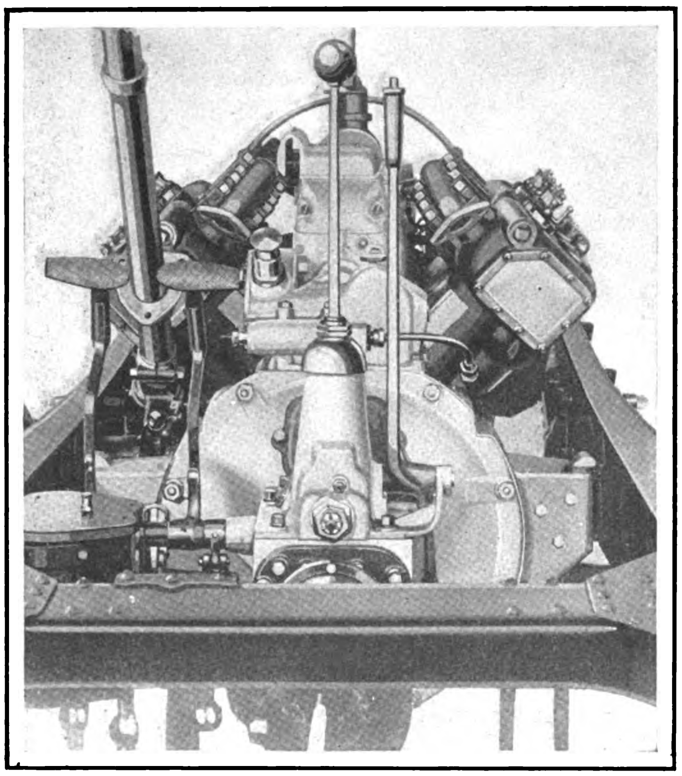
For next year the Cadillac company has discarded the four-cylinder motor and is using an eight-cylinder design, which gives a very compact power plant, one actually shorter than the four-cylinder predecessor. The small flywheel is entirely enclosed and the three-speed gearbox is a unit with the motor. For the first time this company has placed the steering wheel on the left with center control. A single-reduction Timken axle design is used with a set of spiral bevel gears instead of the conventional bevel type. The Delco electric system is continued. The wheelbase is 122 inches, or 2 inches longer than this year

sets at an angle of 90 degrees to each other gives the V form.

Arranged in this way, the eight-cylinder motor is no longer than a four-cylinder one of equal bore. As compared with a six, it has about 30 per cent. less length, resulting in a shorter crankcase—a weight reduction factor. In addition, its crankshaft is of the same form as that of a four, the throws being all in one plane, whereas those of a six crankshaft are in three planes, it is a simpler manufacturing job. Further, the shorter shaft is less given to periodic vibration, the camshaft is also shorter and less prone to whipping.

Considering the weight of a six and an eight, the shorter crankcase, shorter crankshaft and camshaft, lighter reciprocating parts and flywheel give the latter a distinct advantage, considering that both engines have the same power. In the Cadillac case, the new motor has proven to be fully 60 pounds lighter than the four-cylinder engine formerly used. This is because it is shorter and has lighter reciprocating parts.

Because each set of cylinders may be cooled separately and due to the angle of the jackets there is no chance for any of the water to get into pockets, the cooling of a V-shaped eight is superior to that of a six or a four. The natural tendency is for the water to flow upward through the jackets. Further, the water tends to rise to the hottest points of the jackets.



REAR VIEW CADILLAC MOTOR, SHOWING DELCO UNIT IN V CYLINDERS

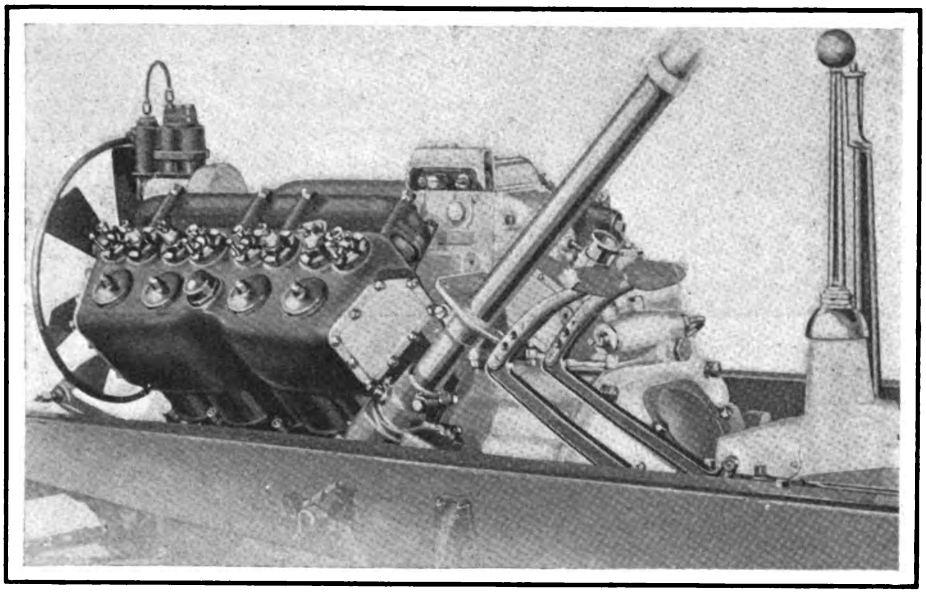
The angular space between the two groups of cylinders affords ample space for the fan and tire pump in front, the carbureter near the middle and the Delco unit at the rear. There is a separate exhaust pipe for each cylinder group, the flanged ends on these pipes being shown. This illustration shows the compact gearbox, a unit with the motor. For next year a multiple-disk, dry-plate clutch is used, composed of fifteen high-carbon steel plates 7.75 inches in diameter. The set of plates driven by the flywheel are faced with wire-mesh asbestos

Aside from the purely mechanical advantages of the newest type of gasoline motor, the car owner is specially interested to know just how these above-mentioned advantages affect the working of the car so far as the actual driving of it is concerned. It is only natural for the average man to say to himself that perhaps the eight is theoretically superior to the six, but that when it comes to actual road work there is probably little difference.

On the Road

The writer must admit that prior to some actual road work with the new Cadillac he was somewhat inclined to be in the sceptical division and questioned the appreciable advantage of tacking on two extra cylinders. A 60-mile run over rolling country where hills abounded, some quite steep, resulted in complete conversion to the eight and great surprise at its performance, however.

Gearshifting proved to be almost an unnecessary operation, speeds anywhere from 2 1-2 to 55 or 60 miles an hour being attainable on high gear. The quick acceleration from slow running to passenger train travel with no apparent effort whatever was truly remarkable. Bad stretches of road, turn outs for slow-moving vehicles and other traffic obstructions very rarely made it necessary to drop into second gear. Nor was this high gear driving done with any effort; the car controlled with the throttle alone just as if it were an electric responding to a current control lever. There was an undeniable feeling of security in driving the car, for the idea of killing the motor does not enter your mind the reserve power is so great.



THREE-QUARTER VIEW CADILLAC EIGHT-CYLINDER MOTOR FOR 1915

Each of the two cylinder castings contains four L-shaped cylinders. The intake valves are tulip shaped to permit of freer flow of gas into the cylinders. The exhaust valves are conventional poppet shapes. Over each cylinder bore is a removable cap which gives access to the waterjacket and to the combustion chamber. Between the second and third cylinder in each block the breather pipe is brought up through the cylinder casting. In rear of the fan is the power tire pump for tire inflation. The two groups of cylinders are mounted at 90 degrees on an aluminum crankcase

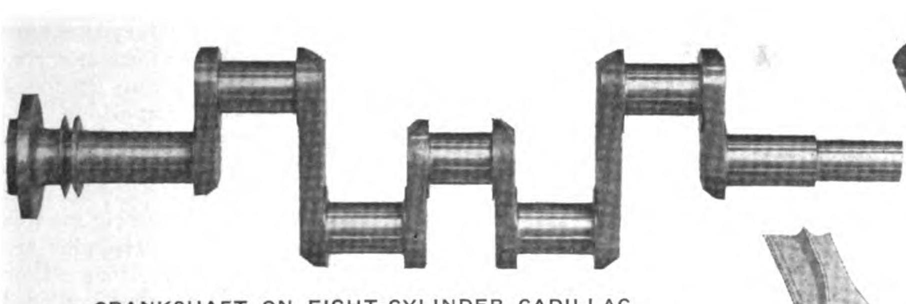
S. A. E. Horsepower 31.28

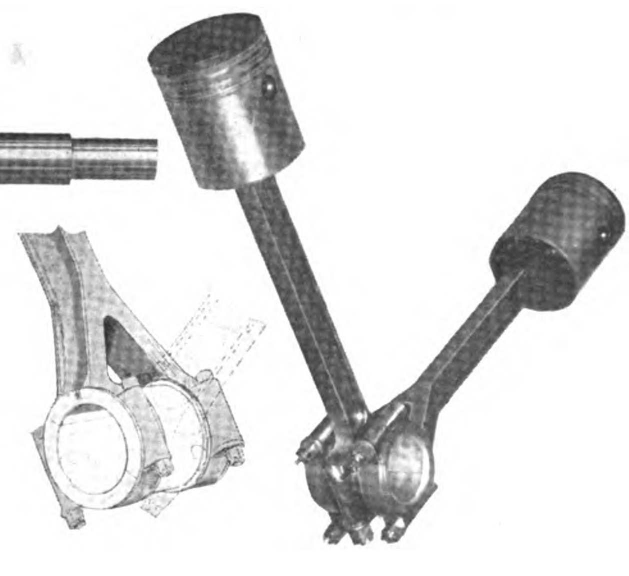
Considering the Cadillac motor in detail, one is struck with the high speed, high efficiency machine which has been produced almost without precedent or previous experience with this type. The two sets of four cylinders are each block cast and present much the same general appearance as any other block of four. The bore is 3 1-8 inches and the stroke 5 1-8 inches, giving a total piston displacement of 314 cubic inches. The S. A. E. formula, which is really not applicable to this motor, gives it a rating of 31.28 horsepower. On dynamometer tests it has developed 70 horsepower at 2,400 revolutions per minute. The power curve herewith serves to indicate the output at various speeds.

Connecting Rods in Pairs

The blocks of cylinders bolt to the copper-alloy aluminum crankcase which is common to both and which is split horizontally into upper and lower sections, the lower portion being the oil base. The upper half carries the crankshaft which has three main bearings. Both sets of connecting-rods connect to this shaft, one throw bearing taking care of a pair of rod ends, in opposite cylinders. In order for both to fasten to the same bushing, one rod has a yoked end, the other rod end fitting within the yoke arms. Two caps are thus required for the yoke rod, one for each arm of the yoke. These fit around the outer part of the bushing, gripping it rigidly, due to the cap bolts and in addition pins go through the rod into the bushing so as to insure the two moving together. The other rod fits around the bushing within the yoke and is free to turn on the bushing. Thus in operation the bearing for the yoke-end rod is the inner surface of the bushing against the shaft, while that of the other rod is the other surface of the bushing. These bearings have babbitt linings in reinforced phosphor bronze shells. Thus there are four connecting-rod bearings on the crankshaft just as a four-cylinder motor would have. The length of the crankshaft to the outer ends of the end bearings is 26 1-2 inches.

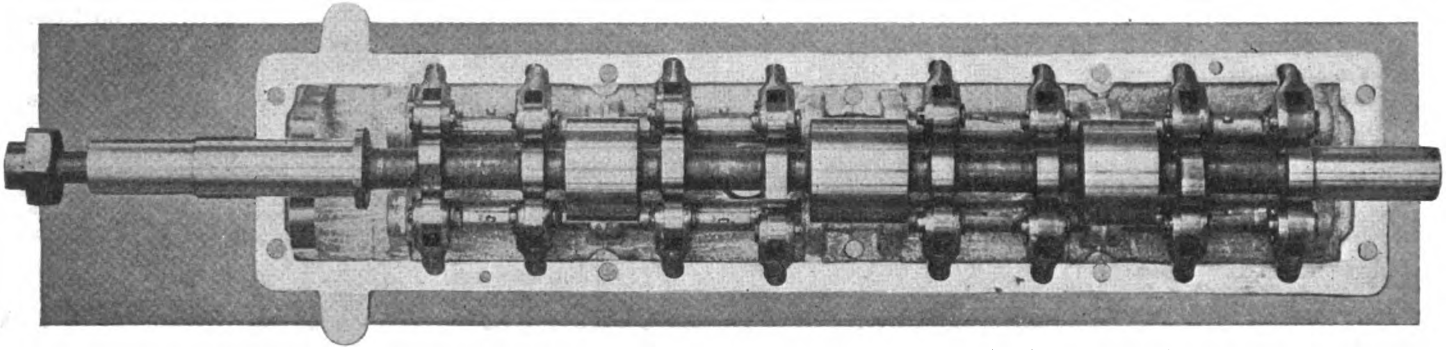
Directly above the crankshaft is the single camshaft with eight cams, one operating two opposite inlet valves or two exhausts as the case may be. The cam assembly is on the underside of a plate which bolts to the top of the crankcase between the two blocks of cylinders. Pivoted to this plate also are the small arms which are interposed between the ends of the push rods and the cams so that the lift will be straight upward instead of having a side thrust component. The camshaft has five bearings.



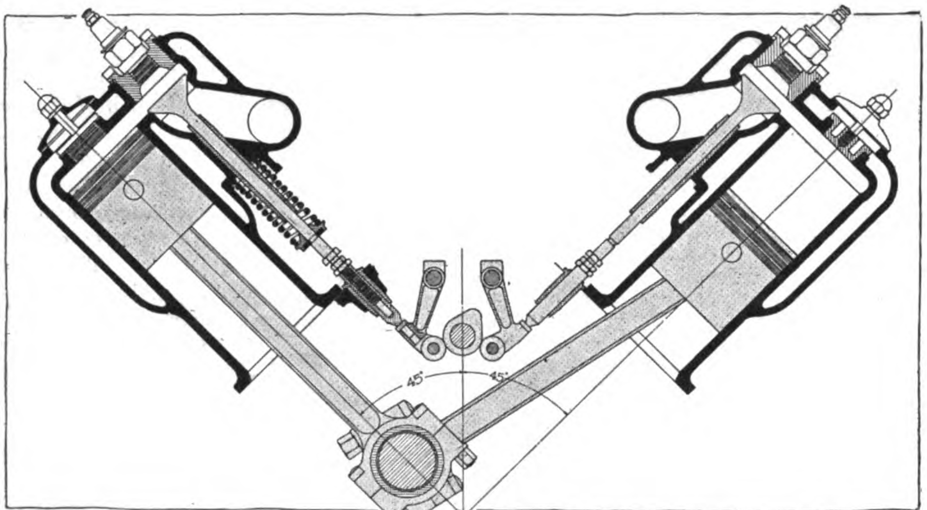


CRANKSHAFT ON EIGHT-CYLINDER CADILLAC

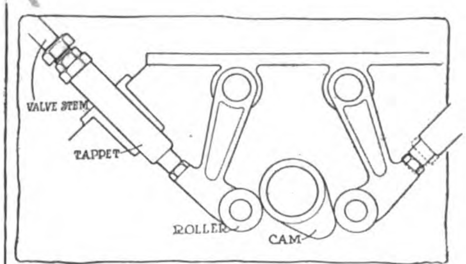
A three-bearing crankshaft is used with the throws at 180 degrees, as in a four-cylinder design. Two connecting rods attach to each crankpin, this being possible by having one connecting rod with a split or forked lower end, and the other a single end to fit between the forks. This shaft is no longer than that used on a four-cylinder motor with the same cylinder dimensions. The connecting rods and pistons are in pairs, two connecting rods attaching to each crankshaft throw. One connecting rod is forked at the lower end and the other one fits between the forks. One bushing is used for both rods, this bushing being pinned to the forks of the outer rod and floating in the inner rod, which merely oscillates on it. The rods are exceptionally light



Single camshaft used in eight-cylinder Cadillac motor. On it are eight cams which operate the sixteen valves in the motor. Each cam works two valves through the rollers shown on opposite sides of it. The shaft is carried on five bearings



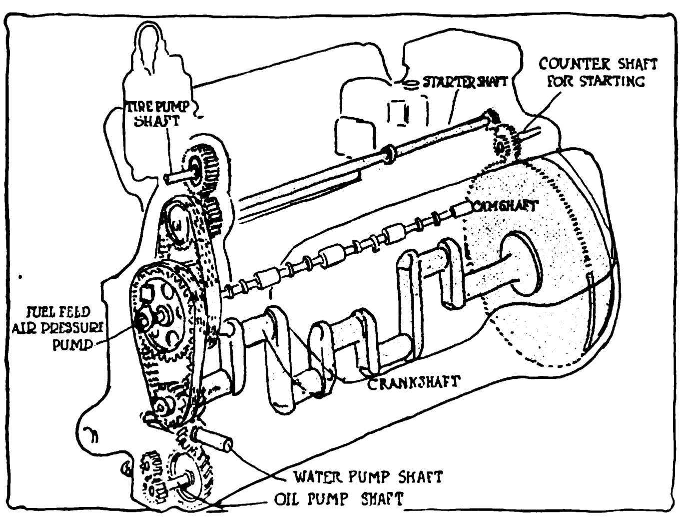
Cross-section of Cadillac eight-cylinder motor with the cylinders mounted in two **groups of four cylinders each at an angle of 90 degrees. The single camshaft is located directly above the crankshaft, and the means whereby one cam operates the two intake valves for the opposite cylinders is shown. Note the tulip-shaped intake valves, this design of head giving a free flow of inrushing gases**



The valve operating mechanism of the Cadillac motor, showing how one cam operates two opposite valves. The cam bears against the rollers in the ends of the small arms, which are pivoted to the plate above and which are interposed between the ends of the push rods and the cams, so that the lift will be straight upward instead of having a side thrust component. Adjustment of the valves is obtained in the usual way by lengthening the tappet. The upper part of the tappet **screws into the lower and the two are locked by a nut. The position of the cylinders makes the valves extremely accessible**

Vertically in line above the camshaft and crankshaft is the generator shaft which drives the fan and the combined motor-generator mounted on top of the camshaft plate and between the cylinder blocks, and also carries a gear which may be meshed with that of the tire pump carried at the forward end of the motor.

Both camshaft and generator shaft are driven by silent chains completely housed at the front end. The camshaft carries two sprockets, the outer carrying the chain running down to the crankshaft sprocket and the inner driving the chain which passes around the generator shaft sprocket above.



Shafting system in the Cadillac eight-cylinder motor, showing the use of two silent chains, one driving the camshaft and another driving from the camshaft to the shaft driving the Delco system. The tire pump is driven by spur gear. There are two water pumps on the cross shaft below the crankshaft, and from this shaft in turn drives the gear oil pump indicated

At the front of the engine and below the crankshaft is a transverse shaft driven from the crankshaft by spiral gears. A centrifugal water pump is located on either end of this shaft, one taking care of each block of cylinders.

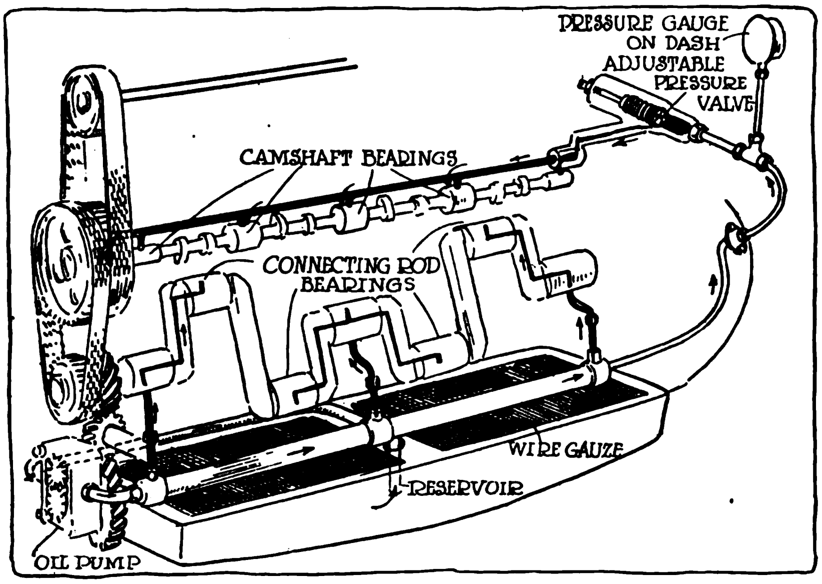
Light Weight Parts

In order to secure the accurate balance necessary to a high speed motor of this type so that it will be practically free from vibration, the pistons and connecting-rods are machined to very close limits. Uniformity of weight is important. Remarkable lightness of these parts has been attained due to the use of a special alloy steel for the rods which has great strength with extreme lightness, and also to the special form of the cast iron pistons, each of which has three ring grooves with three thin steel rings per groove. The wrist pins are fixed in the connecting-rods and oscillate in the pistons. They are constructed of chrome nickel steel tubing, case hardened and 5-8 inch in diameter.

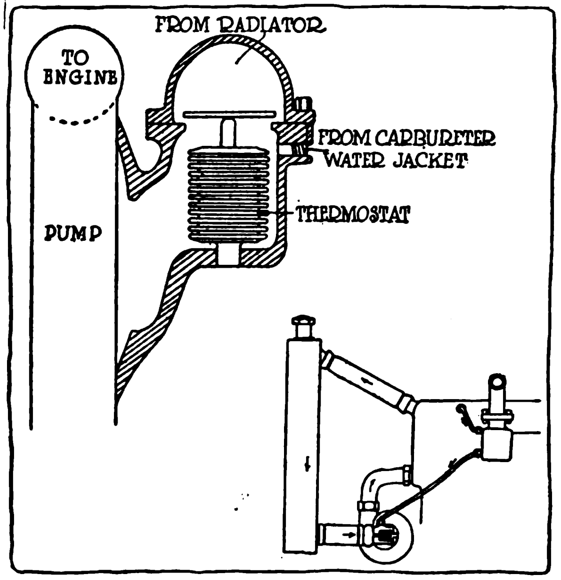
As another indication of the refinement to which this motor has been subjected, the inlet valves are of tulip shape so as to facilitate the intake of the gas, while the exhausts are of the flat type and of tungsten steel.

Order of Firing

In firing, the order alternates from one side to the other, so that there is a power impulse first from a cylinder on one



Lubrication of the eight-cylinder Cadillac motor. The pump draws the oil up from the reservoir and forces it through the pipe running along the inside of the crankcase. Leads run from this pipe to the crankshaft main bearings and thence through drilled holes in the shaft and webs to the rod bearings. It also is forced from the reservoir pipe up to the pressure valve, which maintains a uniform pressure above certain speeds, and then overflows from this valve to a pipe extending parallel with and above the camshaft. Leads from this latter pipe carry the oil by gravity to the camshaft bearings and chains. Pistons, cylinders, etc., are lubricated by the overflow thrown from the rods



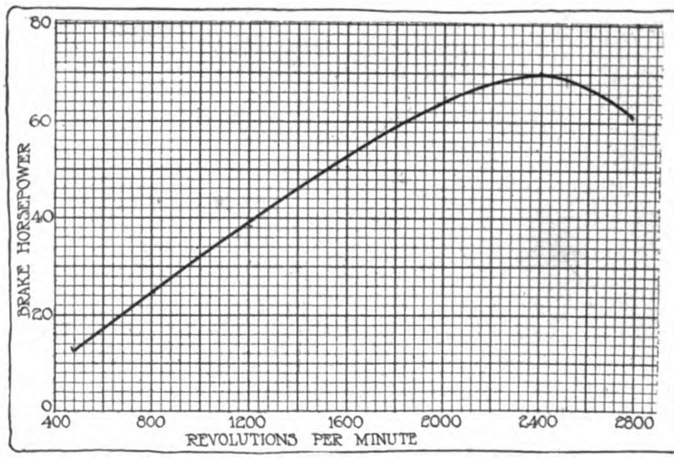
The temperature of the cooling water in the new Cadillac motor is controlled by a thermostatic arrangement, the principle of which is shown in the sectional sketch. When the water is below the desired temperature the thermostat is contracted and allows the valve to seat, so that only that part of the water going through the carbureter jacket and the water jackets of the cylinders is circulating by means of a by-pass

side followed by an impulse from a cylinder on the opposite side. The order of firing is indicated below:

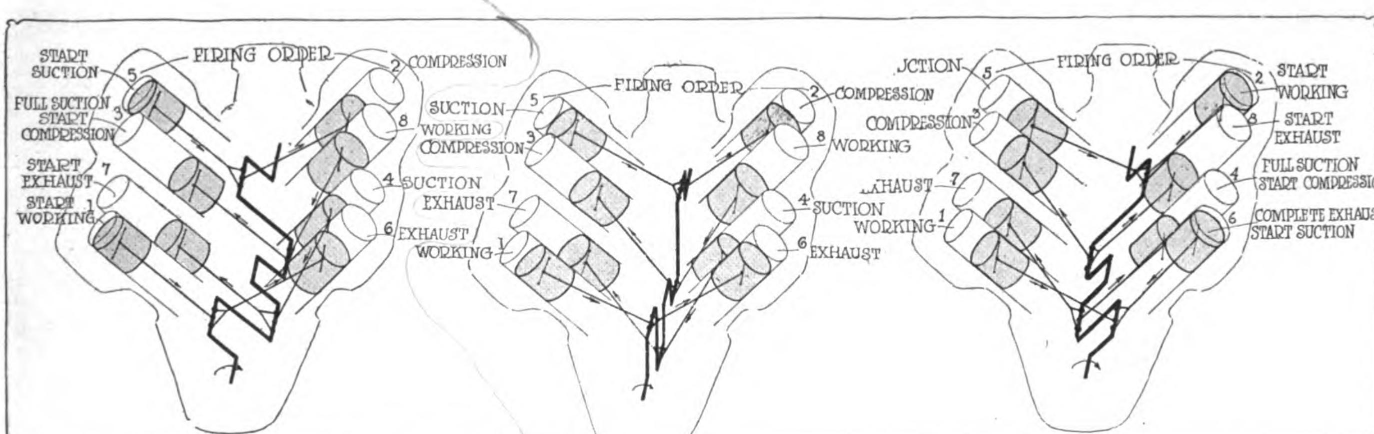
Front
6X — X1
4X — X7
8X — X3
2X — X5
Rear

That is, No. 1 cylinder on the right fires first, then No. 4 on the left, No. 3 right, No. 2 left, and so on. As to the timing, the inlet valves open at top dead center and close 45 degrees after bottom dead center, while the exhausts open 45 degrees before bottom dead center and close at top dead center.

The Cadillac single-jet carbureter, specially adapted to this type of motor, is used. It occupies a position midway of the engine and between the cylinder blocks. A form of U mani-



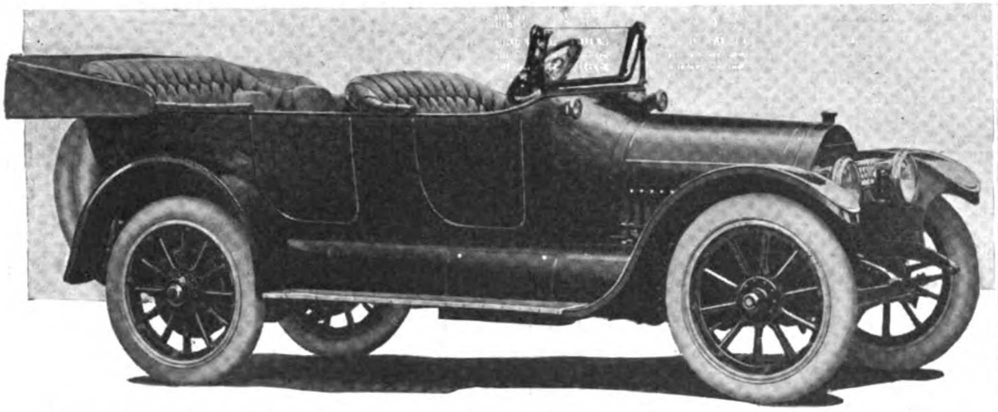
Horsepower curve of Cadillac eight-cylinder motor

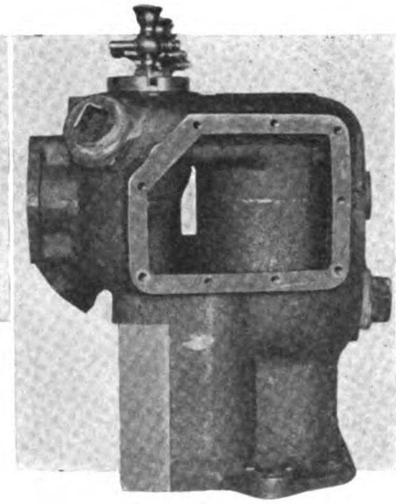


Showing the relative positions of the pistons and what is taking place in each cylinder when No. 1 cylinder commences its working stroke. All pistons on the left are either all the way up or all the way down, while all four on the right are midway

The order of events in the cylinders when the plane of the throws is vertical. The various parts of the cycle are well under way in the cylinders. The function that each cylinder is performing is indicated in the lettering

The shaft has now revolved through 90 degrees and the piston positions of the two sets are just the reverse of what they were in the first diagram. Those on the left are midway of their travel. The fourth cylinder in the right block is just firing

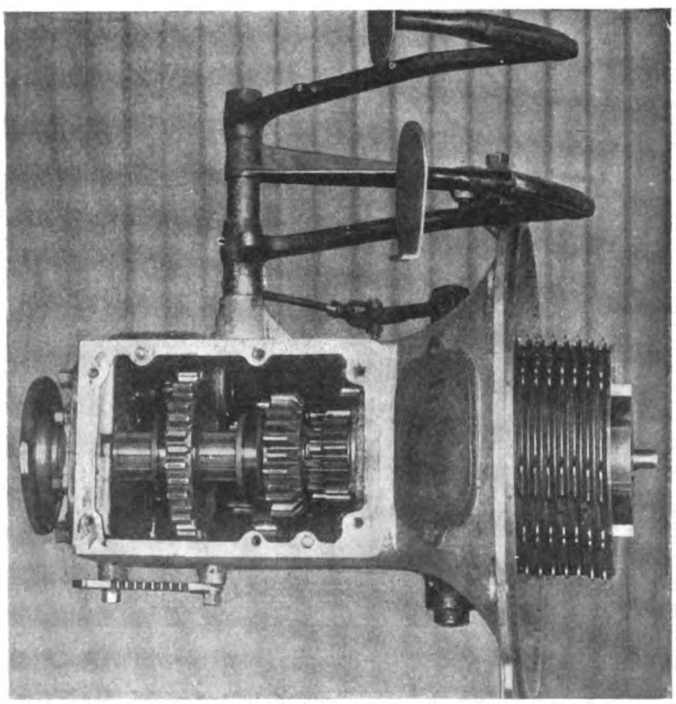




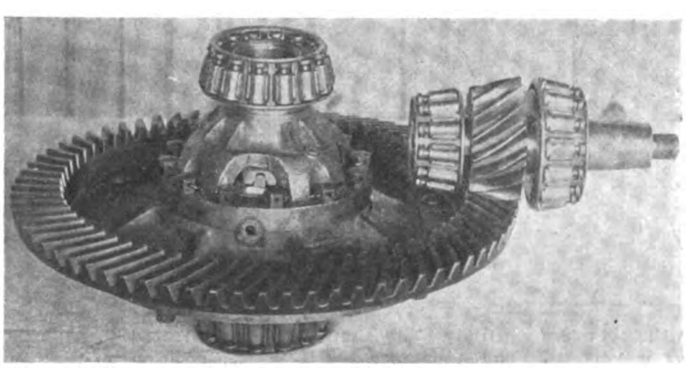
The 1915 Cadillac with eight-cylinder motor. Wheelbase 122 inches. At the right is one of the cylinder castings showing the open water space from end to end

fold runs from it to the two cylinder blocks, the distribution to the various cylinders being done within the casting.

An entirely new feature to automobiles is the application of thermostatic control to the temperature of the cooling water, so that, in running, this water is maintained at nearly a constant temperature. In principle this thermostatic regulation is the same as the form used in connection with the heating systems of houses.



Top view of three-speed gearset and multiple disk clutch used on new Cadillac. This gearset is a unit with the motor, a new construction with Cadillac. It is the first year in which a multiple disk clutch has been used by this company



Spiral bevel gear is used in the rear axle of the Cadillac. The axle is of Timken design and construction, excepting that these spiral bevels are manufactured in the Cadillac factory

Thermostatic Control

In the Cadillac application, there is interposed in the water pump line for each set of cylinders a thermostat which is simply a small coiled copper tube containing a liquid which expands or contracts in accordance with the temperature, thus slightly lengthening or contracting, its total movement being 1-4 inch. This thermostat is in connection with a valve so that when it expands, it raises the valve from its seat, this valve controlling the flow of water to the radiator from the pump. A by-pass connects with the water jacket of the carbureter, and when the engine is started, the water is naturally cold. Therefore the thermostat is contracted and its valve on its seat. Thus the radiator water is shut off, the circulation being simply through the water jackets of the cylinders, through the by-pass tc the carbureter iacket and thence back to the cylinders.

There is thus only a small part of the water circulating, and when this heats up, the thermostat begins to expand and lift its valve from its seat, letting the radiator supply flow into the system. This action continues back and forth so that the water temperature is nearly constant.

Motor Lubrication

As regards motor lubrication, the engine incorporates a positive system of force-feed type. A gear pump located at the forward end of the motor and driven from the crankshaft takes the oil up from the oil pan in the lower part of the crankcase and forces it through a reservoir pipe running along the inside of the crankcase, from which pipe there are leads to each of the main bearings. The crankshaft and webs are drilled and oil is forced from these main bearings to the connecting-rod bearings through the drilled holes. The forward and rear bearings supply the rod bearings nearest them, while the center bearing takes care of the rod bearings on either side of it. The oil is then forced from the main reservoir pipe up to the relief valve which maintains a uniform pressure above certain speeds and overflows from this valve to a pipe extending parallel with the camshaft and above it. Leads from this latter pipe carry lubricant by gravity to the camshaft bearings and front end chains. Pistons, cylinders and piston pins get their oiling by the oil thrown from the lower ends of the connecting-rods.

As heretofore, the Cadillac uses the Delco combination electrical unit for cranking, lighting and ignition, the special eight-cylinder distributer being in unit with the motor generator. As has already been pointed out, the unit is driven as a generator from the camshaft by a silent chain, its shaft

(*Continued on page* 563)

The Automobile as Valuable as Railroad in War

Automobiles of Immense Service in France—Both for Army and Transporting Refugees—Private Motoring at Standstill—Cars Cannot Leave Paris

By W. F. Bradley

PARIS, Sept. 10—Automobiles were never so closely watched and never so highly appreciated as at this present moment. With railroad communication cut, with crowds fleeing in terror, with fierce fighting on every hand, the possession of a car is considered a valuable asset. The few old-school army officers who swore by horses and plenty of men have finally had to admit that their methods are out of date.

The automobile is as valuable, if not more valuable, at this present moment, than the railroad.

Because they recognize their value for good or for evil, the authorities in France have imposed hard restrictions on the use of cars.

No man can use a car unless he has a special permit from the military authorities; that permit must be shown every few miles. None but military cars can be on the road after dusk.

Paris Closed at Noon

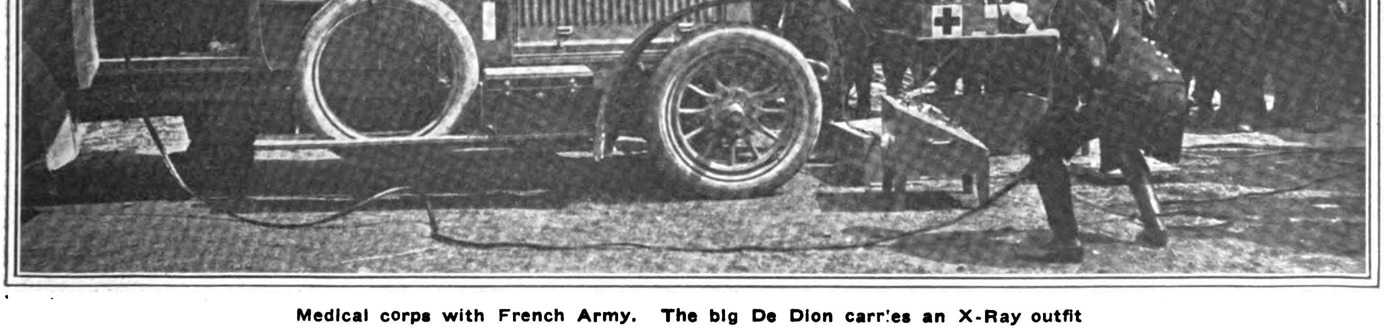
Yesterday the government issued orders that no more cars should be allowed to leave Paris after 12 noon. As it was known that the government was preparing to transfer to Bordeaux, and that the German troops were making desperate efforts to invest Paris, there was a wild stampede for the western provinces. Paris is surrounded by fortifications and gates. All those gates had to close at noon. Cars were loaded up with baggage, passengers were piled in with no other seat but the top of the trunks. At the Porte Maillot, one of the most important gates of Paris, the scene almost baffled description. In an unbroken stream cars poured through. They were of every type from the single-cylinder runabout to the loud-voiced, semi-racer and the handsome limousine. They were similar in one respect: they were packed with baggage and passengers to more than three times their ordinary load. As it was practically certain that no gasoline could be found on the road, enough had to be carried for a journey of 200 to 400 miles. All the oil, tires, spares, etc., that could possibly be required had to be taken aboard.

Exodus from the Capital

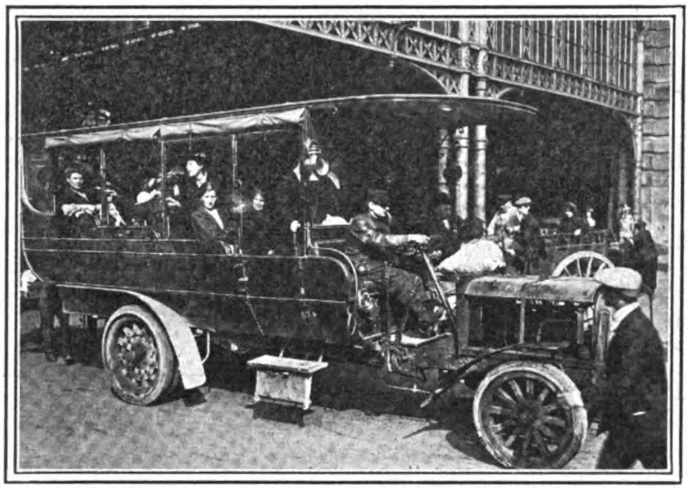
As much furniture as could be saved was packed into the car; trunks were strapped on the running boards until the sides of the car disappeared. In one case, when the car had been loaded in this way, the ladies could not climb back into their seats. A tall cavalry officer who was passing lifted them in. Rich families possessing more than one car put their women folk in one and their valuables in the other. A family of seven had crowded themselves into a car made for four, and by some superhuman feat had got trunks and bedding in with them. The driver's hat blew away as he neared the gates, but so great was his fear that he might be shut in that he did not stop.

An American family was being taken on a small car to the Packard garage just outside the city, where they were to be transferred to a big car carrying them to the coast. When they got through the gates the terror of the head of the family was so great that he threatened and persuaded the chauffeur to continue with the little car, rather than lose the time necessary for the transfer.

On the main roads just outside the city the automobilists overtook processions of peasants in lumbering farm wagons



Medical corps with French Army. The big De Dion carries an X-Ray outfit



Refugees from Belgium and Northern France leaving Paris

who had been turned out of the farms within range of the forts forming a belt round the city. Wizened old grandmothers and wrinkled old grandfathers shared the wagons with healthy children, ricketty furniture, bedding, perambulators, fowls and domestic animals. Heavy wagons loaded with cartridges made in the automobile factories transformed for this purpose traveled along; an automobile towing an armored aeroplane claimed a right of way and was given it.

Many of the drivers of the cars were merely desirous of placing their women folk and children in a place of safety. When this had been done the men would return to Paris to take up military duties. This meant that they had to travel 400 miles or more without a stop, for failure to be back on time would cause them to be marked down as deserters.

One of the engineers of the Pipe Automobile Co., Brussels, has given me interesting particulars of how automobiles were made use of in opposing the advance of the Germans into Belgium. Belgium had no armored automobiles, but the Pipe company undertook to place some at the disposal of the army at very short notice. A number of 80 horsepower chassis were prepared, and in conjunction with a manufacturer of fireproof safes who had his works next door, chrome nickle steel plates were put round the platform body on which a quick-firing gun had been mounted. The wheels and the gasoline tank were protected in the same way, while the driver was protected by an inclined plate coming practically level with his eyes. All the plates were fastened at the base only, thus giving a certain amount of flexibility which tended to deflect the bullets.

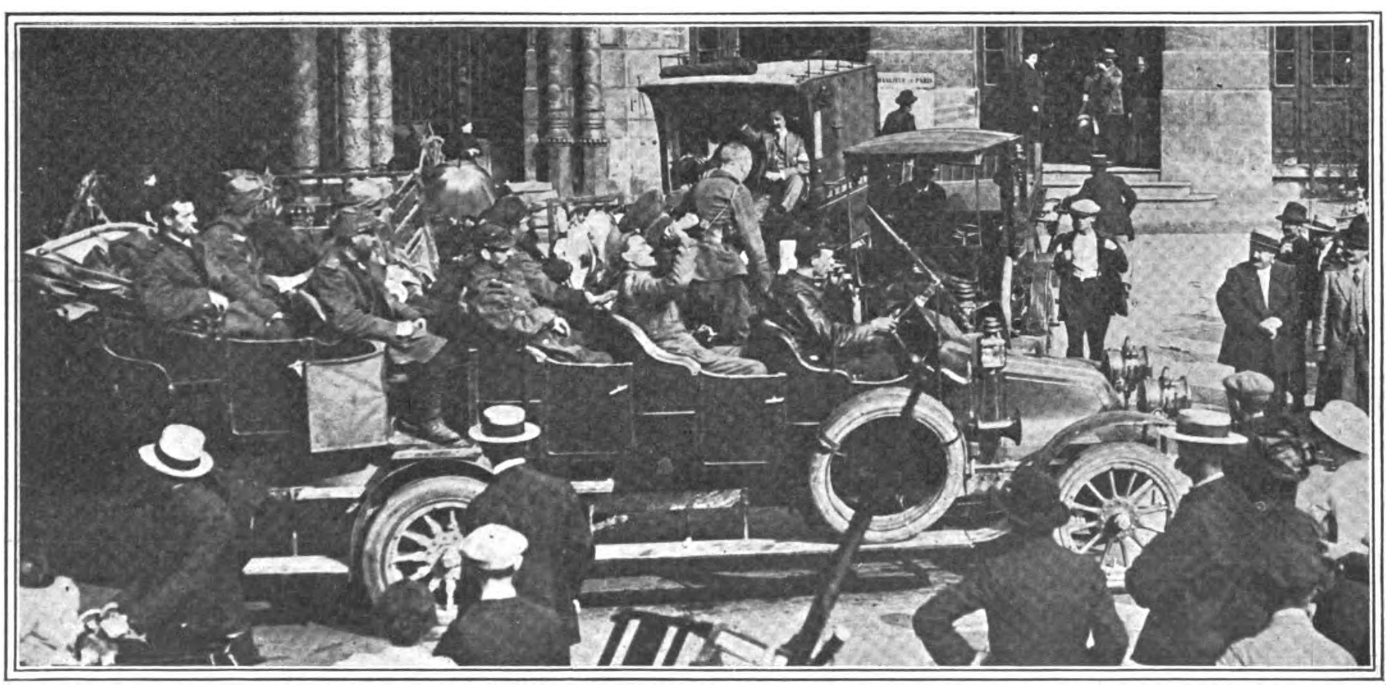
Although hastily constructed and lacking in finish, these vehicles proved invaluable to the Belgian troops. The armor plating was pitted with bullets, but not a single shot went through. When the Germans entered Brussels it was seen to what an extent they had made use of armored automobiles in all their operations. Their plan was to advance with these vehicles into districts only poorly guarded, bombard the villages, set fire to a few houses and continue leaving the peasants in a terrified condition.

Brussels had no well organized automobile service to fall back upon when her territory was invaded. The authorities therefore sent police into the streets with orders to seize all suitable cars. The passengers were turned out and the driver, if of Belgian nationality, was put under military orders. This plan worked well, for each man knew his car and could get the best possible service out of it. In other towns, where cars were requisitioned and given to military drivers much trouble followed, for it frequently happened that the drivers had no experience with this make of car and quickly had their vehicles in a broken down condition.

B. N. D. Steel Factory Wrecked

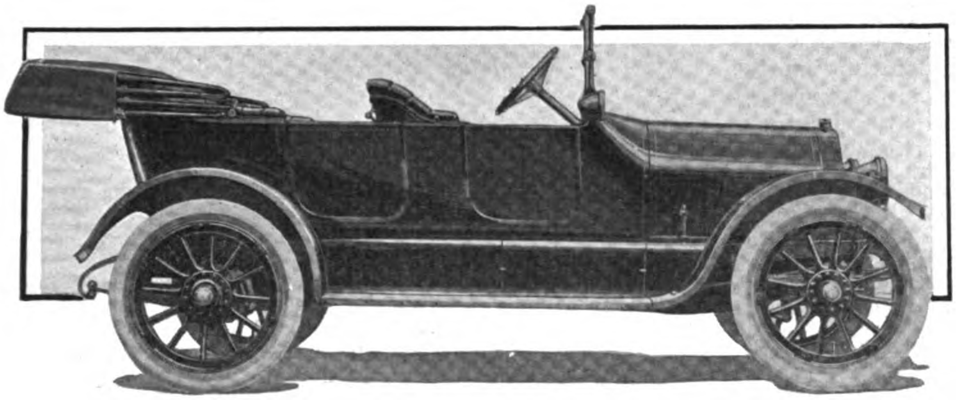
The Pipe factory, one of the most important in Belgium, has escaped damage, for it is located in the heart of the city. It is practically certain that the Derihon factory, at Liege, where the famous B. N. D. steel is produced, has been completely wrecked. This factory was situated at the foot of one of the forts on the outskirts of the city, and it was at this point that fighting was most severe. No definite news has been received as to the whereabouts of the Derihon Bros. one of whom was in active service with the Belgian troops.

It is also believed that the F. N. factory at Liege has been razed to the ground. This factory, in addition to producing automobiles and motorcycles, was the small arms works of the Belgian government. The women who work in the gunmaking departments took up arms when the men had been called away, and as these women are all excellent shots they were able to do some destructive work.



French and English wounded soldiers leaving the Gare du Nord, Paris

Overland 81, Fully Equipped, $850



Overland 81 five-passenger touring car with left drive and center control

Four Cylinder 4 by 4.5 Motor—Electric Starting and Lighting— —Left Drive—Center Control— Also Roadster and Delivery Bodies

MODEL 81 is a new Overland for next year, which sells at $850 with full equipment, including electric lighting and starting units. The same chassis with a roadster body, with the same equipment, sells at $795.

This chassis when fitted with an open express delivery car sells at $850 and with a panel delivery body at $895. These prices of delivery wagons include the electric lighting and starting equipment.

This new Model 81 is a typical Overland design in that the standard features of the Willys-Overland Co., Toledo, O., have been strictly adhered to. Except for a slight difference in bore, the engine is practically the same as that of the larger 1915 model, which made its appearance in August. The bore of model 81 is 1-8 inch less than that of the larger model. The cylinders measure 4 inches diameter and the stroke is 4 1-2 inches. The cylinders are separate castings and the same general arrangement of parts such as manifolds, accessories, valves, etc., is adhered to. Back of the motor is the standard Overland construction with the gearset forming a unit with the rear axle.

This new Overland car, selling at so low a price as $850, is the result of large-quantity production facility at the factory, which facilities have each year been added to until today the plant embraces a great area with a large array of departments in which practically every part of the car, including frames and radiator, are manufactured.

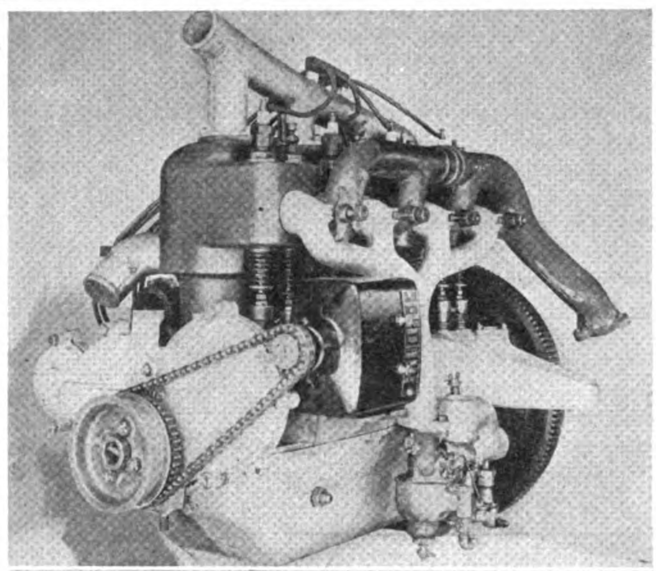
Develops 30 Horsepower

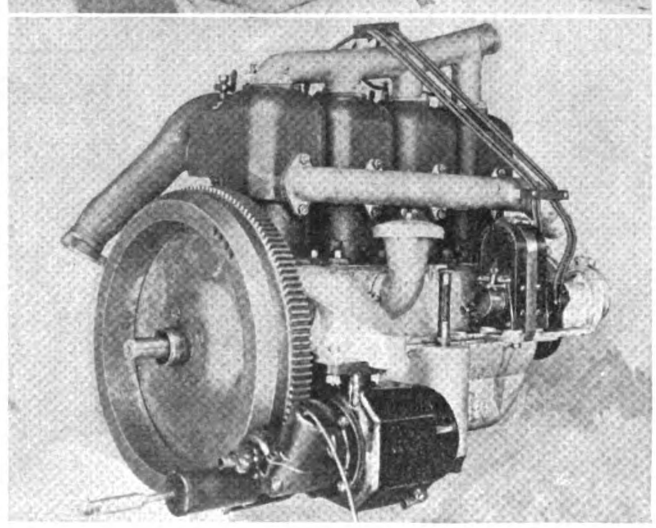
The motor in model 81, 4 by 4 1-2 inches, gives a formula rating of 25.6 horsepower, but actually develops 30 horsepower. It has a piston displacement of 227.5 cubic inches, and its stroke-bore ratio is 1.125. Like other Overland motors, thermo-syphon cooling is employed in conjunction with a cellular-type radiator affording vertical circulation. This radiator has a shell pressed from one piece of sheet steel in the company's radiator plant. With this construction the round edge appearance of the radiator is possible.

The left side of the motor is given over to the valves, the manifolds, carbureter and generator. Both intake and exhaust headers must naturally have separate openings to each of the cylinders, the exhaust pipe passing above the intake. The carbureter has a hot-air attachment. The exhaust manifold is made in two sections so that that portion serving the front two cylinders may be removed without taking off the entire manifold, or vice versa.

Valve Parts Accessible

Valves are not enclosed and present conventional appearance. A yoke construction with a bolt drawing down at its center holds down the tappet assemblies for each cylinder—





Upper—Overland model 81 motor showing mounting of the generator which is driven by a silent chain from the crankshaft. The carbureter is carried low and the motor is suspended at three points. Bottom—Right side of motor showing starter and magneto positions. Note the simple method of carrying the high-tension wires

The water pipes are without sharp bends that might pocket the water, and are of larger diameter. On this side also is a large breather and an oil level indicator intake and exhaust. This one bolt allows their removal in simple fashion. The valve mechanism of the Overland leaves nothing to be desired in the way of accessibility.

Lubrication by Splash

Lubrication is maintained by a constant level splash system with individual splash troughs under each cylinder. Into these the rod ends dip and throw the lubricant up into the cylinders and onto the bearings. The level in the troughs is maintained by a geared oil pump, and a revolving sight-feed indicator on the dash tells that the oil is circulating. The lower part of the crankcase below the troughs forms the oil reservoir into which the overflow falls ready for re-circulation after straining.

Ignition, entirely independent of the lighting and starting equipment, is provided for by a high-tension magneto located on the right forward side of the engine and driven by a shaft in connection with the timing gears.

Separate Electrical Units

As to the other electrical functions, the generation of current and the cranking are taken care of by separate units. The generator, mounted on the left front of the crankcase on a bracket attached thereto, is driven by a silent chain from a sprocket on the front end of the crankshaft and just back of the fan belt pulley. Due to the difference in size of the sprockets, the generator operates at 2.6 times crankshaft speed. It begins to charge the battery at 8 miles per hour and at 25 miles an hour is producing its full charge of 14 amperes. Due to the reversed series coil, the output does not go above this amount regardless of car speed.

The starting motor is compactly built series-wound machine operating on the battery current of 6 volts. It is located at the rear of the motor on the right, and acts directly on the flywheel, a sliding pinion on the electric motor shaft engaging with teeth cut on the rim of the flywheel when the gear latch is released and the heel button pressed down. The ratio of the electric motor speed to that of the engine is 11.1 to 1.

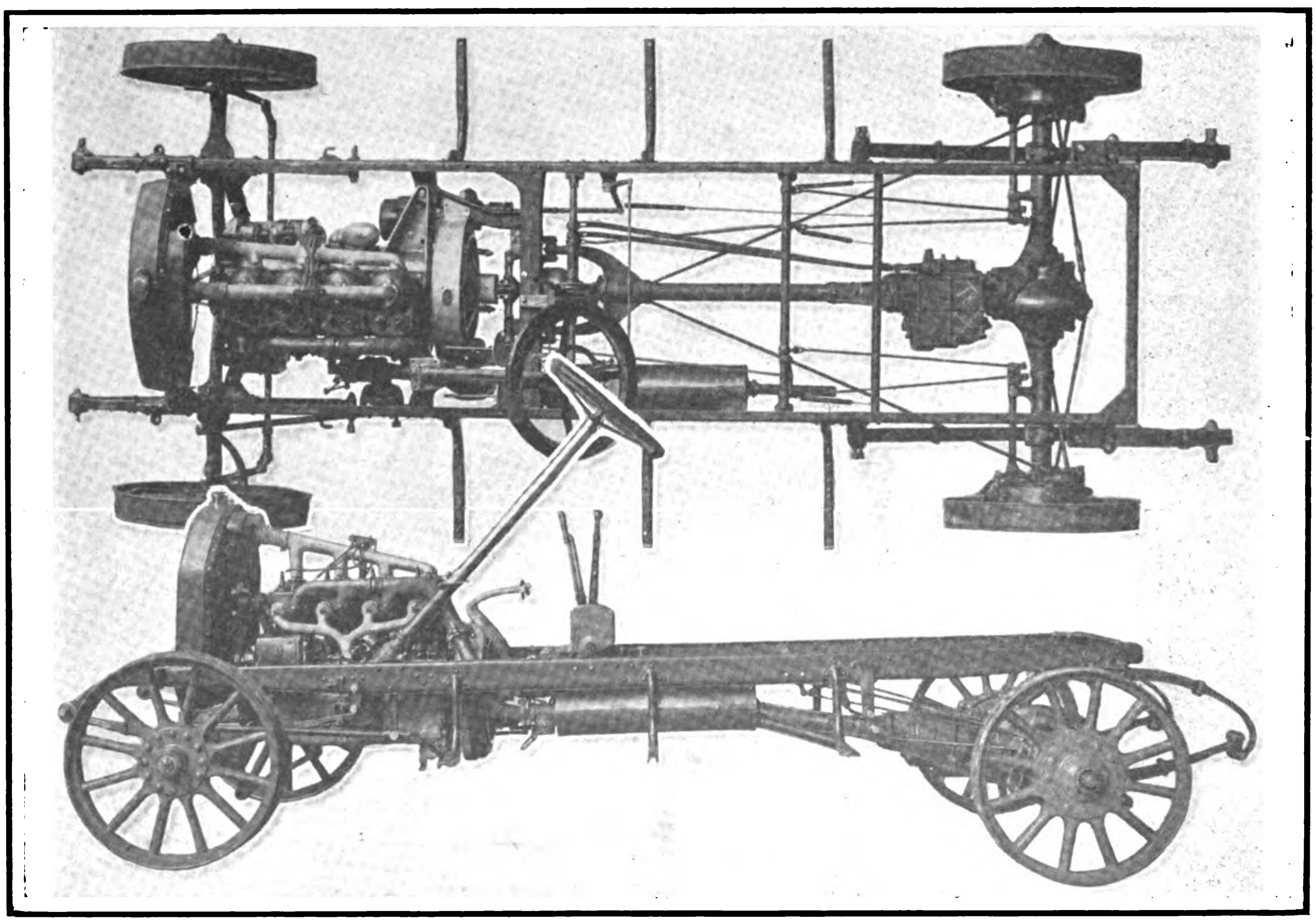
Three-Point Suspension

The motor is suspended on three points. At the rear of the crankcase and just ahead of the flywheel there is an integrally cast arm extending out to and resting upon a diagonal frame member which in turn fastens at one end to the frame side member and at the other to the main cross member back of the motor. Thus the arms do not have to be long enough to extend out to the side rails and are thus stronger. The third supporting point for the motor is at the center of the front where it rests upon a frame cross member which is bowed downward.

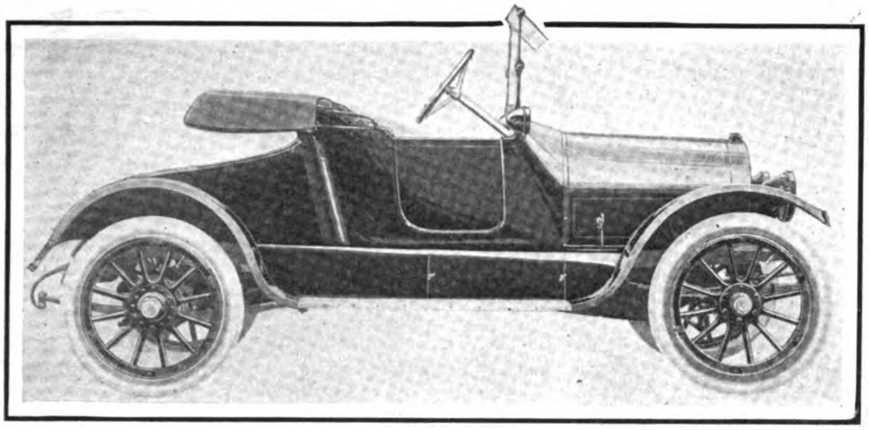
Five-Bearing Crankshaft

The crankshaft, which is carried on five main bearings in the upper half of the crankcase, is due to this number of bearings and its size, very rigid and free from vibration, a feature which the motorist today is coming to think a great deal of, for it tends to greater silence, power, flexibility and less wear. Pistons, each of which is fitted with three piston rings are secured to the connecting rods by conventional wrist-pins carried in the piston bosses.

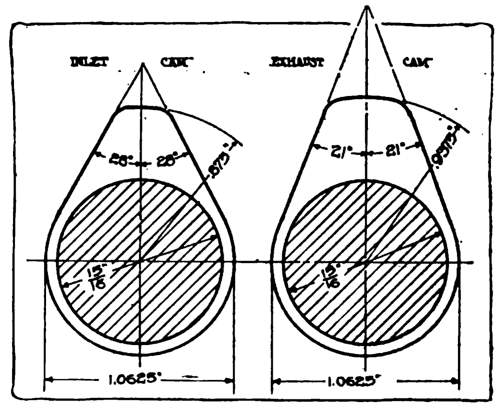
The camshaft is mounted on three bearings and like the crankshaft is drop-forged from carbon steel. The valves are made with carbon steel stems electrically welded to 3 1-2 per cent. nickel steel heads. They are of usual form and seat at 45 degrees.



Upper—Birdseye view of chassis showing straight frame members. The torque tube and axle ends are strengthened by struts. Lower—Elevation of chassis



New Overland model 81 runabout which sells for $795



Intake and exhaust cams

The principal motor dimensions follow:
Crankshaft bearings:
Front—1 1-2 by 2 1-8 inches.
Three center—1 1-2 by 2 1-8 inches.
Rear—1 1-2 by 4 inches.
Connecting-rod lower bearings: 1 1-2 by 2 1-8 inches.
Camshaft overall length—27 9-32 inches.
Camshaft bearings:
Front—15-16 by 2 1-4 inches.
Center—15-16 by 3 1-8 inches.
Rear—15-16 by 2 9-16 inches.
Valve lift—13-32 inch.
Valve diameter—1 13-16 inch.
Valve seat—1-8 inch by 45 degrees.

The cone clutch used is leather faced and acts in the flywheel in the usual way, four springs holding it in engagement. Inserted in the cone face are spring-pressed studs to augment easy action, while a clutch brake stops it from spinning when thrown out. This aids gearshifting. Back of the clutch there is a universal joint, which is on the forward end of the propeller shaft just ahead of the point where it enters the torsion tube. A substantial yoke hinging at its ends to the center frame cross member carries the front end of the tube. Diagonal radius rods run from this point to the ends of the rear axle. Thus the drive and torque are well taken care of.

Gearbox on Axle

Through flanges, the gear box bolts to the torsion tube and the axle housing. It is compactly designed and affords the usual selectively obtained three forward speeds and reverse. The gears are of nickel steel and the shafts are carried on annular ball bearings. The control levers are mounted at the center of the control shaft which is mounted just back of the center cross-member. Rods run from this control back to the gearbox and to the brakes.

The rear axle is the Overland floating type design with four differential gears; the axle shafts removable and roller bearings carry the loads with ball thrust to take the end thrust. The brakes are of ample size, the drums being 10 inches in diameter and 2 1-4 inches wide.

Springs are long and flat, which is a feature for easy riding. The rear springs are slung under the axle with swivel seats while the fronts are of the regular half-elliptic type. The dimensions are 36 and 46 inches, front and rear lengths, respectively, while all leaves are 1 3-4 inch wide.

Frame Straight

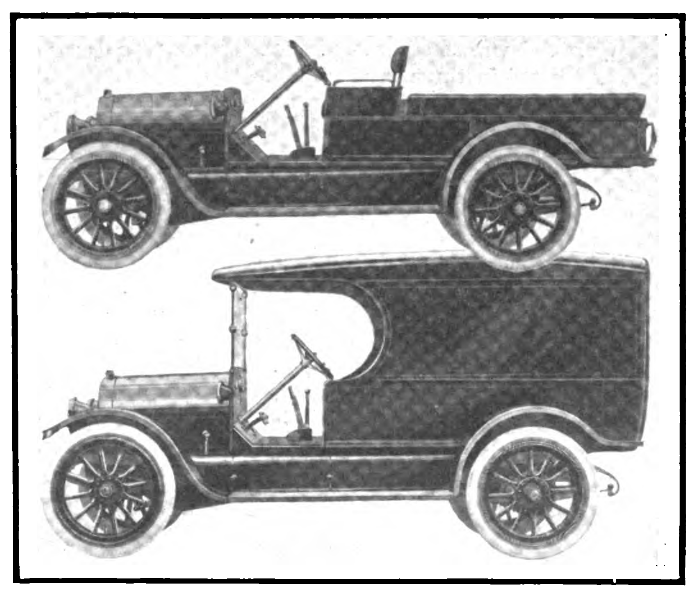
The frame makes a good manufacturing proposition, in that there is no kick up at the rear, nor is there any insweep at the front. The wheelbase is 106 inches and tread 56 inches. The car carries 33 by 4-inch quick detachable tires on demountable rims and the wheels are of wood, artillery construction. Steering is on the left.

The body is a smooth line design with steel panels and doors, and wood frame. The cowl slopes to the bonnet and the instrument board has the various gauges and speedometer conveniently grouped and lighted by a dash lamp. The doors are of the front-hinged U form and their hinges are concealed. The fenders conform closely to the curve of the wheels and running boards are clear.

Gain of $106,000 in Massachusetts Fees

BOSTON, MASS., Sept. 14—Up to September 1 Massachusetts motorists have paid into the State coffers $870,182.19 in fees and registration licenses, which is more than $106,000 in excess of the amount paid for the entire 12 months of 1913. If the present rate of registering continues the total for 1914 will be close to $1,000,000. There had been registered up to September 1 73,367 motor vehicles, which shows an increase of 23 per cent., or 13,789, over the same period in 1913, and 6,747 more vehicles than were registered during all of 1913. There are nearly 88,000 people authorized to operate motor vehicles in the Bay State now. The figures for the first eight months of 1913 and 1914 follow:

Automobiles	59,569	73,367
Motorcycles	6,578	7,553
Manufacturers and dealers	1,300	1,491
Operators	14,039	16,834
Chauffeurs	4,195	4,044
Operator renewals	34,762	43,111
Chauffeur renewals	13,542	16,165
Receipts	$719,331.09	$870,182.19

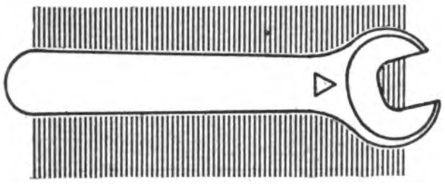


Upper—Overland 81 with open delivery body. It sells for $850
Lower—Overland 81 with closed delivery body. This sells for $895

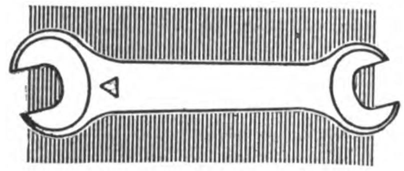
Forged Wrench Efficient and Simple

By F. C. BILLINGS

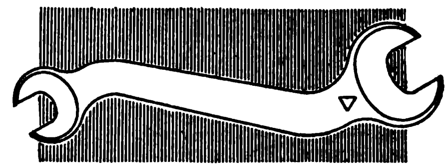
Vice-President of the Billings and Spencer Co.



Engineers' single head



Double head engineers' type



The popular S-wrench

PROBABLY the most abused, least considered and yet the most indispensable tool in the kit of the mechanic, farmer, automobilist, aviator, et cetera, ad infinitum is the wrench, the solid open-ended wrench, known to the British mechanician as the fixed spanner and known in the United States as the machinists' wrench.

Of the many kinds of wrenches, the cheapest, strongest, most efficient and most durable is the open-end wrench. This style of wrench varies in quality and price in the following order: gray iron castings, malleable iron castings, sheet steel stampings and steel drop forgings.

The drop forged wrench is superior to all in quality, strength, durability and utility. It should be made from selected .15 to .25 carbon open hearth bar steel. The bar steel is heated and the wrench formed in dies held in heavy forging hammers. After forging, the wrench passes through various operations of trimming, grinding, milling the openings to size, and not the least important is the heat treatment.

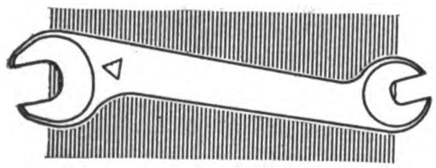
Three Grades of Wrenches

Drop forged wrenches are manufactured and listed in three grades of finish known to the trade as milled or unfinished, semi-finished and full-finished.

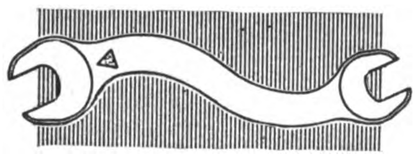
The unfinished wrench is the rough forging with openings milled to size. The semi-finished wrench is the same with the addition of heat treatment and hardening, and with the heads brightened. The full-finished wrench is polished all over before the heat treating and the hardening operations and, with brightened heads, is finally treated with a lacquer finish which acts as a rust preventive and gives the wrench an attractive appearance.

Engineers' Wrenches

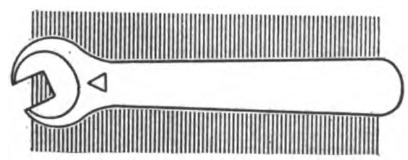
Open-end wrenches are made in a variety of styles and sizes. The style most used is the 15-degree-angle-single-and-double-end-line, also known as the engineers' line. This line was designed primarily to fit U. S. standard bolts and nuts and is also furnished with openings to fit square and hexagon head cap screws, A. L. A. M. standards, S. A. E. standards, and, for export to the British possessions, Whitworth standards, and for Europe the International standard.



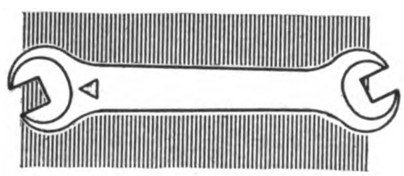
Textile wrench for mill work



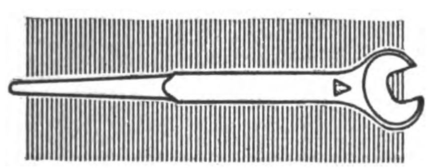
General service wrench



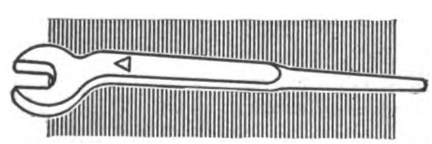
Single head set screw wrench



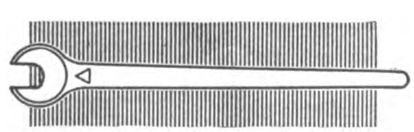
Double head set screw type



For construction work



Structural type of wrench



Single head track wrench

The term 15-degree-angle refers to the angle at which the head of the wrench is placed on the handle and has been determined to be the angle at which the utmost efficiency can be secured in confined places.

Further points considered in designing this line are the size and thickness of heads to give the required strength without unnecessary weight and the shapes and length of handles to give the necessary leverage.

Two styles of handles are used on this line of single-head wrenches: the flared handle, which is narrowest where it joins the head and widest at the end, and the taper handle which is widest where it joins the head and narrowest at the end.

The flared handle is used on wrenches up to about 14 inches in length and the taper handle on the larger sizes.

Check Nut Wrenches

Check nuts are used to prevent threaded connections from working loose on account of vibration. These check nuts are quite thin as compared with other styles of nuts; also two check nuts are often used together to further insure the fixedness of the threaded connection; therefore check nut wrenches have quite thin heads. Otherwise they are of the same general style as the engineers' or 15-degree-angle wrenches. They are made in both single and double end.

S Wrenches

S wrenches are very popular and are made with all the different standard openings. Owing to its shape, from which it derives its name, this style of wrench is used in confined places where a straight-handled wrench will not reach the nut or bolt.

The so-called textile wrenches were originally designed by a firm which manufactured looms and other textile machinery. This is a double head line with heads at an angle of 22½ degrees with the handle. The wrenches are considerably lighter than the engineers' line and with thinner heads. These wrenches are largely used in mill towns by loom fixers, etc. They are furnished with all of the standard openings.

General Service Wrenches

General service wrenches are what the name implies and were originally designed for carriage makers' use, and are popular with carriage makers, farmers, garage men, etc. They are light, handy wrenches, and owing to their lightness should not be used for severe work. This line is furnished with all the standard openings, including A. L. A. M. and S. A. E.

Set-Screw Wrenches

The tightening of set screws is one of the hardest uses to which a wrench is put, and the average wrench is not strong enough for this duty, therefore the reason for a line of single and double end set screw wrenches especially designed for this work.

Construction and Structural Wrenches

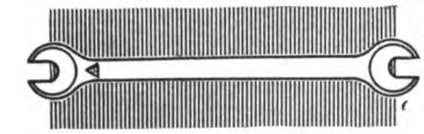
Construction and structural wrenches are especially designed for bridge and structural iron workers. Construction wrenches are made with 15 degree angle and structural wrenches are straight with an offset head. Both these lines have a round, pointed handle which is used to bring punched holes in beams into line so that a bolt or rivet can be inserted.

Track and Car Wrenches

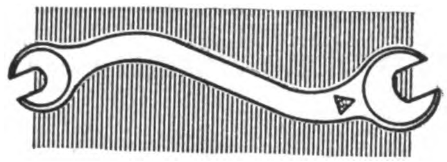
Track wrenches and car wrenches are used by railroads in the construction and maintenance of tracks and cars.

Machine and Tool Post Wrenches

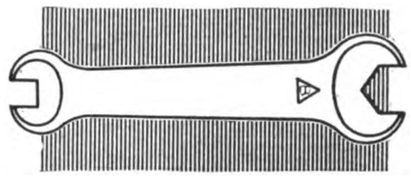
In addition to the above and in the general line of standard wrenches there are machine wrenches and tool post wrenches that are used on machine



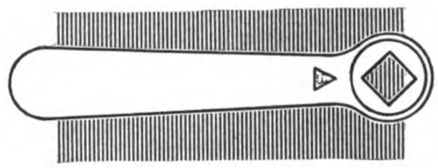
Double head track wrench



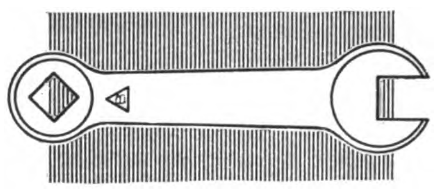
Wrench used for railroad cars



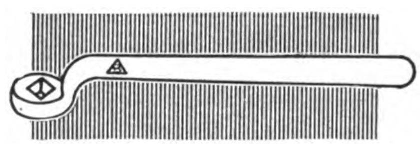
Machine wrench—double head



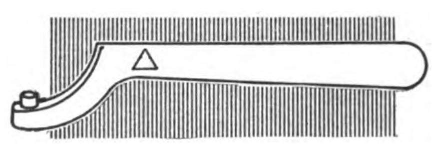
Single head tool post wrench



Double head tool post type



Chuck wrench for lathe work



Single pin type of wrench

tools; also chuck wrenches for operating lathe chucks.

The foregoing wrenches about cover the different lines of open-end standard drop forged wrenches. Other standard lines are spanner wrenches and pin wrenches. These are used for turning collars on threaded spindles.

Socket Wrenches

A very complete line of socket wrenches is now manufactured and listed, both in the T-handle and bent handle varieties. These are made for both U. S. standard hex nuts and for square nuts, cap screws and set screws.

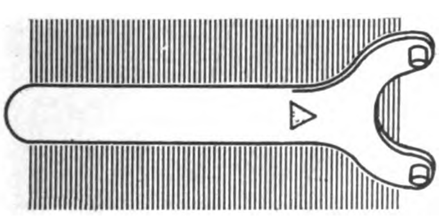
Many of the manufacturers of drop forged wrenches are now putting up wrenches in sets contained in a canvas case or bag. These sets are made up for automobilists, farmers, loom fixers and for general purposes where wrenches are used.

Wrench Display Board

Probably one of the innovations in the matter of handling wrenches which most strongly appeals to the dealer is the arrangement of a stock of wrenches on a display board that is designed to be hung in any convenient and prominent place in the store.

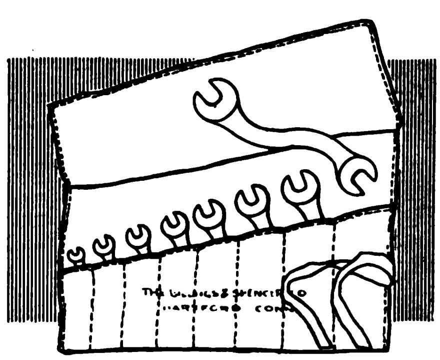
In the past, when a dealer had concluded to put in a stock of drop forged wrenches and it came time to put in a stock order, as a rule he did not know what sizes, kinds or quantities to order, and was apt to ask the salesman to help him out in the matter of the initial stock order. The salesman really had no more knowledge of the dealer's requirements than the dealer himself and generally, in his desire to turn in a substantial order to the house, would stock the dealer up with what would be more or less deadwood, probably on account of locality requirements.

When the stock order arrived, a limited quantity of the smaller sizes would be put on the shelves and perhaps in the show cases, but the bulk would be stored in the basement in bins or on shelves, and in all probability a large part of that stock in the basement would not move in years.

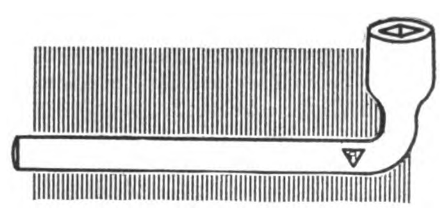


Double pin wrench

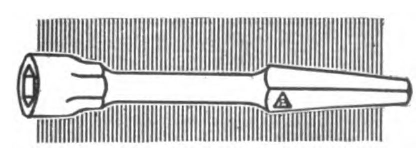
Standard socket wrench



Canvas bag and set of wrenches



Socket type with bent handle



Bit and brace socket wrench

Thinks Oversize Tires Economical for Trucks and Cars on Long Runs

The Automobile Engineers' Forum

Many Factors in Tire Wear — Trucks Most Often Overloaded and Tires Suffer from Careless Driving—Tires Age without Respect to Size

AKRON, O.—Editor THE AUTOMOBILE:—Regarding the economy and advisability of oversizing tires, there is considerable merit in both the pro and the con of the contention. While the statement that a tire would be damaged by cut or puncture, before the effects of undersizing could be appreciated, was almost an axiom as late as 2 years ago, the general improvements of highways and the general increase of engine speed in nearly every make of automobile has altered the near axiom of a new fallacy.

The touring car avoids bad roads and rough spots, considering the comfort of the passengers, if nothing else. The tire question, therefore, with pleasure cars is almost entirely one of wear and endurance. On cars of this type oversizing is unquestionably advisable, save where the car is so located that it can run only about 2 months of the year and is jacked up the other 10.

One size of tire ages just as rapidly as another and when a customer's tire trouble is chiefly due to dry and separated friction, the greater cost of an oversize tire is hardly economical.

Tire Must Keep Normal Shape

If the carcass is stronger, an oversize tire is better able to retain its normal shape under a load. The retention of this normal shape is absolutely necessary to the long life of the tire, for:—

1—Flattening out of a tire under a load offers an unnecessary amount of tread surface to the road, causing the tire to heat more and wear faster.

2—Flattening out of a tire flattens its sectional arch, destroying in great measure its ability to sustain its burden and causes the fabric to mesh or tear and blow out.

3—The flattening out of a tire requires more power to operate the car. A greater amount of gas is consumed by the engine and the gears are heated by the constant dragging.

Trucks Have Most Overloading

The greatest amount of trouble due to overloading tires is experienced by commercial vehicles. The commercial car meets with conditions radically different from those of the touring car. The principal consideration is the size of the car and its type of work.

There is first to consider the light laundry or drygoods car, on 3 and 3½-inch tires, which is required to make innumerable stops and get under way again as rapidly as possible. Such cars are in constant danger of puncturing, bruising, or tearing their tires. Their brakes are often set suddenly and skid the tire. Their engines are of a high speed type that step up from full stop to 4 or 5 miles an hour in about 30 feet. This causes a jackshaft that jerks and strains a tire or else spins it.

Oversizing on such a type of car is hardly economy. The greater tread surface offered to the road by an undersized tire gives a greater tractive power and saves the engine the jerking strain occasioned by spinning, even though it does ruin the case. There is not much danger from heating, due to the frequent stops and the fact that most of these routes are along the shaded streets of residence districts. But there is a constant danger of curb bruising, cutting in car tracks, rim cutting and punctures, and this can hardly be avoided by oversizing.

The heavier type of car, namely those on 4½ and 5-inch tires, are generally subject to long, continuous runs and their usually top-heavy loads require as stiff a side wall and tread as possible.

This type of truck is usually high geared and exerts a terrific strain on the tires in turning corners and in twisting in and out along crowded thoroughfares.

Striking the Curb Hurts Tires

Last, but not least, owing to the fact that the majority of these cars are end-doored, they invariably bang the curb in backing up for a load and here the extra ply of fabric in an oversize tire is often worth its price a hundred times.

Oversizing, therefore, is of value on trucks or cars subject to reasonably long and continuous runs, but is hardly an economy on cars that run from door to door.—RICHARD T. WALSH, Service Department, Swinehart Tire and Rubber Co.

Where Proper Inflation Fails, Oversize Tires Should Be Used

AKRON, O.—Editor THE AUTOMOBILE—The importance of keeping a pneumatic automobile tire inflated to the proper pressure, and avoiding the evil of underinflation, is something that can never be overemphasized. If less than the proper pressure be carried the weight of the car will not be properly sustained and as a consequence, there will be more or less flattening out where the tire touches the ground. This not only subjects the casing to a destructive bending action when in motion, but renders it susceptible to injury from bruises and bumps which a fully inflated tire would safely resist.

Flattened Tire Is Strained

The same condition occurs when a car with its extras is not equipped with tires large enough to properly support the load and although it be properly inflated, the weight flattens it out where it rests on the ground just as in the case of a tire large enough but not inflated to the proper pressure. The extra strain thus imposed not only breaks down the side walls but increases susceptibility to all the various forms of trouble.

In the design of a bridge where the factor of public safety is actively important, there must be no possibility of a breakdown. The strains and their combinations are carefully calculated from both theoretical and empirical data. When, in this way, it is determined that a bar ¼ inch thick would be just equal to the strain, a bar 1½ inches thick—six times the thickness actually necessary—is adopted. The extra inch and a quarter is a margin of safety which insures the structure against any unforeseen and unusual strain to which it may be subject. The lack of this margin of safety would be inimical to public welfare.

Margin of Safety Necessary

By the same token, the tire which gives good service, other things being equal, is the one which not only provides the necessary strength to resist the average strains but which also provides sufficient margin of safety also to resist the unusual extra strains which at times occur even when reasonable care is used in driving.

Proper attention to inflation will usually insure good service. For the man who exercises care in this particular but who is still unrewarded with the good service usually returned by this precaution, the solution lies in the use of the oversize tire—the largest tire that fits each rim. For every standard size of rim, there are two sizes of tire which fit. For example, a 34 by 4 rim carries a 34 by 4 tire. Should the 34 by 4 tire, after the car has been equipped with its extras, prove inadequate for the support of the load, the 35 by 4½ tire which also fits the 34 by 4 rim and is the regular oversize for the 34 by 4, is the proper size to insure satisfactory service. Also the 33 by 4 is the regular oversize for the 32 by 3½.

Oversize Takes the Same Tube

Usually, it is by experience that the motorist discovers he has equipped his car with tires that are too small. He then desires to change to the regular oversize tire for his rims. For making this change, the manufacturer has provided every convenience. Not only does the oversize fit the rim as perfectly as the regular size, but it also takes the same tube. Tubes, like rims, are now made interchangeable. Consequently the change over to the oversize will not require any changes or additions as to the tube equipment.

30 Per Cent. More Capacity

The oversize tire contains between 30 and 40 per cent. more air capacity than the regular size. This extra capacity makes possible not only a more effective air cushion to sustain the weight imposed, but higher resilience as well. An oversize tire naturally costs more than one of the regular size because it is larger. Its more effective air cushion, however, as well as the better distribution of road wear because of its extra width, insures still greater mileage in proportion to the initial cost. And so its use decreases the cost per mile; and cost per mile, rather than cost per tire, is the ultimate test of economy.—F. A. HENDERSON, Manager Adjusting Department, Goodyear Tire and Rubber Co.

Decisions of the Courts—Motorist Recovers Damages

By GEORGE F. KAISER

NEW YORK Court says that when a motorist has an unobstructed view along a street containing car tracks for 200 feet and he starts across without again looking for a trolley, he is not negligent as a matter of law since no car could then be in a dangerous proximity unless it was being run at an unlawful speed.

A motorist's car was on the west side of Broadway, south of 11th street. While attempting to turn to the north on the east side of Broadway his car was struck by a trolley. Before starting his motor he had an unobstructed view for 200 feet and he saw no car until he was in the middle of the track. A trolley came along at the rate of 30 miles an hour and before the motorist had time to reverse the automobile it was hit by the trolley. The motorist sued the trolley company and the Court said that where a trolley proceeds at an unusual rate of speed after an automobile is in clear view, the trolley company is guilty of negligence and must stand for damages caused by a collision.—*Brandt vs. N. Y. Railways Co.*, 147 *N. Y. Supp.*, 17.

Motorist vs. Garage Man

Michigan Court holds that a garage keeper's lien can be assigned to another person when he sells his business, and that the lien may be held to include freight charges which he has paid and an extra tire which he has furnished.

A motorist sued a garage keeper to recover his automobile which was held by right of lien by the latter. He had made arrangements with the garage keeper's predecessor to the effect that he would ship it to Muskegon where it was to be received and repaired. The garage keeper's predecessor paid $33.60 freight charges and furnished an extra tire for which he charged $50.75. Some time after a settlement was made and $75 was paid on account and it was agreed that the balance of $171.60 was to be paid before the car was turned over to the owner. After that the garage keeper went out of business and assigned his lien and claim for repairs. The motorist demanded the car without offering to pay his bill and when it was refused him he sued. The Court ruled that the garage man's successor had a right to keep it until the bill was paid.—*Gardner vs. LeFevre*, 146 *N. W.* (*Michigan*), 163.

Car Collides with Trolley

Court says that when accidents occur between a trolley car and an automobile, unless explanation is given by the trolley company, the fact of the accident is evidence of the trolley company's negligence.

In this case an electric car was coming south down grade at the rate of about 40 to 50 miles per hour, swaying from side to side. Plaintiff was going north on the same road, using reasonable care. The small wheel at the top of the trolley pole left the wire when the car was about 400 feet from the automobile. The trolley pole broke off and fell against the left forward wheel of the automobile, causing it to turn to the right toward an embankment. The motorist expected the car to turn turtle and he jumped out and was injured. He sued the trolley company and recovered judgment for his injuries, the Court holding that in a case like this, unless the trolley company could give some good explanation, the fact that the accident happened showed that it was guilty of negligence.—*Hull vs. Berkshire Street R. R. Co.* 104 *N. E.* (*Massachusetts*) 747.

F. C. Billings Wrote Article on Wrenches

NEW YORK CITY, Sept. 11—Through an error made in correcting page 485 of THE AUTOMOBILE for September 10 before going to press, the signature of F. C. Billings, of the Billings and Spencer Co., Hartford, Conn., was omitted from the communication prepared by him and appearing in the Engineers' Forum under the heading "In Ordering Wrenches Mention Number and Style of Finish."

Sand Blast Has Variety of Uses

From a Paper Read by H. D. Gates Before a Meeting of Associated Foundry Foremen of New York City and Vicinity

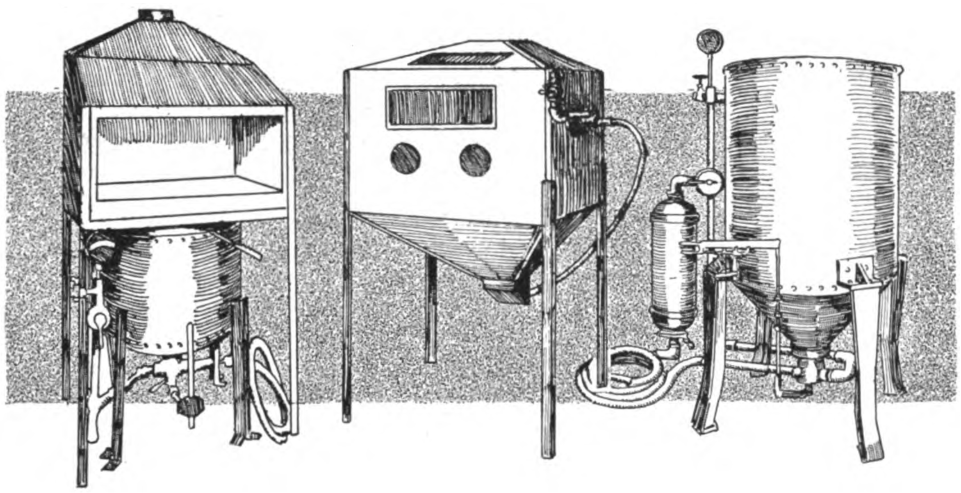


Fig. 1—Left—Combined pressure blast and cabinet. Fig. 2—Center—Continuous speed sand blast cabinet. Fig. 3—Right—Hose type pressure blast

WHILE the sand blast had its origin in the foundry for the cleaning of castings, its many advantages for cleaning or surfacing in all branches of metal working has given it a much wider use. Uncle Sam even demanded that the gates of the Gatun Locks of the Panama Canal be sand blasted before painting. Makers of automobile bodies in steel and aluminum are surfacing them before painting. With the increase in the use of the sand blast it is time to consider its economy.

The Purchaser's Problems

There is no question but there are today many sand blast machines and installations in use which are a loss to the user. Before purchasing a sand blast, it is first necessary to consider the material to be cleaned, what will be its average shape, size and weight and how many will be produced in a day. These and several other problems must be solved before the sand blast purchaser can determine if it is to be economical. If the work will not be uniform and will be in a wide variety of sizes and shapes, it will be impossible to use any but the old stand-by, the hose type of machine. This will clean everything and anything, though not always with the best economy.

Sizes of Pieces an Important Factor

Assuming, however, for the moment that the volume of the different classes of work is sufficient to warrant the use of an automatic machine, there are in general, two types for selection. For small work, the barrel type of machine shown in Fig. 5 will be unquestionably the most economical. The air volume required will, of course, be governed by the number and size of the nozzles and actual comparison of cleaning time with different size nozzles is the only way to determine the most economical for various classes of work. A single nozzle in larger size, of right design, construction and location, giving correct application of the sand stream to the work, will be found more economical in air consumption and power cost than multiple nozzles of smaller sizes.

Pieces too large for successful barreling but that will still permit of automatic handling, will be cleaned with least labor, on the round and reciprocating type table machines, of the type shown in Fig. 4. If, however, the pieces are of such shape or design as to demand constant labor in turning them to bring all surfaces under the action of the nozzle, the question of economy under these conditions requires the closest consideration before selecting this type of machine for varied work. On certain classes of material it is ideal.

Another consideration is that in many plants while the character of the work may be such as to be ideally handled by one of the different types of automatic machines, the daily volume may be so small that the unit cost of the automatic may put it out of the question. To meet such a condition, the small inclosed cabinet type of machine giving a continuous speed such as is shown in Fig. 1 will give a very satisfactory equipment.

The combination pressure blast and cabinet as illustrated in Fig. 2, also offers at small cost a highly efficient equipment for small volume work of a varied character. With this outfit the work can be accomplished in a practically closed cabinet while the outfit is still available for heavier pieces on the bench or floor as desired.

The Hose Type of Machine

Should the work of a particular plant not fall under any of the above heads, there remains one outfit that can take care of any kind of work even though at times a loss of economy on some portion of the output will result from its use. This is the hose type of machine shown in Fig. 3. This kind of machine is designed for the hardest kind of service, being able to clean metal and displace sand, rust or scale, some of

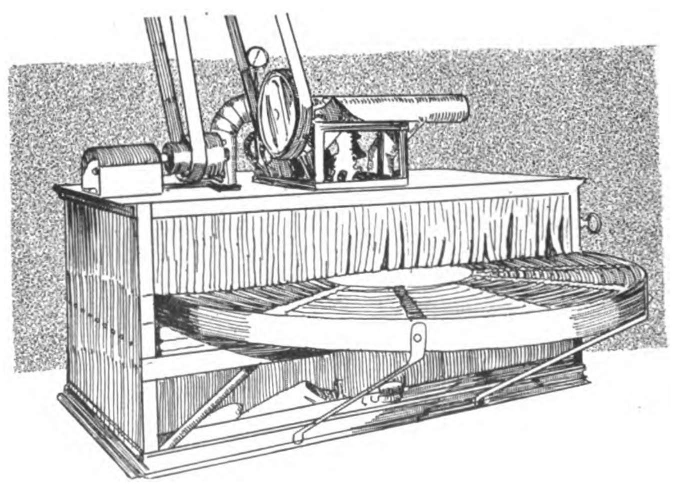


Fig. 4—Revolving table type sand blasting machine

which has fused and become almost as hard as the metal itself. The selection of this type of machine, unlike the automatics, should be made with reference to the nozzle equipment to be used. For instance, under 80 pounds pressure a 3/16 inch nozzle permits 48 cubic feet of free air to flow through per minute and discharges approximately 500 pounds of sand an hour. The air flowing through a ¼ inch nozzle is 85 cubic feet per minute and the discharge is approximately 900 pounds of sand in an hour.

Ample Air Pressure Needed

After the engineering department has calculated the type and size of the equipment necessary, the next problem to be undertaken is the question of air volume and pressure requirements. If the plant is without air, compressor equipment must be installed. In this, it must be remembered that it will be a mistake to buy a compressor adapted to barely meet immediate needs. Fully 90 per cent. of the foundries today are complaining of lack of compressed air capacity, and this is due to the constant increased demands which are made on the air plant once it is in operation. The greater first cost of an air compressor of large volume over the same type of small capacity is so comparatively slight that the provision of ample air to permit use of proper equipment for cleaning at the lowest cost per ton is undoubtedly advisable in the long run.

Undoubtedly, the satisfactory working pressure is the most mooted question among sand blast manufacturers today. There is one answer to the question, however, on which all agree and that is the pressure which is best is that which does the work cheapest. To determine this, it is of course necessary to know the exact purposes for which the blast will be used. If it is required only to remove the loose sand from a casting, a working pressure under 30 pounds will undoubtedly be successful even on iron and steel and would provide a surface suitable for painting. If, however, the pieces are to be machined, every particle of the fused sand must be taken off to expose the pure metal to the action of a cutting tool. On steel, up to 90 pounds will be required for most economical cleaning. Between these two extremes, the correct pressure must be determined.

In the test made by Prof. T. Magruder covered in a paper recently read before the American Society of Mechanical Engineers, it was shown that the time required to remove 1 pound of metal from a cast iron bar at 20 pounds pressure was 3.55 hours; at 30 pounds, 2.77 hours; at 40 pounds, 2.13 hours; at 50 pounds, 1.52 hours; at 60 pounds, 1.07 hours, and at 70 pounds, .82 hour.

The abrasive used is another factor in the economy of the

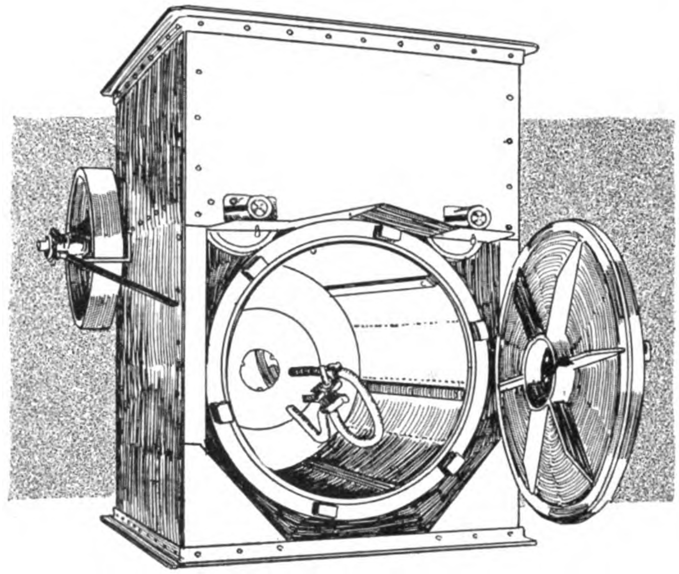


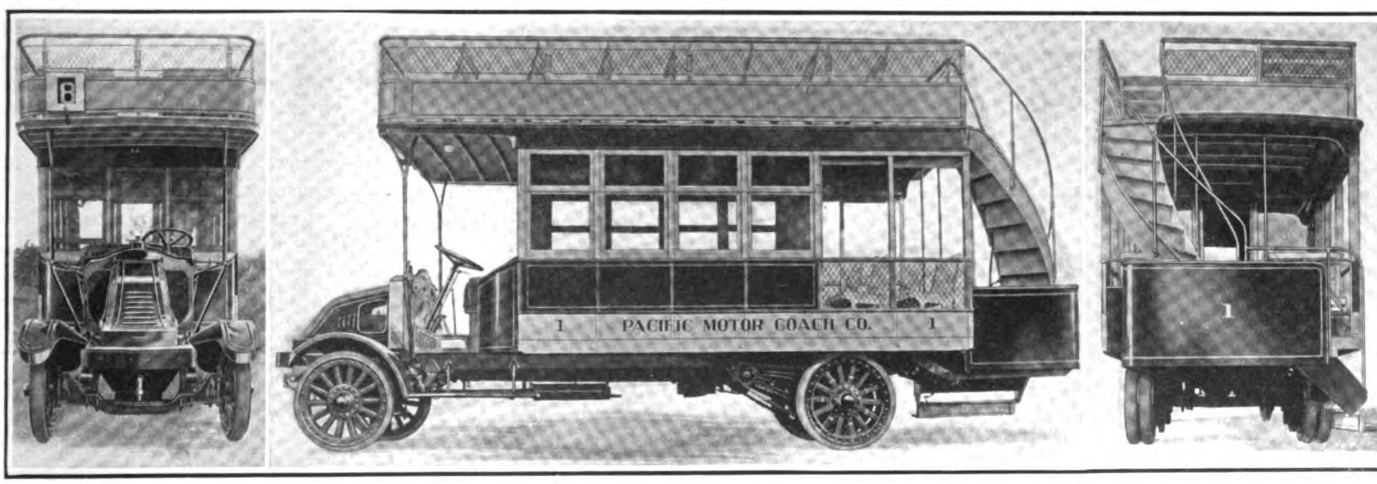
Fig. 5—Barrel type of sand blasting machine which is suitable for miscellaneous jobs

blast. Tests show that lead shot and grit have approximately sixty times the life of sand. In an instance of use of grit with a hose machine, a steel foundry reports a loss of but 10 per cent. out of 3 tons at the end of 1 month. When sand was used, the daily loss by disintegration was 25 per cent. In another foundry the cleaning time required was reduced 20 per cent. by using shot. This seems logical as the metal abrasives have two and a half times the specific gravity of sand.

Records kept for a period of 6 months in this plant showed that with this same apparatus and under the same conditions the 1 pound of shot was equal to 20 pounds of fine silica sand.

Care of the Machine

Care of the machine is the last but far from the least important advice given to the user of the sand blast. Methods of handling and screening the sand should be determined not only by the cost of power requirements, but by the efficiency of separation demanded. Some idea may be obtained of the relative value of different installation, from the fact that one steel concern using a plant provided with adequate ventilation with the abrasive handled, screened and cleaned automatically, was able to increase the output of its sand blast from 15 tons in 10 hours to upward of 18 tons in 5 hours. Routing of the material and handling methods are other items.



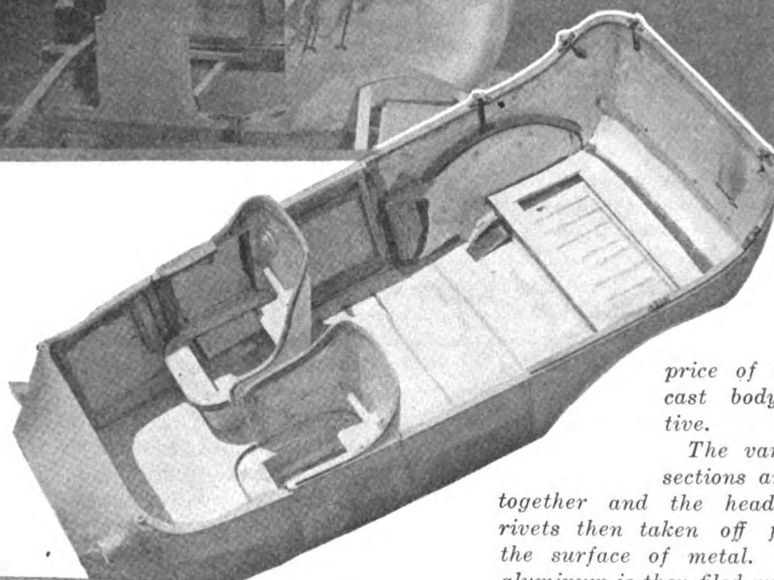
Front, side and rear views of one of the 3.5 ton Kelly Springfield buses to be used in Los Angeles, Cal. One hundred and four of these buses have been ordered by the Pacific Motor Coach Co., Los Angeles, Cal., and are to be operated in and around the city. The bodies were built by the St. Louis Car Co., St. Louis, Mo., and are unusually capacious. Seats for fifty-four passengers are provided—thirty on the upper deck and twenty-four on the lower, eight of these being on the open portion at the rear. A speed of 20 miles per hour can be maintained

Cast Aluminum Shells for Pierce-Arrow Bodies

OFFERING a choice of fifty-four body styles, the Pierce-Arrow Motor Car Co., of Buffalo, N. Y., has set itself a task in body building that requires the efforts of special machinery and an immense floor area especially devoted to this branch of automobile manufacture.

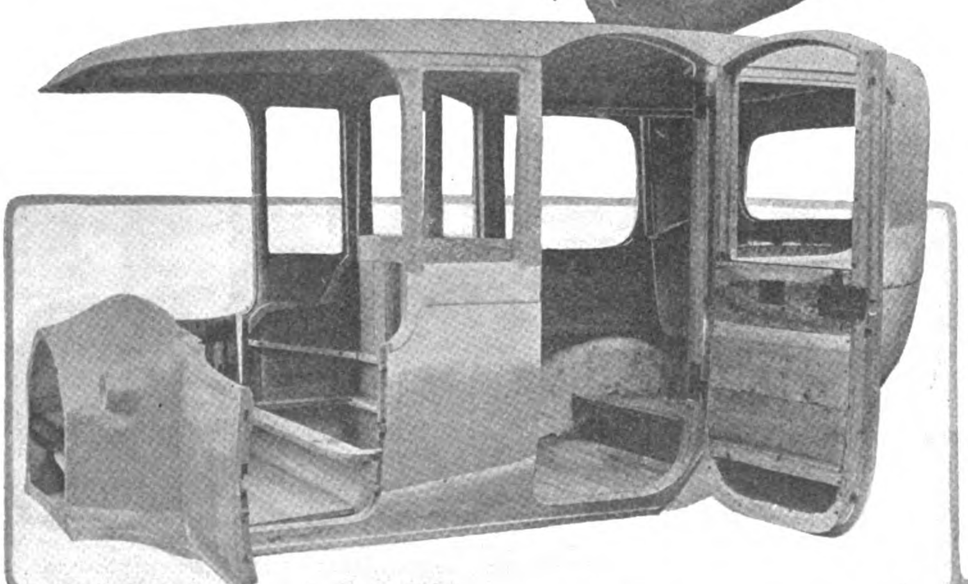
The Pierce bodies are distinctive in that they are made from cast aluminum instead of from the sheet aluminum generally employed by body builders when using the light metal for their carriage work. The company believes that outside of securing a rigid piece of work by the use of the cast metal there is a further advantage in ultimate economy by the use of standard moulds.

In the accompanying illustrations are shown the shop in which the body work is carried on and examples of open and closed car practice in cast aluminum. In practically every case the cast metal is used in preference to the sheet construction by the Pierce company. There is an exception, however, to this and that is where bodies of such individual design are ordered that the cost of moulds and pattern work would make the price of the single cast body prohibitive.



The various cast sections are riveted together and the heads of the rivets then taken off flush with the surface of metal. The cast aluminum is then filed and scraped, giving a smooth working surface for the painting which follows. When all the parts are joined together the aluminum shell is sent to the wood workers to receive its backing of ash.

It is stated that these bodies are lighter and more serviceable than sheet metal ones. They are rigid and do not drum from vibration, or warp or buckle from extreme changes of temperature. Their rigidity is also a great protection to the finish as there is no danger of the paint cracking. Another feature is that the mouldings are integral.



The Ideal American Six

Should Have Efficient 4 by 6-inch Motor, Flywheel in Front and Expanding Brakes, Says A. Ludlow Clayden, M. I. A. E., in Paper Presented To S. A. E. at Cape May

At the present time the position of the six-cylinder car in Europe forms a very interesting study. It is doubtful whether anyone can forecast its future. There was a day when high power was obtainable only from a large car by means of using six cylinders. But at the present time, methods of manufacture and principles of design have undergone so much alteration that numerous high-powered four-cylinder cars, which are quite as smooth and pleasant to handle as the best six-cylinders, are coming on the market. Further, there are a number of difficulties peculiar to the six-cylinder construction. The vexed question of six-cylinder carburetion has never been settled. The difficulty of eliminating periodic vibrations with the necessarily long crankshaft still remains pronounced. Also, probably owing to piston friction principally, the six-cylinder engine is invariably less efficient than a four-cylinder of equally good construction—efficient, that is to say, in the power to volume ratio. This means that for a given power a six-cylinder car must necessarily be considerably heavier than a four-cylinder. Add to this increased cost for a given power, decrease of available body space for a given wheelbase, or greater length and therefore cumbersomeness necessary to carry a bigger body, and most of the disadvantages of the six-cylinder car have been summed up. On the other hand, there are a few six-cylinder cars which possess greater smoothness than has yet been attained with any four-cylinder, owing to the undeniably better torque, but none of these cars is efficient. They are cars which, while suited excellently to bear elaborate carriage work and provide luxurious travel at moderately high rates of speed, are seldom found in the possession of men who drive themselves or take a great interest in the mechanism. From an advertising point of view the six-cylinder car appears to have been made the only possible thing for America. In Europe the six-cylinder argument is practically dead.

Sunbeam—Most Efficient

It is, however, possible that the present position of the six-cylinder car in Europe is misleading because no effort has been given to the production of a really efficient six-cylinder, except by the Sunbeam company; the 30-horsepower Sunbeam holds records which leave no doubt whatever concerning its efficiency. The method followed by such concerns as the Sunbeam company is, first, to produce highly efficient cars and then obtain quietness, etc., without depreciating the efficiency. In this the Sunbeam and Vauxhall companies in particular have been remarkably successful. The Sunbeam is, of course, a small six-cylinder, but there seems to be no reason why the same methods should not be applied to a larger engine.

In making a new car for England or the Continent it would undoubtedly be far better to specialize on a highly efficient four-cylinder type and leave the six-cylinder entirely alone. On the other hand, it seems that for a new American car the so far untried scheme is the production of a highly efficient six-cylinder. The specification hereunder is a suggestion for the main characteristics of such a chassis.

Should Have 4 by 6 Motor

The dimensions should be certainly not more than 4-inch bore by 6-inch stroke and there would be several advantages in adopting 3½-inch bore by 5⅛-inch stroke; this latter size would be capable of giving as much power as the largest American six-cylinder engines if the engine were made in accordance with European principles. The advantages of the smaller dimensions would be less weight, lower cost, greater ease in eliminating vibration and less overall length.

The cylinders should be cast in threes with the valves all on the right-hand side. The three-cylinder blocks are quite handleable by one man; can be rigged in position quickly and easily; are not so likely to be bad castings owing to having less complication than a block of six; need not actually require more machining if care be taken in the design; and, finally, are much easier to remove and replace. When four-cylinder blocks were first introduced there was much complaint in certain quarters that private owners would find them very awkward to take off, and undoubtedly there was something in the objection. A six-cylinder block needs very elaborate tackle and several men to remove it from and replace it on the crankcase for cleaning with the pistons in position. Of course, this is not an objection that the ordinary buyer thinks very much of until he has to take the engine down, but when he does he never forgets it. Also, in my opinion, a six-cylinder block looks very heavy and rather clumsy. However, this last is not a point of great importance.

Generous Water-Jacketing

The water-jacketing should be sufficiently generous to enable thermo-syphon cooling to be satisfactory with an atmospheric temperature of 80 degrees Fahrenheit in ordinary country. In the cylinder blocks the passages to the intake should be cored and carried through the water-jacket to the opposite side to the valves, bringing the carbureter on the left-hand side. Between the carbureter and the cylinder castings the shortest possible pipe should be used and this also should be jacketed in a manner ensuring ample circulation of hot water. Although the word pipe has been used it is better to employ a box big enough to contain one or more cylinder charges, or else to use a circular loop pipe, as has been illustrated frequently on various racing engines, and as is used by the Austin company notably. It will probably be necessary to experiment with different inlet-pipe arrangements, as different engines do not appear to be suited by precisely the same design.

Returning to the cylinder castings, these would each have a water inlet at the bottom on the same side as the carbureter. There would be the usual cast dome for a head, and in addition the Napier practice should be followed of taking two pipes from the jacket immediately adjacent to the valve-pockets, joining these and leading them up to the radiator separately from the main outlet. This has been found to make a very great difference in engines used in mountainous districts, as it prevents entirely the otherwise always-present danger of formation of small pockets of steam in corners of the valve-jackets, it being almost impossible to cast cylinders without risk of a few traps of this nature.

The crankshaft should have seven bearings because, although it is possible to make a fairly satisfactory engine with a smaller number, the best possible running cannot be obtained unless the supports for the shaft possess the maximum of rigidity and this can only be the case with seven bearings. The diameter should be not less than 2½ inches, this applying to both the main journals and the crankpins, while the webs should be proportionally stiff. Weight should not be spared in the crankcase, as the success, or non-success, of the six-cylinder engine depends almost entirely on the absolute rigidity of this portion. Very stiff webbing to support all the bearings is therefore recommended, and the case itself should be distinctly on the thick side. Distribution gearing should be by inverted-tooth chain. A chain 3 inches wide is recommended; 2½ inches might be regarded as the minimum. There are various methods of adjustment, and adjustment is deemed to be essential, not for the use of the owner of the car, but for convenience in manufacture. There would be, of course, a crankshaft pinion, the camshaft wheel, and at least one other. Whether this should drive the water pump and magneto direct or whether the third pinion should be made in one piece with a skew gear driving a cross-shaft for these two accessories, would depend upon the general layout decided upon. If it is possible to dispense with the cross-shaft a certain amount of manufacturing cost is, of course, avoided. On the other hand, usually with large engines the magneto and the pump are brought into the most satisfactory and most accessible position by the use of a cross-shaft, more especially when it is necessary to keep the magneto high. The pump might also be inserted directly in the cylinder casting by leaving the front end of the cylinder open and bolting on a bronze or aluminum casting carrying the pump and fan. This would add a facing operation, but I believe it would save in the long run, as the machining of the pump chamber and the bearings for the fan can be carried out far more expeditiously on a small piece than on the whole cylinder block.

Exhaust Header Separate

The exhaust branch should be a separate casting provided with one expansion joint between the two cylinder-blocks, and it should be kept high, so as to interfere in no way with the accessibility of the valves. Many European makers have made experimental designs in which the exhaust manifold was part of the casting. They have, however, always returned to the separate branch, which I think may be taken as sufficient evidence that the cast-in branch is not satisfactory. Supposing it is water-cooled, it is necessary to make it very big externally and also to increase considerably the amount of water carried. If, on the other hand, it is not water-cooled, it becomes much hotter than any other part of the casting; being hotter it is bound to expand and by expanding it cannot help distorting the cylinders. Even though this distortion be slight it is sufficient to increase piston friction and eventually bring about uneven cylinder wear. Further, in order to make the engine thoroughly efficient (and in my view an engine which is not thoroughly efficient is not worth introducing as a newcomer on an already well-stocked market), it is essential that the inside of both the exhaust and inlet pipes be as smooth as possible, as the resistance offered by roughness of surface is a great deal more than would ordinarily be expected. Owing to the rather complicated nature of the core it is impossible to get anything like a smooth interior with a one-piece cylinder and exhaust branch. Of course, foundry practice has improved enormously, but I am inclined to believe that there is a tendency to put too much on the foundry. Thus, in a six-cylinder block, owing to the large amount of metal to be poured, and the considerable contraction, it is possible for quite grave inaccuracies in wall thickness to occur which cannot be checked except by cutting up a casting and, of course, bad castings are sure to be those which one does not cut up.

Valves Enclosed

The valves will, of course, be enclosed under the usual cover-plates, but the tappets should be mounted in the cylinder foot. The tappets ought, in fact, to be situated in a shallow trough formed in the casting; that is to say, with the cover-plate removed there should be still left a sufficiently deep chamber around the tappets to contain oil which is bound to be exuded from the tappets. Tappets can be made without rollers, but to the detriment of cam durability, and to a certain extent to the detriment of silence. I do not quite see why this should be so, but undoubtedly it is true that the roller helps to keep down noise. It is advantageous to work the tappets in the nearest possible approach to an oil bath, and the arrangement suggested, although not easy to describe in words, is very simple on paper. The ends of the cover-plates should be curved, instead of using a flat plate butting against the end-pieces made with the cylinder casting, because these solid end-pieces render the valves at each end of a cylinder block extremely inaccessible. The curving adds a little to the cost but is certainly worthy.

The camshaft should be of a diameter corresponding proportionally to that of the crankshaft, and cams of the largest possible diameter which can be accommodated should be employed, partly for the sake of durability, but more for the sake of getting the desired valve diagram as nearly as possible. Valves should be not less than 2⅛ inches diameter.

Oil Ducts in Crankshafts

For lubricating arrangements the crankshaft should be drilled and oil supplied to each main bearing at about 30 pounds per square inch pressure. The oil would pass through the shaft to the big ends and no special means need be taken for lubricating the piston-pins or the cylinders. To prevent the access of too much oil to the cylinders the crankcase should be made with a false top. Immediately beneath each cylinder the only connection with the crankcase should consist of the narrowest slot through which it is possible to insert the connecting-rod, but the baffle-plates should not close the bottom of each cylinder individually. A method which has been employed very successfully is to extend the crankcase upwards above the baffles, which are cast in one piece with it, so that the cylinders stand open to a shallow chamber—say one inch deep—running the whole length of the crankcase and separated from the crankshaft by the thin web with the necessary six connecting-rod slats. This longitudinal chamber allows the air displaced by the descending pistons to travel along and ascend under the other three without passage through the oil-laden atmosphere of the crankcase proper. It has been found that ample lubrication is obtained when using high-pressure oil-feed, and with this scheme smoking troubles are overcome. In order to complete discussion of the system of lubrication it is necessary to anticipate a little.

Flywheel in Front

The suggested design includes a recommendation that the flywheel be placed at the front end of the motor instead of at the rear, as usual. The three lowest points in a chassis are the front axle, rear axle and flywheel, and it is easy to see that if there is a hump in the road of wave formation it will be easy for the hump to clear both the front and rear axles and yet strike the flywheel, owing to both axles being lower than normal just at the instant that the flywheel is over the hump. With the flywheel at the front end it would be protected by the front axle and over anything which the front axle would pass the flywheel would be carried also. Another conspicuous advantage, though not so important as the one just mentioned, is that consequent upon the fact that with a unit system for the engine and gear-box the necessary enlargement of the casing around the flywheel is a source of considerable weakness, or, looked at from the other point of view, the necessary enlargement calls for a very great increase of weight in order to get sufficient strength. A smaller casting without the flywheel pit is cheaper in first cost and easier to machine. The arrangement also has several advantages when the fitting of an electric motor-starter has to be considered, but these need not be gone into in detail at the moment.

Returning, therefore, to the lubrication system, the deep end of the crankcase sump obviously ought to be at the forward end as close as possible to the flywheel; otherwise the principal advantage of placing the latter at the front end is nullified. There is, however, a difficulty in that the oil supply to the pump needs to be most certain while ascending a grade. It is possible that this difficulty is not so serious as it appears, but to decide it definitely without knowing the actual clearances and without setting out the design on paper with some degree of accuracy, is almost impossible. Assuming that there is difficulty, the best way of avoiding it would probably be to adopt the system employed on the six-cylinder Wolseley cars. Here there is practically no sump, the crankcase being quite shallow, sloping downwards slightly from each end to the center. Oil is withdrawn from the crankcase by a gear-pump and supplied to a box which takes the place of the sump and is in one piece with the crankcase and high up on the side. This suction pump is of large dimensions but of quite ordinary design and appears to be in every way satisfactory. From this box on the side of the crankcase—which is large enough to contain all the oil in circulation—the forced feeds to the bearings are supplied by a separate and smaller pump. Failure of the suction pump would result in the flooding of the crankcase which would be announced by smoke, and failure of the supply pump would, of course, be shown by the indicator on the dashboard. The extra pump, however, introduces no extra risk and merely adds a little to the cost. The operation of emptying the system, washing out the oil box and so on, is facilitated a little by the higher placing, and the filters likewise become more accessible. For the suction pump a gear pattern is probably the best, but it has a disadvantage for forced feeding in that the output is not easy to control, appearing to bear no very direct relation to the speed. For the Vauxhall cars, including the racing machines, piston pumps have always been used for the oil, and it is doubtful whether this type of pump can possibly be improved upon for any purpose. It is not expensive to make and is easy to set to give the desired feed.

Babbitt Bearings Used

Having discussed the lubrication system it is perhaps worth while to add a word concerning the bearings, which should be of babbitt metal and might be die-cast. One point, however, is essential and that is that the crankshaft should be fitted to these bearings by thoroughly efficient hand-scraping. For six-cylinder work the reaming system *could* be made to serve, but it is not possible to obtain really first-class results from it.

As to the piston, these would preferably be of cast iron with the pins oscillating in the small ends of the connecting-rods, for which latter there is nothing practically better than a good drop forging. Phosphor-bronze bushes on the hardest possible steel piston-pins give the most satisfactory results. For the other bearings the exact nature of the white metal employed would of necessity depend upon the nature of the steel used for the crankshaft. For a six-cylinder crank it is probably worth while to machine all the webs, especially in a seven-bearing crank whereof the clearances must of necessity be somewhat small. It is not, however, necessary that the finish on the webs be of a very high order, because it is regarded as essential that the crank shall be balanced on a running balance machine, and this naturally applies to the flywheel as well.

Clutch and Gear-Box

Having the flywheel at the front end of the motor makes possible a single casting or a single pair of castings (the top half and bottom half) for the crankcase and gear-box. It would, however, probably be more convenient to make a separate piece of the gear-box and the clutch-box. This could be decided definitely only after laying out the design on paper. A lengthy experience of clutches of every kind has led to the conclusion that the dry-plate clutch, in which one surface is steel and the other woven wire and asbestos compound, is the most satisfactory for cars of high power. The number of plates depends upon the diameter and the engine power, and can be decided on by experience. For mounting the clutch there would be an extension of the crankshaft and the shaft carrying the striking gear would preferably be placed beneath the center rather than above it. Such positioning enables long pedals to be used, giving big leverage, while it also clears the clutch completely from above and makes adjustments readily accessible.

It is assumed that the gear-box and crankcase would be bored after being bolted together, and therefore the main gearshaft ought to be perfectly in line with the clutchshaft. It is, however, recommended that a simple universal coupling, preferably of the spring-steel-ring or Schneider type, be employed as this is very easy to disconnect without taking down either part of the unit, and also reduces the accuracy in boring necessary by a small fraction of an inch. Naturally the clutch would be enclosed completely; the lid or cover giving access to it may be either an aluminum casting or a steel pressing.

Four Speeds and Reverse Needed

Turning now to the gear-box, four speeds with a reverse should, of course, be provided. Wheels with big teeth are preferred. Considerable width of tooth is also an advantage from the point of view of silence. The spigot should run on ball bearings, but the main shaft and layshaft may be mounted on either ball or taper roller bearings. The advantage of using the latter is that it eliminates the otherwise absolutely essential thrust race on the mainshaft. Concerning the arrangement of the gears, and the striking mechanism inside the box, no departures from the normal practice are considered, but the control should undoubtedly be in the center of the chassis, the gate thus coming immediately on top of the gear-box. Probably the best arrangement for the gear-shifting lever is to mount it on a ball which is automatically dirt-proof and self-lubricated. There are, however, disadvantages in not having a visible gate, but there is a design entirely adaptable for such a layout as the one under consideration.

It is not proposed to discuss axle arrangements at the present time, but it is believed that the best arrangement, considering the advantages and disadvantages of all systems, is to have a single universal joint behind the gear-box, contained inside a large ball, the latter forming the end of a substantial tube containing the propeller-shaft. This tube acts as the driving member, as a radius- and as a torque-rod. The arrangement can perhaps be improved by the addition of side rods, but they are in themselves troublesome in certain respects and it is doubtful whether the sum total of gain in having them amounts to anything at all. The possibility of side-sway from lack of rigidity can be overcome by the use of wide springs with well-proportioned eyes and carefully fitted shackle bolts. One essential of the arrangement suggested is that the ball be of thoroughly adequate diameter; somewhere in the neighborhood of 5 inches is suggested as about right for a car of the size under consideration. The universal joint contained therein would preferably be of the ring type with ball bearings, or again, taper roller bearings, as these types appear to be everlasting. The torque-tube would, of course, be steel; the ball should be phosphor-bronze.

Steel Gearbox End

It now remains to consider the way in which the thrust from the ball should be applied to the car as a whole. It is suggested that the end of the gear-box be of cast steel and that the ball housing be machined in this. Near the forward end of the power unit on the sides of the crankcase would be a pair of substantial pads, placed vertically, to which a pair of drop forged arms could be attached. It would be possible to use the ordinary cast aluminum arms, but it is deemed preferable to take the drive through steel. The ends of these drop-forged arms would be turned spherical, giving balls about 2 inches in diameter, and a similar ball would be bolted firmly on the gear-box by a pair of long bolts passing right across the steel casting on either side of the large ball at the rear end. The necessary sockets would be placed on the side members of the frame for the front ends, and on a cross member for the back end. This arrangement would avoid the necessity of any dropped or bent cross members, thereby avoiding weakness and expense; would relieve the unit from all twisting stresses and provide ample area for driving. It might be an advantage to mount the socket for the ball at the rear end, itself on a swivel, so that the whole of the driving force would be applied through the two arms; this would dispense with the possibility of undue load being placed on any one ball through disalignment of the frame. Conversely, it might be preferable to take all the drive through the single suspension on the cross member at the rear and allow the front sockets a little swing. Probably convenience in manufacture and erection would be the deciding factor. One detail which has not been mentioned is that the universal joint should be allowed a little telescopic movement on splines, on either the propeller-shaft or the gear shaft. This would compensate for any inaccuracies in erection and also make it possible to withdraw the whole transmission by removing the back half of the cast steel sphere-casing. It might be pointed out that this latter provides a unit which can be fitted in the frame very easily, and which is entirely independent of any necessity for lining up to the rear axle. The system described is likewise a complete unit and the only great accuracy required in the spring mounting on the frame is to see that the two axles are parallel.

Steering-Gear on Crankcase

The steering-gear would be bolted to the crankcase on the left-hand side of the engine, as left-hand drive is undeniably the only possibility for American usage. This would leave the right-hand side of the engine very clear for obtaining access to the motor starter and the oil tank, if the Wolseley arrangement were adopted. It is suggested that if a cross-shaft is used the magneto should be so placed that its contact portion is accessible from the left-hand side. It is an advantage to have such parts as carbureter, magneto and lubrication details so placed that they can be all inspected at the same time with the minimum amount of moving about.

Engine control should consist of hand-throttle and spark lever on the steering-wheel, and also a well-balanced foot-throttle, so operating that the hand-lever controls the cut-off. The throttle-pedal should be situated immediately behind the base of the steering-column and between the brake- and clutch-pedals. An arrangement of steering-gear which allows for a slight adjustment for rake is also recommended, not to enable different angles to be obtained for different styles of body-work, but to allow the driver a little latitude as to the closeness of the wheel. This is a point which has been neglected very much indeed, but there is no doubt that a large man is far better suited by a wheel rather higher up and rather further forward than a small man. All that is needed is an arc of travel giving about 3 inches of movement measured at the top end of the column.

Electric Type of Starter

For the motor-starter it will be possible to fit an electric dynamotor either at the forward end of the crankcase on the right-hand side to mesh with the flywheel, or—and this would probably be much neater—on the right-hand side below the valve level and at the back end, taking the normal drive in the most convenient way, preferably by chain from the camshaft and using a small sliding gear or a little epicyclic train to provide a gear-down for starting. Yet another place where the dynamo can be fitted is on the side of the clutch-case, the outside of the clutch being toothed.

The carbureter is outside the scope of the present discussion. Just as with inlet-pipe arrangements, the best carbureter for any engine is usually found by a process of trial and error.

The only other detail of which no particular mention has been made is the water pump, the only requisite for which is that it should be sufficiently powerful to cope with any climatic conditions likely to be encountered. It should be of a centrifugal pattern which allows fairly free syphonic circulation, if the drive fails; it should have an easily adjustable gland, and a weak coupling between it and its driving-shaft, which will fracture readily should an attempt be made to start the engine with the pump frozen.

Force Fuel Feed

The method of fuel feeding probably most satisfactory is to force fuel by air pressure from a large tank through a small tank on the dashboard to the carbureter. This small tank will trap sufficient fluid to enable a start to be obtained and to give a few minutes' running without the necessity of pumping up the pressure-system by hand. To supply the pressure there should be a plunger air-pump, the clearances being calculated so that it is never possible to deliver air at more than about five or six pounds per square inch. This pump might be driven direct from the camshaft or incorporated with one of the oil pumps. I can quite understand that in America there is a liability for pressure joints to work loose, but even if a gravity dash-tank were used, I would prefer to maintain the feed by pressure, and in such case the pipes would be so short that I think vibration troubles need not be feared. One cannot obtain efficiency with a long inlet-pipe and it is impossible to avoid the use of a long inlet-pipe with a gravity-feed because the tank cannot be mounted at a sufficient altitude, even on the dash, if it to hold enough gasoline for 200 miles. It would, however, be possible to devise a dashboard tank with two compartments and to use the pressure merely to lift fuel from the bottom compartment to the upper one.

Band Brake Useless

The contracting-band type of brake ought not to be considered. It has only one advantage, which is that it is easy to make very cheaply. A band-brake is never powerful, never quick in action, never easy to adjust, invariably gives rise to rattle (as it contains of necessity a large number of joints which get lubricated principally with mud) and moreover is extremely unsightly. Granting that extremely good working surfaces for brakes are steel and woven material such as has been recommended for the clutch, the best arrangement from all points of view seems to consist of wide cast steel drums, ribbed for cooling, fitted to each rear wheel, and two sets of shoes side by side each faced with lining material, one pair operated by the hand-lever and the other pair by the right-hand pedal. Such brakes can be enclosed completely so as to be protected from dirt.

The best operating system is to run the two pull-rods slightly above the torque tube, actuating the expanding cams of the outer pair of brakes by means of shafts, taking one bearing in the brake bracket at each end and the other bearing in the differential case;

the other pair of brakes being controlled from tubes rotating on the outside of the said shafts. These are best situated above the axle and are neater and less troublesome to erect than cross-shafts on the frame itself. The ends of the operating arms would, of course, be connected by an ordinary compensating link. For adjustment and setting, hand-tensioning wing-nuts would be applied to the pull-rods and there should be some arrangement whereby the operating arms can be set relatively to the spreading cams, so that as wear takes place the levers can still be kept in a normally vertical position. It would be easily possible to arrange for the lubrication of the bearings of the brake-operating shafts at the inner ends, from the inside of the differential box. The bearings at the outer ends can be supplied with grease from the same cup that feeds the bearing between the spring table and the axle sleeve. Thus the whole of the connections should be lubricated by means of a single pair of greasers on the axle.

Steering-Gear and Control Parts

There is no doubt that ultimately all front axles will be designed with the steering swivel-pin inside the hub and in the plane of the wheel, because this arrangement removes all possibility of shock in the steering-wheel, gives absolute security on the roughest roads and enhances the durability of the steering-gear enormously. The only disadvantage is the necessarily large bulb which has been considered rather ugly. If such a matter is deemed important, care should be taken that ample ball thrust-bearings are provided in the swivel-pins and in the steering-gear itself. There is only one pattern of ball-joint for steering connections which is absolutely secure and this should, of course, be ample. For the control through the steering-column the simplest possible arrangement should be employed, as a great many controls which are used at the present time contain a very large number of totally unnecessary moving parts.

Balso Co. Considers Motor Condition in Specifying Lubricant

TOLEDO, O., June 22—The Balso Oil Co. of this city has taken up the lubricating problem in a new manner. In selling oil to the car owner the motor is divided into five zones of wear. The first zone is when the motor is new and the fifth is when it is worn out in the moving parts and just about ready for the scrap pile. Between these two extremes are the other three zones. The owner of the car first determines in what zone his motor lies and then proceeds to answer the questions on the chart shown in Fig. 1. This is mailed to the Balso Oil company's office and from it the particular needs of that owner are determined.

It is the aim of this system to meet the need of each individual motor. Only three factors in lubrication are noted, first the rapidity or tension of flow, second ease or rapidity of burning, third rapidity in scavenging or consuming the carbon.

The first is theoretically shown by the viscosity according to the Tagliabue viscometer at 70 degrees Fahrenheit and is practically shown by the ability of the oil to retain its correct flow past the rings of the piston at working temperatures. The flow of the oil is theoretically regulated in the laboratory as follows:

First Zone, perfect fit	230 Vis.
Second Zone, clearance 1/1000 of an inch.....	430 Vis.
Third Zone, clearance 2/1000 of an inch.....	630 Vis.
Fourth Zone, clearance 3/1000 of an inch.....	830 Vis.
Fifth Zone, clearance 4/1000 of an inch.....	1030 Vis.

or 200 points in viscosity per 1/1000 inch looseness or wear.

Second.—The rapidity of burning. This must be shown by the fire test, starting in the First Zone at 440 degrees Fahrenheit, advancing slowly in steps of 8 degrees in each consecutive zone, giving a 464 fire test in the Fifth Zone, which is very low, and in direct opposition to the theory of many engineers of the old school.

Balanced oil standing in the Fifth Zone in some instances has 100 degrees less fire test than many other automobile oils of equal viscosity.

Third.—Rapidity of scavenging or rapid decarbonization is shown by the tenacity of the carbon deposits, and their tendency to cleave from the metal and also by the rapidity with which it becomes incandescent from the heat of explosion.

In experimenting on the question of carbonization, the Balso company finds that too much attention has been paid to carbon content which ranges from 1 per cent. down to hundredths of 1 per cent. in distillates. This they claim to be a negligible quantity to a motor using a normal quantity of oil. When it was finally found that often excessive carbonization which was attributed to poor oil, really came from the carbon clinging to the metal, instead of being ejected, it became apparent that the quality of oil was important.

Carbon deposits show a wide range of consistency. Those from a high gravity high fire test oil being hard in consistency and difficult of expulsion, while those of the extreme low gravity and low fire test oil are more easily handled, having a cleaving action.

By experiment with different base oils the Balso company states it was found that the blends produce different consistencies. By working along these lines the company claims a balanced oil. The Balso company considers that the fight between the paraffin and the asphalt bases is interminable, the arguments on both sides being inexhaustible.

To bring out the points of its arguments the Balso company has issued a booklet entitled Bunco in which thirty-two pages are devoted to exploding various oil theories held by manufacturers, salesmen and owners. This book is designed to explain the value of the "zone system" of lubrication.

BALSO'S BALANCE SHEET

THE TEST CHART

For the Balanced Lubrication of all Internal Combustion Motors, with SPECIAL reference to Automobiles.

In which stage of WEAR do you consider your motor to be NOW? ....

Have you had the moving parts of the motor refitted or cleaned? ....

What was the opinion of the party who did the work? ....

What was your opinion? ....

Have you ever run your motor for any length of time when it was RED HOT? ....

If so, after that did you notice an increase in OIL TROUBLES? ....

How often do you wash out the Crank Case, putting in new OIL? ....

What did you do with the OLD OIL? ....

What Oil do you use mostly? Name..........Color: Lemon.... Amber.... Red....

What Oiling system have you? ....

Direct SPLASH from Crank Case? ....

Combination Direct with sight dash feed? ....

If any other kind describe..........

Are the Carbon deposits in the firing Chamber thin?.....Hard?.... Glassy?.... Thick?.... Soft?.... Dull?....

Are the Spark Plugs placed over the intake valve or side vestibule? ....

Are Spark Plugs over the piston entering the main firing chamber? ....

Is there any difference in the compression when the Motor is hot or cold? ....

Note here any SPECIAL trouble you have; for example: If one piston passes more oil than the others.....

....

HOW MANY MILES ON A GALLON OF OIL?

HOW MANY MILES ON A GALLON OF GASOLINE?

NAME OF CAR H. P. RATING

SUCH QUESTIONS AS YOU CANNOT ANSWER, LEAVE BLANK.

Sheet that owner is required to fill out

The Rostrum

Wants to Be an Engineer

EDITOR THE AUTOMOBILE:—1—I have just graduated from high school and wish to become an automobile engineer. Will you kindly advise me as to which of the following two courses would best equip me for the above vocation: The first course is a 3-year B. S. course at Columbia University, plus a 3-year M. E. course at the same place. The second is a 4-year M. E. ccurse at Polytechnic Institute of Brooklyn, plus 2 years of post-graduate work in electrical engineering at the same institution.

2—Will you also give me any particulars that you are able to, as to salary, position, etc.?

Brooklyn, N. Y. J. MOZER.

—1—The selection of the proper school is a serious problem and doubly difficult for one just out of high school. We do not feel that it is our place to advise you as to whether you should go to Columbia or the Polytechnic Institute. This is something you should decide for yourself, and only after due consideration. You should obtain a syllabus of the courses offered by each school, and study both carefully. Compare the two. Find out how many hours each devotes to drafting and machine design, how many to mathematics and electricity and so on. Then go to these two schools, and become acquainted with some of the men in charge; tell them that you do not know which school to choose and get their arguments as to why their school is best. You will find the professors glad to advise you.

Examine the laboratory equipment, and find out how many of the professors of each school are holding important positions, and what their standing is.

Finally, weigh all the facts you have in hand carefully, and decide which school will teach you the most about the subjects you desire to have knowledge on, considering the number of hours devoted to these subjects, the personnel of the teaching staff and the excellence of the laboratory equipment.

2—As in everything else, the position that you will obtain after graduation and the success you will make in your line depends largely on yourself; on how much you learn in college and what ability you display to apply this knowledge.

It is impossible to give very exact information as to the salaries that are paid by the automobile factories, because the wages for a given position depend largely on the prosperity, size and generosity of the individual concerns. To give you a rough idea you will get from $12 to $20 per week at the start. In years you may work up to be chief engineer at from $5,000 to $15,000 a year, or more; chief draftsman at about $2,000; purchasing agent at about the same amount. A consulting engineer may make $10,000, or more a year. Five thousand dollars is a good salary for an experimental engineer.

A New Explanation for Overheating

Editor THE AUTOMOBILE:—I notice in your issue of Sept. 3 a letter from J. W. L. of Ogden, Utah, in which he states it is impossible to keep his motor from overheating, also that he is using "as lean a mixture as possible." In your reply you say a rich mixture will overheat a motor. Now I trust you will pardon me for contradicting you, but I feel compelled to say that this is not the case. A rich mixture will not overheat a motor, or at least any excess of heat developed would be so slight as to be negligible. On the other hand, one of the surest ways to overheat a motor is to use a lean mixture, and inasmuch as J. W. L. is using his as lean as possible it is no wonder that his motor heats.

I realize that a number of motor drivers do not agree with me on this point, but as a matter of fact it is not a question of personal opinion, but of fact. Even though I have always been entirely sure of my ground I have at various times made tests which have determined this beyond a possibility of a doubt. Moreover, if one will consider the matter for a moment, he will realize that the lean mixture must of necessity be the greater heat producer.

A lean mixture is a slow burning mixture while a rich mixture is not. This is clearly indicated by the fact that the former will fire back into the carbureter, while a rich mixture never does. A rich mixture fires with reasonable promptness or misses altogether, while a lean mixture never misses, but burns slowly, and the leaner it becomes the more slowly it burns. It is this slow burning, this constant flame in the combustion chamber, that overheats the motor. As a parallel I will cite the ordinary household gas stove, in which, as everybody knows, an intense heat is created by adding a considerable quantity of air.

Of course, the really correct way to determine this, as any other question, is by actual test, so I respectfully suggest that J. W. L. enrich his mixture considerably and abide by the results.

Detroit, Mich. F. R. PENDLETON.

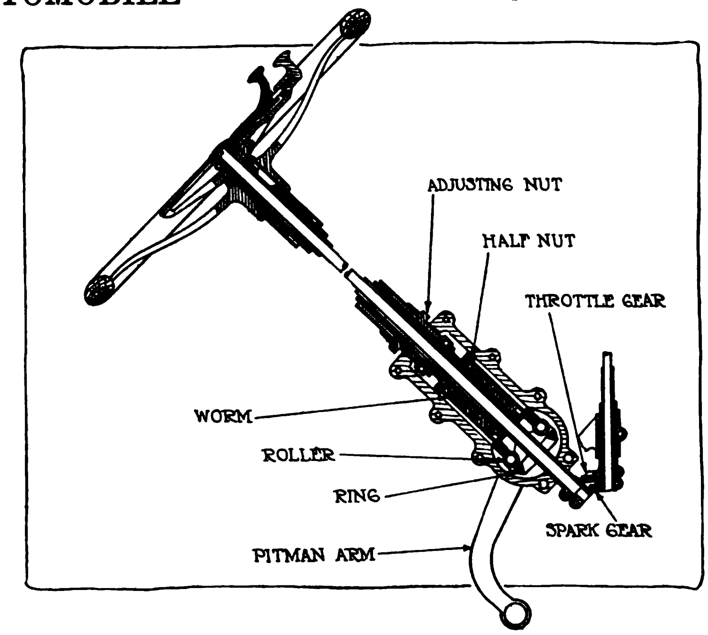


Fig. 1—Buick model 24 steering gear showing construction and adjustment

How to Adjust Steering Gear

Editor THE AUTOMOBILE:—1—Kindly give me through your Rostrum, a sketch of a Buick 24, 1913 steering gear, and its adjustment?

2—How does this steering gear operate?

3—Give me a sketch of how the holes are bored, how many and what size, around pistons to eliminate oil in the head.

Webb City, Mo. FRANK B. PATRUM.

—1—There is just one adjustment on this steering gear which is shown in Fig. 1. This is the nut which screws into the housing around the jacket. Tightening this nut acts on the ball thrust bearing and takes up all the back lash in the hand wheel. It should always be kept so tight that the wheel can only move an inch or so before affecting the road wheels.

Unless you are certain that the play is here, it is better to first lift the front wheels from the floor, so that the wheels are free to turn. Whether the wear is here, or in the tie rod or drag link, can then be easily determined. The latter is provided with adjustable ball joints so that any play can be easily removed.

2—The steering gear is the part of the car that operates on the front axle to turn the road wheels in response to the movements of the hand wheel. Buick automobiles are equipped with an irreversible steering gear of the worm and nut type.

The steering gear consists essentially of the steering tube, to the upper end of which is attached the hand wheel, while the worm is keyed to the lower end. The worm meshes with two half-nuts in the housing, one of which has a right hand thread and the other a left hand thread. The ends of the half-nuts bear against two rollers attached to a yoke on a short shaft which projects out beyond the frame, and to the other end of this shaft is attached the pitman arm, which is connected to the third arm of the front axle by the drag link. The operation is as follows:

Turning the hand wheel also turns the tube and worm in the same direction, and as the worm turns one half-nut rises while the other descends. This pushes one roller down and allows the other to rise, thus turning the shaft and imparting the desired motion to the pitman arm, and so on to the road wheels.

The steering gear is said to be irreversible because, while the motion of the hand wheel is readily transmitted to the road wheels, the jarring of the road wheels over rough and uneven surfaces does not affect the hand wheel.

The worm, yoke, rollers and half-nuts are all enclosed in an oil tight housing which is bolted to the left side of the frame, and a ball thrust bearing in the upper end of the housing takes the thrust of the worm. The housing is kept constantly packed with grease and a pipe plug is provided on top for its renewal. A grease cup on the outer end of the shaft helps to lubricate the long bearing on the left side.

3—We would not advise you to drill the pistons. Set the rings so that the openings in them are about 120 degrees apart and you should have no more trouble unless, by some accident, the motor is defective. It seems most probable that the spaces in the ends of the rings are in line, thus offering an unbroken passage for the oil.

Gasoline Consumption High

Editor THE AUTOMOBILE:—I drive a 1913 Ford touring car which runs with usual power speed and smoothness but I am getting only about 12 miles per gallon of gasoline while I have previously made from 20 to 23 miles per gallon under the same conditions. The magneto tests good. Can you tell me the cause of this?

Sheffield, Vermont. CLINTON E. JONES.

—Anything that will use up power, or reduce the efficiency of your car, might cause this increase in fuel consumption. But before looking for the trouble, make sure that you are getting full measure when you buy your gasoline, and also that your speedometer is correct. The latter can be tested by running the car over a course of known distance and comparing the reading of the speedometer with the distance covered.

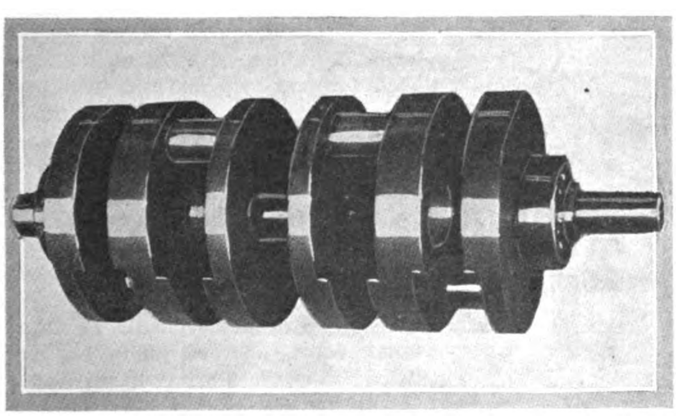


Fig. 2—Maxwell racing crankshaft. The disks connecting the crank pins supply the flywheel effect

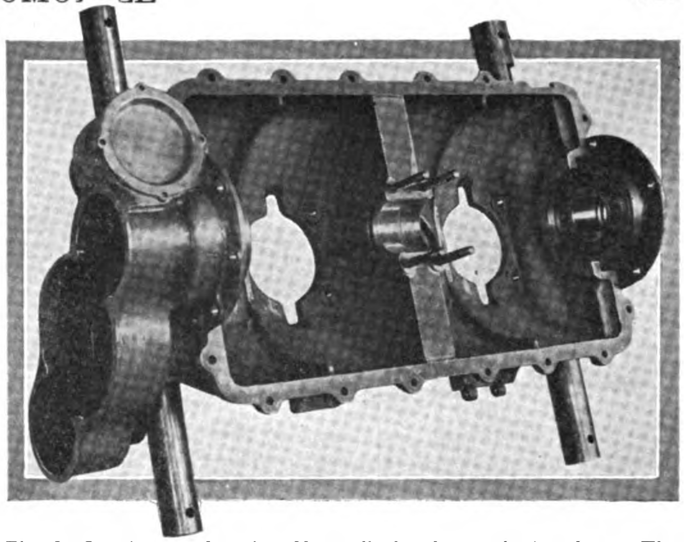


Fig. 3—Crankcase of racing Maxwell showing main bearings. The end ones are ball and the center plain

You may be driving with too rich a mixture. Cut down on the amount of gasoline fed to the carbureter and see if the consumption is not lessened, but without a decrease, and possibly an increase, in power. Make certain that there are no leaks in the fuel system. Just to be on the safe side it would be well to turn the gasoline off whenever the car is not in use, because there may be a small leakage, somewhere, that amounts up in time but is hardly noticeable.

Drive with the spark advanced as far as possible without the motor knocking. See that the spark plugs are in good condition and that the gaps are the correct size.

Next, examine the motor. The compression should be good, and if it is not the valves may need grinding or possibly the rings, pistons or cylinders may be worn.

It is possible that the high speed clutch is slipping, and by driving the car at a medium speed along the level, and then suddenly accelerating, whether this is so, can easily be determined. If the clutch is holding, the car will accelerate as rapidly as the motor.

Push the car over a level garage floor by hand and note whether it requires very much effort. It may be that the brakes are dragging or that there is excessive friction in some other part.

To Go from Reading to Butler, Pa.

Editor THE AUTOMOBILE:—Will you please let me know the best automobile route from Reading to Butler, Pa. I do not care to touch Pittsburgh if another route is just as good.

Kutztown, Pa. Q. D. HERMAN.

—If you follow good roads you will be obliged to go through Pittsburgh. Your route will lie through Harrisburg, Chambersburg, Redford, Greensburg, Pittsburgh, to Butler.

Maxwell Racing Crankshaft

Editor THE AUTOMOBILE:—Please show in a diagram how the Peugeot and Delage and Maxwells arrange their ball bearing crankshafts in their racing cars.

St. Louis, Mo. F. SMITH.

Fig. 2 shows the Maxwell crankshaft. Illustrations of the Delage or Peugeot crankshafts are not obtainable. Ball bearings are used only at the ends of the Maxwell motor, the center bearing being plain. The mounting of the bearings is clearly shown in Fig. 3.

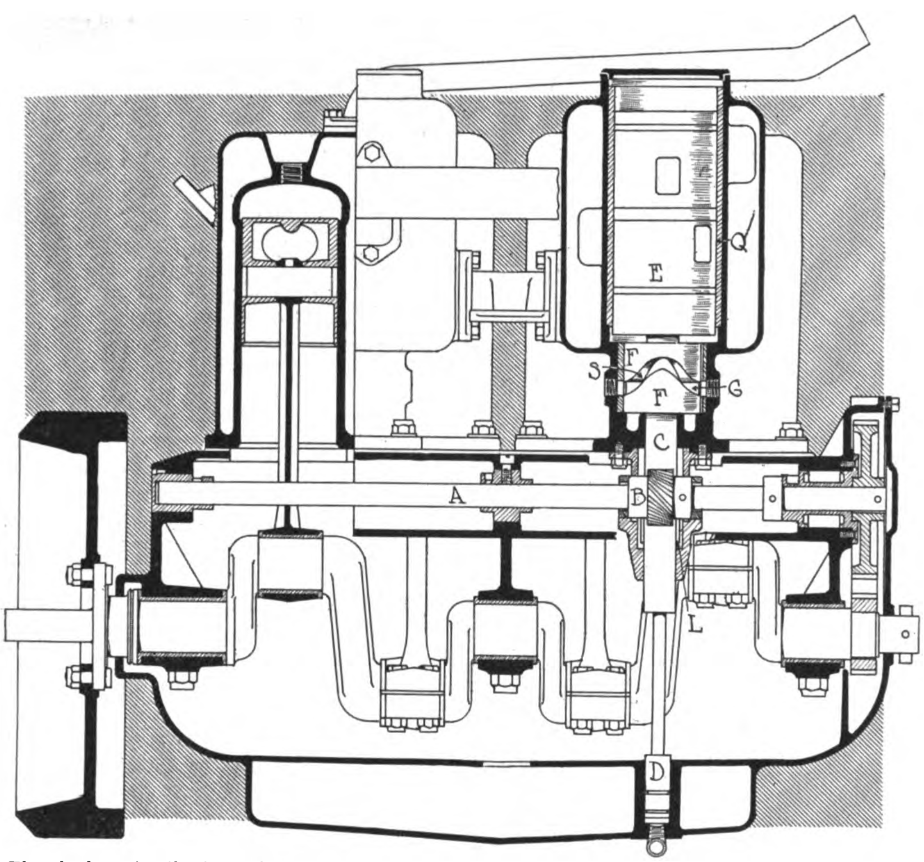


Fig. 1—Longitudinal section through valve action and cylinders of Doherty piston valve engine

Doherty Engine Uses Piston Valve Action

Follows Standard Construction

AN engine actuated by a rotating-reciprocating valve has been invented by H. B. Doherty of Wilkesbarre, Pa. The engine is really a modification of the piston valve design, in which a cored cylindrical valve performs the functions of inlet and exhaust for two cylinders adjacent to one another. That is, for a four-cylinder engine two piston valves are employed.

Spiral Gear Drive

Other than the valve and ports the engine is of standard construction. The valve, however, is different from any of the previous piston designs which have recently been brought out. A plan view of the layout is given in Fig. 3, showing the positions of the cylinders and valves. The valve is slightly larger in diameter than the bore of the cylinder and in position the two cylinders and the one valve resemble a three-leafed clover.

The ports through the cylindrical valve are so arranged that as it reciprocates the needs of one cylinder are first taken care of and then those of the adjacent cylinder. The first cylinder is controlled by the rotating part of the valve motion and the second cylinder by a reciprocating motion that is furnished by a cam.

The manner in which this valve is driven is as follows:

A horizontal shaft extending the length of the crankcase and corresponding in its action and drive to the cam-

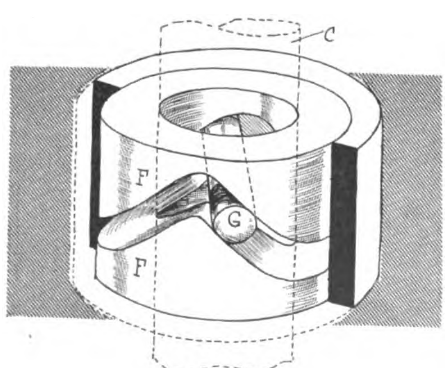


Fig. 2 — Drive of rotating-reciprocating valve

shaft of the ordinary poppet motor is fitted with two spiral gears to take care of the drive of the valves. The horizontal shaft A, Fig. 1, is driven by spur gears off the crankshaft and by means of the spiral gear B rotates the vertical reciprocating shaft C. The shaft C carries the valve with it in a rather unusual manner. The vertical shaft C is provided with a feather L on each side of the shaft, permitting the gear which meshes with the spiral gear B to slide vertically upward and downward on the reciprocating shaft. At the top end of the shaft is the valve E which is fastened to the shaft.

One-Inch Travel

The reciprocating action of the sleeve is accomplished by the drive from the spiral gear which rotates it and permits of the action of the cam slot S on the pin G. The action of this cam is to give the sleeve a reciprocating motion of 1 inch, besides its rotary action.

In manufacture the accuracy of the port sizes is insured by the use of a liner Q which is inserted within the valve cylinder. In the liner there are four ports, one for the intake and exhaust of each of the two cylinders. The liner is fitted between the outside casting which holds the valve and the piston valve itself. Four junk rings make the joint tight between the piston valve and the liner.

Oil Pump Lubrication

Every time the valve is revolved once by the spiral gears it moves up and down twice on the cam. The valve ports are so spaced that one set is 1 inch below the other set, the difference in height being due to the reciprocating motion which is provided to furnish a sealing space between the openings for each cylinder. As the inlet valve for the first cylinder is opened by the registering of the ports, this cylinder draws in its charge and the valve continues until it has closed this intake by rotating a distance equal to the width of the port. It is then lifted by means of the cam and the next port in turn comes into position in front of the next cylinder. Thus the valve operates on two levels, finishing its work on the lower level for one cylinder and then being lifted 1 inch to perform its functions on the next cylinder.

The oil pump for lubricating the sleeve has been provided for in a very ingenious manner. The vertical reciprocating rod has been extended downward and at its lower extremity the plunger pump D has been fitted. On the bottom of the vertical rod for the other valve, another pump has been fitted for use in storing up pressure in the air tank.

In the manufacture of an engine of this design the construction is practically the same as in the ordinary poppet engine with the exception that the core work in the cylinders and valve is different from any other design. An idea of this is given in the accompanying illustration which shows a section through the piston and also through the cylinders and valve chamber. The inlet manifold is formed directly by cored passages in the cylinder casting manifold bolts directly to the outside of the casting, and runs vertically instead of horizontally.

Drilled Oil Passages

The motor is oiled by a force-feed system through leads which are carried from the plunger pump previously described. The cylinders are lubricated by the oil thrown off the crankshaft bearings. Oil passages are drilled diagonally through the crank sheets in connection with the force speed system. The area of inlet and exhaust is shown in the accompanying diagram and a chart of mean gas speeds through the inlet valve. The valve runs at one-quarter crankshaft speed. The inlet opens 10 degrees past upper center and closes 40 degrees past lower center, giving an opening of 210 degrees. The exhaust opens at 50 degrees before lower center and closes 10 degrees before upper center, giving an opening of 220 degrees.

The area of the ports and the mechanism for driving the valve with its combination rotating and reciprocating motion, are so designed that the curve of gas speeds through the inlet valve for increases in revolutions per minute, is a straight line. This curve is shown at the bottom of this page and it will be noted that at normal speeds of say 1,800 revolutions per minute, the mean gas speeds through the inlet valve will be about 20,000 feet per minute. This layout of valve ports with its straight passages and wide opening, should permit of exceptionally high speeds.

As will be noted from the horizontal section, the layout of cylinders and valve permits of ample water jacket space. Each passage through the valve serves as the inlet and exhaust for one cylinder and this is another factor in the cooling arrangement because the exhaust gases heat the passage as they pass out and the inlet gases in turn absorb this heat cooling the passage and at the same time becoming preheated.

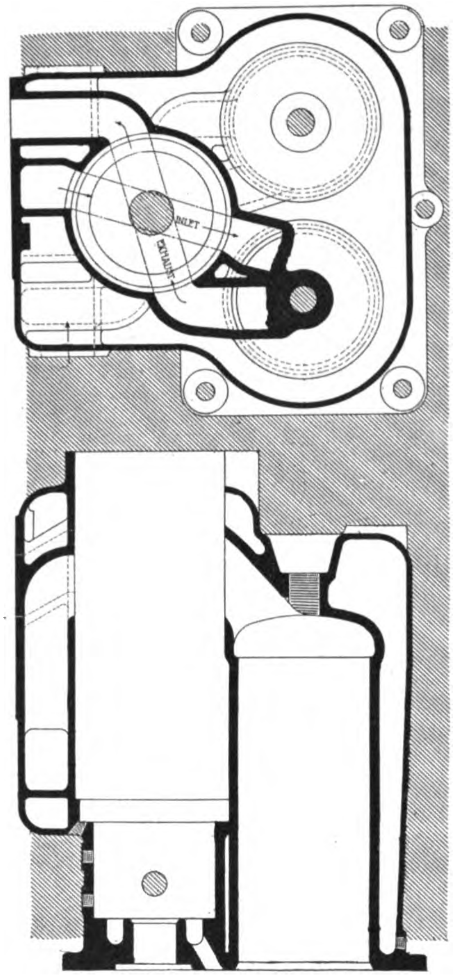


Fig. 3—Vertical and horizontal section through valve and ports

No Leakage

The method in which the ports register with the opening in the valve is shown in Fig. 3. Leakage is prevented by the valve being provided with packing rings and also by vertical packing. The action of the cam in bringing the valve to registry with the different ports is clearly shown in Fig. 2. By elevating one port above the other, a very compact arrangement is secured without materially increasing the height of the engine.

Multiple Disk Clutches

These clutches are, as a rule, delightful, but, like most parts of a car, they need occasional attention. With regard to the type running in oil, it will usually be found difficult when starting from cold in the morning to engage a gear unless the clutch is held out an abnormally long time. A quick way is to press out the clutch and at the same time race the engine once or twice quickly. This will generally throw off the congealed oil and permit the clutch shaft to stop. On my car I have the pattern which runs dry with no lubricant, with steel and bronze alternate plates. Occasionally the plates refuse to separate, and the clutch will not stop spinning when the pedal is pressed out. The remedy is to prop the clutch out of action, squirt paraffin between the plates, run the engine to throw off surplus paraffin (with clutch still disengaged), then wash out with gasoline, paraffin having a tendency to rust steel. As soon as the clutch becomes "dirty," it will refuse to stop, hence the noise when engaging the gears.—*T. Haley in The Autocar.*

WHEN a car has been in service for some time it generally develops annoying little squeaks here and there about the springs and body. The owner or driver will find it well worth while to get rid of these, as the labor involved is slight and a quiet, smooth-running car is always desirable. Squeaks can generally be remedied by tightening the car parts affected or by the application of a little adhesive tape.

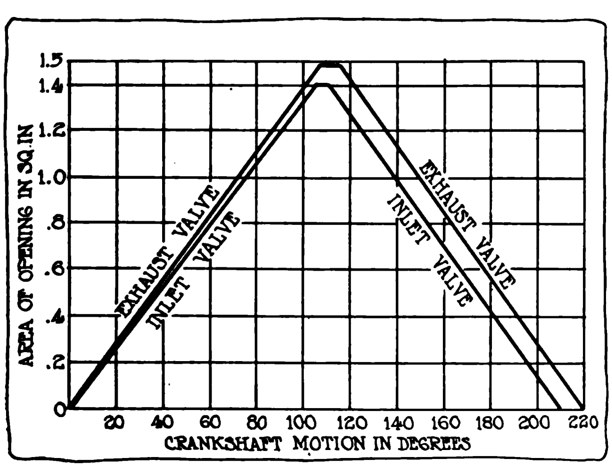


Fig. 4—Valve openings at different points on the crank circle

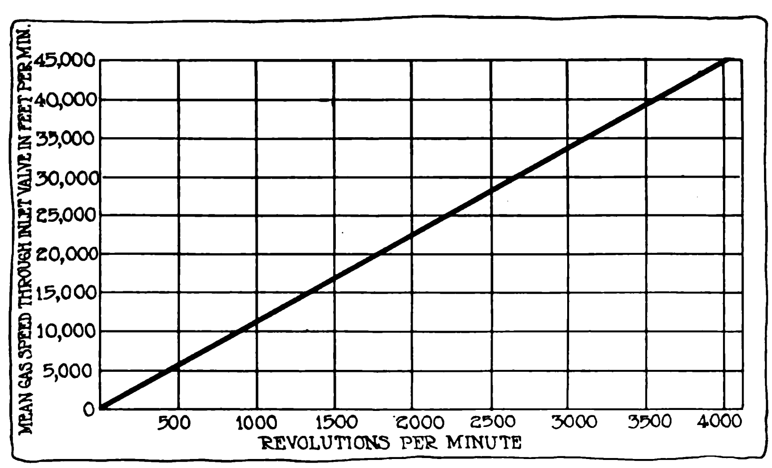


Fig. 5—Uniform gas speed increase with increase in rotative speed of the motor

New Books for the Engineer

Several New Works on Tools and Shop Practice — Metal Statistics for 1914 Published

MACHINE Shop Tools and Shop Practice is an excellent book for those interested in this work. There is also a book on tool making and one on American lathe practice, both published by the Norman W. Henley Company, the former being by Joseph V. Woodworth and the latter by Oscar E. Perrigo. Local Ordinances Relating to Speed and Traffic Regulations is a book written by Mitchell May, secretary of the state of New York.

MACHINE SHOP TOOLS AND SHOP PRACTICE. By William H. Van Dervoort, M.E. The Norman W. Henley Publishing Co., 132 Nassau street, New York City. Cloth, 552 pages; 673 engravings, $3.

This book, which is the sixth edition, is the outgrowth of a series of articles prepared by the author for the students in machine shop practice at the University of Illinois. An effort has been made to treat the subject in a clear and comprehensive manner, carefully avoiding all unnecessary matter and presenting to the apprentice and mechanic many points pertaining to the tools with which they come in daily contact, and about which they are often unable to obtain all the information necessary, in order that they may use these tools correctly and efficiently.

In treating on the various classes of small and machine tools, the author has endeavored to bring out much pertaining to the advantageous use of these tools.

The importance to the machinist having at least a limited amount of information on the subjects of Fastenings, Gearing, and Belting and Transmission Machinery has prompted the addition of chapters upon these subjects.

METAL STATISTICS FOR 1914. Seventh Annual Edition, issued by The American Metal Market and Daily Iron and Steel Report, the American Metal Market Co., New York City. 280 pages with advertisements; cloth.

Small enough to be conveniently carried around in the pocket this little book is designed for buyers, sellers, plant managers and engineers as a guide in purchasing both ferrous and non-ferrous metals.

The monthly production in tons and the average monthly price of the various classes of metals are given in tabular form. The statistics include figures on iron and steel, pig iron, finished products, scrap, copper, tin, lead, spelter, aluminum, antimony, silver, and miscellaneous.

AMERICAN TOOL MAKING AND INTERCHANGEABLE MANUFACTURING. By Joseph V. Woodworth. The Norman W. Henley Publishing Co., 132 Nassau street, New York City. Cloth, 531 pages, 600 illustrations, $4.

A "shoppy" book, containing no theorizing, no problematical or experimental devices, there are no badly proportioned and impossible diagrams, no catalogue cuts, but a valuable collection of drawings and descriptions of devices. In its 500 odd pages, the one subject only, Tool Making, and whatever relates thereto, is dealt with. It is a complete practical treatise on the art of American tool making and system of interchangeable manufacturing as carried on today in the United States. In it are described and illustrated all of the different types and classes of small tools, fixtures, devices and special appliances which are in general use in all machine manufacturing and metal working establishments where economy, capacity and interchangeability in the production of machined metal parts are imperative. The science of jig making is exhaustively discussed, and particular attention is paid to drill jigs, boring, profiling and milling fixtures and other devices in which the parts to be machined are located and fastened within the contrivances. All of the tools, fixtures and devices illustrated and described have been or are used for the actual production of work, such as parts of drill presses, lathes, patented machinery, typewriters, electrical apparatus, mechanical appliances, brass goods, composition parts, mould products, sheet metal articles, drop forgings, jewelry, watches, medals, coins, and so forth.

The treatment of each tool described and illustrated is such as to enable any practical man to design, construct and use special tools, dies and fixtures for the rapid and accurate production of metal parts, interchangeably.

FACTORY LIGHTING. By Clarence E. Clewell, Sheffield Scientific School, Yale University. McGraw-Hill Book Co., 239 West 39th street, New York City. Cloth, 160 pages, $2.

Beginning with a discussion of the requirements of satisfactory lighting, illumination design is considered with special reference to efficiency. Lighting installation work is taken up, the Underwriter's rules stated and methods of wiring described. There is a chapter on maintenance and the keeping of records in connection with this work. Then lighting under various conditions from all angles is considered. These conditions include office drafting, factory, power house, iron and steel mill, and machine tool lighting.

MODERN AMERICAN LATHE PRACTICE. By Oscar E. Perrigo, M. E., the Norman W. Henley Publishing Co., 132 Nassau street, New York City. Cloth, 424 pages, 314 detailed engravings, $2.50.

This is a new book from cover to cover. Written by a man who knows not only how work ought to be done but who also knows how to do it, and how to convey this knowledge to others. It is strictly up-to-date in its descriptions and illustrations, which represent the very latest practice in lathe and boring mill operations as well as the construction of and latest developments in the manufacture of these important classes of machine tools.

Lathe history and the relations of the lathe to manufacturing are given; also a description of the various devices for feeds and thread cutting mechanisms from early efforts in this direction to the present time. Lathe design is thoroughly discussed, including back gearing, driving cones, thread cutting gears, and all the essential elements of the modern lathe.

The classification of lathes is taken up, giving the essential differences of the several types of lathes, including, as is usually understood, engine, bench, speed, forge, gap, pulley, forming, multiple spindle, rapid reduction, precision, turret, special, electrically-driven lathes, etc.

LOCAL ORDINANCES RELATING TO SPEED AND TRAFFIC REGULATIONS. By Mitchell May, Secretary of the State of New York. J. B. Lyon Co., Albany, N. Y.; 110 pages; paper.

This is a convenient vest pocket pamphlet for the motorist that desires to keep informed on the different traffic regulations. The book is very complete, over 200 cities, towns and villages in New York State being included.

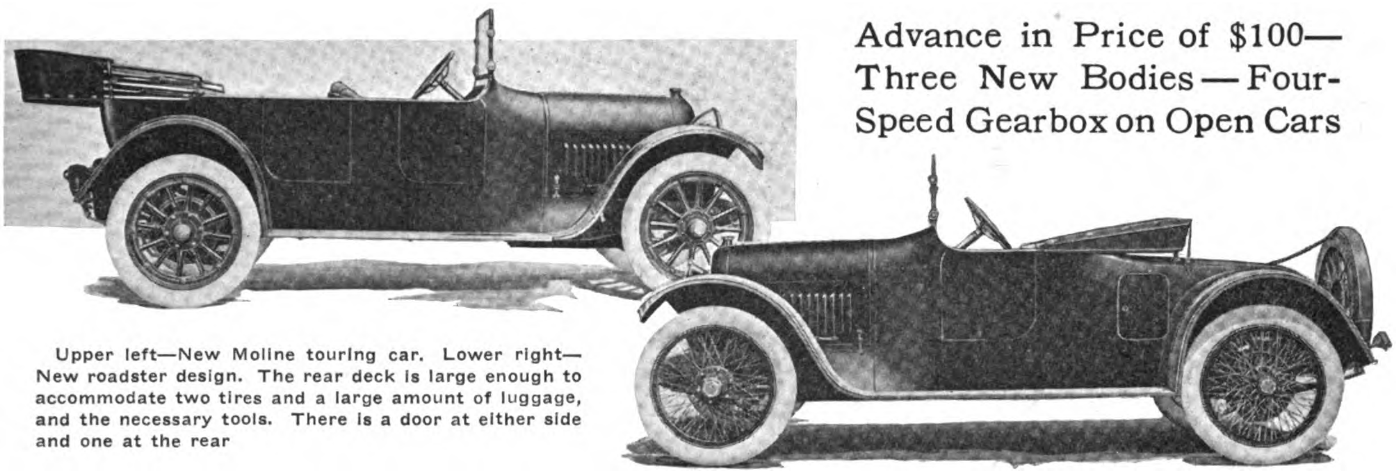
THE YOUNG MAN AND THE ELECTRICAL INDUSTRY is the title of a story, written by James H. Collins, the well-known magazine writer, which has just been issued by the Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

The little book deals with the opportunities afforded a young man in this industry and the different lines in which he may direct his activities as exemplified by the works of the Westinghouse Electric Company.

The company announces that it will supply a copy to anyone interested in it.

New Moline Sells for $2,500

Advance in Price of $100—Three New Bodies—Four-Speed Gearbox on Open Cars



Upper left—New Moline touring car. Lower right—New roadster design. The rear deck is large enough to accommodate two tires and a large amount of luggage, and the necessary tools. There is a door at either side and one at the rear

THREE important chassis changes, a rise in price from $2,400 to $2,500 and three additional body styles, a limousine, berline and roadster, briefly summarizes the difference between the new series Moline-Knight and that marketed heretofore by the Moline Automobile Co., Moline, Ill.

Of the three major chassis changes, one is in the motor, another in the gearset and the third in the rear axle.

The exhaust manifold no longer is an integral part of the cylinder casting and now is not water jacketed, this change having been made to obtain more efficient cooling of the cylinders and still leaving the trim appearance of the engine unaltered. The new manifold is held to the casting by ten bolts. To retain the symmetrical semblance an aluminum cover is placed over the manifold, this cover having the same contour as the intake manifold, hence the apparent likeness to the older motor.

Uses Four-Speed Gearset

Unit power plant construction has been abandoned in the touring and roadster models. The new series has separate units and instead of employing a three-speed gearset, a four-speed type with direct on third is used. The four-speed unit called for the separation of motor and gearbox and four-point motor suspension instead of three. The two points at the rear are rather close together and allow of proper movement through frame distortion. The adoption of the four-speed set brought with it the desired result of eliminating entirely the magnified gear noises, due to the sounding board effect of the rather large aluminum housing. This formerly inclosed both clutch and gearbox, and was an integral part of the motor crankcase.

Gearset on Sub-Frame

The new gearset is larger than the three-speed of the past series and its installation has necessitated the use of a sub-frame. The new position of the gearbox has resulted in the shifter lever, starting lever and emergency brake control being nearer to the front seat and as an added refinement a new type of lever mounting is employed which makes a much neater job than that used formerly. With these advantages of the new installation there is another, characteristic of four-speed sets with a geared-up fourth—the car's flexibility is increased. The car can be driven as low as 5 miles per hour on third, while the minimum on fourth is 7 miles.

The third change is one which will be appreciated by devotees of silent operating mechanism—the spiral bevel rear axle gears. This type of drive, introduced some time ago by the Packard company and which is in use by a number of makers so far, offers the advantages of both the worm and straight bevel gears and is said to be minus the disadvantages of either. Thus, in the Moline-Knight the last step has been taken toward reaching the ideal as regards a silent vehicle.

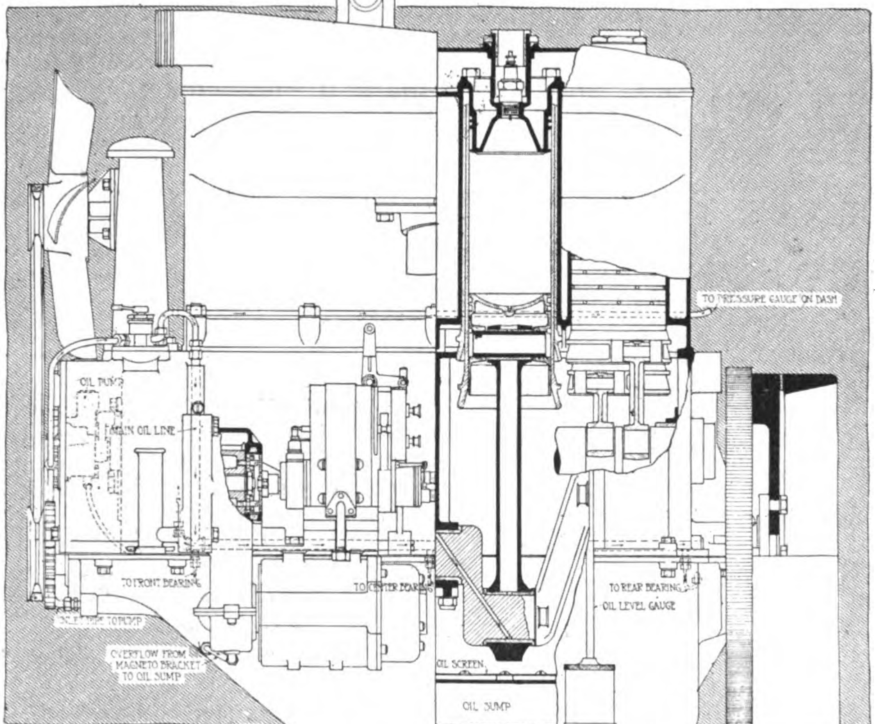
Minor Alterations Appear

Four further changes have been made aside from those just mentioned, but they are not of such importance as to call for a detailed analysis. The first of these minor alterations is the substitution of Whitney chains instead of those used in the past model, for driving the motor shafting, the second, the adoption of a screw-and-nut steering post for the worm-and-sector, the third the removal of the cranking motor switch from the motor casing and installing it as a separate unit, and the fourth change relates to the equipment and is in the form of a new single-cylinder Stewart power tire pump, instead of the two-cylinder pump of other make, used in the previous series.

The Moline-Knight line for the coming season comprises a five-passenger touring car ironed for two extra seats, its price being $2,500 with $40 additional when the two extra seats are desired, a new two-passenger roadster with a cleverly designed body at the same price, a limousine at $3,800 and a sedan at $3,250, all of these being mounted upon a single chassis with a wheelbase of 128 inches. In the case of the limousine and sedan, as mentioned previously, a three-speed gearset in unit with the engine is used.

The four-cylinder Moline-Knight motor which created a sensation in January by running for 336 consecutive hours without a stop and with throttle wide open delivering an average of 38.3 brake horsepower has 4 by 6 inch cylinders and during its official test, showed a maximum of 53.6 horsepower at 1,682 revolutions per minute. This engine in its fundamental mechanisms is similar to most motors of its type, in that it uses an inner and an outer sleeve operated from an eccentric shaft in each cylinder, but aside from this it is at variance with other Knight practice. It becomes a particularly interesting piece of engineering when it is compared outwardly with other designs.

In the first place its cylinders are cast in block, the only



Part vertical section through Moline motor showing details of construction. Note the domed pistons and tubular connecting-rods. Oil ducts are drilled in the crankshaft

Knight engine so constructed in this country. This casting is a series of smooth gracefully curved lines, in a way, blending into one another and giving a first-hand impression of simplicity and after a prolonged look conveys the thought of ultra-simplicity.

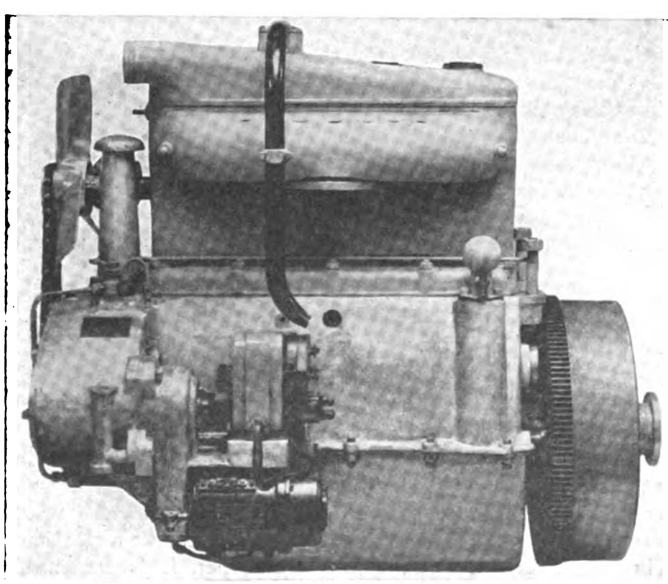
The cooling water is circulated the entire length of the cylinder barrel through the intake manifold, around the cylinder head and the reciprocating sleeves, and even around the lower portion of the spark plugs. Every part calling for cooling surface is adequately supplied, and just how this is done is well brought out in the illustration showing the end section. Note how the spark plug is inserted into a recess in the cylinder head cover and how the lower portion of the plug has water circulating around it. The tops of the sleeves also are water jacketed in the head as shown. However, a departure from last season's practice is the absence of a water jacket around the exhaust manifold.

Thermo-Syphon Cooling

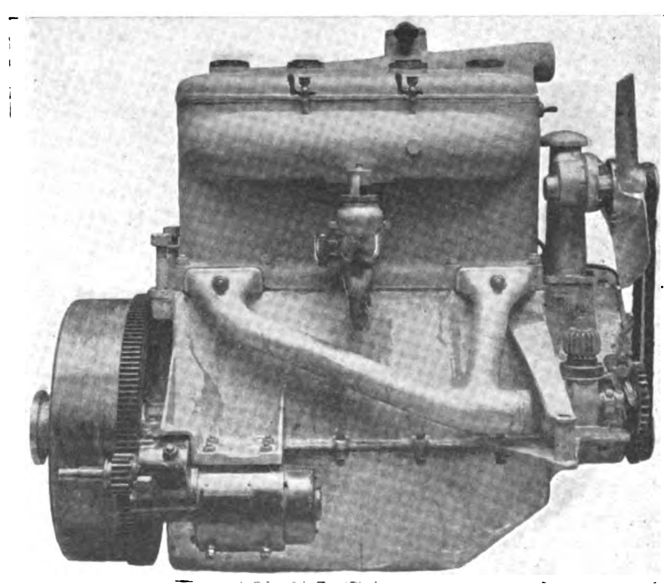
Water circulation is maintained by the thermo-syphon system, another instance of unusual construction, this being the only motor of its type which does not employ a water pump. The water in its path travels from the radiator through a two-arm manifold. These arms are attached to the lowermost portion of the cylinder block and the water passing through them is sent through the various channels mentioned previously and then returned by its natural course through the cylinder head cover which forms the return manifold. One should take particular notice of the relative size of the water pipes and the egg-shape of the motor brought about by the unusual jacketing.

Three bearings support the crankshaft, the front and center being 2 1-8 inches in diameter, and 2 1-2 inches long and the rear 4 inches long, and 2 1-8 inches diameter. These bearings have no grooves. The crankshaft drives the eccentric shaft by silent chain, this method also being used for magneto and lighting generator shaft drive. The sleeves are operated in the true Knight fashion by connecting rods fastened to the eccentric shaft which operates on bearings 1 1-8 inch in diameter and 1 1-4 inch long. These sleeves have a maximum travel of 1 1-8 inches. The intake port is 3 3-4 inches long and 1-2 inch wide and the exhaust 5-8 inch wide and of the same length as the intake. The pistons instead of being flat are concave and this with the dome-shaped cylinder head form a combustion chamber which is a big step toward the ideal chamber—the spherical. Much interest lies in the lubrication of the parts of this engine.

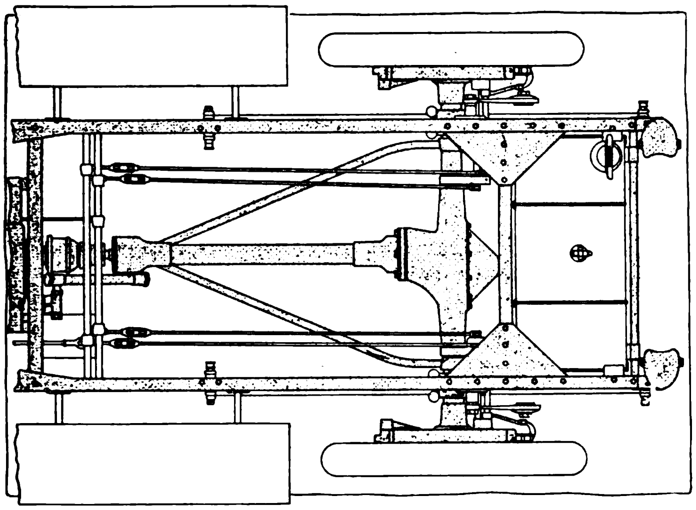
A gear pump forces oil at various pressures up to 40 pounds, dependent upon the motor speed, to every part of the engine requiring lubrication. Oil is drawn by this pump from a sump in the crankcase bottom, and forces it through a screen to a main oil duct shown in the end section of the motor. This duct, which extends along the entire length of



Left side of new Moline motor showing the mounting of the generator and magneto. The generator is under the motor arm



Right side of motor showing starter attachment, water piping, tire pump location, and three-blade fan



Rear view of chassis on new Moline showing triangular rear construction, gusseted frame and mounting of gasoline tank

the crankshaft bearing plate, is tapped at three points at each junction, a lead being sent to the main bearing opposite it. At the main bearing wrists, holes are drilled in the crankshaft, these holes leading to the connecting-rod bearings. The rod bearing holes register once every revolution with a hole in the upper portion of the connecting-rod bearing. This hole, however, communicates with the hollow connecting-rod, the diameter of the rod oil passage being 7-8 inch. This passage as will be seen from the end section view extends to the wrist pin which also receives the proper amount of oil. After the oil lubricates the pin it makes its way to the sleeves, oils them and then drops to the bottom, spraying as it leaves the lower portion.

Governor Controls Oil Pressure

The oil pressure varies with the speed of the motor the extent of the flow being controlled by an automatic governor interconnected with the throttle. This governor has a three-way cock which receives the oil before it is sent to the various parts. The governor openings are graduated so that with fully opened throttle the path is unrestricted, with closed throttle the discharge from the cock is back to the sump allowing little to go on its rounds and at intermediate throttle openings the flow is in proportion.

The Moline engine uses Bosch Duplex ignition, and a Schebler carbureter. The magneto sprocket acts as a means of adjusting the chains used in the motor. This is done by swinging the instrument on a pin pivot shown in an illustration herewith and thus chain slack may be taken up.

Cone Clutch Continued

The new series Moline uses the same clutch as was used in the older model, it being a cone, but this season with two universals between it and the new four-speed gearset instead of one. The change-speed lever is nearer the driver and a neater mounting is provided. From the gearset back the drive is through shaft to the new floating spiral bevel axle. Aside from the change in gear types the axle is as before.

The semi-elliptic, 60-inch rear springs placed under the axle housing are unchanged. Wheels carry 36 by 4 1-2 inch tires and wire wheels of the same size may be had at $90 additional cost. Left drive and center control are retained.

Wagner Cranking and Lighting

The cranking and lighting equipment of this car consists of the Wagner two-unit, 12-volt type with the generator mounted on the left of the motor directly below the magneto. The cranking motor is on the opposite side under one of the motor supports. The drive is direct through a pinion on the motor shaft and toothed flywheel. Initially a current of about 220 amperes is needed by the cranking motor but as soon as crankshaft rotation begins there is a drop to about 75 amperes. Current is furnished by an LBA battery under the front seat. Operation of the cranker is by a lever placed next to the gearshift lever and distinguished from it principally by its length, which is less than that of the gearshift control.

New Roadster Design

The touring body of the new series is practically the same as those of the preceding series, but with little refinements hardly perceptible, and yet thought necessary by the maker. The roadster body is one of unusual design, due to the generous curves of the lines. The rear deck is large enough to accommodate two tires and any amount of tools and baggage, a novel arrangement being a door on either side of the deck and one at the rear, the latter being used for tires and the former for baggage, etc. The cowl, hood and rounded-top radiator are well blended.

The touring car presents almost the same appearance as the roadster from the windshield forward. The touring body is of clean design with a bell back clean boards, and in a word is up to the minute.

Nothing is lacking in the matter of equipment, and among the features aside from the new tire pump may be mentioned, a one-man top, Hartford shock absorbers, electric horn, clock, and trouble lamp.

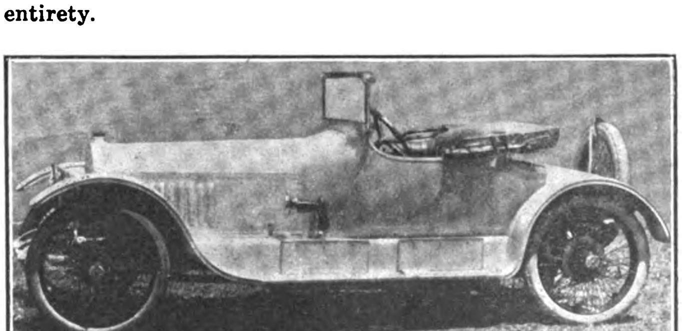
The standard painting is blue black, but with three weeks notice the Moline company will do a special job at $30 additional. If the body alone is to be special only $20 is charged, and if the hood, fenders, etc., are to be colored differently, $10 extra is asked.

New Body on Doble Steam Roadster

A refined type of body has now been fitted to the steam roadster developed by the Abner Doble Co., Waltham, Mass. This car was completely described in THE AUTOMOBILE for April 9, 1914. It is featured by the fact that a honeycomb type of radiator is successfully used as a condenser, doing away with the difficulty experienced in previous steam engines in having to stop frequently for a renewal of the water supply. The car has a 25-horsepower engine geared, 1 to 1, and is capable of developing 75 miles per hour without showing any exhaust steam. At this gear ratio the car is capable of obtaining a speed of 60 miles an hour from a standing start in 15 seconds. The engine is a four by six single expansion, double acting type and has a Stanley tire tube boiler.

Combination Rubber Takes Over Keaton Tire

NEW YORK CITY, Sept. 15—The Keaton Tire & Rubber Co. has been taken over by the Combination Rubber Mfg. Co., this city, which will continue the manufacture of special brand tires and tubes, and take over the business in its entirety.



Finished roadster body on the Doble steam chassis

The AUTOMOBILE

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Initiative Vs. Imitation

NOW that the eight-cylinder motor has become a reality as a component of stock cars in America it is to be hoped that there will not be a needless stampede from four-cylinder and six-cylinder construction to this latest factor in motor design.

Everybody was glad that after the single-cylinder motor the twin made its appearance; there was equal satisfaction when the four displaced the twin; a few years ago the rise of the six played its part in the rôle of evolving the eventual motor, or, at least, bringing us more in line with the course that leads to the eventual goal; and today the advent of the eight cannot but play its part in carrying the history of internal combustion progress nearer the end.

The days of the four-cylinder motor as a factor in the automobile world are far from numbered; the six-cylinder design is yet distant from its final stages of perfection; the eight is but in its swaddling garments.

There is a field for all, and initiative rather than blind imitation should be the watchword of many concerns. The superior advantages of the eight-cylinder over the six cannot be denied any more than those of the six-cylinder over the four-cylinder, or the four in turn over the two.

There are many other factors in the eight; its simple crankshaft, its short length compared with the six, the ability of the engineer to incorporate in it many of the factors that have been developed in the production of the present counter-balanced, high-speed, high-efficiency four; and against these are more valves, more valve parts and some factors.

One of our greatest builders set out a decade ago to develop a four-cylinder car and today he is the biggest producer in the world. Sixes have come, but with him it has been the working out of his own conception of what a rational motor car should be.

Let us have more of this stalwart individuality, an individuality, which between the lines, tells of a careful analysis of conditions as seen at the present and coupled with a sane survey of the factors that play their part in framing the future.

It takes backbone to map out any policy of individuality, in face of great odds. But sane individuality always will succeed, provided the three essentials of success are in the proposition: First, that you have a motor that has merit in it; second, that you have the men to design and manufacture and sell it; and, lastly, that the money is at hand to carry the organization along.

The eight has its broad and peculiar merits; so has the six, so has the developed high-efficiency four; let us have them all, until such time when the continued development of each to more nearly its maximum perfection is accomplished.

WE DO NOT WANT STAMPEDING, BUT WE WANT A DEVELOPMENT OF ALL TO ACCURATELY WEIGH THEIR RESPECTIVE MERITS AND DEMERITS.

The Wake of War

THE commercial vehicle is bound to develop more as a result of the present war than the passenger vehicle industry. There is today a staggering destruction of motor trucks of all kinds and also of horses in the war. With the closing of hostilities business will demand a replacement of these. Merchandise will have to be moved. Europe must have trucks. Many of her railroads will be more or less out of commission for a year, as their bridges are gone, their road bed destroyed in places and much of the rolling stock crippled.

In the cities the scarcity of horses will make itself conspicuous, and it will be at a high price that horses can be secured. The motor truck maker then will have his opportunity. He must have his vehicle ready, and he must be ready to meet the terms of the people. The American truck builder desirous of getting into the European market, and it is worth while, if for no other reason than the enormous field Russia offers, must be ready to meet long-term finance that is sure to follow in the wake of the war. Time payments up to 2 years will not be abnormal.

European factories in the majority of instances are already so disrupted that it will take 6 months or a year to get well re-organized. Much new help will have to be taken on, to fill the places of those who went to the front but never returned. American makers have a fighting chance, but they must be ready with the goods and with the business arrangements.

Trucks and Horses Destroyed by War

Tradesmen Back from Europe See Commercial Vehicle Boom for American Manufactories—Will Replace Railroads Temporarily

NEW YORK CITY, Sept. 15—John A. Olt, director of the export department of the Hudson Motor Car Co., one of last week's arrivals from Paris, where he has been for the past 14 months in the interest of the Hudson export trade to Continental Europe, looks for a heavy demand for American cars after the cessation of hostilities. This will largely be due to the great numbers of motor cars and motor trucks that are being destroyed in the present campaign.

According to Mr. Olt, everything is carried on with an unprecedented rush in military circles. Drivers do not stop to lubricate and give proper attention to their cars, so that up to September 4, the date of Mr. Olt's departure from Paris, as many cars were being abandoned in the war zone due to the carelessness of drivers as to mechanical difficulties. As soon as a car is incapacitated in this way it is generally destroyed, particularly when the army is retreating. What is needed today in France is more drivers rather than cars.

Trucks Will Replace Railroad

The need of cars after the war is over will be due to a variety of causes: First, many of the railroads are being destroyed and the roadbeds torn up. It will be months before these are repaired and in the meantime freight will have to be moved so that the demand for commercial vehicles will be particularly great. Second, due to the great slaughter in horses there will be a shortage in many of the industries after the war, and in many cases motor trucks will be called for. There should be a big market for a small capacity vehicle.

In the passenger car field many of the wealthier classes will undoubtedly want to purchase cars immediately after the war is over due to the fact that they have donated one or two of their machines for military use and where these are destroyed they will naturally purchase new ones.

Long Credits Necessary

Mr. Olt contends that the determining factor in American export business after the war will naturally revolve on the question of long credits and finance. The European buyers are educated in purchasing on time extending from 6 months to 2 years, and American exporters will undoubtedly have to revamp their European selling policy more or less in accord with these time-payment methods.

Few sales can be expected from the prosperous business man in Paris worth $50,000 or under. This class learned the terrible lesson of thrift after the war of 1870 and it is certain that the present war will not change their characteristics but rather tend to make them hoard still more. In commercial vehicles it will be different as industries will demand these and Americans should be in a position to profit by it.

Many exporting houses pulled in all of their European representatives as soon as the war situation became acute, which policy can only be considered as a mistake. Neutral countries are today asking for American cars and their confidence in those companies that have temporarily discontinued their representation will be considerably reduced. Europe is learning more and more the lesson that America has good cars. This war will temporarily set matters back but it remains with American makers to keep close to the European situation.

Mr. Olt says that Hudson cars, except those in the possession of owners, have not been commandeered by the government. There are several of them, however at the front, one being used by Capt. Rawlinson, a former Indian officer, but now in the service of Sir John French, commanding the British troops. This is the car that was to have participated in the Isle of Man races last June but which was disabled the day previous to the races.

To Organize National Dealers Association

MINNEAPOLIS, MINN., Sept. 12—It is the purpose of the Retail Automobile Dealers Association, of the Northwest, which has just held a 2-days' convention here, to have the organization become the National Retail Automobile Dealers Association.

Organized in 1913 as a state organization its officers have broadened its field and have made it a Northwestern association, including among its members the dealers from the Dakotas, Wisconsin, Iowa, Montana, and, of course, those of Minnesota.

The principal object of the association is to bring about the standardization of the automobile business through closer co-operation among the dealers, by education of the dealers on the matters which do not promote their interests but rather harm them. It appears from what one of the speakers at the convention said that many dealers still consider the automobile business as a little "game" instead of a serious business proposition.

The association will work especially to bring about the elimination of abuses and malpractices, such as the selling of cars at different prices when there should be only one price, or the selling of a car at the old price in one place and at the new cut-price in another place, the very same day the announcement of the new price has appeared. An effort will be made to convince the automobile manufacturers that it is not a good policy to announce their new models months before they can actually start to supply them. It will also be one of the objects of the association to urge the manufacturers to see to it that at local shows, or state fairs, only the new models are exhibited, and not old models which, however, might lead people to think that they are the new ones.

Trade Data Wanted By English Makers

NEW YORK CITY, Sept. 15—The dependence of Europe on the United States for automobiles and supplies in the present crisis is shown in a letter received today by THE AUTOMOBILE from Critchley, Evans & Co., London, signed by S. E. Barlow of that firm.

Mr. Barlow asks THE AUTOMOBILE to interest the American trade in sending catalogues and descriptive matter to his firm if the trade are desirous of supplying English makers with material. His letter reads:

"Owing to the present European crisis there is a state of temporary stagnation in the pleasure car section of the motor trade, but on the other hand the commercial vehicle makers are exceptionally busy owing to the large orders given to them by the War office.

"While in the pleasure car section there is sure to be a falling off in the demand during the period of war there is every reason to believe that soon after the declaration of peace the motor trade will become very brisk in this country, not only in the commercial vehicle section but also in the pleasure car section.

"Continental supplies of material are entirely stopped and the automobile firms in this country have to look for supplies of material to manufacturers at home. What effect the war will have as regards Continental supplies of material to this country is difficult to say at the present moment. The fact is that British motor firms will have to look for their supplies in this country, and may also be tempted to go to America. Now, therefore, is the time for American firms to do business here if they are able and willing to do it.

"Needless to say we are in as good a position if not better than most firms connected with the motor trade for introducing new sources of supply, particularly if they are of excellent repute. We have done a huge trade for continental manufacturers which has, of course, suddenly ceased.

"We shall be glad if you will get into touch with the large American suppliers of automobile material of all descriptions, and ask them to be good enough to communicate with us as soon as possible, sending catalogues and all descriptive matter together with full information relative to their capacity and ability to supply firms here, if they are willing to do the business. Standardization of parts has only been adopted on an insignificant scale here and it is a question in the majority of cases of supplying material to meet English automobile makers' individual requirements.

"Owing to the great changes which are bound to come over the whole course of commerce in Europe, it is necessary to consider all possible sources of supply. We shall be glad therefore if you will ask suppliers to write to us direct giving us full information as soon as possible.

"We are interested in everything appertaining to the automobile trade. There must be a large number of firms requiring representatives here for the sale of accessories to wholesale and retail houses."

L. B. Kilbourne's $350 Taxi Ride

NEW YORK CITY, Sept. 12—L. B. Kilbourne, Chicago, Ill., financial partner with Chas. Y. Knight in the firm of Knight & Kilbourne, owners of the Knight sleeve valve motor patents, returned today on the *Campania* from a 3 months' visit in Europe, the last month of which was spent in Germany. One week of this month preceded the opening of war, followed by the first 3 weeks of the war. This time was spent in Baden in the southern part of Germany, and during the last week in August Mr. Kilbourne, in order to get out of the country, had to travel by taxicab from Baden up the Rhine valley to the Dutch frontier where he took a train to Flushing and thence by boat to England.

Mr. Kilbourne's taxicab ride, which cost him $350.00, is representative of the many experiences that American tourists have been through due to the European war. Practically an entire month was spent at Baden before a solution was arrived at as to how to get out of the place. Mr. Kilbourne and his party had arrived at Baden after a 1,600-mile tour through France and Switzerland, getting into Germany the day mobilization started. At that time he was on the Swiss-German frontier and was compelled to register himself, party, and chauffeur, with the German police authorities before he could proceed in his car from village to village. After this registration, and securing military passports, he toured to Baden, where 3 weeks were spent. It was impossible to leave this place with his car, which is still held there, and where his English chauffeur also remains as a prisoner of war. For the present, the chauffeur is permitted to live in the hotel where he is given the freedom of the town, but where he must pay his own bills. Should he not be able to do this he would be dispatched with other prisoners of war to some impounding depot.

Mr. Kilbourne's taxicab ride from Baden to the Dutch frontier was the only means of getting out. He was charged 1 mark, or approximately 25 cents a mile, and had to pay this sum for the out trip as well as the return trip. This one-way trip of 400 miles was up the Rhine valley, some of it through country over which the German troops had passed in their march to the front. The taxicab was not disturbed on its trip excepting being stopped at every village, town and city to show the necessary passport to the soldiers guarding these places. Every bridge was guarded by soldiers and here the transports had to be shown.

When passing through Coblentz, Mr. Kilbourne passed within a few yards of the castle where the German Emperor with his suite were stopping at that time. It was about 5:30 in the afternoon and the population of the city was on the street waiting for the Emperor to leave in his train of fifty motor cars which were drawn up in front of the castle. These cars represented every type of vehicle necessary for the Emperor and his staff, and included kitchen cars, sleeping vehicles, office quarters, etc. With such a motor equipment it would be possible for the Emperor to move his headquarters according to convenience and entirely independent of railroads.

Throughout the Rhine valley conditions seemed normal. The crops in the vineyards were being looked after, it being apparent that those needed to harvest the grapes and other products were left behind. Business seemed about as usual in many of the towns passed through, excepting Frankfort, the big financial center, where there was a greater air of dullness. Stores were open in all of the places, but theatres and other places of amusement entirely closed. In many places large forces of reservists were being trained in military camps.

The roads were practically deserted by motor cars excepting those used by officers of the different regiments, which were constantly moving about. These are all passenger cars of all types, and have the number of the regiment printed in large figures on the bonnet similar to the numbers on a racing car in a contest.

When traversing those stretches of road over which the army had passed, there were few evidences of military activity. These were largely confined to huge piles of empty tins by the roadside, these having been filled with food for the soldiers. At other places there were evidences of night encampments of cavalry.

Motor cars and horses are most in demand at present, and present indications would show that there will be a tremendous demand for motor trucks after the war is over because of the large number of horses that have been destroyed, these horses having in many cases been taken out of industrial fields which must be either supplied by more horses or motor trucks. There will also be an increased demand for motor trucks because of the large destruction of them that is taking place in the movements of the armies. This is largely due to the forced retreat, first of the allies, and later of the Germans. In these forced retreats whenever motor vehicles break down they are totally destroyed by a charge of explosive, rather than being left to fall into the hands of the enemy. This destruction means a heavy reduction in the number of vehicles in commission, and it is natural to expect that many of these vehicles will have to be replaced when the war is over.

When in England, Mr. Kilbourne visited the plant of the Daimler Co., Coventry, which plant has been working at full capacity since the declaration of war. Upwards of 100 workmen have been taken from the factory to join the colors, but others have taken their places. The factories have been working at capacity schedule on the 3.5 ton subsidized chassis and also on the 20 horsepower passenger car, which chassis seems specially suited for officers.

At present there is an enormous demand in England for magnetos, due to the fact that the English makers were great users of Bosch goods, which it is now impossible to receive from Germany. Already some English manufacturers have begun overtures with American magneto makers.

Patriot Presents Chandler Stock to Denmark

CLEVELAND, O., Sept. 10—The Chandler Motor Car Co., has received a letter from its Denmark distributors, Messrs. Mammen & Drescher, who are located in Copenhagen, which partly reads, as follows: "We have not a single car on hand as one of our wealthy patrons on learning that our Danish army was rather short on motor cars, bought our entire stock of sixes and presented them as a free gift to the government. If our stock had been larger he would have taken more cars. We are now entirely without your cars and wish you to rush our orders for immediate delivery."

In speaking about its foreign business, vice-president and sales manager C. A. Emise of the Chandler company said: "Our export business has already materially increased. Nearly every one of our foreign dealers outside of the war zone increased their orders for immediate delivery and we are at present enjoying a larger export business than at any time in our history."

For Uniform Automobile Laws in N. J.

TRENTON, N. J., Sept. 15—With the selection of Job H. Lippincott, commissioner of motor vehicles, as chairman, the commission named by Governor Fielder to consider municipal ordinances governing automobile traffic is completed. The commission adopted a resolution which outlined the scope of the work. It will examine the motor vehicle laws of every municipality with a view to the preparation of a model ordinance.

Briscoe Reduces Roadster Price to $785

JACKSON, MICH., Sept. 14—The Briscoe Motor Co. has reduced the price of its roadster to $785, completely equipped, instead of remaining at $900, as announced in THE AUTOMOBILE of September 10, page 513. The price of the touring car is also $785.

Benz Takes Over KisselKar for N. Y. City

NEW YORK CITY, Sept. 14—KisselKars and KisselKar trucks will be handled at retail in this city by the Benz Automobile Corp., which has taken over the salesrooms of the Kissel Motor Car Co., at 1696 Broadway with the agency.

C. H. McCausland, who has conducted the Kissel retail as well as Eastern wholesale business from 1696 Broadway, will continue as district manager, retaining his office at the same address. His territory will include, as before, the states of New York, Connecticut, New Jersey and Eastern Pennsylvania.

Big Program for Truck Convention

Industry to Be Enlightened in the Best Ways to Build, Sell, Drive and Maintain Commercial Vehicles at 4-Day Detroit Congress Beginning October 7

DETROIT, MICH., Sept. 11—The motor truck convention to be held in this city on October 7, 8, 9, and 10, gives promise of being one of the greatest motor truck conventions ever held in America. The work of drafting the program for the 4 days was practically completed last week, but as yet definite announcements giving the names of the people who will present the different papers cannot be made until the acceptances from these people have been received.

The program for the 4 days is particularly exhaustive and has been drafted with the object of taking up questions of direct value to the truck maker, the truck dealer and the truck owner. These questions are on pertinent subjects rather than academic.

The opening of the convention on Wednesday afternoon will be given over exclusively to manufacturers when subjects of direct value to them will be handled.

Thursday will have forenoon and afternoon sessions on subjects which concern both manufacturer and dealer.

Friday will be dealers' day and will be largely given over to questions of truck guarantees and service that manufacturers and dealers should give. These questions will be handled by representatives of the manufacturers and also dealers. Many dealers have been invited to come specially prepared to participate in the discussion.

Saturday forenoon will be clean-up session on subjects that have not been completed during the 3 previous days. There will also be a discussion of pertinent business subjects such as the necessity for dealers' organizations, the desirability of some form of motor truck exhibitions and other questions that may be brought up.

Although the exact order of the program cannot be given many of the subjects are now definitely decided upon.

The Trading Evil a Topic

"The Trading Evil" will be handled by one or two makers and several dealers. This is considered one of the most pertinent topics and in a canvass made of several hundred dealers, this subject is paramount with them. Dealers have been allowing too liberally on used trucks. The object of the paper and the discussions will be to show how this evil can be reduced, as well as offer means for making this business more profitable to the dealer.

"Evils from Overloading and Overspeeding and Avoiding Too Heavy Bodies" is a subject to be discussed. Manufacturers, dealers and body makers have been invited to prepare short symposiums on different aspects of this question. Axle and spring manufacturers have also been invited to participate.

"Used-Truck Market Reports" has been listed as a subject. The recent "Used-Car Central Market Reports" published by the Chicago Automobile Trade Association has resulted in the suggestion that similar reports be arranged for the motor truck field. It is believed that such would be of value and would serve as a guide to the dealer who is not familiar with value of used trucks.

"Traffic Engineering" will be handled by at least two experts in this line. Their papers will tell how the dealer can improve his conditions in this way.

"How to Calculate Costs," a question many manufacturers and dealers are asking themselves, will be analyzed in special papers by at least three traffic engineers who specialize in this work. Their papers will be direct and valuable, so that much of the information given can be applied at once by the dealer. Many dealers have been invited to supplement these papers by their own experiences.

Shall Trucks Be Sold on Terms

There are few questions that have been more widely discussed during the past 2 years than that of "Time Payments on Trucks." One professional financier who specializes on this work has been invited to outline his method. A leading manufacturer who sells direct on time payments will outline and defend this scheme. Makers and dealers who are opposed to this method of selling have been invited to prepare short papers for discussion.

"Territorial Lines for Dealers" will be handled by two or three makers. There is a movement to restrict dealers' territories and demand more intensified selling efforts. This aspect of the question will be discussed. The problem of carrying adequate supply of parts for trucks sold is one that enters into this topic.

"Tires for Motor Trucks" will be one department of the convention to be handled by four of the leading truck manufacturers who have been invited to prepare papers specially for the benefit of makers and dealers. They have been allotted different aspects of the tire questions.

One manufacturer has agreed to present a paper entitled "Parts to Be Carried in Stock by Dealers." His paper will go into the many ramifications of this subject.

It is expected that the question of "Manufacturers' Guarantee and Service" will occupy all of the Friday morning program. This is a question for manufacturers and dealers and will be handled by a leading truck maker and also by a leading dealer. Many dealers have been invited to participate in the discussion.

There are many other subjects that will be brought up, among which are:

"Loading Devices—Their Merits and Shortcomings."

"Driver's Influence on Successful Operation."

"How Manufacturer Can Co-operate with Dealer in Advertising."

"The Export Business; Best Fields and How to Develop Them."

"Motor Truck on the Farm."

It is expected that in a matter of 1 week the complete program for each day, with those handling the different subjects, will be announced.

Already the local committee here has made active progress. Headquarters and all convention sessions will be in Hotel Cadillac. The pleasure of those attending the convention is being well looked after. On Wednesday there will be a Dutch lunch with cabaret. Thursday evening the Detroit committee will tender a theatre party to all delegates. On Friday evening the official banquet will take place. Two or three well-known public speakers will attend.

Horses Twice as Dangerous as Automobiles in Chicago

CHICAGO, Sept. 15—As a part of street traffic, the automobile is safer for the pedestrian than the horse. Peter M. Hoffman, Coroner of Cook County, Ill., sets forth this fact in his biennial report on the deaths due to accidental causes in the city of Chicago, and its environs, for the year 1913. For each 5,000,000 miles traveled by motor vehicles there were 12.6 accidents as against 26.55 for horse-drawn vehicles.

In the city of Chicago and its environs, according to the report, there are 37,406 power vehicles and 65,118 horse-drawn vehicles. The daily individual mileage of these is forty-two and twelve respectively. Each day the total mileage of these vehicles collectively, is 1,571,052 miles for motor cars as against 781,416 miles for horse-drawn conveyances, or about twice as many miles for the automobile. Yet for the past 4 years accidents due to horse-drawn vehicles have averaged 4.15 daily while those due to motor cars have been 3.96.

It is clear that comparisons made as to the relative danger between horse vehicles and motor vehicles must be estimated on efficiency, and the number of miles traveled is the only rational basis on which to calculate. Therefore, in spite of their greater speed, automobiles are apparently under greater control in cases of emergency than any other form of street traffic.

Less Killed by Autos than Street Cars

Comparisons with street cars are also favorable. Of the total number of persons killed by accident in Chicago, 2.4, or 136 were traceable to automobiles, as against 2.92 or 165 by street cars. These out of an entire total of 5,648. In 1912 and 1913 automobile accidents as a cause of death were in tenth place on the Coroner's list, while street car accidents occupied sixth and eighth places respectively in those years.

If those who merely take the round figures in automobile accidents, in Chicago, for instance, 16 deaths in 1907, 18 in 1908, 28 in 1909, 52 in 1910, 75 in 1911, 98 in 1912 and 136 in 1913, would also consider the vast mileage being made by these freight and passenger vehicles, together with the decrease in horse vehicles and the corresponding increase in the number of power vehicles, they would get a true idea of real facts and relationships involved.

The blame for 50 per cent. of all automobile accidents may be placed upon the shoulders of the pedestrians who are injured. Safety First committees are beginning to realize this, and are making great efforts to educate the public to the necessity of looking out for themselves. Of course, to safeguard all concerned, the final solution of the automobile situation in all cities must rest in great part upon the competency and efficiency of the drivers, and this problem will no doubt be gradually worked out in more or less the same way as that of locomotive engineers, who, after having been trained in the shops as firemen and proved themselves competent are granted a license and given charge of an engine.

All Should Be Licensed

At the present time, in many of the states, only hired chauffeurs are required to have licenses, whereas owners of automobiles, their sons, daughters and relatives are permitted to drive their cars at liberty through the streets without licenses. It is from this latter class of people that most accidents are reported. About 6 months ago in New York City, a girl, whose father had just bought an automobile for her, and which she had driven for a short time on one occasion, killed two people and injured three others, when she became confused and drove her car on the sidewalk. Had it been necessary for this girl to obtain a driver's license prior to her taking out her own car, this accident would never have occurred.

Motorists as a rule drive carefully. This is shown by the small number of collisions between machines. When traffic from side streets is considered, this is quite an item. Pedestrians confuse motorists many times by wavering as to which side of the street they will run when they see an automobile approaching them. If pedestrians when standing in the middle of the street were to indicate to an approaching motorist on which side to pass them, and stand where they were, accidents of the kind would be reduced to a minimum.

Even under present statistics the streets are more safe from accident than the home. Falls, over 90 per cent. of which take place in the house, are among the leading causes of accident. It would therefore seem that while the streets are not entirely free from risk, it would be well to take into consideration that the constant attention and publicity which they call forth are making them more safe every year, while other causes of serious injury and fatality are overlooked.

E. V. A. A. Now Has St. Louis Section

ST. LOUIS, MO., Sept. 11—A St. Louis section of the Electric Vehicle Association of America has been organized. C. E. Mitchell, of the Union Electric Light & Power Co., has been elected chairman; F. E. Stevens, of the Stevens-Waverly Auto Co., vice-chairman; H. V. Marshall, of the Exide Battery Depots, Indiana, secretary. Other members are: Ralph R. Doak, Woods Electric Vehicle Co.; Louis Goodhart, Milton B. Strauss and Dwight B. Blossom, of the Electric Garage and Service Co.; Harry S. Turner, Mississippi Valley Automobile Co.; C. A. Irving, Rauch & Lang Garage; Harold G. Brouster, Rauch & Lang, St. Louis Co.; Dr. Melcher Ekstromer, General Motors Truck Co.

Crude Rubber Prices Normal—Due to British Control of Sea

NEW YORK CITY, Sept. 16—"The prices of crude rubber in America are practically normal and will remain normal, so long as Great Britain retains control of the seas so that shipments of plantation rubber from Ceylon can reach New York without interference."

This sums up the present crude rubber situation as expressed today by Thos. L. Robinson, president of the Republic Rubber Co., Youngstown, O., who returned yesterday from a month's trip to England where he had occasion to make a close analysis of the crude rubber situation.

One of the most salutory conditions observed by Mr. Robinson so far as the crude rubber supply for America is concerned, is that the British rubber brokers have diverted shipments of crude from Ceylon direct to New York and have further arranged that the shippers will draw on New York direct for payment, thus leaving London and the matter of high exchange out of the transaction entirely.

Mr. Robinson thinks that there was genuine reason for the panic in American prices of crude rubber a month ago, when the war first broke out, because for a period of 2 weeks no one knew whether Great Britain had complete control of the high seas and whether shipments of rubber from the East could be counted upon. Two weeks from the declaration of war England had demonstrated her control of the high seas and immediately the uneasiness in the market ceased. The prices of crude rubber did not increase in England while they were doubling in price in New York. The feeling is general that the price of plantation crude will rather decrease than increase.

Large Mileage from 7-Inch Tires

One of the interesting aspects of the tire industry in England as observed by Mr. Robinson is the extended use of 7-inch Palmer cord tires used on such large cars as Rolls-Royce, Sheffield-Simplex and Daimler. These tires are inflated to a pressure of 110 to 125 pounds and are actually giving as high as 30,000 miles road service. The only seeming objection to them is that the high inflation pressure makes for vibration, which is not desirable. Practically all of the cars of this type are using such tires. The cost is approximately 25 per cent. over standard sizes.

At the present time the Dunlop Tire Co. in England is practically under the government control in that the government has first demand on all tire supplies. The factory is particularly busy in contrast with many of the Continental factories which have been compelled to shut down because of war conditions.

At present there are being used in Great Britain a great many steel-studded pneumatics and throughout the country are billboards advising customers to put the steel studded tire on the right rear. In America this type of tire has a very restricted following but English motorists seem to prefer it.

Wants U. S. Dollar as Exchange Basis in S. A.

NEW YORK CITY, Sept. 16—That the business men of the United States in their South American trade, have been under a handicap of from 1 1-2 to 2 per cent. each way, by reason of the expense of making payments through London, is claimed by John E. Gardin, vice-president of the National City Bank.

When asked as to the possibility of providing for direct exchange in dollars and cents, as against the present system of payment through London in pounds, shillings and pence, Mr. Gardin states that there are two factors which will enter into the establishment of a system of direct exchange in dollars between the United States and South America, namely the establishment of branches of national banks such as are permitted by the Federal reserve act, also the increase of trade with South America.

$2,870,188,575 Business Done by S. A. Countries

NEW YORK CITY, Sept. 15—The twenty Latin-American countries of Central and South America conducted in 1913 a foreign commerce valued approximately at $3,000,000,000, the exact total being $2,870,188,575. Of this total the imports were valued at $1,304,261,736 and the exports at $1,565,916,812.

Argentina, Brazil and Chili are three of the biggest importers of American goods, especially in automobiles. Brazil did a 1913 business of $795,754 from this country, its total being $4,684,069. Automobile accessories from the United States also formed a large part of its imports, amounting to $104,118, out of a total business of $534,850.

MILWAUKEE, WIS., Sept. 15—The Kissel Motor Car Co., Hartford, Wis., and the Chas. Abresch Co., Milwaukee, last week shipped fifty truck chassis and bodies to Greece for delivery to the Greek government. The bodies are regular express bodies with canopies and the chassis are of the 2 1-2-ton type.

NEW YORK CITY, Sept. 14—J. T. Ranier and P. N. Lineberger have severed their connection with the R. & L. Co., Inc., of New York City, metropolitan dealers for the Garford and Willys-Utility trucks. They have opened a temporary office at 299 Madison avenue, this city, and expect to sell automobiles and commercial vehicles.

July Exports Declined; 1914 Total $1,000,000 Less

WASHINGTON, D. C., Sept. 17—*Special Telegram*—In July, 1,315 motor cars valued at $1,249,819 were shipped abroad. During the seven months ending in July, a total of 18,942 cars valued at $16,818,422 were exported.

This shows a considerable falling off for the month. The previous month saw 2,072 cars valued at $1,991,139 sold abroad, while during July of last year 1,764 automobiles, selling for $1,736,253, were sent out of the country.

More cars have been exported during the first 7 months of this year than were shipped abroad during the corresponding period last year, but the value is less. Last year the number of cars was 17,190 as against 18,942 this year, and the value was $17,760,733 as compared to $16,818,422. This indicates an increase in the popularity of the low-priced American car.

Rubber Goods Mfg. Co. Declares Dividend

NEW YORK CITY, Sept. 11—The Rubber Goods Mfg. Co. has declared the regular quarterly dividend of 1 3-4 per cent. on the preferred stock and a dividend of 2 per cent. on the common stock, both payable September 16 to stockholders of record, September 12.

NEW YORK CITY, Sept. 11—The Kelly-Springfield Tire Co. has declared the regular quarterly dividend of 1 1-2 per cent. on the 6 per cent. preferred stock and 1 3-4 per cent. on the 7 per cent. second preferred stock. The dividends are payable on October 1 to stock of record, September 15.

Registrations in N. Y. State Number 161,353

NEW YORK CITY, Sept. 14—$1,462,963.86 has been paid to New York State up to September 8, in fees for the registration of motor vehicles and chauffeurs' licenses. This is nearly $200,000 in excess of the amount contributed for the same purpose during the whole of last year.

Up to the above date, 161,353 motor vehicles have been registered. This is an increase of 36,090 over the corresponding period last year. The number of chauffeurs licensed is 61,398. During all of last year there were registered only 132,450 motor vehicles and 56,702 chauffeurs licensed.

Market Reports for the Week

This week's markets were in general more quiet and steady. The changes that occurred were the usual ones. Tin declined $1.62 per 100 pounds. There were several small sales of spot. About 3,500 tons of tin are available for September delivery. Copper was quiet and steady. More small sales of electrolytic made this week to domestic consumers, were reported. The exports of copper to Europe since September 1 were at the rate of 18,000 tons for the month. Lead rose $0.15 per 100 pounds. There is a fair demand for this metal. The crude rubber market is easier with Up-River Fine at $0.68, with no sales of any consequence noted. Shipments of rubber are coming in regularly from the various foreign ports.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.11¾	.10½	.10	.10	.10	.10	—.01¾
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	......
Bessemer Steel, ton	20.50	20.50	20.50	20.50	20.50	20.50	......
Copper, Elec., lb.	.12¼	.12	.12	.12⅛	.12⅛	.12⅛	—.00⅛
Copper, Lake, lb.	.12	.12⅛	.12⅛	.12¼	.12¼	.12¼	+.00¼
Cottonseed Oil, bbl.	5.82	5.86	6.03	5.80	5.80	5.88	+.06
Cyanide Potash, lb.	..	..	..	.32	.32	.32	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.93	.93	.93	.93	.93	.93	......
Lead, 100 lbs.	3.70	3.70	3.85	3.85	3.85	3.85	+.15
Linseed Oil	.60	.60	.60	.60	.60	.60	......
Open-Hearth Steel, ton	20.50	20.50	20.50	20.50	20.50	20.50	......
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.65	—.10
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	74	.73	.73	.69	.69	.68	—.06
Silk, raw, Ital	..	..	..	..	..	..	......
Silk, raw, Japan	..	..	..	..	..	..	......
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	33.00	32.75	32.00	31.50	31.50	31.38	—1.62
Tire Scrap	.05	.05	.05	.05	.05	.05	......

Ajax-Grieb Fiscal Year Greatest in History

NEW YORK CITY, Sept. 10—With the close of August the fiscal year of the Ajax-Grieb Rubber Co. came to an end, showing a greater volume of business done than ever before in the history of the company. This, despite the fact that in November there was a 28 per cent. decrease in tire prices, a difference which had to be made up before any gain could be shown. Furthermore, the Ajax was one concern not to make any advance in prices when the European war began. It has not yet announced any such new schedule, and will not as long as its supply of crude rubber, bought at before-the-war prices, lasts.

A 10 Per Cent. Pope Creditors' Dividend

HARTFORD, CONN., Sept. 12—Judge Joseph P. Tuttle of the superior court issued an order this week authorizing Receiver Colonel George Pope, of the Pope Mfg. Co., to pay a dividend of 10 per cent. on the claims allowed. The receiver represents that he has sufficient funds to pay a 10 per cent. dividend on disallowed claims if they are eventually allowed. Receiver Pope has been authorized to turn over to the Massachusetts receiver old bicycles and tricycles which made up the Pope museum in this city. The allowed claims aggregate approximately $1,600,000.

In the United States court at Boston Pope claims to the extent of $1,641,382 have been allowed. The allowed claims include those of the noteholders. Claims to the extent of $157,365 are to be referred to a master and included in these are the claims of the officers of the Pope company, $44,537 for Albert L. Pope, $30,153 for Charles E. Walker, and $26,802 for Wilbur C. Walker.

No offer has been made yet for the Massachusetts property at an upset price.

Heavy Printed China Duty for Plug Porcelains

NEW YORK CITY, Sept. 15—The Champion Ignition Co., Detroit, Mich., lost in a protest over the rate on porcelain insulators for spark plugs. The insulators had printed letters and numbers on their fronts, and for this reason the customs collector classified them as printed china with duty at 55 per cent. The importer claimed that the lettering was merely to protect patent rights.

Reo Declares Extra 12½ Per Cent. Dividend

LANSING, MICH., Sept. 12—At a meeting of the stockholders of the Reo Motor Car Co., this city, R. C. Rueschaw, general sales manager, was elected to the board of directors. In addition to the regular quarterly dividend of 2 1-2 per cent., an extra dividend of 12 1-2 per cent. was declared, payable October 1, to all stockholders of record at the close of business September 20.

Seven More White Trucks for Post Office

WASHINGTON, D. C., Sept. 14—The Post Office Department has awarded contracts for seven trucks to the White Co., Cleveland, O. The capacities are as follows: Five 1,500-pound trucks at $2,050; one 3-ton truck, $3,445, and one 1.5-ton truck at $2,825. These seven, together with the twenty purchased from the White Co. a year ago, make a total of twenty-seven of these vehicles at present owned by the department. The twenty purchased a year ago are in use in postoffices in five or six different cities.

Knox Sells Five Tractors to Europe

NEW YORK, Sept. 16—Direct results of the European war on the motor truck business in America has been demonstrated this week when the Knox company sold five 5-ton tractors to one of the foreign governments. These tractors are being shipped this week. For the past week emissaries of other foreign governments have been in America looking for motor trucks. There seems to be a demand for approximately 650 trucks of from 2 5 to 3-ton capacity, these being practically on a par with the subsidized trucks in the majority of the European countries. In addition there is talk of buying 250 trailers with approximately 750 wagons to go with them. Other lines of merchandise being purchased include 6,000,000 horseshoes, 400,000 army blankets, and 100,000 horse blankets.

Ford's Home Trade Growing; Locates Four New Branches

Profit-Sharing Announcement Has So Boomed American Sales That War Constriction Has Not Been Felt

DETROIT, MICH., Sept. 10—Beginning October 1, there will be four new Ford branches in the United States, bringing the total number of branches up to forty-eight. These new branches will be located in Milwaukee, Wis., 143 Eighth street, A. W. L. Gilpin, manager; Newark, N. J., 1721 Halsey street, E. T. Baskett, manager; Charlotte, N. C., A. J. Langford, manager; and Brooklyn, N. Y., 1476 Bedford avenue, G. E. Hunt, manager.

Besides these forty-eight branches the Ford Motor Co. now has twenty-four assembling plants and 5,600 dealers in the United States. Including the whole world there are about 8,000 dealers. There are seventeen branches located in foreign lands and two Ford factories outside of America, these being the Walkersville, Canada, plant and the one in Manchester, England, where probably 15,000 cars are made now annually. This English plant supplies the British Isles only, that is, England, Ireland, Scotland and Wales.

The Ford plant in Walkerville, Ont., supplies the British colonies and the Canadian trade. Europe's requirements, excepting those for the British Isles, have been taken care of from the main plant here in Detroit.

While the exact figures are not given, it is safe to say that at least 10 per cent. of the 1914 output was shipped to Europe and this totals about 24,000 cars. To France alone at least 5,000 cars were shipped, and during May, according to H. P. White, continental manager, 500 cars were sold in France. The business in Russia figured at between 4,000 and 5,000 cars for the year. In most all other European countries the sales have been heavy this year.

Although the export trade to Europe is necessarily small at present, and will remain so for some time, there is no intention to cut down its proposed output of 300,000 cars for 1915. As a matter of fact, it is stated that since the profit-sharing scheme went into effect the demand has been so heavy that it will be somewhat difficult to supply all the dealers with the number of cars they desire.

200 Hupmobiles in New York Reunion

NEW YORK CITY, Sept. 15—More than 600 persons in nearly 200 Hupmobiles participated in a Hupmobile reunion which was promoted by Chas. E. Reiss, New York Hupmobile distributor, on Wednesday afternoon, September 9. The cars were formed in line at 130th street and Riverside Drive and, headed by Reiss in one of the new 1915 models, proceeded to the Hotel Shelburne, Coney Island. At the hotel Reiss' guests were lined up for a photographer, after which a banquet was served. Chas. E. Buck, assistant advertising manager of the Hupp Motor Car Co., acted as toastmaster. A tall silver Hupmobile cup, presented by Reiss for a dancing contest, was won by Dr. H. W. Taylor and Miss Nockler. Dr. Taylor has been a Hupmobile owner only about 6 months.

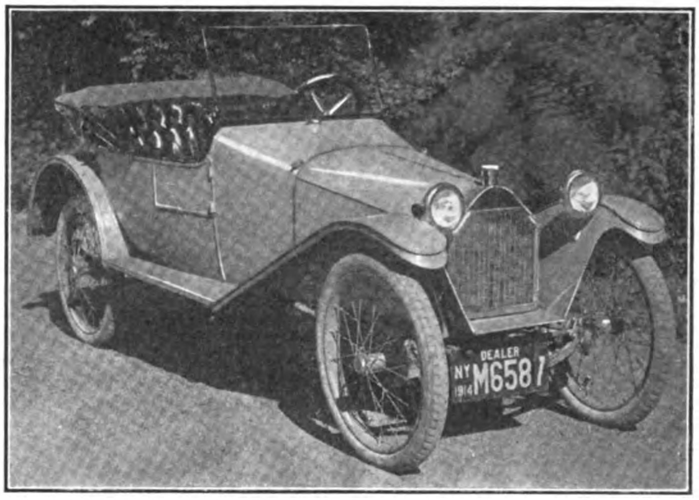
Pierce-Arrow Agents in Session

BUFFALO, N. Y., Sept. 15—The first annual convention of agents and salesmen of the Pierce-Arrow Motor Car Company opened here yesterday forenoon in the factory of the company in Elmwood avenue. About 60 agents and salesmen are in attendance at the meeting which continues until Wednesday evening. An interesting program has been arranged by the Pierce-Arrow people which includes considerable entertainment for the delegates.

Officers of the company will read interesting papers touching on the vital subjects of the day in the automobile industry. As the Pierce-Arrow factory is behind in its deliveries, causing a scarcity of cars, arrangements were made with the International Railway Company for a special car to transport delegates to and from the factory. After business hours two banquets, theater parties and various other entertainments were on the program.

Coffin Added to Patents Committee

NEW YORK CITY, Sept. 14—Howard E. Coffin, vice-president of the Hudson Motor Car Co., Detroit, Mich., has been appointed a member of the patents committee of the National Automobile Chamber of Commerce. With him on the committee are C. C. Hanch, Marmon, chairman; Wilfred C. Leland, Cadillac; Windsor T. White, White, and W. H. VanDervoort, Moline.



Remington roadster with electric equipment and automatic gearshift

New York Show Space Drawing, Oct. 8

NEW YORK CITY, Sept. 11—The National Automobile Chamber of Commerce has voted that the automobile shows in January shall be invitation affairs to which will be invited such concerns in the automobile and accessory industry as can be cared for properly.

Allotment of space will be confined to members of the N. A. C. C., to members of the Motor and Accessory Manufacturers, the Motor Cycle Manufacturers' Assn. and the Electric Vehicle Manufacturers' Assn., and to such other persons and companies as may be formally invited by the management to participate.

All applications for space must be in hand by October 3 to participate in the first allotment. The drawings for space for both shows will take place at the offices of the N. A. C. C. on October 8, in connection with the semi-annual meeting of that organization.

The show committee will again be George Pope, of the Pope company, W. C. Leland, of the Cadillac company, and H. O. Smith, of the Premier company.

The Chevrolet Motor Co., Flint, Mich., has been admitted to membership in the association. The N. A. C. C. now includes ninety-two automobile manufacturers.

TACOMA, WASH., Sept. 7—For the automobile exhibit at the Oregon State Fair at Salem, Ore., September 28 to October 3, space has been set aside to accommodate fifty cars. Both trucks and pleasure cars will be exihibited and it is expected this will bring numerous buyers from all parts of Central Oregon. The exhibit will be staged by Joseph M. Rieg.

New Small Velie Six at $1,595

NEW YORK CITY, Sept. 15—An entirely new small six selling at $1,595 and called the Biltwel series 15 is the feature of the line of the Velie Motor Vehicle Co., Moline, Ill., for the ensuing season. Last season's small four, the model 11 has been discontinued and the big six, called series 14 this year and the big four called series 12, have been improved and reduced in price. The four has been reduced, from $2,000 to $1,750, and the six from $2,350 to $2,015. New bodies are featured on all the cars. In the new small six the Velie company has incorporated a number of special features which have lately come into use by motor car builders. The spiral bevel rear axle gears is one of these features, the tapered frame, another.

Show Building for St. Louis Accessory Trade?

ST. LOUIS. MO., Sept. 10—At a dinner-meeting of the St. Louis Motor Accessory Trade Association, the Continental Auto Equipment Co., was elected a member of the association. T. L. Hausmann was appointed chairman of the show committee. There was a discussion concerning the securing of an auditorium for show purposes in St. Louis, just as one was obtained by the Kansas City and Denver dealers. There will be another meeting within a short time at which all interested in the automobile and accessory trade in this city will be asked to attend to give their views, so that active work may be started in the endeavor to secure an auditorium.

One Car in Every Twelfth Wisconsin Family

MILWAUKEE, WIS., Sept. 12—There are now fully 50,000 automobiles owned in the State of Wisconsin, 36 per cent. belonging to farmers and 64 per cent. owned in cities and towns.

According to the schedule of the assessors in forty-one counties considered the agricultural districts, and not including Milwaukee county, as the latter's city population represents 97 per cent. and the rural population only 3 per cent., it is shown that one farmer's family in every twenty-two owns an automobile, and the proportion is one to twelve for the city family. In Milwaukee county one in every fifteen farm families owns a motor car and one in every sixteen city families. In Walworth county, considered the richest, one farmer in every nine owns a car. In that county the average value of a farm is $13,000, while in Shawano countv the average value of a farm is only $6,000 and only one car is to be found to every thirty-seven farms.

Blair Co. to Make Trucks Only

NEWARK, OHIO, Sept. 10—Steps are being taken toward a complete reorganization of the Blair Mfg. Co., under the title of the Blair Motor Truck Co., which was recently chartered under the laws of Ohio. To facilitate the reorganization all of the assets of the concern have been deeded to Carl Norpell, trustee, for $15,000 and other considerations. The old concern will remain in business long enough to close up its affairs and dispose of its finished agricultural implements.

In the future the product will be restricted to motor trucks. The truck is equipped with a patent direct drive. A number of the old stockholders will be interested in the new corporation.

The company is now building a 5-ton double deck truck for passenger service in Philadelphia.

A $495 Car with Automatic Gearshift

NEW YORK CITY, Sept. 15—The Remington Motor Co. will manufacture a two-passenger roadster selling at $495, with electric lighting and starting and full equipment. An automatic gearshifting device is a feature of the car.

The car is built on conventional lines, but on a small scale, the wheelbase being 100 inches, the tread 42 inches and the weight between 750 and 800 pounds.

A four-cylinder L-head block-cast 2 3-4 by 4 1-2 motor is a unit with the three-speed gearset and the inverted cone clutch, the unit being on a three-point suspension. Lubrication is by splash with pump circulation, cooling by the usual method with circulating pump, and ignition by the Atwater Kent system with automatic spark advance.

Drive is through a propeller shaft with two leather universals, bevels and a four-pinion differential to the three-quarter floating rear axle. A pressed steel torque member is used. Wire wheels are regular equipment, but wood wheels will be furnished as an option. Tires are 28 by 3. The front spring is a transverse semi-elliptic and the rear springs three-quarter elliptics. Steering is by worm and sector gear, adjustable, with a 15-inch wheel. Service brakes are metal to metal, running in oil, consisting of two bands enclosed in the differential housing and adjustable from the outside; the emergency brakes are on the hubs in the usual way.

The equipment includes top, side curtains, windshield, speedometer, electric horn, electric starting and lighting system with headlight dimmers, and the usual tools. The body (only one style is built) is of steel with tapered hood and, in fact, big car lines throughout. The color is gray, with black striping.

The Remington Motor Co., this city, has opened offices and salesrooms at 2 Columbus Circle, and has completed arrangements for the erection of a factory at Rahway, N. J. A temporary factory has been secured for the production of the first lot of cars, which will be ready for delivery in November.

P. E. Remington is the moving spirit and vice-president of the company. B. B. Monypeny is president; J. T. Macgregor, treasurer; C. W. Bliss, secretary, and C. P. Hollister, chief engineer. Messrs. Monypeny, Remington and Macgregor, with James Barber, William Grant Brown and R. T. McKee form the board of directors. The company was incorporated in June under the laws of the State of New Jersey with a capital of $500,000.

Enger Brings Out a $1,495 Six

CINCINNATI, O., Sept. 12—A new six-cylinder car has been brought out by the Enger Motor Car Co., Cincinnati, O., to sell for $1,495 with complete equipment, including electric lighting and starting; a single model is offered, six- or a seven-passenger touring car with a wheelbase of 124 inches and 34 by 4 tires.

The motor is block cast with cylinders 3 1-2 by 5, giving a S. A. E. rating of 29.4 horsepower; valves are enclosed. Ignition is by the Atwater Kent system with both automatic and manual spark control.

Electric lighting and starting are provided for by a separate generator and starting motor. The cooling water, pump circulated, passes through a square-tube honeycomb radiator. The carbureter is a Rayfield.

Power is transmitted through a multiple-disk clutch and three-speed gearset, forming with the motor a unit power plant, and propeller shaft to the floating rear axle. Wheels are of wood with Firestone demountable rims carrying 34 by 4 Firestone tires. Front springs are semi-elliptic and rear springs three-quarter elliptic.

The equipment consists of one-man top, quick adjustable curtains, windshield, electric horn, Stewart-Warner speedometer, extra rim and the usual tools, etc. A gasoline gauge is mounted on the dashboard, and, with the other instruments, is electrically illuminated. A dash adjustment for the carbureter is provided to make starting easy in cold weather.

Sphinx Co. Buys Hart Kraft Plant

YORK, PA., Sept. 12—The Sphinx Motor Car Co., York, Pa., has purchased the building formerly owned and occupied by the Hart Kraft Motor Car Co. and is manufacturing cars. Deliveries will be made October 1.

The dimensions of the property are 115 by 265 feet, and is located along the Pennsylvania and Western Maryland Railroads. The four-story building affords ample room for the production of 5,000 automobiles annually.

The style of the car will be a light touring car, fully equipped, including electric lighting and starting systems, at the selling price of $695.00.

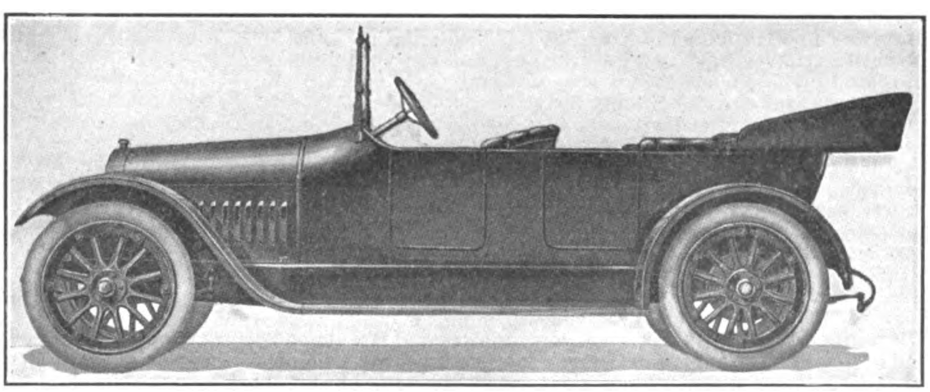
Herbert R. Averill and Ernest T. Gilliard will have the management of the factory. The following will be directors: Howard Rohrer, Jacob Rohrer, Lancaster, Pa.; Theo. C. Auman, Milton G. Hollis, Reading, Pa.; Dr. Posey, York, Pa.; Dr. Otto Schaefer and Thomas C. Goodwin, Baltimore, Md.

Studebaker Supplies Extra Coupe Bodies

DETROIT, MICH., Sept. 9—The Studebaker Corp. is furnishing Studebaker dealers and branches with coupé bodies which can be mounted on almost any chassis. As the Studebaker is not made with closed models, this will meet the demand of patrons who desire a closed car for the winter.

Stutz Light Four Runabout, $1,475

NEW YORK CITY, Sept. 16—The price of the new light four Stutz runabout is $1,475 with full equipment and not $1,450 as was stated in THE AUTOMOBILE for September 3 on page 468.



New seven-passenger Enger $1,495 light six

Buick Wins Wisconsin 500-Mile Reliability

MILWAUKEE, WIS., Sept. 11—Repeating his brilliant victory in the first Wisconsin reliability tour in 1910, Emil Hokanson, Madison, Wis., driving a Buick model C-37, captured two out of three trophies in the fourth annual Wisconsin reliability-economy tour, run over a course of 508.8 miles on September 7, 8 and 9, and might have taken the third cup but for the fact that six contestants drew lots for it. Franklin, Jeffery, Studebaker, Chevrolet and R. C. H. finished in the order named.

Buick Wins Economy

By averaging 24.8 miles per gallon of fuel, which figures 1,455 pounds per gallon, Hokanson's Buick won the economy test, and with a score of 2,995 out of a possible 3,000, was awarded also the $1,000 sweepstakes cup. A trophy, for best road score, was awarded to the Studebaker 4, the decision being made by drawing lots because all contestants finished with perfect road scores.

It was with a model 19 Buick that Hokanson won the cup in the initial tour for this trophy in July, 1910. In 1911 Hokanson finished second, and in 1912 he was tied with several other contestants for the major trophy and with the others received certificates instead of the cup. There was no tour in 1913.

Franklin Wins in Owners' Division

In the private owners' division, John D. Babcock, of Milwaukee, driving a 1911 Franklin 6, won over Henry O. Stenzel in a White 30, and becomes permanent possessor of the Emil Schandein trophy by virtue of having won the cup three times. Stenzel has been Babcock's competitor in this division since 1911 and tied the Franklin in 1912. This division was run under grade 3 rules of the A. A. A. and Babcock finished with a perfect score, while Stenzel suffered 31 points penalty for taking on water between controls and for work on a water connection.

The 1914 Wisconsin state tour was without doubt the most important run of the kind staged in America this year. The addition of an economy test made it the most important tour ever held in the country, for reliability has long since been proven, while economy has until now been a matter of guesswork.

Fuel Carefully Measured

For the purposes of the economy test, all gasoline tanks were emptied and filled with a supply of Bartles-Maguire 60-62 degree gasoline, carefully measured by pints, and all replenishment of gasoline supply during the run was as carefully measured and noted by the technical committee, under whose supervision all tanks were drained at the conclusion of the run and total consumption noted. All cars finished by 6 o'clock Wednesday, September 9, and were then returned to the official garage and kept locked up until Thursday morning, when brake, clutch and transmission tests were held. Immediately thereafter the technical committee tore down each car for final examination and was able to report to the contest board late Thursday that the Buick was entitled to the *Sentinel* and Wisconsin Motorist trophies and all cars were tied for the Milwaukee *Free Press* trophy.

All Were Penalized

As is shown in the report of the technical committee, not one car came through the exacting final examination without demerit. However, it can readily be seen that the majority of penalties thus assessed were of a minor character and proves the contention of many that the reliability of modern motor cars under the most exacting conditions cannot longer be questioned.

Each contestant started out with a credit of 3,000 points, divided into three sets of 1,000 points each, as follows: Road score, technical score, and economy score. The winning Buick lost only 5 points, which were assessed in the final examination, but for minor faults. The Franklin, Jeffery and Studebaker lost only 3 points each in the final inspection. The Chevrolet, which went into the technical committee's hands with a small fracture in the water jacket, was assessed 36 points for the fault, which was aggravated by the 500-mile run. The new R. C. H. suffered the heaviest technical penalties, being listed for a deduction of 159 points from its 3,000 for a net 2,790. The left rear axle shaft was broken, causing 100 points, and both sets of brakes failed to come to scratch, causing 50 more points to be added to the penalty.

Fuel economy was determined by dividing the total weight of the fuel consumed on the entire trip into the weight of the car, including passengers, driver, observers, tools, equipment, and everything complete as the car went over the roads in the tour.

Burman Sets World 15-Mile Record in 12:47

PEORIA, ILL., Sept. 12—Bob Burman today established a new world's record when he drove 15 miles on a circular dirt track in 12:47. The old record was 13:30, made by Disbrow at San Jose, Cal., April 14, 1912. Disbrow's mark of 13:03 for the same distance made at Hamline, Minn., Sept. 12, is also broken.

Burman's attempt today was in an official time trial.

64 Mile Average in Spokane Road Race

SPOKANE, WASH., Sept 10—Eight cars entered the 21-mile automobile race Labor Day on the course at Spokane, Wash., known as the Apple way.

The winner was a 50 horsepower Stutz car owned by Harlan Peyton and driven by Herb Alderson, who has captured many road and track races in the Northwest.

Ed McGoldrick's National was forced to retire by a broken drive shaft at the start of the race and Roy Nobel's Detroiter went into the ditch on the return lap.

Alderson drove the powerful car over the 21 miles of country road at an average of 64 miles an hour.

The little red Detroiter was racing neck and neck on the first mile of the return lap with Claude L. Laws's Hudson when he met with an accident which put him out of the race. The Hudson skidded and locked front axle hubs with the Detroiter. The latter was catapulted off the road by the shock, but landed right side up, both driver and mechanic escaping any serious injury.

Another car which had hard luck was Ray Paulsen's Lozier, which developed engine trouble on the first half of the lap.

A driving rain fell throughout the first part of the afternoon. In spite of weather conditions about 3,000 people saw the races. The course began 1 mile east of Spokane and ended at Liberty Lake Junction, a distance of 21 miles. The road was in perfect condition.

The winners of the race received a first prize of $210; $126, second; $84, third. Following is summary:

21 Miles Free For All	Out	Back	Round Trip
Stutz (Alderton)	10:14	9:27	19:41
Everett (Cunningham)	11:12	9:42	20:54
Hudson (Laws)	10:49	10:30	21:19
Chalmers (Schmidt)	11:45	9:51	21:36
E. M. F. (Morrill)	12:00	10:28	22:28
Lozier (Paulsen)	16:38	9:37	26:15

Faster time made on the return trip was due to the fact that the rain had stopped, permitting the drivers to follow the road more easily. Other events and results of smaller races on the Apple way, were, as follows:

100-Yard dash, three gear shifts—Won by Joe Stenstrum, Chalmers Six; time, 12 4-5 seconds. Dr. Hahn's Lewis six, second; J. A. Raymer's Hudson six, third.

100-Yard race, low speed on high gear—Won by A. D. Jones' National; time, 1 minute and 14 seconds; Verne Dempsey's Chalmers, second; H. A. Fletcher's Lozier, third.

Tire change followed by 100 yard dash—Won by Roy Nobel in Detroiter; time, 2 minutes and 8 seconds; Cunningham's Everett, second.

100-Yard race from start with dead engine—Won by D. R. Riegel's Detroiter; time, 14 seconds; Fletcher's Chevrolet, second; Smith's Hupmobile, third.

In the tire changing event the Detroiter's driver and mechanic stole a march on their competitors by dispensing with the use of a jack, raising their light car by hand to put the tire in place.

During the big race the course was patrolled by national guardsmen stationed at every crossroad to warn vehicles. Some criticism was elicited, however, by the failure of officials to keep the crowd from the track near the start of the race.

30 by 3-Inch Tire, $6.75

NEW YORK CITY, Sept. 16—In an advertisement in THE AUTOMOBILE in the issues of August 27 and Sept. 3, it was stated that the price of the 30 by 3-inch tire advertised by the Fire Sales Co., 1334 Arch street, Philadelphia, Pa., was $5.75 when the price is $6.75.

Eight Cylinder Motors for 1915

(*Continued from page* 428)

being placed directly above the camshaft. The generator runs at camshaft speed. At the rear end of the generator is the train of gears which mesh with the teeth in the flywheel rim for cranking purposes. These gears are not in mesh unless the starter pedal is depressed, and the reduction between electric motor speed and engine speed is 25 to 1. The Delco unit temporarily becomes an electric motor in the usual way of cranking.

Wheelbase 2 Inches Longer

The Cadillac changes this year are not all in the motor, for the chassis is altered considerably also. The wheelbase has been lengthened from 120 to 122 inches, while left drive and center control replace right drive and control. The hinged steering wheel, which was an innovation last season, has been retained.

In the transmission system, a big alteration appears in the incorporation of the gearset in unit with the motor instead of locating it amidships as heretofore. The same type and design of three speed sliding gearset is used, however. The cone clutch has also given way to a nicely designed disk clutch of the dry plate type. This has fifteen carbon steel plates 7 3-4 inches in diameter, the driving plates, eight in number, being faced with wire mesh asbestos. This construction has resulted in an exceedingly soft-acting clutch.

The drive shaft back to the axle continues to be of the uninclosed type, fitted with two universals and being paralleled by a triangular torque arm.

A floating type rear axle which is similar in general construction to that formerly used is employed. This axle is, however, of the latest form in that worm bevel gears replace straight bevels for the ring gear and driving pinion.

Spiral Bevel Rear Axle

The spiral bevel gearing which appeared last year provides a rolling contact along the teeth and this is conducive to smooth running and quietness. It is looked upon as the last word in rear axle drive refinement, and in order to generate these complicated gears, the Cadillac company has installed an elaborate equipment of machines which give a movement of the cutter with respect to that of the gear blank itself in exceedingly complicated fashion. Very close limits of accuracy are obviously necessary in generating such teeth.

In other respects the chassis is about as it was. The frame is of bottle neck form, 33 inches wide in the rear and 30 at front. The characteristic Cadillac platform rear spring suspension is retained and its easy riding qualities are commendable. The gasoline tank is at the rear with pressure feed to the carbureter. Tires are 36 by 4 1-2 inches on demountable rims and wood wheels.

It is a notable fact that the new Cadillac is much lighter than its predecessor.

Bodies for 1915

Bodies have come in for little change, being of the smooth sided type with present-day lines gracefully worked out. The usual array of closed types is offered, while in addition to roadster and five- and seven-passenger touring types, a four-passenger salon, of open car design, is an attractive member of the family. This car provides a passageway to the rear seat and between the individual front seats. There is only one front door to it.

As regards prices, there has been no change made. Nineteen seventy-five is asked for any one of the open models, while the usual increases are required for the closed line. Equipment is complete in every detail.

Headlight Committee Appointed by Indiana S. A. E.

INDIANAPOLIS, IND., Sept. 15—*Special Telegram*—At the monthly meeting of the Indiana section of the Society of Automobile Engineers, held in the rooms of the Hoosier Motor Club, of this city, a committee composed of Howard C. Marmon, Nordyke and Marmon Co., George A. Weidely, Premier Co., and J. W. Esterline, Esterline Co., was appointed to take up with a committee from the Hoosier Motor Club, the matter of non-blinding headlights. These committees will act with the city and state officials.

NEW YORK CITY, Sept. 15—At a meeting of the Contest Boara of the American Automobile Assn. held today, Wm. Schimpf, who held the position of chairman of the board for 2 years, 1912-1913, was presented with a gold watch by the contest board in recognition of his services.

At today's meeting Hughie Hughes and Ray F. Brock were suspended for 2 years for failure to live up to contracts with promoters requiring their appearance at races.

Two records were officially allowed, one 100-mile for dirt tracks made by Ralph De Palma, in a Mercedes, at the Labor Day, Brighton Beach meet; time 1:40:15. The other was a 25-mile record established by Percy Barnes in a Romano car at Portland, Ore., July 12; time 22:07 1-5.

The Automobile Calendar

Sept. 15-Oct. 11...New York City, Commercial Tercentenary Celebration.
Sept. 23-Oct. 3...Oklahoma City, Okla., Show, Oklahoma Automobile Association.
Sept. 26..........Kalamazoo, Mich., 100-Mile Track, Inter-State Fair.
Sept. 27..........Pleasanton, Cal., Track Meet, Alameda County Fair Assn.
Sept. 28-Oct. 3...Salem, Ore., Automobile Show, Oregon State Fair.
Oct. 3-10.........Cincinnati, O., Show.
Oct. 3............Fresno, Cal., Track Meet, Fresno Co. Agricultural Assn.
Oct. 4............St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 5-12.........St. Louis, Mo., Show, Forest Park Highlands
Oct. 7-8-9-10.....Detroit, Mich., First Truck Convention of Motor Truck Manufacturers', Dealers' and Owners' Organization; promotor, Motor Truck Club of America.
Oct. 7-17.........New York City Electric Vehicle Show, Grand Central Palace.
Oct. 10..........Medford, Mass., Track for Light Cars, Combination Park.
Oct. 10-17........Boston, Mass., New England Light Car and Cyclecar Show, Horticultural Hall.
Oct. 17...........Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-24........Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1....Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21....Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26........Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31........Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov..............El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 8-9..........El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11.........Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 26...........Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4.........New York City, Annual Meeting of the American Society of Mechanical Engineers.
Jan. 2-9..........New York City, Annual Automobile Show, Grand Central Palace.
Jan. 3-10.........Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16.........Philadelphia Automobile Show.
Jan. 23-30........Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb. 22..........San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition
Mar. 7...........San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 14..........San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

Accessories for the Automobilist

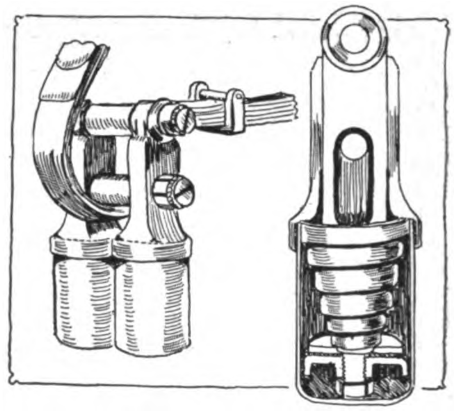


Fig. 1—Geschwa shock absorber. The air piston takes the rebound

GERMAN - AMERICAN Aluminum Solder—To dispense with the present oxy-acetylene method of repairing fractures in aluminum parts is the object of the German-American Aluminum Co. which has just established a sales office at 25 West Forty-second street, New York City.

The new solder is the invention of Karl R. Peters, a metallurgist of Berlin, Germany, and at the present time it is being manufactured in this city as well as in that country. The inventor claims that no breaks are too complicated to be repaired by the new method and that the work can be done at a saving of at least one-third the cost of the welding job. The strength of the solder, according to Mr. Peters, is about double that of aluminum as regards its resistance to tensile strains and even greater as regards its resistance to bending.

Outside of the greatly reduced cost of making the repair, it is claimed that the work attached to the job is no more than in ordinary soldering. Instead of having to purchase an expensive welding outfit, in the nature of oxygen tanks, acetylene and welding jets, the ordinary gasoline torch can be used. Another advantage claimed by the German-American company for its product is that the work requires no machining after the soldering is run in place.

In performing the work on an aluminum casting that has been broken into a number of pieces, the various parts are matched as closely as possible and screwed down on a jig. The fractures are then chiselled in the form of a V-shaped slot in the same manner as for a welding job. The solder, which melts at a temperature of 400 degrees Fahrenheit, is then run into the slot and finds its way down into crevises between the two pieces of metal. Upon solidifying the joint is made.

Mr. Peters states that he has had 8 years' successful experience with his solder both in this country and abroad. It is a secret composition, containing eight ingredients, five of which are metals and the other three salts of metals. The German-American company will either do the repair work itself at its factory at Port Jefferson, Long Island, or will sell the solder, together with territorial rights and instructions for its use in garages and repair shops. A guarantee is made that regardless of the work to be performed that the aluminum will break before the soldered joint under any ordinary strain.

Geschwa Shock Absorber—A combination spring and pneumatic shock absorber is shown in Fig. 1. The spring is a spiral type and it is situated in the top of the casing, while at the bottom is the piston and compressed air chamber.

The instant a primary jolt or shock is transmitted to the body springs of the car, the flat spiral coil spring of the absorber compresses in proportion to the extent of the jolt or shock and draws up the hanger and piston of the absorber from the bottom of the cylinder. The cylinder then takes in air on the principle of an air pump. On the rebound, which is the downward stroke of the hanger and piston, the air gradually is expelled through the relief hole at the bottom of the cylinder. Each rear set has four relief holes which control and check the excessive recoil and absolutely eliminate the series of oscillations occurring directly after spring expansion, it is claimed.

The shock absorbers are made in three sizes costing $45, $50 and $60 per pair. They are sold by the Marolin Co., 30 Church street, New York City.

Bench Machinist—A combination lathe, drill press and milling machine is shown in its various roles in Fig. 2. It is made by the Hunt Engineering and Sales Agency, 320 Lissner Building, Los Angeles. This machine is adapted to all kinds of small machine work—boring, turning, threading, milling, drilling and tapping, at any angle; die-sinking and routing. The universal feature of this machine is obtained by means of swinging the spindle—in the vertical position it rotates the drill; in the horizontal position it drives the face plate or lathe chuck or the milling cutter.

The spindle is driven through a three-step cone pulley and telescopic shaft, with two universals. In the head are two bronze mitre gears, and the spindle passes through one gear with a feather key. The power-feed screw is actuated by a train of spur change gears on a radial arm which engages either with the end of the spindle when in a horizontal position or with a special worm gear attachment driven from the cone pulley which is furnished with the machine when desired.

As a drill, the work is clamped to the table and by the use of cross and longitudinal feeds is adjusted to any desired position. For drilling and tapping at any angle, the spindle may be adjusted and the work brought to the tool. The capacity of the drill is ½ inch.

As a lathe, the spindle is horizontal. The face plate is 5 inches in diameter, but much larger work than this may be swung. As the head is adjustable to any angle, any taper may be cut. If a tail stock is required a dead center may be attached to the extension arm, as when used as a milling machine.

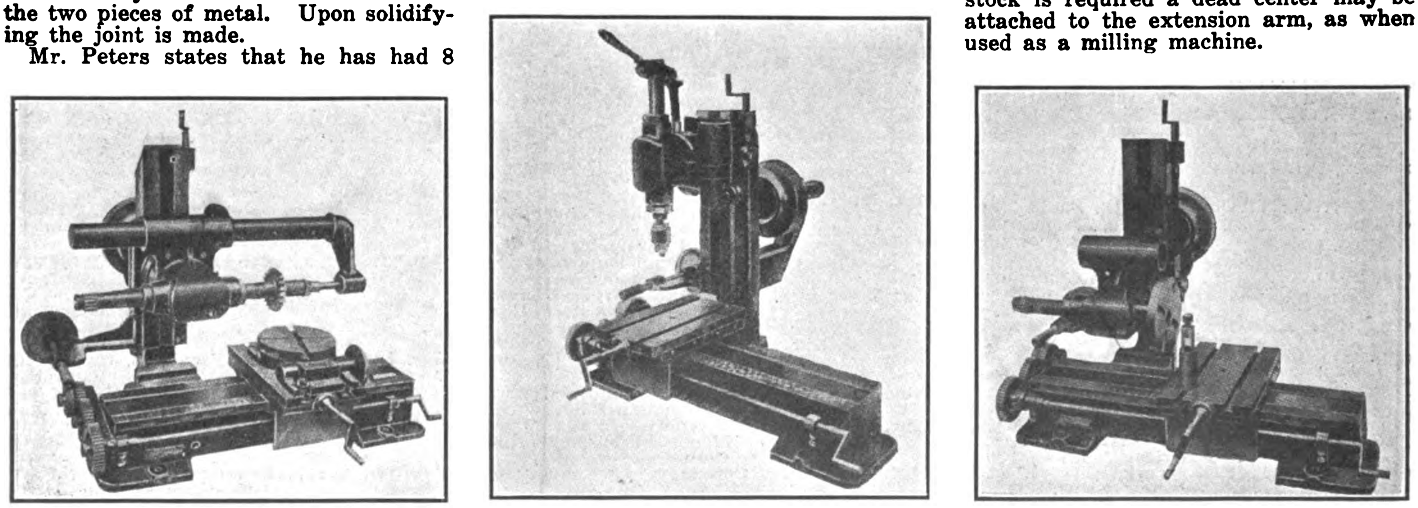


Fig. 2—Bench machinist which combines many machine tools in one. At the left is the device set up as a milling machine; in the center it is a drill press and at the right it takes the form of a lathe. The universal feature is obtained by means of swinging the spindle. It is made by the Hunt Engineering and Sales Agency, Los Angeles

VOL. XXXI — NEW YORK—THURSDAY, SEPTEMBER 24, 1914—CHICAGO — No. 13

The AUTOMOBILE

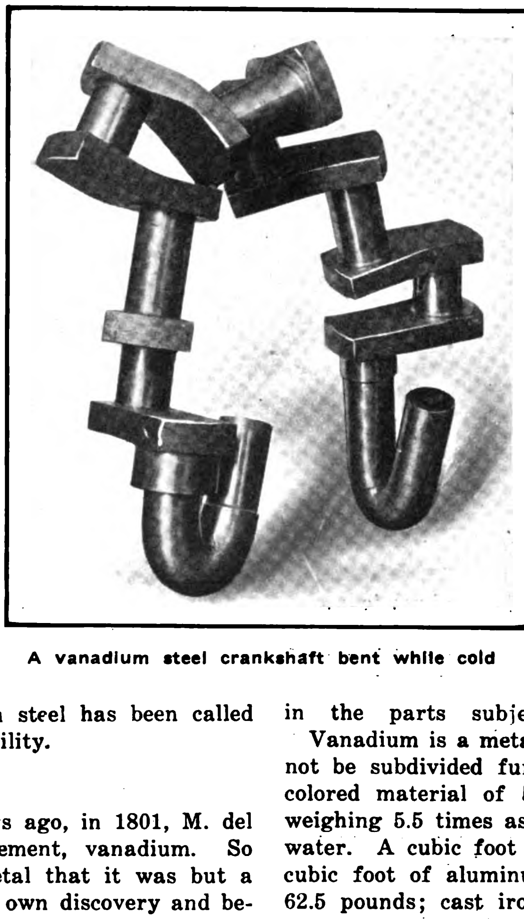
Vanadium—A Vitalizer of Steel

Mined in the Clouds, the Element Finds Its Way Into Automobile Axles, Crankshafts and Springs

By J. Edward Schipper

A VANADIUM steel axle can be tied in a knot without breaking. Any mechanical handbook will tell you that the effect of vanadium on steel is to increase its tensile strength and its elastic limit. Furthermore it will tell you that the use of vanadium in proportions of from .16 to .25 per cent. gives the metal the valuable property of resisting, to an unusual degree, repeated stresses.

No piece of machinery has so called upon the efforts of science in the production of metals as the automobile. In the search for the dual qualities of lightness and strength the value of every known alloy has been tried to the utmost, and nowhere has success been met with in a more gratifying manner than in the use of the alloy, vanadium. For springs, axles and gears subjected to hard service and for parts which must withstand the stresses of vibration and the tendency of crystallization, vanadium steel has been called upon to assume the post of responsibility.



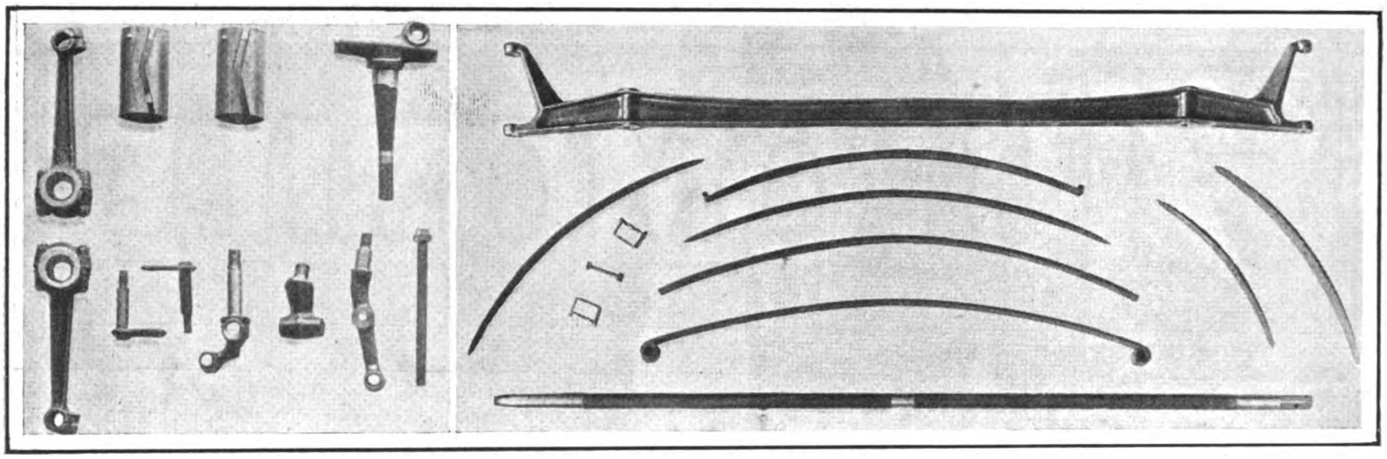
A vanadium steel crankshaft bent while cold

A Hundred Years Old

A little more than a hundred years ago, in 1801, M. del Rio first mentioned the metallic element, vanadium. So elusive was the newly discovered metal that it was but a short time later when he doubted his own discovery and believed that what he had thought to be vanadium was nothing but an impure chromium. In 1830 N. G. Sefström discovered traces of the vanadium content in the slags of the Taberg iron ores. Finally, Sir H. Roscoe managed to segregate the element from its impurities and to determine its correct atomic weight and to place it in its correct group in the series of elements. He incidentally showed that what previous investigators had thought to be vanadium, was merely a nitride or oxide of the element.

It was not until very recent times that the use of vanadium in combination with iron and steel began to be a commercial enterprise of success. In the accompanying chart on page 566 the popularity of vanadium steel in recent years is clearly shown. More than twenty-three times the quantity of vanadium is used for this purpose than in 1908. It cannot be gainsaid that the automobile industry uses a large percentage of the total output. The Ford car, for instance, uses vanadium steel throughout the motor and entire chassis. And this is only one of the representative concerns which have found this alloy to be of use in the parts subjected to the severest strain.

Vanadium is a metallic chemical element. That is, it cannot be subdivided further into components. It is a light-colored material of 5.5 specific gravity, in other words, weighing 5.5 times as much as an equal volume of distilled water. A cubic foot of vanadium weighs 343.2 pounds. A cubic foot of aluminum weighs but 159.7 pounds; water, 62.5 pounds; cast iron, 450 pounds; lead, 709 pounds and iridium, 1,400 pounds. From this it is shown that vanadium is a comparatively light metal and hence, would tend to lighten rather than to make heavier the steel with which it is combined. The percentage of vanadium added to the ladle averages about .15 per cent. and hence, the weight is not



A few of the vanadium steel parts used in the Ford car. Many more parts of this alloy steel are employed

Llamas transporting the ore from the Peruvian mines

greatly affected either way in making up the alloy steel.

While vanadium ores are found in the United States, the largest company operating in this country is using the ore from the mines of Peru. In America the principal deposits are found in Colorado and Utah and recently a deposit of vanadium ore has been discovered in California. The ores of America are known as vanadite, mottramite, descloizite and roscoelite. It is also found as a constituent of various clays, iron ores and pitchblendes. The ore which is found in Peru and which has a far larger percentage of vanadium than any that is found in the United States is known as patronite. The color of the ore is brighter than that of the ore of Colorado and Utah and carries as much as 50 per cent. vanadium oxide. The patronite, the main source of vanadium mineral, is greenish black and has a hardness of 2.5 and a specific gravity of 2.71. It contains from 19 to 24 per cent. of vanadium oxide, while the miners in the Colorado and Utah mines have a hard time in securing ore valuable enough to ship for refining purposes and yet anything which contains more than 3 per cent. of vanadium is worth shipping.

Some of the physical qualities of vanadium which are of note are that it is not volatilized, even when heated to redness in a current of hydrogen and it is insoluble in hydrochloric acid. It precipitates platinum, gold and silver from their salts when in solution.

Ores in the Mountains

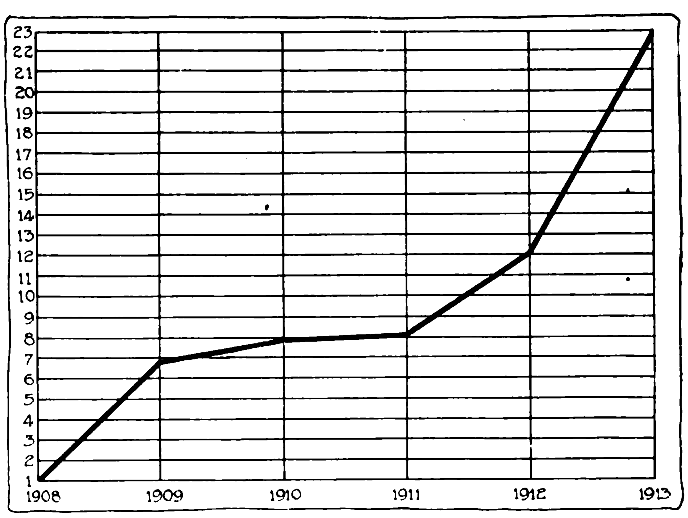
In the United States the ores are found in the higher plateaus of southwestern Colorado and southeastern Utah in the form of soft sandstone. The same ore from which vanadium is extracted is also the source of supply of a large percentage of the world's supply of the rare metal, radium. In fact, much of the ore has been mined for the purpose of extracting this rare substance and only that having the largest percentage of vanadium has been used for the purpose of securing the latter metal. The ore known as roscoelite comes from Placerville, Col., and on the north side of the San Miguel river, between Sawpit and Placerville.

The ore is generally found lying on one or both sides of a parting in the sandstone and in most places the vein is less than 1 inch thick, consisting of roscoelite and a little quantity of quartz which often carries as much as 8 per cent. vanadium. The ore has to be then very carefully selected so that it gives at least 3 per cent. of vanadium. By far the largest part of the vanadium-bearing rock in this country carries less than 1 per cent. vanadium. The ore is often found as vanadinite in fine crystals in combination with other minerals such as lead and copper.

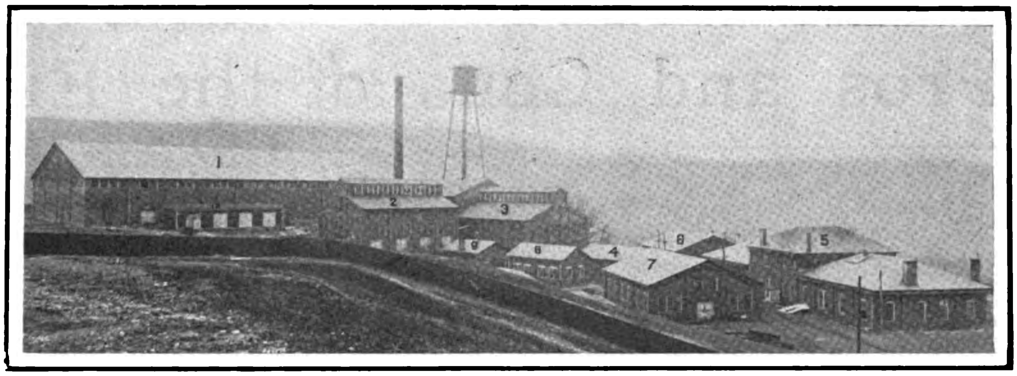
Rich Ores in Peru

The American Vanadium Co. in 1905 located the rich deposits of vanadium sulphite ore in the Peruvian Andes. These deposits are located at almost the very topmost point of the mountains, being 16,200 feet above sea-level, and establishing the site of what is probably the highest factory in the world. The buildings of the main plant in Pittsburgh are illustrated. There is an ore-storage building, the interior of which is also shown and the furnace and reduction plants are also completely outfitted at the top of the mountain. The ore is named patronite afer the name of the original discoverer of the Peruvian deposits, M. Antenor Riza Patron.

Four reverberatory roasting furnaces are used for reducing the ore at the mines, and in this form it is transported on the backs of llamas to the railway which is 28 miles distant. The nearest point to the mine is Fernandini



Curve showing increase of vanadium steel using 1908 as a unit station on the Central Railway of Peru. From this point it is taken to the coast. It is stated that each llama will carry a 110-pound sack of the ore and if as much as a pound or two of extra weight is added to the burden the animal will refuse to move. In building this plant on the top of the mountain, the American Vanadium Co., which owns the mines, states that every brick had to be carried to the factory site on the backs of the patient beasts of burden before the factory could be built.



American Vanadium Co.'s plant near Bridgeville, Pa. 1—Ore storage building. 2—Furnace building. 3—Reduction building. 4—Crusher building. 5—Office and alloy building. 6—Storehouse. 7—Machine shop. 8—Carpenter shop. 9—Blacksmith shop. 10—Brick storage building

Coming down to the use of vanadium in the manufacture of modern machinery, it is found that it is in parts subject to the racking and pounding of travel, that it finds its principal use. For this reason it is not surprising to find that it plays a prominent part in the manufacture of locomotives and automobiles. In the framework of locomotives which are subject to the stresses of the huge driving forces, vanadium steel has proven a success. On the Chicago, Rock Island & Pacific Railway, there are thirty locomotives, each weighing 281,500 pounds, all of which are equipped with vanadium steel frames. On other locomotives the axles, crank pins, and side rods are of this metal. On the Baltimore & Ohio road a 462,000-pound locomotive is using heat-treated vanadium steel tires. The elastic limit of heat-treated carbon steel generally averages from 50,000 to 55,000 pounds per square inch. That of chrome-vanadium steel forgings will average from 80,000 to 90,000 pounds per square inch.

By the adoption of heat-treated chrome-vanadium steel frames for their London type busses, the Fifth Avenue Coach Co., of New York City, states that it has overcome considerable trouble that it was experiencing with frame fractures. Previous to using the vanadium steel, this concern used a high-grade carbon steel, heat-treated, but with this, frame trouble was experienced from breaking and also from the fact that the side members would take a permanent set.

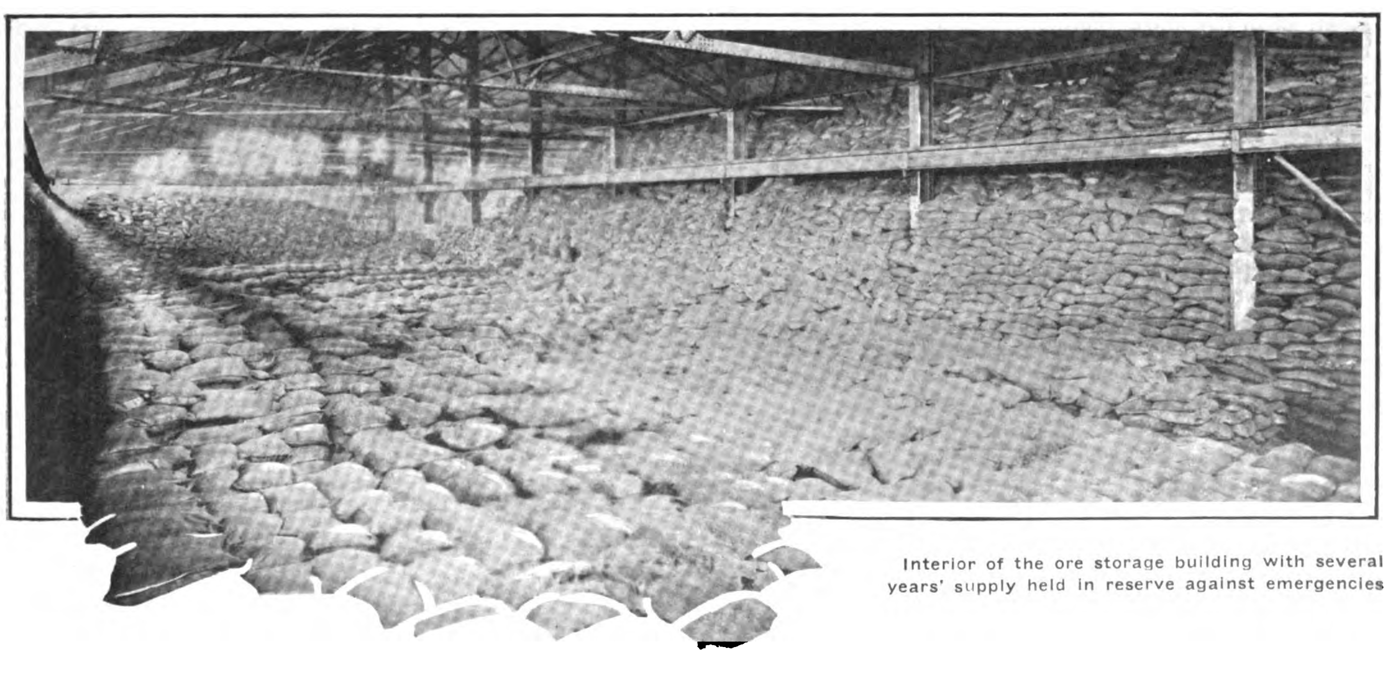
Used in Truck Frames

The vanadium steel frames have been in use in this service for over a year now and the company reports that they have so far shown no signs of bending or breaking. The main frame, complete with the engine cradle is made of chrome-vanadium steel. The construction consists of riveting two vanadium steel plates 15-64 inch in thickness, with an ash filler 1 3-16 inch thick between. The vanadium steel is heat-treated and has an elastic limit of 95,000 pounds per square inch, a tensile strength of 120,000 pounds per square inch and an elongation of 18 per cent. in 2 inches. In weight, the vanadium steel frames are slightly lighter than the carbon steel frames previously used. The total weight of the old frames with engine cradle and feltings, was 865 pounds, while the weight of the new frames is 850 pounds. Thus, by the use of vanadium steel a much stronger frame has been secured, not only without any increase but with a slight decrease in weight.

The American Vanadium Co., which has its general offices in Pittsburgh, has a reduction factory at Bridgeville, Pa., about 12 miles from Pittsburgh. After being transported on the backs of several thousand llamas on the trails of Peru, then being transported by freight car to the coast and by steamer to America, the reduction process is given in the Bridgeville factory. This plant is designed and equipped to produce 30,000 pounds of ferro-vanadium a day, and it is in this form that it is added to the steel.

In the form of ferro-vanadium, or vanadium mixed with iron, the alloy is sold to the steel manufacturer and by him it is put into the steel to meet the requirements of the manufacturer. For automobile manufacturers the Society of Automobile Engineers has specified chrome-vanadium steels

(*Continued on page* 575)



Interior of the ore storage building with several years' supply held in reserve against emergencies

Pros and Cons of the Eight Motor

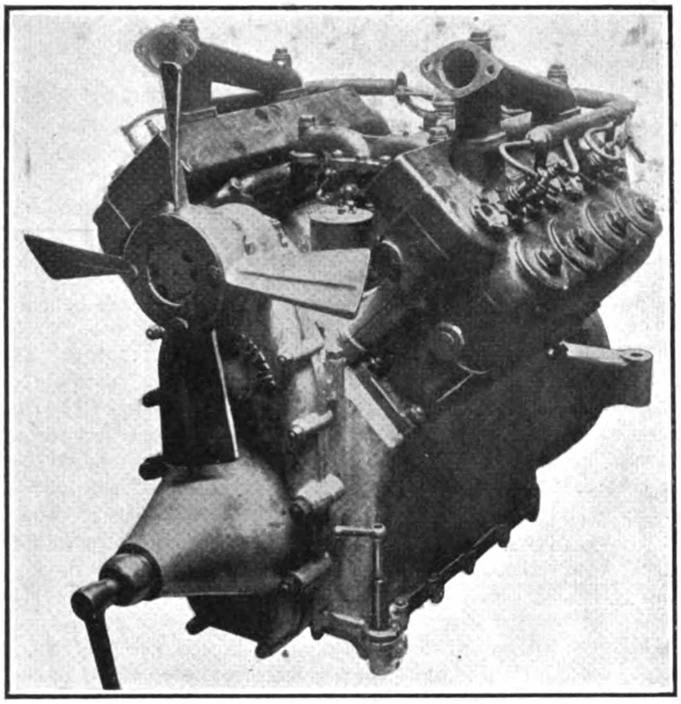


Fig. 1—Eight-cylinder De Dion motor of 30-horsepower. This is a 1911 model but is the same as the present design except in minor details

Lighter and More Economical Than Six-cylinder — Ultimate Type Except for the Small Four

By OWEN THOMAS

EDITOR'S NOTE—This article by Owen Thomas, of the engineering firm of Thomas & Thomas, Kenilworth, England and New York City, is based on an analysis of the De Dion eight-cylinder motor design extending over a period of more than 3 years. Mr. Thomas tries to show in this first article of a series that the four-cylinder motor design inevitably leads to the small-bore high-speed, high-efficiency four-cylinder car of Europe and that these principles can only be applied to larger motors by the use of eight cylinders. This is the most complete article that has been printed in an American journal on the subject of high-speed, high-efficiency motors by an engineer who has had actual experience with these motors in Europe.

FOUR-CYLINDER motors of maximum efficiency and horsepower for a given size and weight can not be built with a bore much exceeding 3 inches, if extreme durability is desired. Since the bore is thus limited, an increase in power calls for the addition of cylinders. The six-cylinder motor weighs more per horsepower and entails a longer and heavier car. The eight fulfills the demand for a motor of more power, because it weighs, if anything less than the four and is as efficient as a four of the same power.

Before attempting to prove the claims of the eight, as to flexibility, thermal efficiency, power output per pound, and durability, a successful motor, the De Dion, that has been tried out for several years will be described in detail, and proof of the excellent wearing qualities of this type of motor will be given. With the details of the eight-cylinder construction thus well in mind, this form of motor will be analyzed and reasons for believing that this is the ultimate type of motor for all, except low-powered cars, will be set down in detail.

It is interesting to note, at this point, that in speaking of the début of the eight-cylinder V-type motor in America few realize that there are running in New York today over 100 De Dion Bouton eight-cylinder cars varying in horsepower from 20 to 50. The first of these cars of 50 horsepower was sold in May, 1909, but it was not until 1911 that the 30-horsepower model made its appearance. The motor of this car had eight cylinders, of 70 millimeters, or approximately 2 3-4 inches bore by 130 millimeters, or approximately 5 1-8 inches stroke.

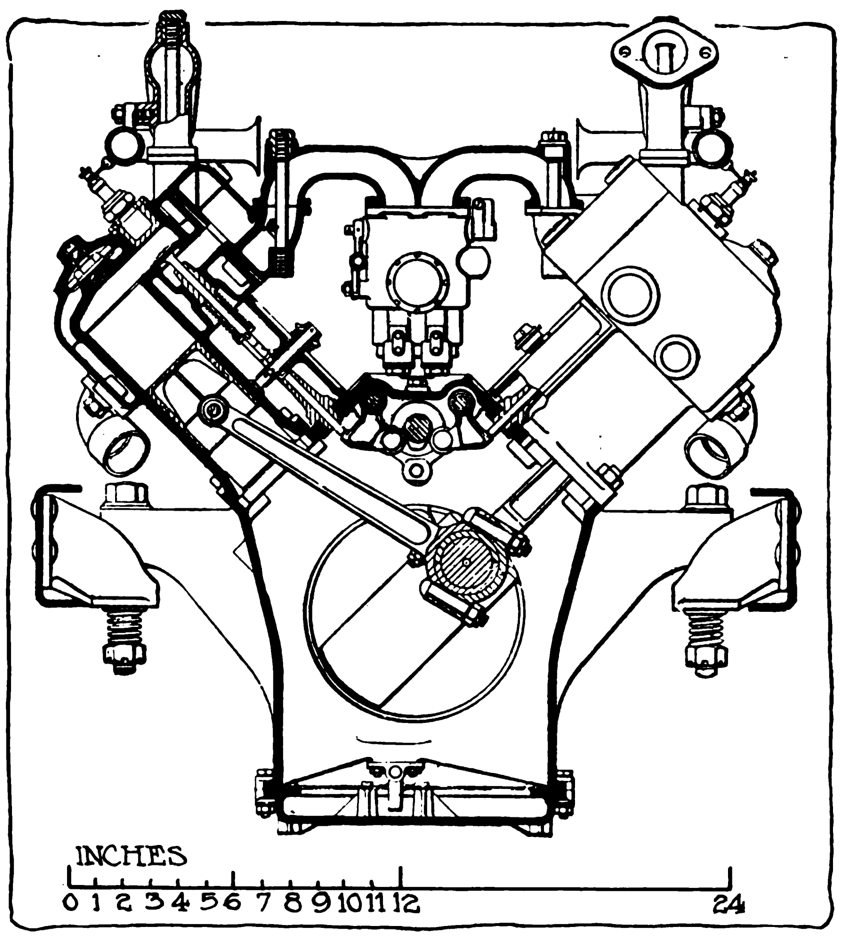


Fig. 2—Part section through motor showing mounting of double carbureter, arrangement of valve mechanism and the connecting-rod construction. Note the springs used in anchoring the motor to the frame

In 1913 this 30-horsepower model was superseded by another of 75 millimeters, or approximately 2 15-16 inches, bore, with the same stroke as before, and a new 24-horsepower model having a bore of 66 millimeters or 2 5-8 inches bore by 130 millimeters or 5 1-8 inches stroke, was added. All of the cars sold, except two, are in the hands of the original owners, these two having been replaced by larger cars of the same make. Last week an effort was made to procure for a Detroit firm one of these worked-in cars but there was not one available.

The beginning of this month saw the taking down and reassembling of the first of the 30-horsepower cars. At the time of this examination the accompanying photographs, Figs. 1 and 4 to 11, inclusive, were made.

First Motor Overhauled

While this motor is not the latest model, it is worthy of close study because it is the first eight-cylinder motor that has been dis-assembled in this country and therefore the only one whose condition is exactly known. At the time it was overhauled it had been driven 32,000 miles with a limousine body. It was found that all the surfaces were in good condition but that the cam and valve mechanism had showed slight wear. This is proof that this type of motor is most durable and improvements that have been made since in this design indicate that this record should be exceeded.

The general form of this motor is shown in Figs. 1, 2 and 3. It is an L-head design with the cylinders placed at 90 degrees and cast in blocks of four. The spark plugs are located over the intake valves and there are removable caps that give access to the cylinder interiors.

The cooling system is thermo-syphon; the water pipes above each bloc taper from 1 3-8 inches inside diameter to 1 3-4 inches inside diameter.

The fan in this model has four blades and runs 1 1-3 times engine speed, while in the later motors it runs with the magneto drive at engine speed and has eight blades.

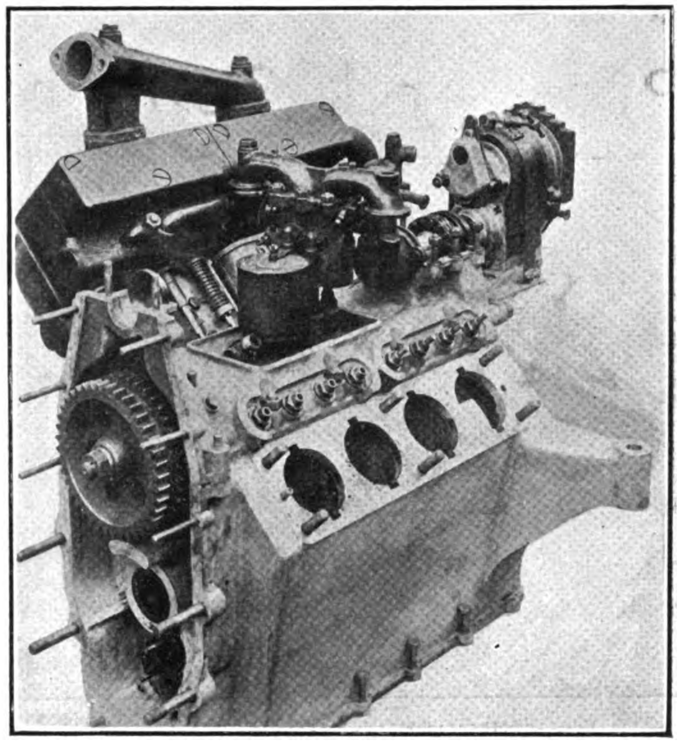


Fig. 4—Motor with left cylinder block and timing gear cover removed

The magneto is a Bosch model H.L. 8. The armature revolves at engine speed, the half-time shaft carries at one end an eight point, high-tension distributer and at the other, an eight point cam, operating a single contact breaker which is carried in a fixed case, giving no variation in the timing of the spark.

The carbureter is carried high between the Vs and connects to the cylinder blocks by means of very short intake pipes. Two separate Zenith carbureters with a single float chamber are employed, balanced throttles being used. This undoubtedly sacrifices the flexibility of the motor to the limitations of the fixed Venturi tube carbureter. So perfect is the balance of this type of motor and so small are the losses that it is more flexible than the carbureter and the difficulty is to find a standard carbureter that will satisfactorily meet the demands of the motor. The intake piping is 7-8 inch.

The depression for the carbureter, Fig. 3, is provided with a copper tube drain cast in, to carry off any leakage of gasoline to the opposite side to that shown.

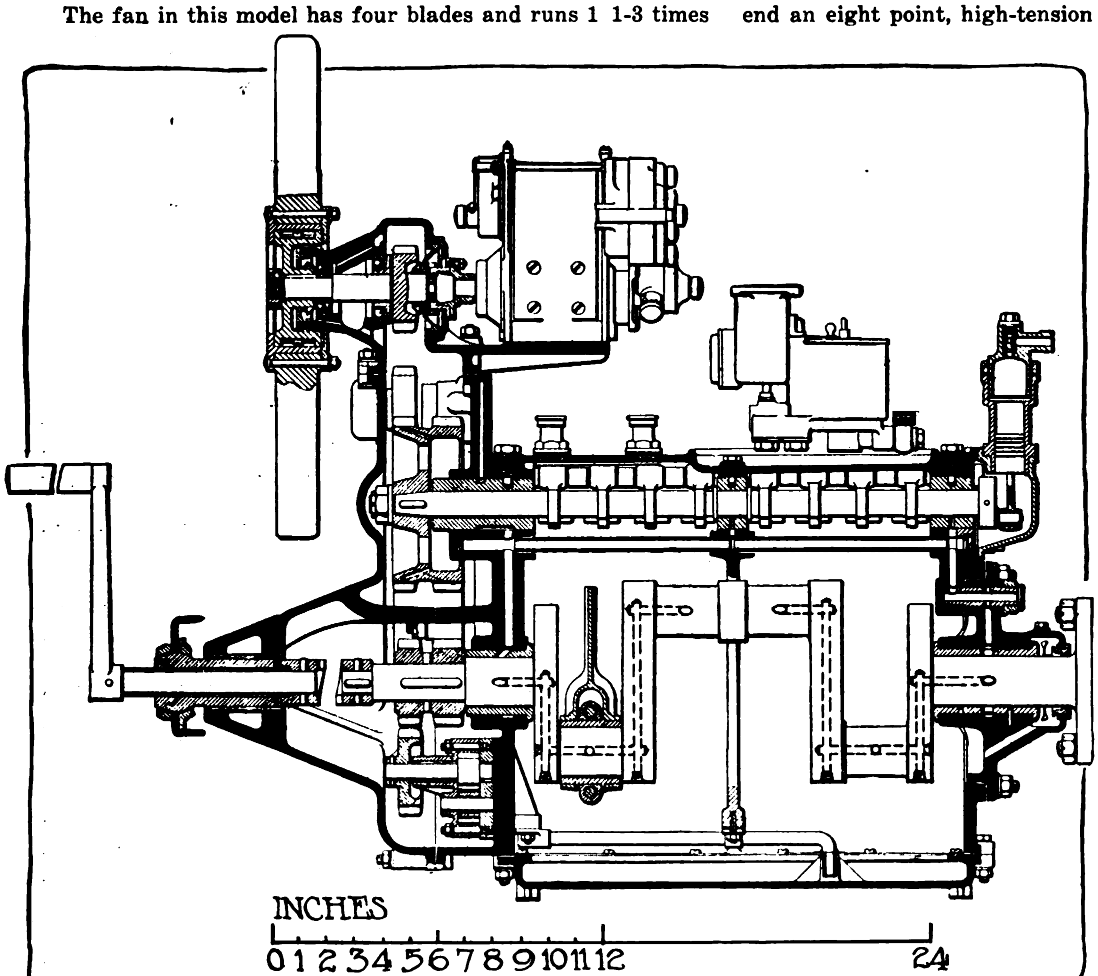


Fig. 3—Longitudinal section through motor with cylinders removed illustrating motor details

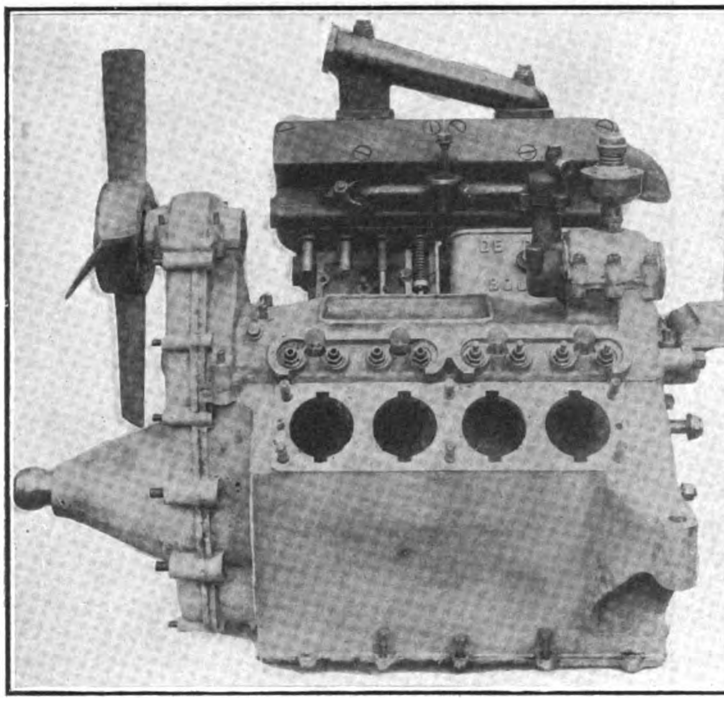


Fig. 5—Left—Another view of the motor with the left cylinder block removed

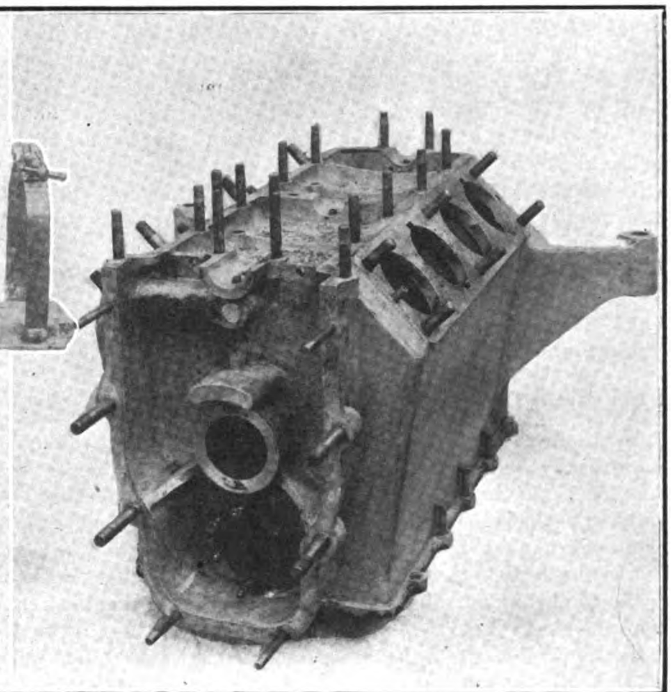


Fig. 6—Right—Crankcase casting illustrating the studs for holding the parts

The exhaust passages are smaller than usual, 1 1-8-inch pipes from each bloc join together into a common 1 3-8-inch diameter exhaust pipe and a single muffler. Larger pipes would undoubtedly increase the output at high speeds.

Force Feed Oiling

The lubrication system is by force-feed, Fig. 3. The crankshaft is drilled to the pins of cylinders 1 and 2 from the front main bearing, and to the pins of cylinders 3 and 4 from the rear main bearing, the drilled oil holes being 1-4-inch diameter. All the oil holes in the case, including the copper tube cast in, are 1-2-inch diameter inside. The rod bearings are held and pinned in the forked rod. An oil hole through the bronze bearing lubricates the outer surface of the bearing on which the center rod runs between the forked ends of the other rod. The oil thrown from the main and rod bearings lubricates the pistons and other parts. All the camshaft bearings are pressure lubricated. The oil pump running at engine speed has gears 1 3-16-inch pitch diameter, with 12 teeth and 13-16-inch gear face. One gear is integral with the steel shaft, the other is bronze, running on a hardened steel pin which is supported at both ends.

The pump supplies about 20 pounds pressure per square inch at 500 revolutions per minute and about 40 pounds at 1,200 revolutions per minute, the pressure being regulated automatically by the action of a spring valve, shown horizontally, Fig. 6, just under the camshaft bearing. The surplus oil escapes through the two small holes shown in the plunger valve casing and is used for the lubrication of the chain drive. A spring indicator warns of insufficient pressure or oil.

Fig. 10 shows the oil base and screen, the oil pump and suction pipe and the valve-cover parts. The large hole shown in the screen is for the insertion of the suction pipe, the small standpipe at the left is evidently a vent to prevent heavy oil trapping air under the screen.

Fig. 4 shows the cam case cover, one cylinder block and the carbureter, the magneto and air pump in place. Fig. 5 shows the same with the exception of the carbureter and magneto, but with the front chain case and fan cover added.

The bottom flange has 12 bolts and 2 studs, all 8 millimeters diameter.

The upper cam case is held down by fourteen 10 millimeter studs. Fig. 6 shows the oil pockets on top of case into which the cams dip. The hub of the front main bearing is 1-2-inch thick, carrying a 5-16 solid bronze bushing.

The rear flange, to carry the split rear bearing flange, is 13-16-inch thick with 5-8-inch face, Fig. 9. The center web has a hole 7 1-2 inches diameter and is full 3-8 inch thick. The center pad on this web is a support for the oil pump suction pipe. The other two webs die into the case at the side and are tapered down to 1-4-inch at the edges.

Order of Firing

The cam action layout is shown in Fig. 12. The order of firing is:

Right—	1		3		4		2	
Left—		4		2		1		3

Reading zigzag: 1,4; 3,2; 4,1; 2,3, first on the right side and then on the left side of the motor. It will be seen that each pair adds to 5 and that unlike the four and six-cylinder motor, they balance equally to the front and rear.

In other words, if any diagonal pair of explosions adding up to 5 is taken, it will be noted that the diagonal drawn between these two cylinders will pass through a point exactly in the center of the motor.

While there are eight possible firing orders there are only two that can be utilized if full advantage of the eight-cylinder principle is taken.

There are eight cams on the camshaft, four for the intake and four for the exhaust. Each pair of four are equally spaced, being set at 90 degrees.

Since the cylinders are set at 90 degrees it is natural to assume that the valve mechanism, Fig. 12, would be laid out so that the cam opening the intake valve on the right cylinder, number 1, for instance, would open 90 degrees after that on left cylinder, number 4. But this is not the case because the camshaft is rotating at half the crankshaft speed —a 90-degree movement of the crankshaft results in only 45 degrees on the camshaft. While the crankshaft is moving 90 degrees the camshaft goes only 45, with the result that in order to open the second valve 90 degrees of crank movement after the first, the spread between the cams must be 90 plus 45 or 135 degrees.

Fig. 12 shows this plainly, the 135 degrees representing the interval between the firing of cylinders left 1 and right 1. On the later type engines the rocker parts are all assembled on the rods and put into the case itself instead of being assembled in the separate cover as shown in the photographs of the 1911 70-millimeter motor.

The rods in various combinations on the crankshaft are illustrated in Fig. 8. The complete twin rods are shown on the rear pin. The complete bronze bearing, clamped and doweled in the forked rod, is shown on pin 3. Small flanges on the bearing, about 1-16 inch wide and high, locate the forked rod on the bearing by fitting between the two sides of the fork. They also serve to take the side bearing of the single center rod and prevent it from rubbing the inside of the forked rod. The outside of the bearing is 58 millimeters in diameter, where the forked rod clamps and the center rod bears. The fit of the center rod is 22 millimeters wide and each side of the forked rod is 16 millimeters wide.

Motor Part Dimensions

All of the shaft bearings are 44 millimeters diameter; the front main bearing and all of the rod bearings are 58 millimeters long; the rear main bearing is 110 millimeters long. The shaft is 54 millimeters diameter between the rod bearings of cylinders 2 and 3.

The crankshaft cheeks are all 64 millimeters wide, the end cheeks are 64 millimeters by 23 millimeters in section and the cross cheeks are 64 millimeters by 34 millimeters in section. The crankshaft is finished all over, the pins and bearings being ground. The side bearing surfaces of the rods present a face 3-16 inch wide. The drilling of the crankshaft is described under lubrication.

The pistons are 84 millimeters long by 70 millimeters diameter. They have three wide rings, all above the piston pin bearing. The pistons are forged and turned out very thin and light. The pins are 12 millimeters diameter; they are held by two taper pointed screws. The bushings are bronze, 34 millimeters long.

The rods are 265 millimeters long on centers for the 130-millimeter stroke. The forked rods have four 8-millimeter bolts and the center rods have two 10-millimeter bolts. The rod sections are 3-4-inch wide on the front and back side near the top and 1 1-8 inch wide near the bottom; the webs and flanges are all 3-16-inch metal tapered to 1-8 inch at edges, the flanges have a total width of 7-16 inch. The caps are 3-16 inch thick in the thinnest place. The split aluminum rear bearing flange has a fairly uniform thickness of 3-8 inch with a gasket face of 5-8 inch. The oil connection shows plainly on Fig. 8. There are four 10-millimeter bolts, holding the two half flanges together, two inside the case and two outside.

The rear supporting arms and the front ball support are plainly shown in Fig. 5. The front weight comes on the chain case cover which is bushed with cast iron to take the steel starting crankholder which is 1 5-8 inch outside diameter, and terminates in a ball joint 2 inches in diameter.

Crankcase Is Strong

The crankcase is very strong and simple, and is an excellent design for cheap manufacture in quantities. It is plainly shown in the illustrations. The general thickness is a full 3-8 inch, the flanges being the same thickness with a 5-8-inch wide gasket face. The cylinder faces are thickened to 1-2 inch over their whole surface and carry six 12 millimeter studs and two dowels. The front chain cover joint which transmits the weight to the front support has four 12-millimeter studs in reinforced bosses, Fig. 6, and eight 8-millimeter studs.

The cam drive details are shown in Figs. 3 and 4. The crankshaft carries two twenty-tooth pinions, one driving a forty-tooth wheel on the camshaft and the other a twenty-tooth wheel on the oil pump shaft which is just below the main front bearing and runs at engine speed. A forty-tooth twin wheel on the camshaft runs the fan, which carries a fifteen-tooth wheel. The magneto is driven through thirty- and fifteen-tooth chain wheels from the rear end of the camshaft.

All chains are 1-2 inch pitch, outside guide link type, Coventry made; the main camshaft chain is 3 by 4 combination, all the others are 2 by 3 combinations. The chains are all in the front case and all but that driving the oil pump are provided with adjusting idlers. A 3-8-inch pitch or 10-millimeter pitch would be much preferable to the 1-2-inch pitch used.

The cylinder center distances of the 70-millimeter cylinder shown are 3 3-4 inches from 1 to 2, 4 inches from 2 to 3, and 3 3-4 inches from 3 to 4. The valves are 1 5-16 inch over all diameter with a clear opening 1 1-8-inch diameter and a lift of 6 millimeters. The valve stems are 7 millimeters diameter. The valves of the 50-horsepower motor have corresponding diameters of 1 5-8 inches and 1 3-8 inches with 9 millimeter diameter stems. The valves of the 70-millimeter cylinder are 75 millimeters centers to the center line of the cylinders. The exhaust bend, Fig. 11, has an inside diameter of 28 millimeters.

Weight of 1914 Motors

The weights of the 1914 motors are, including carburetor and magneto: 20 horsepower, 462 pounds; 30 horsepower, 550 pounds, 50 horsepower, 693 pounds. It was noted that the distances from the center lines of cylinders 1 to 2 and 3 to 4 on the new 24-horsepower engine was 3 1-2 inches, while the distance between center lines of cylinders 2 and 3 was 3 1-4 inches, or 1-4 inch less. This shows that the engine could have larger bore cylinders by increasing only the center distance to 3 1-2 inches. The cylinder castings are much heavier than the standard European design.

The action of this engine and its condition after hard use are a good argument for the adoption of the general two-bearing, eight-cylinder design it follows. Its condition after 3 years of hard service was easily as good as that of a standard four-cylinder American motor after a similar service for one season. In fact, few four-cylinder motors are found in as good repair as this eight-cylinder.

The origin of the eight-cylinder dates back with the De Dion Co. to 1906 when six experimental six-cylinder cars

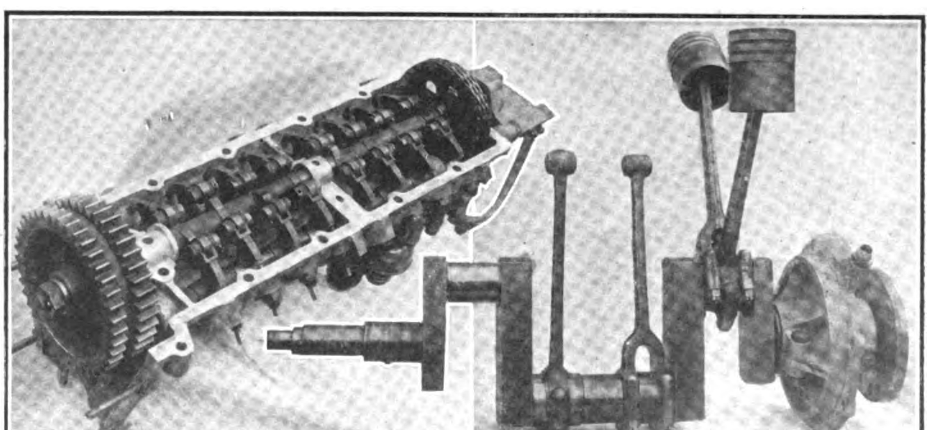


Fig. 7—Left—Camshaft assembly showing cam-roller construction
Fig. 8—Right—Crankshaft with connecting rods partly assembled

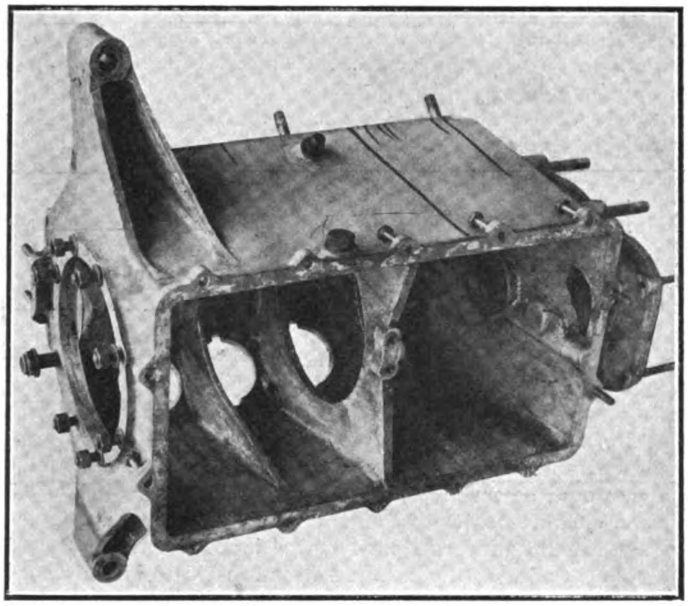


Fig. 9—The crankcase from the bottom showing the method of webbing

and six experimental eight-cylinder cars all of 50 horsepower were built. All of the cars were put on the road and tested for 10,000 miles after which time careful tests and comparisons were made by members from practically all of the departments of the works at Puteaux outside of Paris. The decision was so unanimously in favor of the eight-cylinder cars that the sixes were consigned to storage in a basement until they were finally destroyed by the late floods of the river Seine. This experience is probably unique as the advent of the six-cylinder car in most factories passed without a thought of the possibilities of the eight.

In Europe it cannot be said that the six-cylinder has in any way superseded the four as there are many plants that have never built a six-cylinder and many that have abandoned it with the improvement of four-cylinder design and with the tendency to design lighter and smaller cars for general work. On the other hand, many extremely small sixes are in service, although the performance of the later high-efficiency, counter-balanced four-cylinder models renders them entirely unnecessary. It may be truly said that these small four-cylinder engines and the cars designed with and for them represent the real progress in European automobile engineering for the past 3 years.

Test of Small Four

I started in a serious tryout of this type practically 3 years ago, partly because I did not believe in it and partly because I had to solve some of the manufacturing difficulties of a small car for very little money without an American-sized output to pay for the tooling up. The first year's work resulted in three small cars having 80-millimeter four-cylinder engines. These cars gave the impression of being under-engined except in England, where the roads are particularly good and the hills few and easy. The first remedy was to reduce the axle ratios to slightly lower than 4 to 1 in a car weighing 2,250 pounds, with 34-inch wheels.

Most of the engines of this age and type were designed with a three-bearing crankshaft. When they were new they gave excellent service, but once they began to loosen the bearings, it was difficult to put them back in their original condition. The trouble was naturally sought for in the fact that the engines were proportionately working harder for their size than those in more liberally-designed cars. To make a long story short, it was found to be in the fact that all of the center crankshaft bearings wore out of round on the side furthest from that which would naturally take the thrust of the piston, due to the centrifugal load of the cheeks and pins adjacent to the center bearing. This was plainly shown by the wearing out of the grinder and tool marks, as well as by measurement. The eccentricity of the shaft spoiled the alignment of the bearings whenever they were rescraped and caused the most mysterious roughness. Various expedients, as the stiffening up of the shaft and the crank cheeks and the strengthening of the crankcase and even the use of cast-iron crankcases proved of no avail, and it was not until the advent of the counter-balanced crankshaft that the first of the small type motors was successful. During these troubles much was accomplished by the use of steel and alloy pistons, by the lightening up of working parts generally, by the lengthening of the wearing surfaces of the pistons above the wrist pins and by removing the oil grooves from bearings and generally improving lubricating systems. Some of the engines were of the Knight type; the development of these proved to be of especial interest.

It was not until the year after, that it began to be realized that for the same weight as one of these counter-balance three-bearing crankshaft engines a still more compact two-bearing type could be built as the two-bearing crankshaft is inherently counter-balanced, except perhaps for a very slight projection of the two end cheeks. These two-bearing motors were of a much more refined type than the previous two-bearing motors of France, and on account of their smooth, light running at speeds the sizes were generally reduced to 70 millimeters, and in some cases even smaller bores. These later motors maintained their torque both at very low and very high speeds and gave none of the evidences of being over-worked, which the earlier motors did. It is quite common to see such cars tried out in France at speeds well above a mile-a-minute. I have myself driven them in ordinary touring, covering 35 miles in each hour for long trips.

Small Four Permanent

There is really no question of the success and permanency of the small four-cylinder car in Europe. The problem appears when the 3-inch bore motor is not large enough to fill the bill, as this may be considered as about the limit of assured success in this type, although from time to time larger motors are built.

For my part, I consider the small six-cylinder motor in exactly the same class as the slightly larger four; the same necessity of counter-balance appears if the engine has to be used at high enough speeds to make centrifugal loads a factor. The four-bearing six presents much worse problems than the three in this respect. In the larger motors I have never found the counter-balanced four less flexible, quiet or smooth running than a six-cylinder motor of the same horsepower, either Knight or poppet-valve. The difficulty of balancing the crankshaft is very great in the ordinary six-cylin-

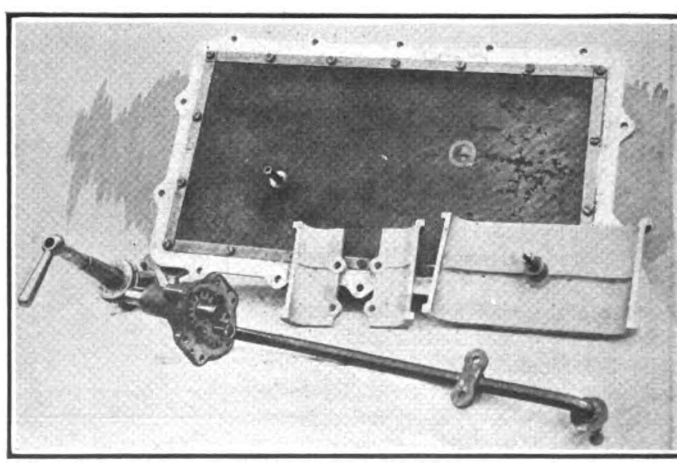


Fig. 10—Crankcase cover and gear oil pump

der and even greater with a counterbalanced shaft due to the springing of the shaft from its own weight during the operation.

What are the problems in replacing a four with a six. A well-known maker with a five-passenger, four-cylinder car wishes to get into the six-cylinder field to supply the popular demand. He is thoroughly satisfied with everything about his car which has been worked down to an economical design in its third season. His six-cylinder motor proved to be 90 pounds heavier than the old four although its flywheel was much lighter. This does not seem very serious. However, he finds it necessary to increase his wheelbase 5 inches to accommodate the longer motor, and here his troubles begin. The longer frame necessitates a deeper section and weights generally go up a little until the tires need to be made a little larger. The motor, moreover, does not show quite the same power or economy as the four-cylinder, although it has to handle the increased weight. The result is that he decides to make it 1-8-inch larger bore and further increase the weight. The motor shows distinct signs of weakness in the crankcase and it is strengthened and made a little heavier. It is thus impossible to make a direct comparison between the old four-cylinder and the newer six-cylinder. A much more satisfactory job could have been made by substituting a more modern four-cylinder engine. Let us suppose that instead of the new six he is willing to investigate the eight-cylinder motor.

Eight Shows Up Well

For his moderate-sized car the eight-cylinder motor of the same capacity can be built with a two-bearing shaft and in less length than the old four-cylinder. It will permit of a slight lengthening of the body space or a corresponding reduction in the wheelbase and weight of the car and even a slight reduction of its own capacity for the decreased weight. These factors together will more than compensate for the slight reduction in thermal efficiency chargeable to the larger cooling area on the greater number of smaller-bore cylinders. This, in turn, will give him the same, if not a greater mileage, per gallon than the original four-cylinder. The tendencies in the six-cylinder design were all against efficiency, as the lengthening of the motor increased the weight and started everything piling up in the wrong direction.

As the cylinders have gradually multiplied, three questions have arisen, first, to what extent does the multiplicity of cylinders and other parts help the flexibility of the motor; second, when does the multiplying of cylinders affect the simplicity and economy of design in general; third, what is the effect on vibration?

The first question of flexibility demands some study. Let us consider a single-cylinder of an engine with cranks 180 degrees apart, as a unit, and take a manograph card of a typical poppet valve motor running at 500 revolutions per minute with the throttle wide open as an indication of the distribution of pressure throughout the working stroke of 180 degrees of the crankshaft when the engine is normally pulling at reasonable speeds. Neglecting side thrust, angularity, friction, and other relative modifying influences and tabulating the pressure times the lever arm for each 15 degrees movement of the crankshaft we will study how much of the stroke of each cylinder is effective.

Degrees of Crankshaft.	Cylinder Indicated Pressure. Pounds Per Square Inch.	Compression Indicated Pressure. Pounds Per Square Inch.	Effective Pressure on Crank.	Relative Lever Arm of Crankshaft.	Relative Turning Moment.
0°	165	0	165	0.	0
15°	210	1	209	.258	54
30°	190	2	188	.5	94
45°	160	3	157	.707	111
60°	140	5	135	.866	117
75°	120	7	113	.965	109
90°	102	9	93	1.	93
105°	88	12	76	.965	73
120°	75	15	60	.866	52
135°	61	18	43	.707	30
150°	50	22	28	.5	14
165°	40	35	5	.258	1
180°	20	60	—40	0.	0

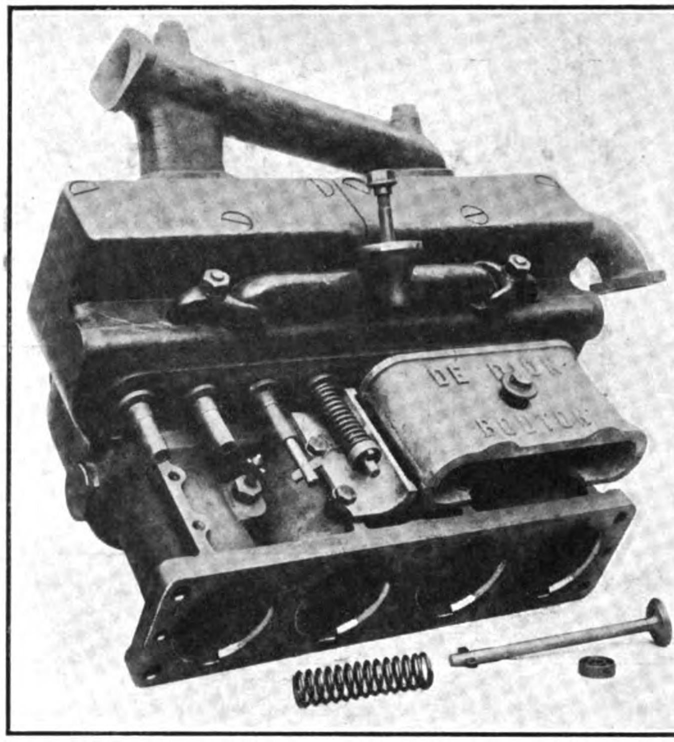


Fig. 11—Right cylinder block with the valves partially removed. The water piping and intake and exhaust manifold are clearly shown

At the upper center or firing point, which may be called, as in the steam engine, the dead center, the pressure contributes nothing whatever to the turning moment of the crankshaft but simply puts the parts under stress and tends to drive the crankshaft out of the bottom of the engine.

After the shaft has turned through the first 15 degrees, the pressures which have decreased but slightly, still contribute little to the turning moment of the crankshaft, on account of the short lever arm presented by the crank at this point.

From 30 degrees to 120 degrees, the turning moment reaches a maximum at 60 degrees and again descends to about the same low point as at 15 degrees. Thus, practically all of the useful work of this cylinder is accomplished between the 30-degree and the 120-degree points of the crankshaft or within 90 degrees. If two or more such cylinders are made to work in succession at 90-degree intervals a fairly uniform turning moment will result although even then the variation in torque amounts to one-half of the maximum.

The smallest number of cylinders that will accomplish this is eight, arranged as a V-type engine. Any smaller number will show a greater variation and depend that much more on the flywheel.

Then the multiplicity of cylinders, up to eight, does help the flexibility of the motor.

Studying the second question: When does the multiplying of cylinders and parts affect the simplicity and economy in general, we find that the eight-cylinder V-type engine with two-bearing shaft has a much simpler crankcase, crankshaft, camshaft and intake manifold than the six-cylinder.

The cylinders are two duplicate bloc castings with an increased number of valves and other parts. The cam rockers are also more complicated and have to be set at 135 degrees as stated in the description of the De Dion motor. The connecting-rods are the real problem, although they present no great difficulty.

The engine is as short as a 4 of the same displacement, providing the crankpin bearing is the same length for a pair of opposite connecting-rods in the eight-cylinder as for a single rod in the four-cylinder.

Two separate designs accomplish this logically and prac-

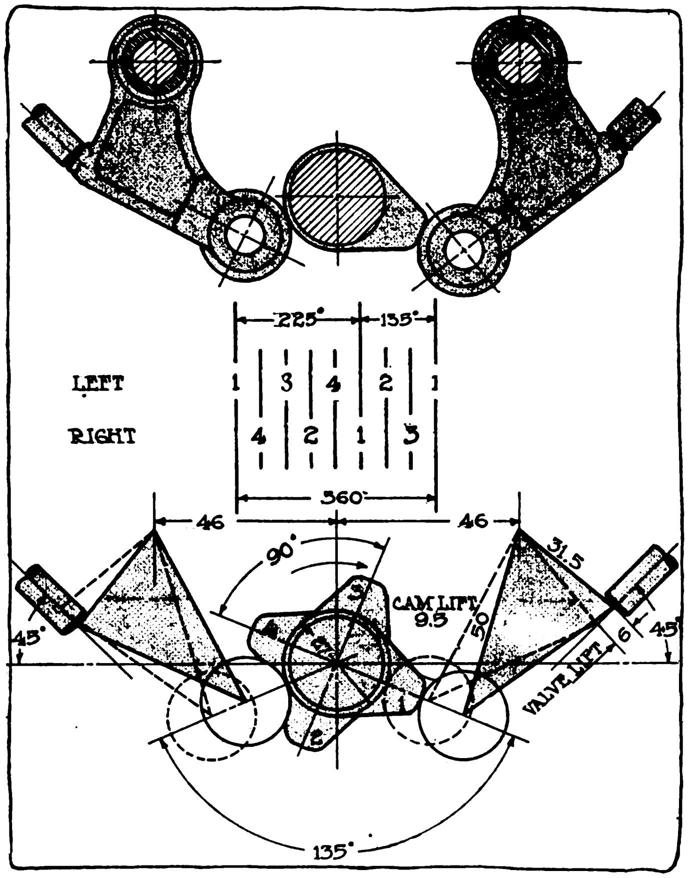


Fig. 12—Layout of valve mechanism showing that the spread between cams of the cylinders firing in sequence must be 135 degrees

tically. In one type, one of the opposing rods is hinged to the big end of the other outside the crank-pin bushing. In the other, as illustrated in the De Dion engine, a single bronze bushing on the crank-pin is used in common for the two opposite rods, one of which is forked to straddle the other. The bronze bushing is held solid in the end of the forked rod and prevented from turning by a dowel in each of its caps, while it is free to revolve or rather rock in the big end of the single-capped rod.

The De Dion crankshaft, Fig. 8, shows No. 1 crank-pin without a rod or bushing, No. 2 with a bushing and a center rod free to rock on it, No. 3 with a bushing dowelled securely in the caps of a forked rod, and No. 4 with both rods.

The placing of rods separately on two crank-pins adjacent longitudinally gives the motor such a length as to destroy its economy of design.

In some instances of four-, six- and eight-cylinder small-bore engines, the bearings at either the top or big end of the rods have been offset longitudinally from the center line of the rod, but these and similar expedients, which result in an unequal distribution of stresses and bearing pressures, do not actually produce economical design; in every such case, a relatively smaller engine designed with all stresses and bearing pressures equalized, will do the same work with equal depreciation and maintenance. I have been connected with many such designs and have kept records of them, covering long periods of operation and test, sufficient to entirely eliminate them from future consideration.

Considering the noise only, the muffling of an eight-cylinder is simple and can be accomplished with a smaller muffler than either a four- or six. In fact, the open exhaust from eight cylinders is not disagreeable. The exhaust valve of any particular cylinder of an eight opens before the exhaust valve of the preceding cylinder has closed, and tends to blow back the exhaust gases of the preceding cylinder to an extent that it is necessary to use either a very liberal muffler or a separate expansion chamber for each block of four cylinders to prevent the next charge from becoming foul with too large a proportion of spent gases. This phenomena appears in many six-cylinder engines where the opening of the exhaust valve exceeds 240 degrees of the crankshaft and has often been charged against the carbureter instead of against the exhaust system. In poppet-valve engines, the area of the valve opening varies directly as the diameter of the valve, for the given lift, while for a given stroke, the cubical contents of the cylinder varies as the square of the diameter; the difficulties of designing the valves of sufficient area of opening, decrease directly as the cylinder bore.

Studying the Third Question of Vibration

Whatever other inertia disturbances, admitted or otherwise, exist in an engine having vertical cylinders, their effect is communicated to the supporting members in the same vertical direction as the stresses due directly to torque reaction. At certain recurring speeds, the periods of vibration due to these disturbing influences, harmonize with those due directly to torque reaction. These speeds are usually designated as critical speeds.

These critical, vibrating speeds can be materially affected by reducing the weight and inertia of reciprocating parts on the one hand and by increasing the number of cylinders and reducing the unit torque reaction on the other, providing the connecting-rods and crankshaft are rigid enough to transmit the intermittent stresses due to inertia and torque, without perceptible spring.

In the V-type motor, having cylinders spaced 90 degrees apart, the inertia disturbances of each side of the engine are still in the line of the cylinder axis. They can be plotted on the sides of a right angle triangle, whose horizontal base or hypothenuse will represent the magnitude and direction of the disturbing stresses due to inertia. These stresses are at right angles to the stresses due directly to torque reaction and can never, at any condition of load or speed, be in phase with them or their harmonics.

This fact applies equally well to any combination of cylinders arranged in a 90-degree V-type engine and explains the success and lack of vibration in the two-cylinder Riley car of England as well as many of the cyclecar engines of this type, in spite of their unequal angular distribution of power.

Advantages of Eight Summarized

The eight-cylinder V-type engine permits equal angular distribution of the power impulses; it has good thermal efficiency, because for a given work, its superior turning moment and more equalized torque permit a smaller engine to be used for the same work; like the small-bore, four-cylinder it permits a short, rigid, self-counterbalanced crankshaft; it has light reciprocating parts with low inertia stresses; it has the immunity from critical speeds enjoyed by all 90-degree V-type engines, and lastly it does not take more space or increase the weight or wheelbase of any car over a four-cylinder engine of the same capacity.

It is surprising how little difference there is either in gear ratio, general design or detail between the modern town car chassis and that eminetly suited for high-speed work. We are gradually beginning to realize that any disturbing forces which mitigate against high engine speeds and spend themselves in vibration are the greatest causes of self destruction, not only in the engine but in every other part of the car.

During the last 6 months the demand from Detroit factories for European experimental high-efficiency cars has been an indicating that considerable study is being applied to this important subject, while the orders appearing on the horizon from the same place since the announcement of the Cadillac eight-cylinder cars threatens to deplete the available stock of eight-cylinder cars which had already been decreased by the European war.

Vanadium—A Vitalizer of Steel

(*Continued from page* 567)

and also nickel-chrome-vanadium steels in which the vanadium content is not less than .12 per cent. An idea of the automobile parts in which this material finds its best use, may be gathered from the accompanying illustration which shows a few representative parts. In one well-known light car it is used for connecting-rods, crankshafts, transmission gears, differential gears, axle shafts, springs, steering knuckles and front axles, besides a number of other small parts subject to wear and shock.

It is not only for vehicles, however, that this alloy has been usefully employed. One of the tools which has the severest duty to perform is the circular saw used for cutting steel rails such as are used for railroads. It is said that these saws cost one-third as much as high speed steel ones and can perform the work as rapidly as the others. Furthermore, the cracking trouble that was experienced with the high-speed steel has ceased with the use of vanadium steel.

Uses a Typical Analysis

It is not alone in automobile engines that vanadium has been successfully employed for internal combustion power plant purposes. The Wisconsin Marine engine has also used vanadium steel crankshafts, connecting-rods, pump shafts and camshafts. The motor particularly mentioned is a 5.25 by 7 six-cylinder marine type and the steel used, a typical chrome-vanadium composition containing not less than .15 per cent. vanadium, .90 per cent. chromium, .65 per cent. manganese and .35 per cent. carbon. The phosphorus and sulphur impurities were kept under .04 per cent. These vanadium steel parts, after their heat treatment, give a tensile strength of 125,000 pounds per square inch. In the automobile racing motors used by the same concern, the same analysis and strength of steel is employed.

Vanadium has been used extensively in brass containing from 50 to 60 per cent. of copper. Its effect is to materially increase the tensile strength of the resulting metal, although in the case of manganese bronze this was at the expense of reduced ductility. The amount of vanadium present is but a trace and micro-photographs show that when the amount of vanadium present is over .5 per cent. there is a slag-like substance which would indicate that above this percentage the vanadium exists in oxidized form.

In a word, we find vanadium used wherever a part is subjected to stresses which would tend to fatigue the metal. The substance which 100 years ago was so elusive that the foremost chemists of the day had difficulty in separating it from its ores, today is one of the factors of making travel safe and economical by increasing the strength of the lightweight parts used in the vital points of vehicle manufacture.

How To Weld Malleable Castings

WHILE the process of autogeneous welding is being used so successfully in all the metal trades, many unsuccessful attempts have been made to weld malleable cast iron, and to those who have experienced disappointment, an explanation of why their efforts failed, with an outline of a method by which these castings can be mended, should be of benefit.

Malleable castings are first made in the condition of hard, brittle, white cast iron and subsequently made malleable by heat treatment. The heating process which converts white cast iron to malleable iron is called annealing, and effects a chemical change in the structure by decarbonization. This decarbonization is nearly complete at the surface and penetrates in a lessening degree toward the center, giving the outside portion the texture of mild steel while the inner portion may retain, in a more or less degree, the qualities of cast iron. When this metal is remelted the carbon is dispersed, and the entire mass reverts to cast iron.

Methods Must Vary with Material

The operator who is used to welding mild steel and cast iron will recall that they are handled differently. That the method used in welding steel to steel would be useless in welding cast iron, or the methods employed with cast iron would be equally unsuccessful with steel. That is practically what he is trying to do when he undertakes to weld a malleable casting. The material is not homogeneous. The bottom portion of the welding being in cast iron, and the top portion in steel, with no definite dividing line between, it is useless to follow the method prescribed for either.

It follows that to successfully mend a malleable casting the process employed must not necessitate the sides of the fracture, that the welding material should fuse at a lower temperature than the casting, and that its adherence, bonding qualities, physical strength and ductility should closely resemble the original casting. After much study and experiment the Vulcan Process Company and their allied interests in Minneapolis are having considerable success in mending broken malleable castings, and a description of their methods will undoubtedly be useful to others who are employed in the metal trades.

In preparing the work for mending, the fracture is chipped away in the form of a V groove with the pointed bottom just coming to the surface on the opposite side, or, if the casting is thick and the opposite side accessible, two grooves are cut with their pointed bottoms meeting in the center. The part surrounding the fracture is then heated with an oxy-acetylene torch to a bright red, and sprinkled with Vulcan bronze flux followed by a few drops of Tobin bronze melted from the welding rod. If the bronze remains in a little globule the work is not hot enough, but if it spreads and adheres to the surface, the temperature is right, and the groove should be quickly filled. It is not advisable to keep the work hot any longer than is necessary, but to make the mend as quickly and at as low a temperature as possible. The behavior of the bronze affords a guide in regulating the temperature. This process cannot be called autogeneous welding, but a malleable casting mended in this way is practically as good as one piece. It has about the same tensile strength and ductility as the original and the process has the advantage of being very quickly performed.—From *The Iron Age*, July 16, 1914.

Rubber Tires Proposed for Street Cars

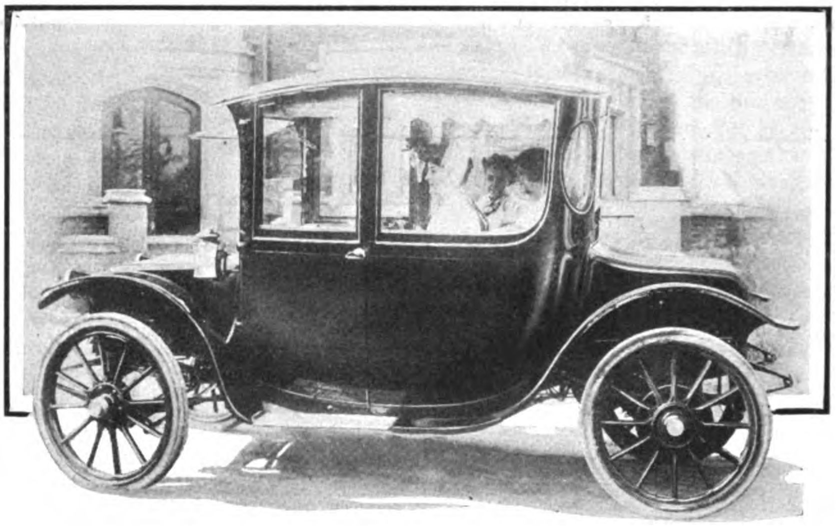
LONDON, ENGLAND, Sept. 20—At the recent session of the Tramways Assn. of Great Britain in Newcastle one of the speakers suggested the introduction of rubber or some other silent material for tires for street cars.

The speaker contended that a properly designed tire for street cars would exceed the life of tires on motor buses and motor wagons, on which a life of 20,000 miles and over was common; that the wear and tear on the rails would be reduced; that the cost of maintenance would be largely eliminated; and that the corrugation problem would be solved.

The question of doing away with noise and vibration, it was contended, was a strong argument in favor of rubber tires. A higher rate of speed could also be attained, which the speaker placed at 20 miles an hour.

More Graceful Lines on New Four-Chair Waverley Electric Brougham

Rounded Corners on Body—Larger Windows With Sashless Frames—Aluminum Body Panels—Chassis Unchanged



New Waverley four-chair Brougham, model 109. Note the rounded corners at the rear and the new shape of battery boxes at front and rear. The windows are larger and sashless

UNDER the model number of 109 the Waverley Co., Indianapolis, has brought out a refined design of electric brougham which incorporates many details new to practice in this field. The new car is fitted with a four-chair body and supersedes the previous body of that type manufactured by this company.

The entire exterior appearance of the body is new. The rear corners are now rounded instead of carried to an edge as in previous models. The battery boxes, still mounted under the front and rear decks, are lower and smaller and have a more delicate curvature. The windows are larger and are now sashless types; oval corner windows are fitted and decorative window shades are factors in the improved and more luxurious appearance of the car.

Four-Chair Seating

The four-chair seating arrangement is continued. By this scheme each passenger has the maximum of knee, shoulder and elbow room and at the same time a wider range of vision. In the construction of the body a new departure for Waverley has been introduced and that is in the use of aluminum. The roof and panels are now of this light metal.

Another feature is the curved sill which gives a low body suspension and yet does not alter the road clearance. The floor is 7 inches nearer the ground than that of the previous design and yet the same road clearance is given.

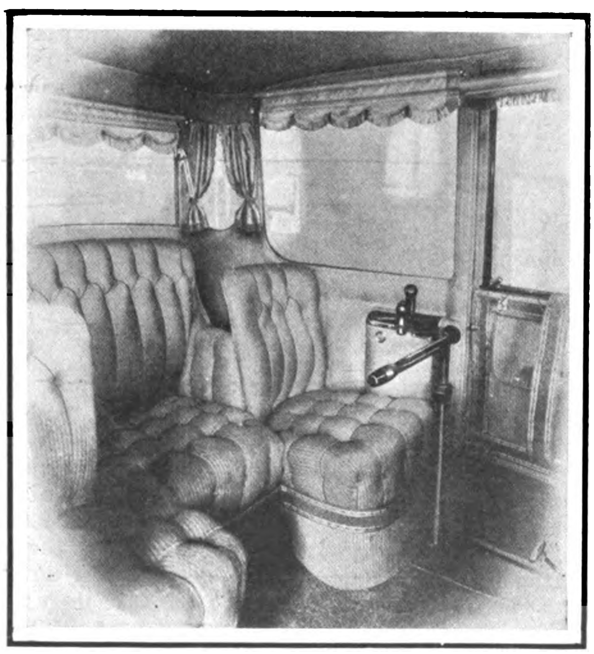
Chassis Details Continued

The same motor is retained, and the same drive and spring suspension. The latter is a feature of Waverley design being a five-quarter elliptic all-around. In the entire spring suspension there are 33 feet of alloy steel distributed among eighty-four spring leaves. Throughout the mechanical parts of the car, standard Waverley practice has not been departed from.

Forty-Two Cell Lead Battery

On the new model the source of power is a forty-two cell eleven or thirteen plate lead battery. Any standard make will be supplied and if the purchaser desires to add slightly to the cost the Edison or Ironclad Exide type will be supplied. The battery supplied is sufficient under ordinary circumstances to carry the car 75 miles.

The Waverley company emphasizes the fact that the ampere-hour capacity is not the true method of measuring the capacity of a battery for purposes of judging the distance that it will propel a car. The true criterion is the watt-hour capacity. This is reached, in the case of a lead battery which measures about 2 volts to the cell, by multiplying the number of cells by two and multiplying this result by the ampere-hours capacity of the battery.



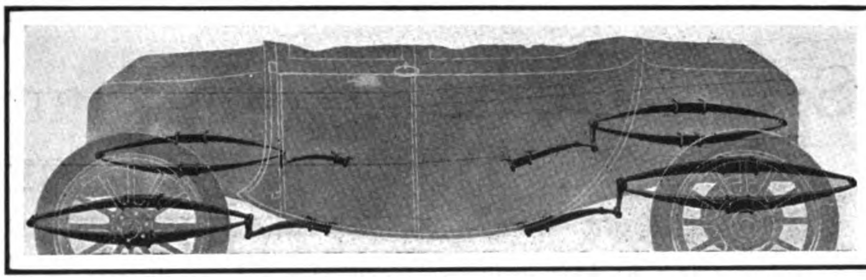
Interior of new four-chair Brougham with left drive. The decorative window shades are a feature

In the case of the Edison battery the voltage runs about 1.2 to the cell. For this reason the number of cells will have to be multiplied by that figure in calculating the capacity of an Edison battery. In fitting the Edison battery at the extra price the company supplies the 60-cell type.

The batteries are carried at the front and rear. The battery boxes are covered by the sloping decks which are rounded off to give a harmonious design. In order that no acid can reach the paint through spilling of the liquid, the battery compartments are lined with acid-proof material.

Knife-Blade Controller

The flow of current from the battery to the motor is regulated through a knife-blade type



Five quarter elliptic spring suspension which gives all the advantages of the full elliptic and the cantilever, it is stated

of controller. As the handle of the controller, by means of which the driver regulates the speed of the car, is pushed forward, the knife blade switches are picked up one by one. Each blade of the switch is of brass, and the contact is made on both sides of the blade by means of copper blocks which are sprung apart on the entrance of the blade. The springs which hold the blocks tightly against the knife blade are of the finger type and are made from phosphor-bronze. A Yale lock is fitted on the controller handle to guard it against theft. The car cannot be started on any but the lowest speed on account of an interlocking device. The electrical connections are made without any break in the circuit giving a continuous smooth acceleration.

Medium Speed Motor Used

A medium-speed, four-pole, series-wound motor is employed in the new Waverley as in all the other models of this make. The nominal speed of the motor is 1,500 r.p.m. This speed has been selected because it is high enough to furnish the high torque necessary in pulling the car through a difficult stretch of road and yet it is not of such high speed that there are material losses through the necessity of a large gear reduction.

The motor has a nominal voltage of 80 and the battery of 84. This allows for a drop of 4 volts in the line between the battery and the motor. As the entire system, especially as regards the controller has been designed to keep the current loss through resistance at a minimum, this allows a good factor of safety.

The motor is suspended from the body just forward of the rear axle and as will be seen from the illustration there are two reductions. The first is through a silent chain from the armature shaft of the motor to a shaft parallel with the rear axle. From the latter shaft the drive is transmitted by means of a silent-herringbone gear to the rear axle. The reduction is such that at 1,500 r.p.m. of the motor the car is traveling at 20 miles an hour.

Floating Rear Axle

The rear axle is floating, the shafts being of 3.5 per cent. nickel steel, heat-treated. One end of the axle shaft floats in the differential and the other is connected to the wheels by a clutch through which the drive passes. The short shaft between the rear axle and the motor is merely a driving member as are the axle shafts. They are not called upon to bear any twisting torque strains. The differential gears and the herringbone drive can be exposed to view by the removal of cover plate from the housing as shown in the illustration.

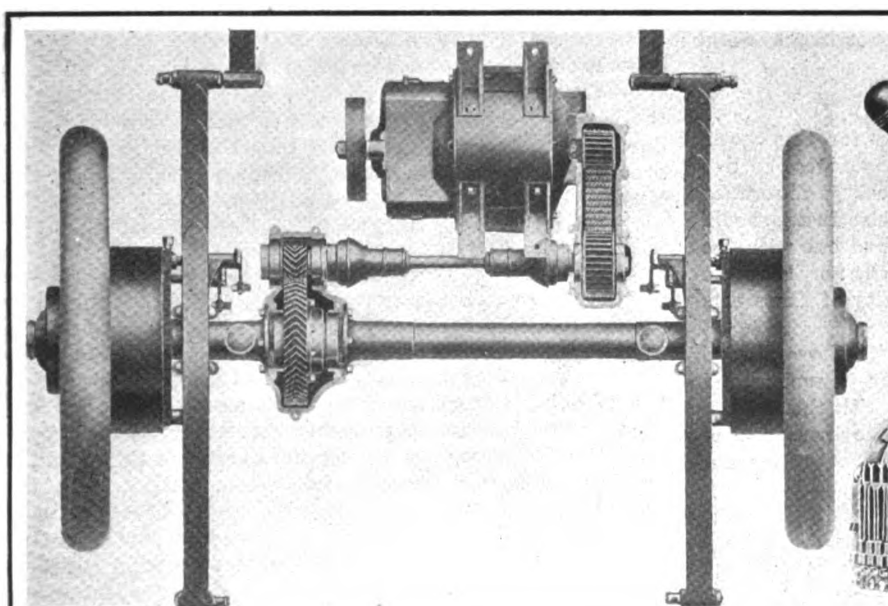
The front axle is an I-beam section of one-piece, drop-forged, steel. The spring pads which carry the full-elliptic springs are forged integrally. A rather unusual feature in axle work is the outward slant given to the steering knuckle and the downward tilt, to counteract this given the spindle. This results in a semi-irreversible steering gear as there is a greatly reduced tendency of a road shock to swing the front wheel about the tilted pivot pin. The steering connections are ball and socket all through. The joints are provided with coil springs to absorb the shocks and they are universal in action. The unassembled view of the axle illustrates the parts.

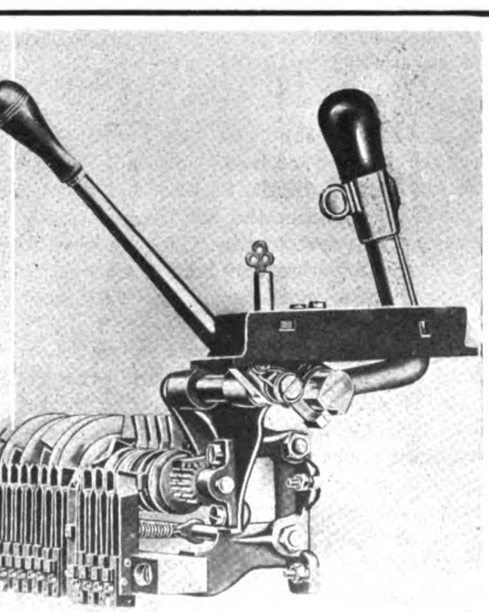
Trussed Wood Frame

The frame of the Waverley car is a patented feature which ingeniously furnishes a large amount of strength and at the same time forms a good support for the body. A trussed hardwood beam is used. This is brought close to the ground in a graceful sweep providing an entrance low to the ground and yet not lowering the part of the body which supports the motor to such an extent that the road clearance is cut too low.

Both the front and rear wheels are carried on the Timken bearings. Dust caps are fitted over the outside of these

(*Continued on page* 597)





Left—Power plant showing connection of motor with floating rear axle. A double reduction drive is used, the first being through a silent chain and the second through herringbone gears

Right—Controller used on new Waverley. A Yale lock is fitted to guard against theft

Thinks Set of Gears Better than Extra Battery Cells for Starting

The Automobile Engineers' Forum

Engineer Likens Starting a Motor to a Study in Leverages, the Starter Being the Lever and the Gear Ratio the Fulcrum Location

DAYTON, O.—Editor THE AUTOMOBILE:—The question of relative merit of the 6-volt and 12-volt electrical systems for automobiles cannot be answered by stating that either is best. As Mark Twain said, "It is difference of opinion that makes horse races."

The 12-volt proposition at the present time seems to have its strongest supporters among those manufacturers who use a very low gear ratio between the starting motor and the engine, and must, therefore, have greater torque than would be necessary were a higher gear ratio used.

Study in Leverages

Starting an engine can be considered as a simple study in leverages. In the choice of a long or short lever to move a given weight, you must have a heavier short lever and a heavier pull on the end of it than if your lever is longer. In the case of starting an automobile engine, the lever is the starter and the location of the fulcrum is the gear ratio. You can take either a short heavy lever, which is a low gear ratio motor, and a heavier battery to pry the engine loose and keep it moving; or you can use a reasonable gear ratio—a small machine—in which case a light, low voltage battery is ample.

This company is not in the habit of entering any discussions of this type, as we believe no useful interests are served in argument. Our apparatus for any automobile is designed to give the best operating efficiency for that particular case, and we usually design a gear ratio which will crank under the most unfavorable conditions at a good starting speed.

Gears Preferable

If there must be complications in the system, we believe a set of gears, which are idle except at the moment of starting, to be far preferable to a multiple cell battery in which the extra cells are always to be reckoned with in the added space and weight necessary and the additional care which they demand, because for a given weight of battery the fewer the cells the greater the efficiency, and the less care they require.

As far as the lighting proposition goes, the argument is all in favor of the lower voltage.—W. A. CHRYST, Chief Engineer, Dayton Engineering Laboratories Co.

Considers Two-Wire System the Only Logical One

BRONXVILLE, N. Y., Editor THE AUTOMOBILE:—Our company makes a specialty of supplying its lighting and starting system with all the wiring necessary for wiring a car, with the plugs on the ends of the wires, the wires cut to proper length, connected to the switch, etc., so all that our customers have to do is to put these wires in place and fasten the switch to the dash.

Two-Wire System Never Fuses

We will not supply a single wire system for this work, because of the fact that a ground in the single wire system means a short circuit, and as a consequence it is absolutely essential that either the two-wire system or else fuses, should be used. No system that we have ever turned out with the two-wire copper return has ever been fused, nor have we ever known or seen a case where the necessity of fuses was apparent.

The advocates of the grounded return system have always claimed that it was simpler, and was easier to understand than the all copper circuits, but I disagree with this. I believe that any owner will find it as simple to trace a two-conductor cable from his battery to his switch, as to trace a one-wire cable.

The introduction of the fuse immediately entails complications that make the grounded return system entirely too complicated for the average users of motor cars.

Four Reasons for the Two-Wire System

I consider the two-wire system preferable for the following reasons:

1—It is safer—because on account of the elimination of fuses, a single ground will not immediately produce a short-circuit, which will blow out fuses and put out the lights when the car is being driven.

2—It is simpler—on account of the elimination of fuses and fuse contacts which become loose, etc.

3—It is cheaper—on account of the elimination of fuses.

4—The entire history of electrical engineering records the use of ground return systems in each branch of the industry when in its infancy, and then the elimination of the ground return and the use of a copper return finally.—L. KEBLER, President Ward-Leonard Electric Co.

Thinks Lower Upkeep Offsets Extra Cost of Oversize Tires

AKRON, O., Editor THE AUTOMOBILE:—We acknowledge receipt of your letter of the 16th inviting an expression of opinion from us on oversized tires. There has been so much misinformation published regarding so-called "oversized tires" that we are taking the liberty at the outset, of defining the term "oversized tire" when used by us by this statement.

By "oversized tire" we mean a tire that fits a rim of accepted standard size in spite of the fact that the tire is so made that it is 1-2 inch wider in cross sectional diameter than the regular sized tire for that rim. To be specific, we regard a 33 by 4-inch tire as the "oversize" for a 32 by 3 1-2-inch tire. With us variance between a number of different

32 by 3 1-2-inch tires would not constitute one of them as the standard and some of such tires be regarded as "oversize" and others by the same token as "undersized."

It is not promised for oversized tires that they will give more mileage, although in theory perhaps, they should do so. This is due to the fact that we regard mileage as something which is largely within the control of the tire user. We think most drivers are careful of their tires and wear them out rather than otherwise. Consequently, the oversized tire has the opportunity in most cases of establishing its superiority over the regular sized tire.

The strongest defence of the oversized tire that we know of is the fact that no case has ever come to the writer's attention or to the attention of any other tire man with whom I have had the pleasure of discussing this question, of a person who once having used the oversized tire went back to the smaller regular size.

This, we think, conclusively establishes that the oversize is the more satisfactory tire and this satisfaction must, we think, be based largely on serviceability.

A Greater Margin of Safety

The oversized tire having a larger area, manifestly has more material than the regular sized tire and a greater carrying capacity. These two factors result in a greater ability to withstand abuse, ability to do its work with less distortion of the tire, the probability of minimizing trouble from cuts, bruises, etc., and a greater margin of safety. In addition, oversized tires require less air pressure to properly carry a given load and this affords greater riding comfort to the occupants of the car and less jarring and jolting of the car proper and a corresponding reduction in the loosening of nuts, bolts, motor mechanism, etc. This again results in lower car up-keep, which we are satisfied if closely analyzed, will more than offset the increased cost of the oversized tire over the cost of the regular sized tire.

The Other Side of the Argument

The possible disadvantages of the oversized tire are its additional first cost and the possibility that if the tire is injured so badly as to be beyond repair, the net loss is greater on account of the relatively greater investment.

All things considered, however, we have no hesitation in urging our customers who are not getting satisfactory service out of regular sized tires to use the oversize; and as previously stated, no case has come to our attention of the return of such person to the regular sized tire.—DIAMOND RUBBER Co.

Decisions of the Courts—Must Sue Repair Man

By GEORGE F. KAISER

REPAIR man is responsible alone when a collision occurs after a car has been turned over to him for the purpose of being repaired and tuned up.

While an automobile was in the possession of a repair man for the purpose of being put in order and was being tested by him, it collided with a motorcycle. The motorcyclist was injured and brought suit against the owner of the car. The latter showed that he had bought the car for the purpose of speculation, intending to sell it again. It was an old car and it had been turned over to the keeper for a small garage who was to put it in order. He was to be paid for his services and, if he was able to sell it for more than the owner's asking price, he was to receive a commission in addition. The repair man worked on the car at odd times for a month and finally took the car out one Sunday to test it. This was without the knowledge of the owner, who had given him no instructions or suggestions regarding the testing of the car. At this time the collision resulted.

The Court said that when a man turned a car over to a mechanic for repairs and exercised no control over it nor over the mechanic, if the mechanic, finding that a test is necessary, tests the car and injures someone, the owner is no more responsible than if the mechanic took it without any authority and the injured party must seek recourse against the mechanic.—*Segler vs. Callister*, 139 *Pac.* 819.

$3,500 Judgment Affirmed

Connecticut Court says that, when a collision occurs between an automobile and a wagon, and the person riding on the wagon is injured, the owner of the car is responsible in money damages, if she allows another to act as her agent in giving the chauffeur instructions.

This collision resulted while the car was being driven by a chauffeur under the direction of the owner's 18-year-old daughter, who was taking two girl friends out for a drive. After going to a near by town, they returned home and the daughter directed the chauffeur to drive home to his own house for supper and to bring the car back again. The chauffeur went home, had supper and then, coming back, the collision resulted.

The Court said that the mother was not liable, merely because of the relationship of mother and daughter, but because she had given the daughter authority to direct the chauffeur and had told the latter that he was to take orders from the daughter in the absence of direct orders from herself and stated the rule of owner's liability to be that he is liable "for all acts done by a servant in obedience to the express orders or directions of the master, or in the execution of a master's business within the scope of his employment and for acts in any sense warranted by the expressed or implied authority conferred upon him, considering the nature of the services required, the instructions given and the circumstances under which the act is done; for acts which are not within these conditions the servant alone is responsible.—*Carrier vs. Donovan*, 89 *Atl.* (*Conn.*) 894.

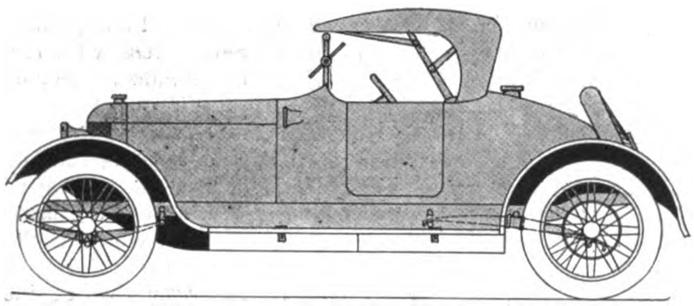
Judgment for Children

New Jersey Court holds that when a person is placed in a position of peril, as the result of another's negligence, if he makes a mistake of judgment in the moment he has to decide, he is not guilty of such negligence as will bar him from recovering judgment for injuries from the other negligent party.

A suit was started by the representatives of three adult children for their mother's death. The mother was killed while crossing Atlantic avenue in Atlantic City, being run down by an automobile which was going along at great speed.

No Time To Decide

The Court said that the judgment for the representatives of the deceased against the motorist was proper as, where a person in a moment and position of peril, which is the result of another person's automobile charging down upon the person at great speed, makes a hasty decision and does not do the thing which would probably have been done if more time were given for consideration, is not so at fault as to be prevented from recovering damages from the motorist, guilty of reckless driving.—*Wescoat vs. Decker*, 90 Atl. (New Jersey) 290.



The Rostrum

Puts Old Shoes Over New

EDITOR THE AUTOMOBILE:—I noticed a communication in your issue for September 10 from W. B. Duling, Back Bay, Wis., regarding the use of old tires over new ones, and I thought you might like to hear other readers' experiences with them. Using old discarded tires in this way has become a general practice in this section of the country. All, of course, do not use them, but a great many do to good advantage.

To use the old tires, Fig. 1, do not cut the head off. You have to take the casing off the wheel and insert, by hard work, into the old casing and apply both to the wheel at one time. Then you have practically a puncture-proof tire and one that is long lasting. It is desirable to have good inner tubes on account of it being too much trouble in changing in case an old tube gives away. So far as heat and sand are concerned, it does not seem to amount to anything. The old casing fits so tightly over the good one that there is no slippage and it protects the good tire from road heat. Some drivers, however, cut slits in old casings around the whole tread from bead to bead. They say it makes them easier to apply, as well as to allow ventilation. These slits are cut about every 4 inches and about 1-2 inch of the material taken out. I know a traveling salesman who covers a vast territory, is all the time on the road, and he used this equipment for over 2 years and never has had a puncture.

Coolidge, Texas. W. M. PRICHARD.

From Illinois to Texas

Editor THE AUTOMOBILE:—Please give through THE AUTOMOBILE the best route to San Antonio, Texas, going by way of Kansas City and Webb City, Mo.?

Winchester, Ill. WILSON COULT.

—First go to St. Louis, and then through Columbia and Marshall to Kansas City, 350 miles. Then turn southwest to Arkansas City, 232 miles, through Emporia and Florence. The next large city is Dallas, 417 miles, through Oklahoma City and Dennison. Turn west to Fort Worth, 33.2 miles and then go south to San Antonio, 354.4 miles, through Waco and Austin.

Wants to Use Car Motor in Boat

Editor THE AUTOMOBILE:—1—What would you consider the necessary changes in order to make a 30 horsepower White automobile engine give good service as a motor boat engine?

2—What kind of a propeller must be used?

3—Would it be advisable to lower the compression by putting a fibre gasket under the cylinders?

4—Would it help this engine any to change the valve timing, and if so, how could this be accomplished?

Montgomery, Ala. R. S. B.

—1—This motor should give satisfactory service without any changes. Proper cooling arrangements should be made, however. The flow of water through the cooling system should be regulated so that the temperature of the water issuing from the motor will be at a temperature of about 180 degrees Fahrenheit.

2—The type of propeller depends on so many things that it is impossible to say what kind or size to use. Write to the propeller manufacturers stating the size of the motor, its speed, the size of the boat, including length, beam and draft; the weight of the boat, and give a general idea of the lines of the hull.

All these matters have an effect on the size, shape and speed at which the propeller is to run. For instance, if the boat is so large that this motor cannot possibly run it more than 10 miles per hour, the propeller cannot be operated at as fast a speed efficiently, as if the maximum speed of the boat were 20 miles per hour.

3 and 4—No.

Formula Should Consider Stroke

Editor THE AUTOMOBILE:—I was very pleased to see that on page 407 of THE AUTOMOBILE for August 27, 1914, you recommended the horsepower formula $\frac{D^2 S N R}{15{,}000}$. For a number of years in the hospitable columns of THE AUTOMOBILE and *Motor Age* I have been advocating a similar formula having for its divisor 12,000. The results given by the $\frac{D^2 S N R}{12{,}000}$ formula which I devised in 1906 are somewhat higher than those obtained from the rating which you recommend, but are probably nearer the actual output of the fairly efficient motors of today.

As regards simplicity the $\frac{D^2 S N R}{12{,}000}$ rating scores even over the now discredited S. A. E. formula $\frac{D^2 N}{2.5}$. For example, if the power developed by a four-cylinder motor at 1,000 revolutions per minute is desired, the formula becomes merely $\frac{D^2 S}{3}$; for a six-cylinder motor under the same conditions, $\frac{D^2 S}{2}$; etc.

London, England. JOHN JAY IDE.

No Free-for-Alls in 1913

Editor THE AUTOMOBILE:—1—Could you tell me the name, date, place, distance, cash prizes, and who won in every free-for-all race held in the U. S. during 1913?

2—When and where will the American Grand Prize be held in 1915?

3—What are the rules governing a free-for-all race? Would a steam automobile, a motor cycle, or a tri-car be allowed to compete in one?

4—Why does THE AUTOMOBILE, editorially, favor races with a limited piston displacement?

Roebling, N. J. SIEGFRIED ROEBLING.

—1—According to THE AUTOMOBILE for this year no free-for-all events of importance were run. Possibly some small races of this type were run but the results of these are not obtainable.

2—The Grand Prize race will be held on March 7 at the Panama Pacific exposition, San Francisco, Cal. The race will be on the exposition grounds.

3—A steam automobile would be admitted, but a motorcycle, or a tri-car would not, unless it had a reverse gear. The rules state, "A Non-stock free-for-all race is open to any gasoline car which complies with the definition of motor car, without restriction as to piston displacement, price or quantity produced." And a motor car is defined as, "A vehicle of three or more wheels propelled by a self-contained mechanical means, fitted with at least two brakes, operated independently of each other and a motor-driven reversing mechanism.

4—We favor races with limited piston displacement because these contests force the maker to obtain greater efficiency and power from a motor of given size and this leads to improvements in stock car design. Furthermore, the racing motors of limited piston displacement are more nearly the size of stock car motors and the lessons learned in racing can often be directly applied to stock car practice. For instance, if it is found that a connecting-rod of a given size and shape stands up satisfactorily in a racing machine, the same rod might be used in a stock motor, where the greatly reduced strains would make it unlikely that one of these would ever break in service.

Remedy for Slipping Clutch

Editor THE AUTOMOBILE:—One of our customers, who owns a 1910 model Buick has had trouble with the clutch slipping and we write to ask if you could suggest anything to remedy this.

Williamsport, Pa. THE HARER-WURSTER CO.

—The slipping clutch may be due to a worn facing or weak spring—or in the case of the 1910 runabout which is equipped with a planetary gearset, the leather may be overlubricated due to grease leaking in through the worn transmission bushings. Remove the facing, clean it well and if it is made of leather soak it in neat's-foot oil for 24 hours before replacing.

To Locate a Loose Push Rod

Editor THE AUTOMOBILE:—What is the easiest way of locating a loose push rod?

Sugar Grove, Ill. H. V. SMITH.

—A loose push rod can easily be found by feeling with the hand. If there is too much clearance between the stem and the top of the rod, it can be ascertained by rattling the push rod and if this is the case, it should be adjusted, preferably while the motor is warm. Make the space about 1-100 inch or the thickness of a sheet of writing paper.

If the rod is worn in the guide, a certain amount of lateral movement will be noticed when force is applied to the rod by the hand.

Arched Manifold Reduces Loss

Editor THE AUTOMOBILE:—What is the reason for having the intake manifold arched as in the Mercedes cars used in the recent Grand Prix race in France, and in the Mercedes which De Palma drove at Indianapolis?

2—What kind of rings are used on the rotary valve of the Jaeger motor? Are they pinned? If so, are they fastened to valve or casing?

3—What is your opinion as to the reliability of the Van Kueren motor? Does this motor keep good compression at all times, and is there bearing enough between the ports and the port in the top of the cylinder to maintain compression after the motor has been used for a considerable time?

4—Is there any rule for determining the compression pressure for a certain size motor?

5—What should be the size of valve openings in a rotary valve for a motor 3¾ by 5, four-cylinders, compression 85 to 90 pounds, speed, 2,500 or 3,000 revolutions per minute, cone-shaped compression chamber?

6—What power should it develop?

7—What should be the timing of such a motor?

East Marion, L. I. W. FURST.

—1—Apparently the arch is to allow the carbureter to be carried high and at the same time provide a passageway without sharp curves.

2—This is unobtainable.

3—We have not seen this motor in service and therefore cannot say whether it retains its compression.

4—The compression pressure does not vary with the size of motor but is independent of it. The compression pressure depends on the ratio of clearance to piston displacement. If these two facts are known, the compression may be calculated, assuming that the rise in pressure follows the adiabatic law, that is, no heat is given to the charge or taken from it during compression. This is approximately correct.

$$\text{Compression press.} = \left(\frac{\text{clearance vol.} + \text{pist. disp.}}{\text{clearance volume}}\right)^{1.4} \times \text{atm. press.}$$

By compression pressure is meant the absolute pressure, which is equal to the gauge pressure plus 14.7 pounds. The volumes are expressed in cubic inches and the pressures in pounds per square inch.

5—There is very little data on this subject but we would advise making the valve ports with an area of at least 3 square inches, and larger if your motor design will allow.

6—The power should be 56 according to the formula,

$\frac{D^2N\,S\,R}{15{,}000}$, when the motor is running 3,000 per minute.

Where D=bore in inches, N=number of cylinders, S=stroke in inches and R=revolutions per minute.

7—Intake should open 20 degrees after top dead center and close 40 degrees after lower dead center. The exhaust valve should open 60 degrees before lower dead center and close 15 degrees after top dead center.

How to Adjust Hudson Axle

Editor THE AUTOMOBILE:—Will you please describe how to adjust the rear axle parts on the Hudson 37?

New York City. L. W.

—The adjustments on this axle, which is illustrated in Fig. 2, are as follows: The outer pinion shaft bearing is adjusted by means of the lock nut A, while the inner pinion

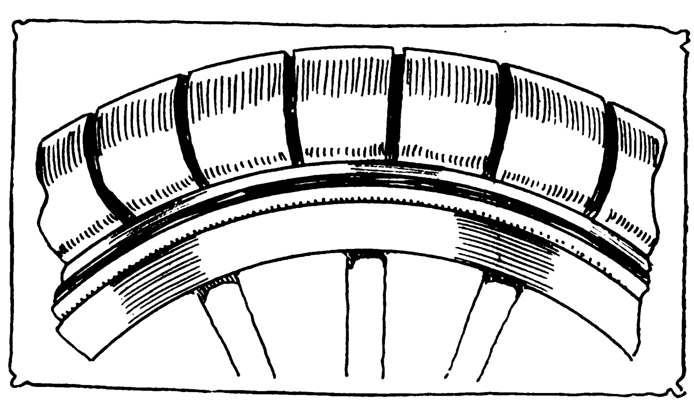


Fig. 1—One method of placing a worn out casing over a good one. In this case slits are cut in the outer casing at intervals of 4 inches to give a non-skid effect

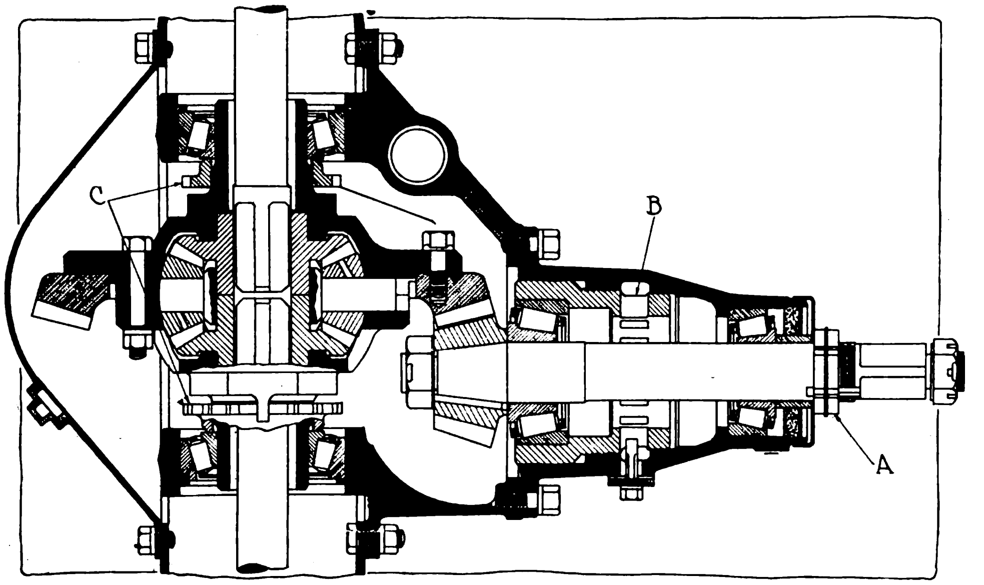


Fig. 2—Hudson model 37 axle showing points of adjustment

shaft bearing is held in a cage B which is capable of adjustment by screwing to the right or the left. It is positively locked by a set screw.

The differential bearings are adjusted by means of the nuts C.

The wear in the drive pinion may be taken up by means of the adjusting nuts A and B, the object being to set the pinion closer to the gear, in order to compensate for the wear. Play in the differential is removed by similarly adjusting the nuts C.

Comparison of Long and Short Strokes

Editor THE AUTOMOBILE:—1—A friend and I had a dispute over long and short stroke motors. Which motor develops the most power, one with an equal bore and stroke, or the one with the longer stroke than bore; both having the same displacement?

2—Which will give more power when driving over hills?

3—Which will give more speed.

4—Which will be more economical?

5—Can you supply an illustration in which a person will be lifting a weight with a two foot lever, and another with a ten foot lever, to these motors?

6—Would you place the person at the short end or the long end of the lever to bring out the point.

7—If I stand about 3 feet away from fender of car, and touch spark plug with a piece of metal when motor is running, I receive a shock. Can you explain how it makes a circuit through the pneumatic shoes?

Verona, N. J. THOS. P. LAMBE.

—1—Within reasonable limits there is very little difference between the two types as regards the power developed.

2 and 3—At equal motor speeds the power and maximum car speed would be the same.

4—Somewhat greater economy may be obtained from the long-stroke type.

5 and 6—The question of leverage does not enter into the problem at all. Let us consider a 4 by 4-inch motor and a 3.5 by 5.25 motor, the former having a displacement of 201.1 cubic inches and the latter 202. The former is square and the latter may be called a long-stroke motor. Under the same conditions, this includes temperature of combustion chamber walls, compression, and time of ignition, etc., almost the same pressure will be generated by the combustion of the charge. In both cases the expansion of the gases will be brought to about the same point before the exhaust valve is opened, and therefore the mean effective pressure in both instances will be practically the same. It can be assumed to be 90 pounds.

The work developed during the stroke is equal to the total average pressure on the piston during the stroke multiplied by the distance through which it moves. Therefore, power per stroke = area of piston $\times$ average pressure per square inch $\times$ length of stroke.

The area of the 4-inch cylinder is $4^2 \times .7854$, or 12.55 square inches, while the area of the 3.5 inch cylinder is 9.6 square inches.

Therefore the total amount of work done in each case is,

Work $= 12.55 \times 4 \times 90 = 4{,}500$ inch pounds.

Work $= 9.60 \times 5.25 \times 90 = 4{,}500$ inch pounds.

7—You experience a shock for the reason that the voltage is high enough to force a current through your body, the ground and up through the tire to the motor again, and thus the circuit is completed. The rubber is not a perfect insulator; probably because there is always a certain amount of moisture in it. The quantity is small but sufficient considering the great voltage.

Reasons for Motor Knocking

Editor THE AUTOMOBILE:—My Ford car knocks when running free. It has been overhauled twice. Has new block, crank shaft, pistons, camshaft and timing gears. In fact it has a new engine, added piece by piece. The knock is said by an expert Ford mechanic, to be in the crankshaft and camshaft gears. It does not knock when working hard. The position of the spark does not affect it, but a certain notch on the throttle lever brings it out strongly. What can you suggest?

Portland, Me. WALTER E. TOBIE.

—It is impossible to state where this knock is but it does not seem likely that it is in the timing gears. Possibly the cause is a loose bearing, due to wear or carelessness in assembling the motor. Examine the main connecting-rod, camshaft and wrist-pin bearings for this trouble. See that the compression is good in all the cylinders and that the valves are tight and seating properly.

Speeds of Various Cars

Editor THE AUTOMOBILE:—1—Kindly give me in the Rostrum the following information: The highest speed that can be made with each of the following cars, fully equipped with touring car bodies.

Packard, 38.

Peerless, 38.

Franklin, 30.

2—Also, kindly give gear ratios of each.

Matador, Texas. L. B. HUBBARD.

—1—The speeds of these cars are as follows: Packard, 67 miles per hour; Peerless, 60; and Franklin, 55.

2—The gear ratios are: Packard, 3.53 or 3.93, at option; Peerless, 3.56 to 1; Franklin, 3.69 to 1.

Brush Motor Will Run Generator

Editor THE AUTOMOBILE:—Please let me know what you think of this outfit. A Brush engine from a Brush car to run a 3 K.W. generator direct connected to a 110-volt dynamo.

Please let me know if this engine will run it direct connected satisfactorily and without any flickering.

Eunice, La. K. MOOSA.

—If you operate your generator at full capacity at any time and the speed of the generator is in the neighborhood of 1,500, the motor will hardly develop enough power to allow of it being direct connected.

It is a simple matter, however, to do it by means of a belt.

Your motor will run this generator satisfactorily, providing the belt pulleys are the proper size and a good governor is fitted. The flickering of the lights depends entirely on how smoothly your motor runs under varying load conditions and this in turn is affected by the sensitiveness of the governor and the size of the flywheel.

You have not given enough details for us to determine the size of the pulleys or advise you as to the other details of the installation. Probably your generator runs at a speed of about 1,500 revolutions per minute. The motor should be run at such speed that an overload of 50 per cent. or a 3 K. W. can be carried. This is approximately 4 horsepower.

Since the bore and stroke are 4 by 5 inches, the motor will produce this horsepower at 750 revolutions, according to the formula:

$$\text{Horsepower} = \frac{D\,S\,N\,R}{15{,}000}$$

or

$$R = \text{revolutions per minute} = \frac{\text{horsepower} \times 15{,}000}{D\,S\,N}$$

Where D = bore in inches
S = stroke in inches
N = number of cylinders, which is 1

Substituting, we have,

$$\text{revolutions per minute} = \frac{4 \times 15{,}000}{4^2 \times 5 \times 1} = 750$$

It must, of course, be borne in mind that the solution given by this formula is not absolutely accurate, but it should be near enough. The only sure way to determine the speed at which this motor must run to develop 4 horsepower, would be to test it.

Therefore, if your generator runs at 1,500 revolutions per minute, the pulleys for driving will need to be in the ratio of 2 to 1. If the speed of the generator is some other amount the ratio can easily be calculated.

The flywheel on this motor is approximately 17 inches in diameter and 2.5 inches wide, therefore, the pulley on the generator should be about 8.5 inches in diameter and 2.5 inches wide.

The thickness of belt can be determined by the formula taken from Machinery's Handbook:

$$\text{Horsepower} = \frac{P\,W\,D\,N}{12{,}000}$$

P = number of plies in the belt; 1, 2 or 3.
W = width of belt in inches
D = diameter of smaller pulley in inches
N = revolutions per minute of the smaller pulley

The number of plies represented by P is just another name for the thickness. The width of belt D is limited to 2.5 inches, and had better be made 2 inches. D, the diameter of the smaller pulley, is 7.5 inches, and its speed per minute, N, is 1,500.

Solving the above formula for P, we have

$$P = \frac{12{,}000 \times 4}{2 \times 7.5 \times 1{,}500} = 2.15, \text{ which can be taken as 2,}$$

in other words a 2-ply belt should be used.

A governor may be obtained from the Pierce Speed Controller Co., Anderson, Ind., or the Duplex Engine-Governor Co., 80 Maiden Lane, New York City.

Both engine and generator should be solidly mounted. A large tank of water would be satisfactory for cooling, the thermo-syphon system being used. The outfit may be mounted on a steel or wood frame, or may be fastened to a stone, brick or concrete foundation.

Starter Gears Noisy

Editor THE AUTOMOBILE:—I have an electric starter on my car and several times lately when I put my foot on the button to start the car, it makes a noise as though every gear in the car was being stripped. Can you tell me the cause for this, and how to remedy same?

Lowville, N. Y. L. H. SMITH.

—It is possible that the gear teeth are worn or that the armature bearings allow play. Inspection should show whether this is so. It may be that the gears need oiling. It must not be forgotten that a starter should make a little noise, the amount depending on the design, workmanship and material.

Valve Diameters of Large Cars

Editor THE AUTOMOBILE:—What are the outside diameters of the valves in the following cars:

1—Pierce-Arrow 38-C3, 48-B3, and 66-A3; Packard 38 and 48; Peerless 38, 48 and 60; and Chalmers "Master" and "Light" sixes for 1915?

St. Louis, Mo. E. H. K.

—1—The outside diameters of the valves on these cars are as follows:

Pierce-Arrow,	38 C-3, 2 3/16 inches.
Pierce-Arrow,	48 B-3, 2⅜ inches.
Pierce-Arrow,	66 A-3, 2¾ inches.
Peerless,	38 Discontinued.
Peerless,	48 2 17/64 inches.
Peerless,	60 Discontinued.
Chalmers,	29 2.182 to 2.192 inches.
Chalmers,	29B 1.932 to 1.942 inches.

Make of Engine in Selden

Editor THE AUTOMOBILE:—What is the make of engine used by the Selden Motor Vehicle Co., in its five-passenger touring car, Model 40-T?

Alexandria, Louisiana. J. R. STANLEY.

—According to the information we have at hand the motor is either a Brownell, Continental or a Buffalo. We would advise you to write the Selden Motor Vehicle Co., Rochester, N. Y., stating the motor and car number, for more definite information.

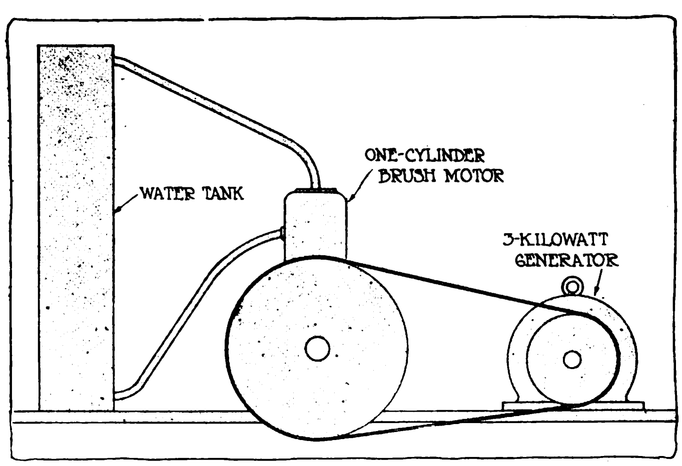


Fig. 3—Diagram showing layout for connecting Brush runabout motor to a 3 K.W. generator for stationary lighting work

The Engineering Digest

The Design of Valve Control Organs—Formulas Developed for Springs, Cams and Camshafts

A METHOD FOR DESIGNING CAMS IN UNISON WITH SPRING TENSIONS AND MOTOR SPEED

THE NEEDED RIGIDITY OF CAMSHAFTS

(*Continued from issue of September* 10)

FORMS and Dimensions of cams are determined by the folowing factors: (1) Valve lift, (2) nature of the tappet action—roller, flat or cambered plate or hammer type, (3) timing of opening and closing of valves; (4) the curve representing the piston travel, (5) the curve representing the valve travel under the kinematic influence of the valve spring, and (6) the play between tappet and valve stem.

The valve lift can be determined from equation 4 [see the previous instalment]. The nature of the tappet action (2) and the valve timing (3) must be chosen suitably. The form of the tappet head or roller determines the cam profile if the curve of valve travel is known. For the valve timing no definite rule can be established, as practice varies surprisingly. In 18 leading models of French automobile motors of 1912 the timing varies as follows (according to Henri Petit: Le Moteur, 1912 edition): The advance of exhaust valve opening from 30 degrees in Vinot-Déguingand and 32 degrees in Renault to 58 degrees in Ariès and Sultan; the retarding of exhaust valve closing from 0 degree in 9 of the 18 models to 15 degrees in the Peugeot; the retarding of the inlet valve opening from 0 degree in 4 models—including Panhard and Darracq—to 23.5 degrees in Renault; the retarding of the closing of the inlet valve from 5 degrees in Grégoire to 58 degrees in Peugeot, with the majority between 30 and 45 degrees.

These figures are all to be understood as relating to degrees upon the crankshaft circle.

In other works (Faroux: Construction Automobile, 1913 edition, and Lacoin: Construction et Réglage des Moteurs à Explosions, 5th edition) the average timing used by large French firms for an average motor speed of 1,370 revolutions per minute is given as 46, 5, 12 and 25 degrees for the four valve movements in question.

The large variations in the timing are no doubt partly due to undersized valves and too complicated forms of inlet and exhaust conduits, which interfere with the filling and emptying of cylinders within the regular periods of the cycle at high motor speeds and render it necessary to extend the periods for suction as well as those for exhaust by artificial means. The widely accepted opinion that the first and the fourth cylinders should have a different valve-timing from that of the second and the third must be explained likewise, as no other rational explanation presents itself. The only thing which can be stated in general, on the basis of practical experience, with regard to valve-timing, is that it must vary with the motor speed [meaning the normal motor speed], with the specific gas velocity in the conduits and with the volumetric compression. Theoretically next to nothing may be said, but for small high-speed motors practice sanctions the figures of 50, 4, 8 and 40 degrees for the advance of exhaust opening (α_1), the retarding of exhaust closing (β_1), the retarding of intake opening (α_2) and the retarding of intake closing (β_2), respectively.

In laying out separate cam diagrams it is important to determine the positions of both cams with accuracy. As the camshaft runs only half as fast as the crankshaft, the angles of advancing and retarding must be marked half as large on the cam diagram as the corresponding angles (α_1, β_1, α_2 and β_2) on the valve-timing diagram relating to the crankshaft. In accordance herewith the angle α_o spanned by the base of the exhaust cam and determining the period from opening to closing of the valve is

$$\alpha_o = 90° + \frac{\alpha_1 + \beta_1}{2} \qquad (8)$$

and for the intake valve

$$\beta_o = 90° - \frac{\alpha_2 - \beta_2}{2}, \qquad (9)$$

α_o and β_o being center angles of the camshaft circle. The lines dividing angles α_o and β_o in halves may be designated as cam axes; then the angle γ between the two cam axes is

$$\gamma = \tfrac{1}{2}\left(90° + \frac{\alpha_1 + \beta_1}{2} + 90° - \frac{\alpha_2 - \beta_2}{2}\right) + \frac{\alpha_2 - \beta_2}{2} = 90° + \frac{\alpha_1 + \beta_1 + \beta_2 - 2\beta_1 + 2\alpha_2 - \alpha_2}{4} = 90° + \frac{\alpha_1 + \alpha_2 - \beta_1 + \beta_2}{4} \qquad (10)$$

With these data a diagram is laid out, as in Fig. 3, on which the dead centers corresponding to two revolutions of the crankshaft—set 90 degrees apart, as a graphical expedient, to allow for the difference in crankshaft and camshaft movements—the cam axes and the four valve-opening and valve-closing points are marked on a circle. The diameter D of the circle is best taken as

$$D = 2\,(d' + 2m) \qquad (11)$$

as that gives a diagram on the scale of 2 to 1 or twice life size.

Notations

The angles α_1, β_1, α_2, β_2, α_o, β_o as explained in text.
d' = diameter of the base circle of the cams.
m = play between tappet and valve stem.
l = valve lift.
D = diameter of base circle of cams on 2 : 1 diagram.
D_1 = diameter of top circle of cams on 2 : 1 diagram.
d'' = diameter of roller.

With l the valve lift, the diameter of the top circle of the cams becomes

$$D = 2\,(d' + 2m + 2l) \qquad (12)$$

The base circle of the cams is to be chosen as large as the construction permits.

The above applies to the case when it is intended to use plate or hammer tappets. If rollers are to be used, D and D_1 must be enlarged with twice the diameter d'' of the roller, and then

$$D = 2\,(d' + d'' + 2m) \qquad (11A)$$

and

$$D_1 = 2\,(d' + d'' + 2m + 2l) \qquad (12A)$$

[It is noticed that the author is occupied only with standard construction and assumes, for example, that the valve lift of the intake valve should be the same as that of the exhaust valve, although much has been said lately of the advantage in making the lift of the intake valve greater rather than keeping the valve open for 40 degrees after dead center.—ED.]

When the diagram has been laid out up to this point, the piston travel curve is drawn into it for each cam, starting from the dead centers. If the gas velocity in the valve port were naturally constant, this curve would represent the valve travel, too. But in reality this is not the condition, and the piston travel curve represents only the minimum of the valve lift for each corresponding position of the piston. To prevent the gas velocity from assuming a higher value at any point of the piston travel than that provided for in the dimensions of the conduits, the lift of the valve at any point must be higher than shown by the curve of piston travel; compare the two pairs of curves in Fig. 3.

To construct the piston travel curve, the angles on the crankshaft circle corresponding to, for example, 10 equal divisions of the piston travel are first determined graphically, as in Fig. 2, the method being obvious. This figure is here shown on a reduced scale. The halves of these angles are transferred to the camshaft diagram, Fig. 3, so as to obtain a division of two 90 degree arcs of the cam circle in 10 unequal parts, corresponding to the 10 equal parts of the piston travel.

On the polar [radially converging] ordinates obtained in this manner, the corresponding lengths of l, enlarged to the 2 : 1 scale, are marked off, starting from circle D. These lengths can be figured from the equation

$$l = \frac{d^2 . s . n}{d_v . 6{,}000} \times \sin \alpha \ (1 \pm k \cos \alpha)$$

[this being a standard equation for a valve lift giving uniform gas velocity, approximately; compare "Hütte," 20th edition, volume II, page 307, or modern gasoline engine textbooks.—ED.]

Notations

d = cylinder bore in cm.
d_v = diameter of valve.
s = piston stroke in cm.
n = revolutions per minute of crankshaft.
α = center angle of crank.
k = crank length divided by connecting-rod length.
$Z = \sin \alpha \ (1 \pm k \cos \alpha)$.

The first member of the value for l, being a constant can be figured out readily. The second member, a variable in which α is the angle turned by the crank, at any given point in the movement, and k the ratio of crank length to connecting-rod length, may be designated as Z. The values for Z are calculated and tabulated herewith for a value of $k = 1/5$ and for 10 equal divisions of the piston stroke (compare Güldner: Entwerfen und Berechnen von Verbrennungsmotoren, 2nd edition, page 317).

termines the releasing-profile of the cam. Between the curve of the valve release and the parabola described by the valve under the influence of the valve spring [the vertical valve movement becoming a parabola when viewed in its relation to the rotating circumference of a cam or camshaft.—ED.], there must be a certain relation, in order to avoid noisy bounding of the tappet on the cam or of the valve stem on the tappet, accompanied by too late closing of the valve.

The release-curve must therefore coincide with one representing the free (spring-determined) movement of the valve during the closing period. A relation between the trajectory and the velocities of the movement must therefore be provided. Fig. 1 indicates the method to be followed [and illustrates also the manner of obtaining equa-

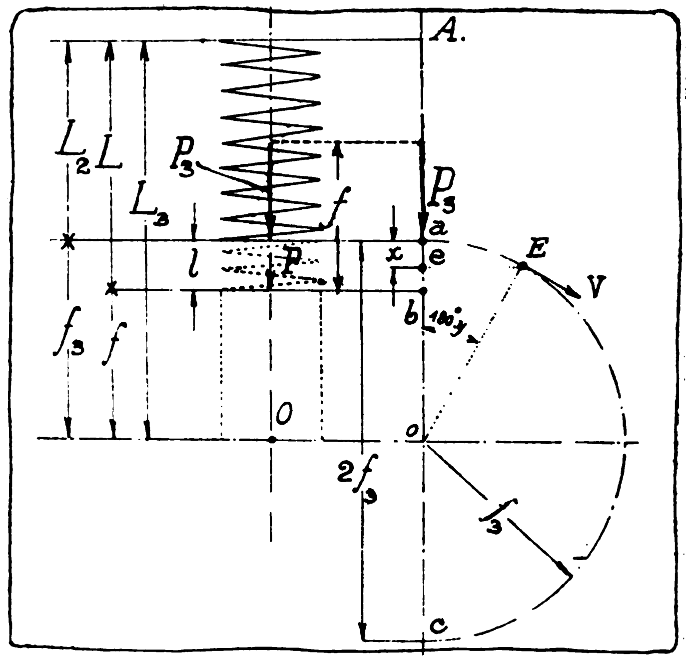


Fig. 1—Diagram of spring tensions, auxiliary in determining valve-releasing curve

tions 5, 6 and 7, relating to the dimensions of valve springs, in the previous instalment], the movement in question being conceived as part of a rectilinear oscillation of which the full course ac is equal to twice the deflection of the valve spring at fully open valve, so that $ac = 2f_3$.

It is assumed, as may be done without notable error, that the spring tensions are proportionate to the deflections. Aa represents the length of the spring at its initial tension; that is, with valve fully open, as at the beginning of the closing; and Ao the total length of the released spring (equal to L_2 by previous notation), so that the force of the spring steadily diminishes from a to o, dropping from P_3 at a to zero at o. Also, we have $P_3 : f_3 = P : f$.

Under such conditions the oscillation can be considered as the projection—speaking with reference to the graphic

Percentage of Piston Stroke	10	20	30	40	50	60	70	80	90	100
Values of Z	0.648	0.853	0.962	1.011	1.014	0.976	0.892	0.759	0.554	0

The values for l_1, l_2, l_3, etc., are now in the form of $l = AZ$, in which

$$A = \frac{d^2 . s . n}{d_v . 6{,}000} \qquad (13)$$

and the values for Z are taken from the table above.

The curve of the valve travel and of the corresponding time periods during the closing movement of the valve de-

representation of it—of a uniform circular movement which the valve body describes under the influence of a radial force P_3 and a constant tangential velocity V.

If the mass of the valve body is M and t_o is the period of oscillation; that is, the time in which the body, moving at uniform velocity along the circle, reaches from a to c, then

$$t_0 = \pi \sqrt{\frac{M \cdot f_1}{P_1}}$$

If we consider an arbitrarily chosen point e between a and b, which is the projection of point E on the circle, and if we designate the length of ae as x and the angle aoE as $180° \cdot y$, then the time in which the body covers the distance ae, or the arc aE of the circle, is $t = t_0 \cdot y$, or, inserting the value of t_0,

$$t = y \cdot \pi \sqrt{\frac{M \cdot f_1}{P_1}}$$

Consequently $$y = \frac{t}{\pi} \sqrt{\frac{P_1}{M \cdot f_1}} \qquad (14)$$

On the other hand we have the relation (see Fig. 1)

$$x = f_1 \left[1 - \cos\left(y \cdot 180°\right)\right]$$

By insertion of the value for y from equation 14, this gives

$$x = f_1 \left(1 - \cos\right) \frac{180°}{\pi} \cdot t \sqrt{\frac{P_1}{M \cdot f_1}} \qquad (15)$$

By substituting for M its approximate equivalent .1Q, [under the metric system which has 9.81 m/sec for the factor of acceleration], where Q is the weight of the valve body, including spring plate and spline, we obtain (for f_1 expressed in cm)

$$x = f_1 \left[1 - \cos\left(57.29578° \times 31.623 \sqrt{\frac{P_1}{f_1 \cdot Q}} \cdot t\right)\right] \qquad (16)$$

By designating as C the constant in the expression for the angle $y \cdot 180°$, we have first

$$C = 1811.1 \times \sqrt{\frac{P_1}{f_1 \cdot Q}} \qquad (17)$$

and, by making use of this designation, equation 16 takes the simpler form

$$x = f_1 \left[1 - \cos\left(C \cdot t\right)°\right] \qquad (18)$$

In order to draw this curve [meaning the curve determined by the values of x for a suitable number of locations of e] into the diagram, Fig. 3, it is necessary to determine the point at which closing begins, for both cams. With a view to the silence of the motor it would be desirable to place this point as close to the axis of the cam as possible and to shape the release curve gently declining. The piston travel curve admits however in only slight degree of such design, and the beginning of the closing period must usually lie 30 to 35 degrees from the point of valve closure, if the risk shall be avoided of raising the gas velocity toward the end of the exhaust stroke, thereby causing imperfect scavenging and poor subsequent filling of cylinders.

The values for x must be laid out radially from the top curve D_1 toward the center, while the corresponding values for t are represented by a radial division of the circle. This division is regulated by the following considerations:

If n is the number of crankshaft revolutions per minute, the camshaft makes $n : 120$ turns per second. Accordingly, the time in which the camshaft turns 2 degrees can be expressed as

$$T = \frac{2}{3n} \text{second,} \qquad (19)$$

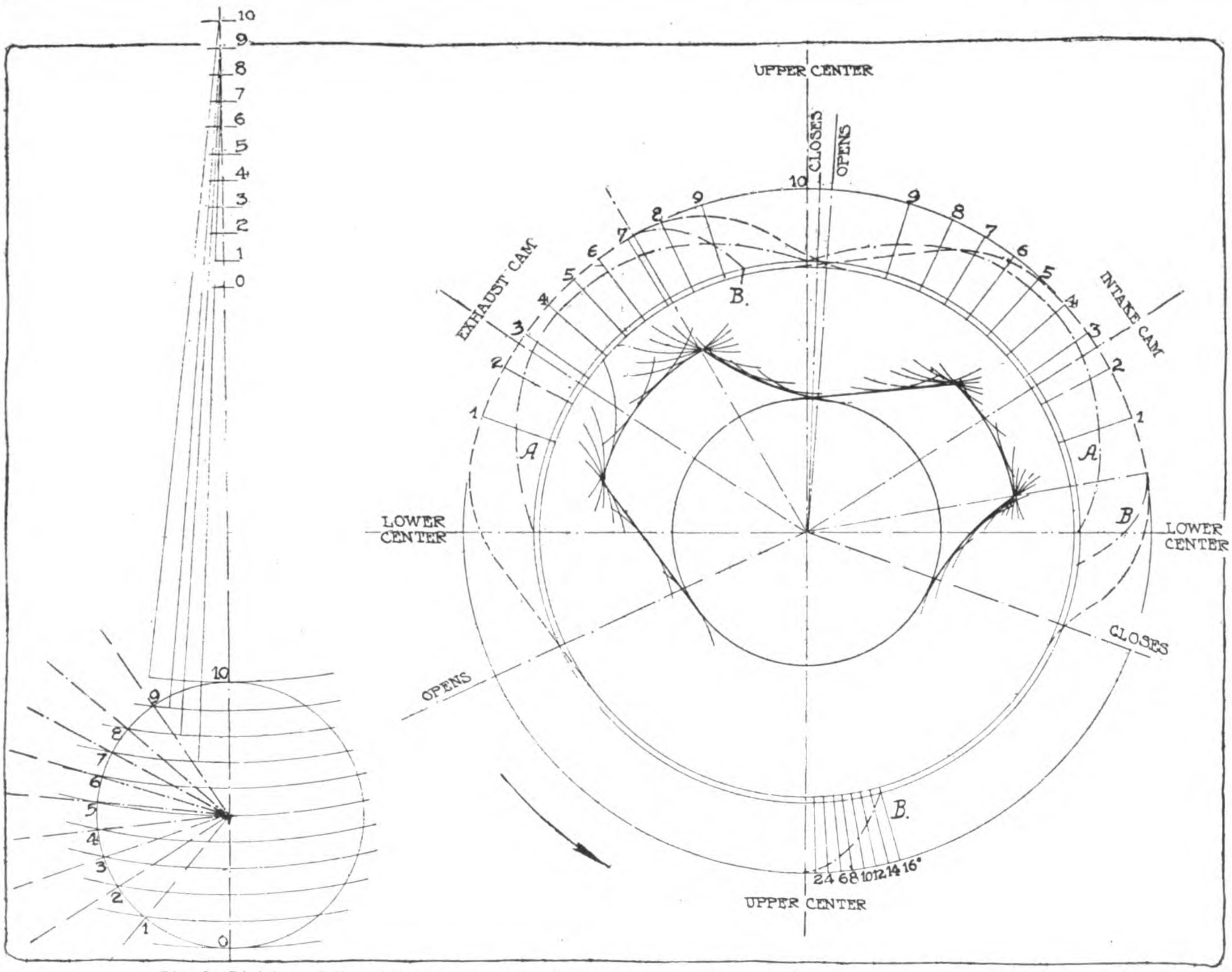


Fig. 2—Division of the piston travel. Fig. 3—Graphic determination of location and shapes of cams

and if arcs of 2 degrees are chosen for abscissas in the system of polar co-ordinates, the values for t obtained are

$$t_0 = 0;\ t_1 = \frac{2}{3n};\ t_2 = \frac{4}{3n};\ t_3 = \frac{6}{3n};\ \text{etc.}$$

The corresponding values for x can then be calculated from equation 18.

Compromise in the Shapes

After the curve for each cam has been determined and laid out in the manner explained, the curve of the real valve travel can be found. The main condition for realizing a correct and practicable design is here that this curve lies outside of the curves so far determined, in each case. With the use of plate or hammer tappets it is necessary to make the raising and the releasing camside profiles symmetrical, as they must develop themselves tangentially upon the plate surface at the lifting as well as at the seating of the valve and therefore must be made rather strongly convex, tangentially to the base circle of the cam. If the camside is made rectilinear and tangential to the base circle and the tappet plate is flat, a blow is delivered against the plate at every lifting of the valve, and this is not admissible in view of the requirements for silence and durability. On the other hand, the curve of the camside must not be too convex, as then it collides with the curve of the piston travel. In most cases it is preferable to form the camside tangential to its base circle and convex at the junction with the piston travel curve, while giving the curvature at the cam base a smaller radius than at the cam top. Even with symmetrical shaping of the camsides the cams become rather pointed if the lines are made notably convex, and it is therefore in most cases not practicable to shape the releasing-profile with further special reference to an easy and slow closing of the valve. This is especially true for intake valves, as they span a smaller angle than the exhaust valves.

The inner end of the curve [by which the play in the tappet elements is taken up] is joined, between the circles D and d_1, as flatly tangential to the latter as possible.

If rollers are to be used or hammer tappets with heads of semi-circular profile, it is advantageous to shape the lifting camside rectilinear or even concave, in order to cause rapid opening of the valve, while the releasing-curve should be formed so as to retard the valve movement at the closing. The most approved method is to draw the lifting-curve as a rectilinear tangent to a circle of the diameter $D - 2m$ and to make it join the top circle D_1 with a rounding of radius $.5d''$ [d'' being the diameter of the roller, as before], while the releasing-profile is made as strongly concave as circumstances permit and, at the beginning of the valve-closing period, is joined tangentially to the kinematic valve-closing curve [being that marked B in Fig. 3 and determined by the valve spring tension] and continued concavely to the circle of diameter $D - 2m$.

The curve so obtained represents the movement of the center of the tappet roller and thus of the valve itself. To obtain the actual shape of the cam, arcs are described from points in this curve, as centers, with a radius of $.5d''$, and the cam shape is then drawn as the curve following these arcs tangentially, as indicated in Fig. 3.

For this illustration a motor with 80 millimeter bore and 120 millimeter stroke was chosen. The piston travel curves are marked A and the kinematic releasing-curves of the valves are marked B. To avoid confusion, B is constructed separately at the bottom part of the drawing and is afterwards transferred to its right places. The diagram is drawn to 2 : 1 scale [slightly changed in the reproduction] and intended for tappets with rollers. The curves for the travel of the roller centers are drawn in dashes, the final cam shape in full lines and the auxiliary curves, both A and B, in dots and dashes.

The lifting-curve of the intake cam intersects the piston travel curve at the beginning of the suction stroke in Fig. 3, and this relation would indicate increased gas velocity at this point. It is the unavoidable consequence of the retarding of the intake valve opening; but, far from being a drawback, the increased gas velocity at the beginning of the suction is greatly desired with a view to obtaining a uniform vaporization. The volumetric efficiency of the motor does not suffer; if for no other reason then because any loss of charge at the beginning of the suction is more than offset by a considerable retarding of the valve closure.

Required Rigidity of Camshaft

In motors with cylinders close together and short crankshafts running in only two bearings, the camshaft can also be mounted in two bearings, but must then be of very liberal diameter to avoid deflections and vibrations. An ordinary calculation of strength is insufficient, and it is necessary to ascertain the maximum deflection to which the shaft can be subjected. Even for shafts running in three bearings this calculation of the deflection is urgently advised.

The force to be considered is the resistance of the exhaust valve against lifting, and this is composed of the pressure of the expanding gases against the valve and the spring tension P.

Notations

v = the gas volume at end of working stroke = cylinder volume.
v_0 = gas volume at beginning of working stroke = volume of compression chamber.
v' = gas volume at moment of opening of exhaust valve.
p_0 = pressure at moment of explosion.
p_1 = pressure at moment of opening of exhaust valve.
p_2 = pressure at beginning of working stroke.

We have, through the relations of pressures to volumes,

$$p_1 = \frac{p_2 \cdot v_0}{v'}$$

For an advance release of 50 degrees the value for v' can be taken as approximately $v' = 0.85\,v$, considering the proportions between angle of turn and piston travel, and therefore

$$p_1 = p_2 \frac{v_0}{v} \times 1.175$$

As referred to before, e being the volumetric factor of compression,

$$\frac{v_0}{v} = \frac{1}{e} \quad \text{and hence} \quad p_1 = p_2 \frac{1}{e} \times 1.175 \qquad (20)$$

In practice this value for p_1 must be multiplied with the thermic efficiency co-efficient 0.75; which gives

$$p_1 = p_2 \frac{1}{e} \times 0.88 \qquad (21)$$

According to earlier research [referring to a development by the same author of a power formula for automobile motors without the aid of an assumed value for the mean effective piston pressure, published in *Der Motorwagen* for May 10, 1914]

$$p_2 = e^{\kappa} + \frac{H\,(e-1)}{T_0\,Cvm\,(L+1)}$$

where κ (kappa) is the ratio between the specific heats of the explosive mixture at unvarying pressure and at unvarying volume, H the heat units of 1 kg. of gasoline, T_0 the absolute temperature at the beginning of the compression stroke, Cvm the mean specific heat of the gas mixture at constant volume and L the weight of the air required for the combustion of 1 kg. of gasoline.

From this equation, by insertion of the assumed values, there is obtained:

$$p_2 = e^{1.3} + 7\,(e - 1),$$

and thus we get from equation 21:

$$p_1 = \left(e^{0.3} + 7\,\frac{e-1}{e}\right) \times 0.88 = 0.88 \times e^{0.3} + 6.2\,\frac{e-1}{e} \quad (22)$$

[The author's reference to a formula developed on a previous occasion is here reproduced literally, but it seems necessary to state that an examination of this reference discloses several discrepancies between the notations used there and those employed in the present text, to the effect that only a lengthy and searching analysis could determine whether, despite these discrepancies, the author is justified in inserting the value for p_2, as taken from his development of a power formula, in equation 21 of the present text. If he is not so justified, the whole subsequent development of numerical values for the pressures acting to deflect a camshaft is of course vitiated, but is presented here on account of the interest of his method, while those sufficiently interested in ascertaining the true formula for p_1—to take the place of equation 22 which is in doubt—may look up the original articles or develop a formula for p_1 by independent means.

At any rate, the table of values given below should be accepted only with reservation.—Ed.]

The discrepancies referred to are the following (with allowance for certain changes from both originals made for typographical reasons):

Notations employed	*In present text*	*In the reference*
Gas volume equal to cylinder volume =	v	v_0
Gas volume equal to compression space =	v_0	v'
Gas volume at opening of exhaust valve =	v'	not used
Pressure at moment of explosion =	p_0	p_2
Pressure at opening of exhaust valve =	p_1	not used
Pressure just before explosion-compression =	p_2	p_1
Pressure at beginning of compression stroke =	not used	$p_0 = 1$

The following table gives the values for p_1 calculated from equation 22 in kilograms per square centimeter for 50 degrees advance release of the exhaust and for compressions ranging from $e = 4$ to $e = 5$.

$e =$	4	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5
Pressure p_1 at moment of opening of exhaust valve	5.98	6.02	6.08	6.12	6.16	6.20	6.24	6.28	6.32	6.35	6.39

To obtain p_1 for another advance of the exhaust, the value given in the table may be multiplied with $0.85 : x$, in which x stands for $v' : v$ for the desired advance.

The force K necessary for raising the exhaust valve is accordingly, d_2 being the diameter of the valve:

$$K = P + \frac{\pi d^2_2}{4} \cdot p_1 \quad (23)$$

The importance of this calculation should not be underrated, as K can take considerable values. For example, even for a small bore of 80 mm, the value of K is found to be 87.8 kg.; and this value grows at the square of the bore.

The camshaft should have a diameter giving so high a resistance that the maximum deflection at the locations of the cams does not exceed 0.02 cm.

In Fig. 4, let a and b be the distances of the exhaust cam axis to the center lines of the bearings A and B and δ (delta) the diameter of the shaft.

We have then (see handbooks on beam stresses):

$$f = \frac{64\,K}{2\pi\,\delta^4 . E} \cdot \frac{a^2 . b^2}{a + b}$$

and, for $f = 0.02$ cm and $E = 2{,}200{,}000$ kg.:

$$\delta = 0.111 \sqrt[4]{\frac{K . a^2 b^2}{a + b}} \quad (24)$$

—From article by A. G. von Loewe in *Der Motorwagen*, July 10.

Construction Lessons from Grand Prize and Tourist Trophy Races

ONCE let loose, so to speak, upon a stem to stern design for racing and racing alone, almost every engineer turned to the overhead valve engine quite naturally, says *Automobile Engineer* editorially in commenting upon the inferences which engineers and the employers of engineers are now in a position to draw from the results of the English Tourist Trophy race and the French Grand Prize race of this year. Some of the remarks of the commentator have a bearing upon normal as well as racing construction and are reproduced in substance—with some additional comment—as follows:

The premier race of the year has been won by a type of engine quite new to the road, and the Minervas in the Tourist Trophy event have shown that the theoretical virtues of a hemispherical combustion chamber may be exploited by other means than the use of multiple poppet valves. The Mercedes and the Minervas were of equal originality of design, though in both of them the same theories were applied which underlie the Peugeot construction.

Did the Better Cooling Win?

There is no doubt that the Mercedes had more power than the Peugeots. In both types the top gear was direct, and that of the Mercedes was a good deal the lower. This means that the Mercedes drivers were not afraid of driving their engines at a decidedly higher speed than that at which the Peugeots were turning. Hence it is easy to see where the higher power came from. This leads to the all-important question: Why could the Mercedes engines stand the higher speed?

[In the absence of any evidence of overheating of Peugeot motors, the urgency of this question is perhaps not so conclusive as it might seem at first glance. It is possible that it was inferior road qualities of the Peugeot cars which prevented the vehicle speed, and therefore the motor speed, from being pushed to the limit, and that the reasons for the slight superiority of the Mercedes cars should be sought in

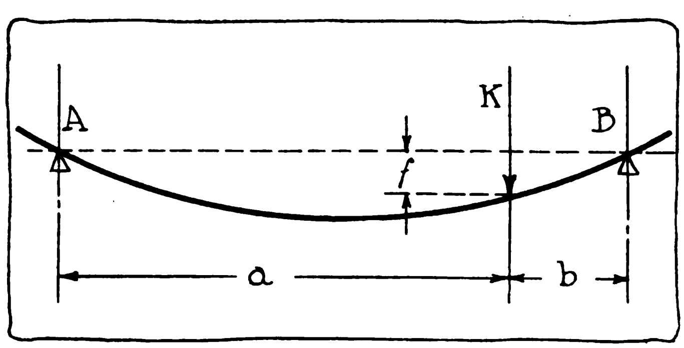


Fig. 4—Diagram of elements in rigidity of camshafts

their general vehicle design and in their spring suspensions, which determine how fast the driver dares to go—more directly than any anticipated motor troubles.—Ed.]

It is the experience of most engineers that engines which can be run at four thousand revolutions per minute for an hour cannot be kept turning at that speed for five or six hours, although they may be able to run at three thousand revolutions for an almost indefinite period. On the face of it, there seems some difficulty in explaining this, because it is not clear what happens when running fast that takes an hour or more to develop. Fatigue of the materials is sometimes the reason; but what is wanted is an explanation as to why an hour at four thousand revolutions, say, should be more likely to produce fatigue than a week at three thousand. In not a few cases failures in engines which are being run at their maximum are traceable to overheating of one part or another—local overheating in fact—and this despite the utmost precautions to prevent the temperature of the water from rising unduly. It may be that in a highly stressed water-cooled engine heat is accumulated slightly faster than it can be dissipated, and that it is this slow accumulation which eventually takes effect—sooner or later, according to the design details of the engine.

Now recall the fact that the Mercedes steel cylinders are machined all over, inside and outside, that the jackets are welded on afterwards, so that the water spaces are all alike and there is an equally free flow of water around each combustion head and valve seat. Add to this that the walls are thinner than they must be if of cast-iron, and it becomes obvious that the cooling of the Mercedes engine is more certain, and probably more efficient as well, than the cooling of any cast-iron block-cylindered motor ever could be.

The Oil—Another Cumulative Factor

[In seeking for a factor which undergoes certain changes by the mere lapse of time, apparently, it would perhaps be well to consider the lubricating oil. In aviation motors of the Mercedes type and in nearly all racing motors a portion of the oil used is returned to the oil circulation system and is used over again. Now it is known that oil when exposed for some length of time to heat undergoes certain chemical changes of a rather subtle nature and largely depending upon exact temperatures and time periods. The polymerization of turpentine into isoprene and of isoprene into synthetic rubber is perhaps the best known example of this action. The oils are "cracked" more or less and lose volatile elements whose vaporization in the motor cylinders naturally contributes to the cooling properties of the oil so long as it is fresh. It is thus conceivable that after some length of time at maximum temperature of the motor that portion of the lubricant which is derived from the circulation system loses both in lubricating and in cooling qualities, eventually lowering the efficiency of the motor for continued running—unless an entirely new oil supply is provided.—Ed.]

Bevel Gear and Single Camshaft

As to the operation of poppet valves—with the now almost universal four-valve design, so far as racing motors are concerned—the Mercedes success has shown beyond all possible doubt that there is no need for the Peugeot train of spurgears to drive an overhead camshaft. On the contrary, it shows that a properly proportioned bevel gear of much smaller weight is just as efficient.

It has been said that in a high-stressed engine valve rockers are a source of weakness; this opinion accounting for the direct operation of the valves by Peugeot and Sunbeam from a pair of camshafts. As the single camshaft is constructively much preferable, it is good to know that the bevel-gear construction need not be feared any longer.

Another point brought out by the Mercedes is that plain bearings are good enough for a racing crankshaft if the oil pressure is high enough. Undoubtedly the rigidity of a good plain bearing gives much better resistance to the bending stresses of a shaft than ball bearings, though but few cases of actual failure of the latter have been reported.

A Question of Bearings

[At this point continental technical opinion leans toward the idea that plain bearings for crankshafts will eventually be worn out conically from the effects of irresistible vibrations, unless the dimensions are made larger than admissible from other points of view, and that, on the other hand, ball bearings can be protected against vibrations if they are either mounted so as to permit them to oscillate in response to the shaft vibrations or so designed that the balls can oscillate in the fixed outer ball race. This view thus favors ball bearings in the matter of durability and for ordinary cars—their adaptedness for block cast motors and short crankshafts being also considered—while for a racing motor the plain bearings may offer superior guarantees for any single exploitation of its stamina.—Ed.]

Cantilever Springs in the Balance

It is to be regretted that the Vauxhall and the Aquila-Italiana in the two races were never able to show the behavior of their cantilever rear suspensions. If this type of spring is satisfactory for the ultimate test of the road race, it should be better than the half-elliptic, because it is easy to adapt to give a large amplitude of spring movement, and it has several advantages from the points of view of the erecting shop and the body builder. It must be left for next year to show how it can behave when called upon.

The outstanding lesson of the two big races is really that there is still plenty of opportunity for originality of design; that those who had the courage to follow their own ideas without any reference to others have reaped a rich reward. —From *Automobile Engineer*, August 15.

Legal Views on Contributory Negligence

A motor car was started from front of plaintiff's residence on a street at right angles with the trolley line, which was about 40 feet away. The trolley had head-lights and other lights and was easily seen at a distance of 700 feet. The chauffeur wished to turn right on the car street. As he turned a collision occurred. It came out on the trial that the car was going 20 miles per hour and the automobile 4 to 5 miles per hour. The Court said that as the chauffeur saw the car when he was about to enter the track and continued for 25 feet when he might have stopped or turned off, or speeded up and gone straight across, he was guilty of contributory negligence because he did neither of these things but went leisurely on his way.—*Bertrand vs. Milwaukee Electric Railway & Light Co.*, 146 *N. W.* (*Wis.*), 915.

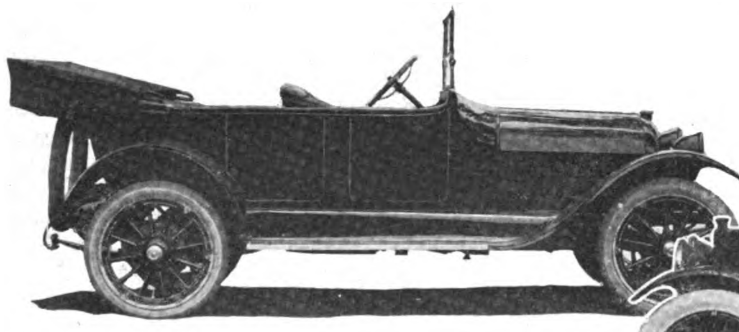
Speeding Across Railroad Tracks

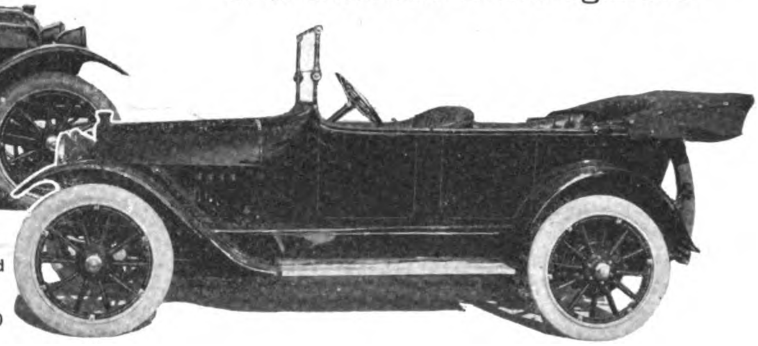
The fact that a motorist kept on driving his machine at a high speed when he came to a railroad crossing was held by the Court in a recent case to be such negligence on his part as to prevent him from being successful when he sued for injuries for damages caused by a collision with the rear end of a freight train.

A motorist was driving at a high speed along a country road. On approaching a railroad crossing he did not slow down and collided with the rear end of a freight train which was on the roadway. The Court held that even if no warning gong was rung, he was not relieved from ordinary precaution for his own safety, but as he had his side curtains down and his windshield up it must be presumed that he knew he had only his sight and his knowledge of the location to depend on, and for that reason the railroad company was held free from liability.—*Farmer vs. N. Y., N. H. & H. R. R. Co.*, 104 *N. E.* 492.

New Velie Six $1,595—Two Other Models

New Model Has Spiral Bevel Axle —Tapered Frame—Vacuum Feed and Atwater Kent Ignition





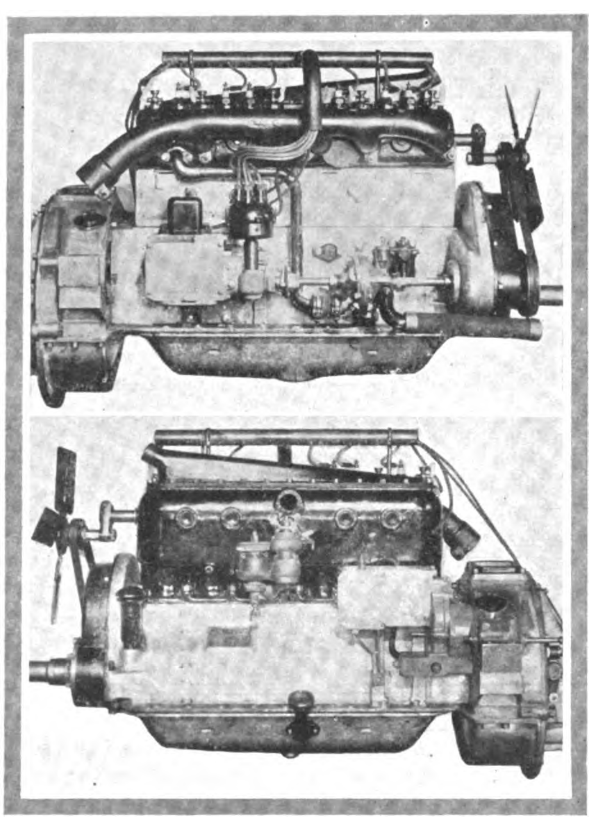
Left—New Biltwel Velie with round nosed radiator and smooth body lines

Right—Four-cylinder Velie model 12 which sells for $1,750

AN entirely new small six selling at $1,595 and called the Biltwel series 15 is the feature of the line of the Velie Motor Vehicle Co., Moline, Ill., for the ensuing season. Last season's small four, the model 11 has been discontinued and the big six, called series 14, this year and the big four called series 12, have been improved and reduced in price. The four has been reduced, from $2,000 to $1,750, and the six from $2,350 to $2,015. New bodies are featured on all the cars. In the new six the Velie company has incorporated a number of special features which have lately come into use by motor car builders. The spiral bevel rear axle gears is one of these features, the tapered frame, another, and it might be mentioned that the frame of the new Velie brings the distance between front spring centers to 27 1-4 inches. The rear of the frame is 37 inches wide and the front 29 1-4. Hotchkiss drive is another adoption. In this car propulsion is through the springs, eliminating the conventional radius rods or torsion tube. Stewart vacuum fuel feed and Atwater Kent ignition with automatic spark advance are other features used in the new small six which were not used on previous models.

The engine is a Continental, forming a three-point suspended unit power plant with a cone clutch and gearset made by the Warner Gear Co., Toledo, O. The engine cylinders are cast in block, have a bore and stroke of 3 1-2 by 5 inches and are of L-head design. The crankshaft is supported by three bearings and through helical gears operates the camshaft. The valves controlled by the shaft are 1 1-2 inches in diameter. The oiling system is a combination of circulating splash and pressure, the main bearings being fed directly by leads and the reciprocating parts by splash distribution.

On the left side of the engine is a Stromberg model H.B. 2 carbureter of 1 1-4 inch. This carbureter bolts directly to the cylinders feeding to the valves through a cored passage in the casting. The carbureter air intake is connected to the exhaust manifold by a sleeve and pipe. Fuel feed is by the Stewart vacuum system in which a small tank is placed behind the dash while the regular fuel tank is in the rear of the chassis. The fuel is drawn into the small tank by motor suction and then fed to the carbureter by gravity, doing away with all pumps and air lines necessary with a direct pressure feed.



Upper—Right side of Continental motor used in new Velie Biltwel six. The pump, Atwater Kent ignition system and generator are on this side

Lower—Left side of motor showing high mounting of the carbureter and position of starting motor. The construction of the fan bracket is clearly shown and the oil gauge is seen at the bottom of the crankcase

High-Speed Cranker

On the same side with the carbureter is a Gray & Davis small, high-speed engine cranker operating at 6 volts and turning over the engine through the medium of a toothed-flywheel. On the left side there is also an oil gauge attached to the lower portion of the crankcase.

On the right or exhaust side of the motor is the small-type Gray & Davis 6-volt lighting generator with the regulator installed on top of its casing. Next to the generator is the Atwater Kent distributor with wires leading from it into a conduit making a neat wiring installation.

The ignition system is fitted with a reverse-current switch. This switch is of the rotary type with four positions instead of two.

The electric system has all its wires housed in metal conduits and the headlight wiring is concealed. The headlights are supported by single props which house the wires. These headlights are of the double-type affording a means of using bright or diffused light. Every lighting circuit is fused, and there is a combination switch installed which allows of any set of lamps being used. The tail light and dash light are wired in series, so if the dash light goes out the tail light is extinguished also.

The clutch is of the cone type with a 2 1-2-inch face with an angle of 12 1-2 degrees. Back of the clutch is a four-speed selective gearset, with the following motor-to-wheel ratios: First, 12.87 to 1, second, 6.73 to 1, third, which is direct, 4.08 to 1 and geared up fourth, 3.42 to 1. This gearbox is of the narrow type in which the countershaft is above the shifter shaft making a neat installation and taking up little room apparently.

The drive from the gearset is through an open shaft fitted with two Spicer universals to a Timken floating rear axle fitted with spiral-bevel gears. This type with its sliding action of the teeth offers a set more quiet than the straight bevel and may be called the mean between the worm and the ordinary bevel. The car's wheelbase is 124 inches.

The controls of the new Velie six have interesting points of advantage. The steering post for example, placed on the left side, has self-lubricating bushings. This post is of Gemmer make and has a large horn button at its center. To the right of it is the ball-joint gearshift lever. The ignition control has an auxiliary in the form of dry cells operated by a switch near the floor boards and within easy reach of the driver's right hand.

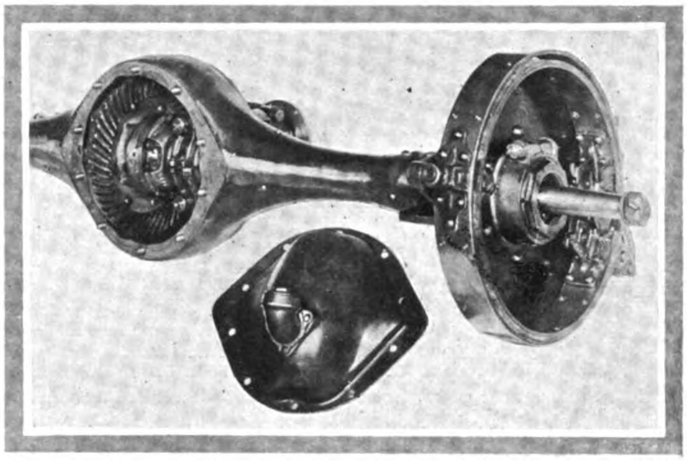
The new Velie frame has an unusual taper. The frame is 4 1-2 inches deep by 2 by 5-32 inch and because of its narrowness in front, only 27 1-4 inches between spring centers, the car has a very short turning radius.

On the improved six no chassis changes have been made, but the body has been altered, the lines are better, and the cowl dash arrangement is slightly different. The rear tires now are of the non-skid type instead of plain tread and a Taylor Noil pump is given as added equipment. The only other change has been in the fitting of headlights with dimmers.

Continental Motor Used

The engine in the big six is a Continental of 3 3-4 by 5 1-4 inches bore and stroke and has its cylinders cast in blocks of three. The engine shows nothing radical but differs from the small six motor in that it is equipped with a Bosch magneto instead of an Atwater Kent system and the Gray & Davis electric cranking and lighting system is of the larger type.

The engine drives to a disk clutch and four-speed gearset and then to a floating rear axle. By propeller shaft fitted with two Spicer universal joints. The wheelbase is 126 inches.



New Biltwel rear axle grease filler on axle cover

The price of the Velie big six has been reduced from $2,350 to $2,015 for the five-passenger. This and the seven are the only open types made. A sedan is listed at $2,715. Blue with Velie green optional are the touring colors while the sedan is sold only in blue.

The carried-over Velie four, shows the same general body lines as the other cars and the changes in this are the same as those made in the big six with one additional. This has been the increase in tire size from 36 by 4 to 37 by 5 1-2.

This car is the only one using a motor made in the Velie shops. It is of L-head design with pair-cast cylinders of 4 5-8 by 5 1-4 inches bore and stroke. A feature of this engine is the transverse magneto driven by worm gears, and set over the timing gear case. Another unusual feature is that the carbureter is on the right side with its intake pipe passing over the cylinders to the manifold on the left side. This forms a very accessible position for the Stromberg carbureter.

The running gear of the four consists of a disk clutch, four-speed gearset giving a motor to wheel ratio on third or high of 3 13-14 to 1. The rear axle is a Timken floating type and the wheelbase 121 inches.

The Velie four has been reduced in price as mentioned previously from $2,000, in four- and five-passenger form, to $1,750. A five- passenger sedan is sold at $2,450. The latter is finished in blue only while the touring cars are painted in either blue or Velie green.

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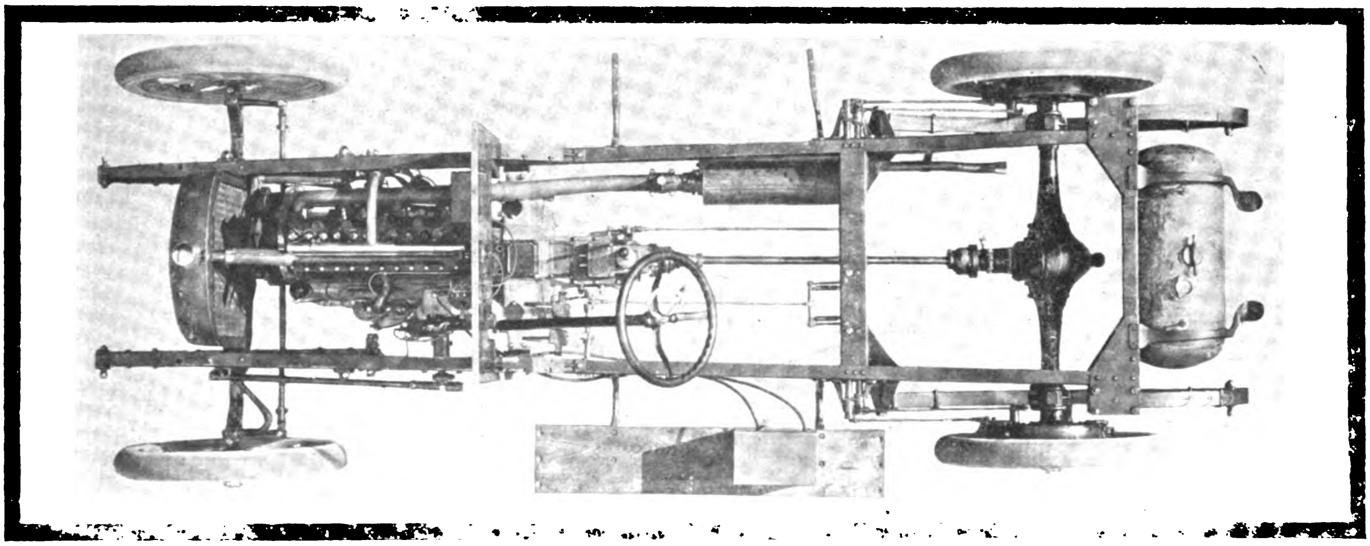

Plan view of new Biltwel Velie showing unit power plant construction and left drive with center control. The battery box is carried on the left running board and the gasoline tank is in the rear

Two Bosch Magnetos—One Has New Distributer

New Model With Collector Ring-Distributer for Small Cars—Other Model Gives Easy Starting, Called Vibrating Duplex System

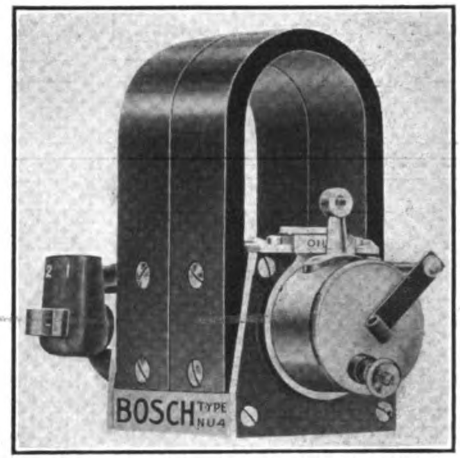

Fig. 1—New NU4 without distributer. The breaker box construction is conventional. A double slip ring takes the place of the distributer

TWO entirely new Bosch systems to meet the requirements of recent developments in automobile design have just been announced. They are a vibrating duplex system to make possible the certain starting of the motor when cranked at low speeds by the starter, and an entirely new design of high-tension magneto, Fig. 1, with a combined current collector ring and distributer to take care of the popular-priced, small four-cylinder car.

Simplified Magneto for Small Fours

With the placing on the market of several makes of small four-cylinder cars of light weight, the Bosch company has kept its product up to time by the marketing of a greatly simplified high-tension magneto especially designed for this work. By the elimination of the distributer as an independent unit of the magneto construction it has become possible to reduce materially the number of parts used in the manufacture of the magneto, making it exceedingly light.

The function of distributing the ignition current has been placed in the new instrument on the slip ring. The single slip ring however, has been replaced and instead a double ring has been substituted which not only acts as the collector for the high-tension current but as the distributer as well.

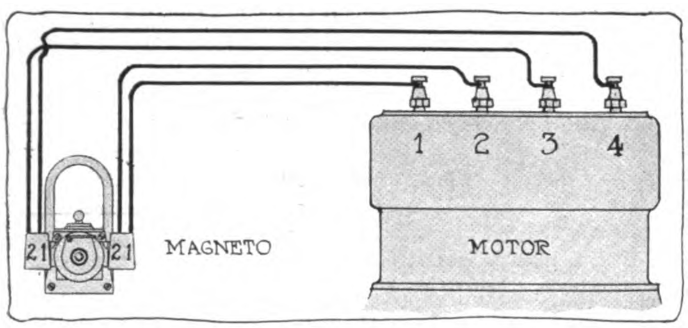

Fig. 2—Simple wiring diagram of new NU4 magneto without distributer

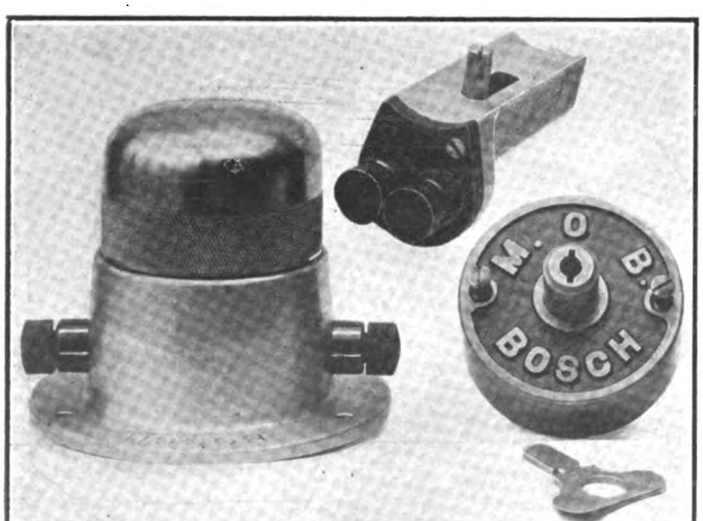

Fig 3—Components of vibrating duplex system. The inclosed vibrating coil is at the left and the dash switch at the right

Another new feature about the new Bosch magneto, which will bear the name NU4, is the use of two entirely separate armature windings. Hitherto the secondary winding in the Bosch magneto has been practically a continuation of the primary, its inner end connecting with the latter and the other end is led to the insulated slip ring or current connector ring which rotates solidly with the armature shaft of the instrument. From the slip ring the high-tension current is collected by a brush and led to a central point on the distributer block. It is taken from this point to the various plug points by a rotating brush.

New System on NU4

On the NU4, Fig. 2, an entirely different system has been worked out. The primary winding, as in other types, has one end connected to the armature core and the other end to the insulated contact block supporting the long platinum screw on the contact breaker. The breaker box mechanism is in every particular similar to that used on previous Bosch models. It is shown in Fig. 4.

It is in the high-tension winding that the first difference manifests itself. In the new model there is no connection whatever between the primary and secondary windings. In fact they are heavily insulated from each other. The two ends of the secondary winding are connected to two metal segments located on a double slip ring as shown in Fig. 7. This double slip ring is mounted on the armature shaft and rotates with it.

Bearing against the double slip ring are two pairs of brushes. Each of these four brushes forms the terminal of a spark plug wire. As the armature rotates the segments form a contact in turn with each of the four brushes sending the spark to the plug to which contact is made. The high-tension current is thus distributed without recourse to the ordinary type of distributer.

The keynote of the new magneto is the slip ring which so ingeniously takes care of the needs of the collecting and distribution functions of the magneto. It is made in one piece with two deep grooves in place of the single groove seen on other Bosch rings. It is of hard rubber insulating material. Imbedded in each groove is a metal segment. The two segments are set diametrically opposite on the armature shaft, that is, a distance of 180 degrees in angular measure. They are insulated from each other as well as from the core of the armature and the magneto frame.

The four brushes are supported by two double brush holders, as is clearly illustrated in Fig. 7. With this arrangement the magneto will give two sparks to each revolution from alternate segments on the collector-distributor ring. The brush holders fit into openings provided in each side of the driving shaft end plate and are held in place by catch springs. The brush holders together with the brushes can be pulled out of place without tools.

The NU4 magneto is installed so that it is driven at engine speed. As there will be a surplus spark in each cylinder 360 degrees behind the effective spark or one revolution of the crankshaft, the timing must be such that the inlet valve has not started to open at this time and so that the exhaust is preferably still open. Under average conditions this state of affairs is secured if the magneto is fitted so that the interrupter housing is in full retard position just as the interrupter screws are about to separate when the number 1 cylinder is on top center. At this time the metal segments of the slip ring should be in contact with the brush marked 1.

This magneto is suitable for installations up to 30 horsepower. It can be used as the sole source of ignition on engines up to this size, being of independent design. It can, however, be used to advantage in connection with the Bosch Duplex above described.

Vibrating System Instead of Dual

The vibrating system is designed to render unnecessary a dual ignition system on cars that are cranked by a starting motor at such a low speed that the ignition current from the ordinary magneto is insufficient to give certain ignition. Instead of using independent current supplied by a set of dry batteries or by some other source, the new Bosch system takes the primary current from the primary winding of the magneto and by means of an inclosed type of coil and a battery placed in series with the primary winding produces the high-tension spark necessary at the plug gaps.

The number of extra parts required with this new system is small. No additional wires running to the magneto are needed and the timing device which is already incorporated in the magneto suffices for the purpose of directing the spark to the proper cylinders. A further simplification of the system is secured by taking the connections necessary for the operation of the system directly from the starting switch instead of placing another switch on the dash.

When the starting pedal is depressed the vibrating duplex system is thrown in. The coil receives current from the battery as soon as the starting switch reaches its first contact point. The coil is so constructed that it will operate down as low as 4 volts. In other words the functions of the secondary winding in the magneto are for the time being fulfilled by the little vibrating coil. The contact is made, broken and timed through the breaker box of the magneto in the ordinary manner so that as far as the wiring of the magneto is concerned no alterations are necessary. A wiring diagram is given in Fig. 5.

In case the starting motor for some reason should fail to work the new duplex system also works to advantage. The Bosch company states that a special switch can be built into the starting crank end of the engine so that when the crank is in-

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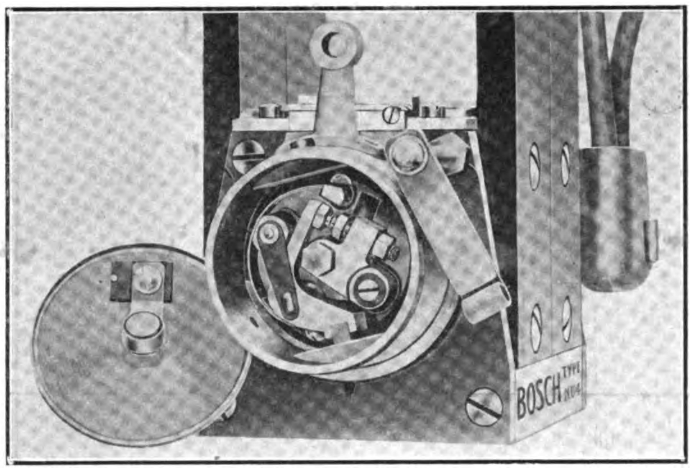


Fig. 4—Breaker box construction on new NU4. It is conventional

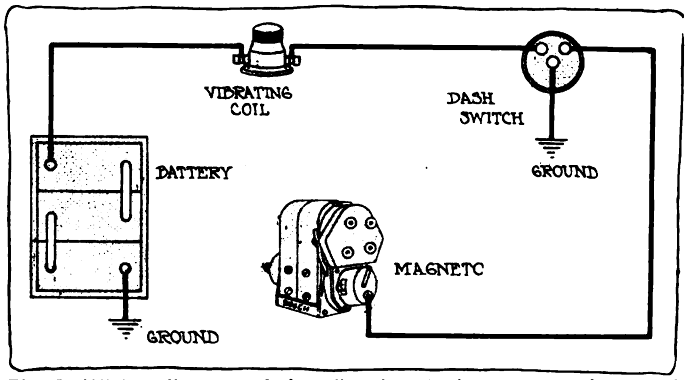


Fig. 5—Wiring diagram of the vibrating duplex system when used in connection with a starting motor

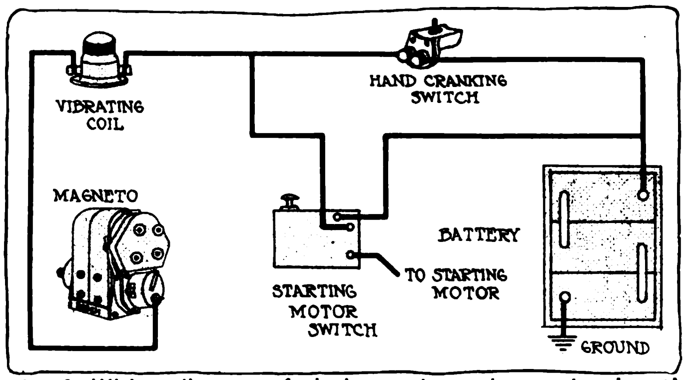


Fig. 6—Wiring diagram of duplex system when motor is not equipped with starter

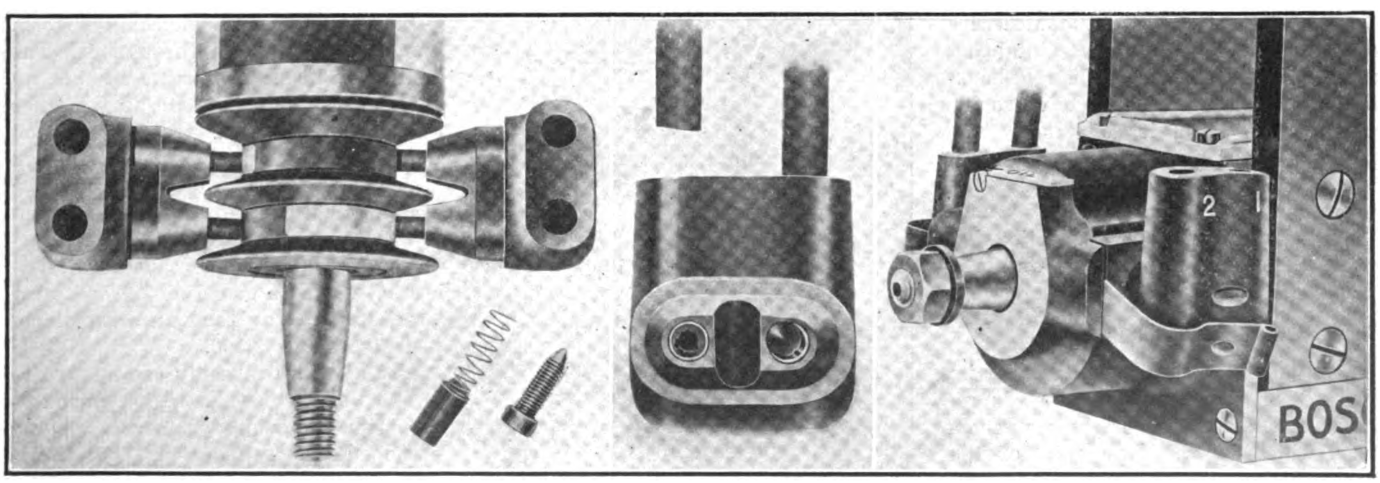
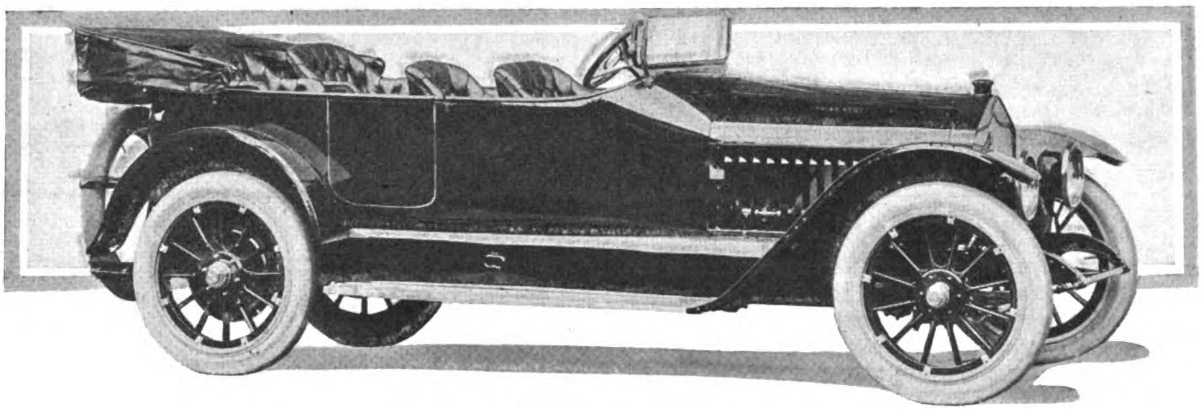


Fig. 7—NU4 magneto—Left to right—Setting of carbon brushes. Detail of double carbon holder—Brush holder construction

One Six—National Offering for 1915

This Chassis Continuation of Present Six—Boat Body Feature of Car—Five Other Body Types—New Electrical Equipment



New six-cylinder National with two-door boat body

FOR 1915 the National Motor Vehicle Co., Indianapolis, Ind., is building but one chassis, a six-cylinder type, which is a continuation of the 1914 design. This company, which for years has been a leading exponent of the four-cylinder design, is still bringing some of these through the factory, but after the present factory lot is shipped, four-cylinder styles will only be built on special orders.

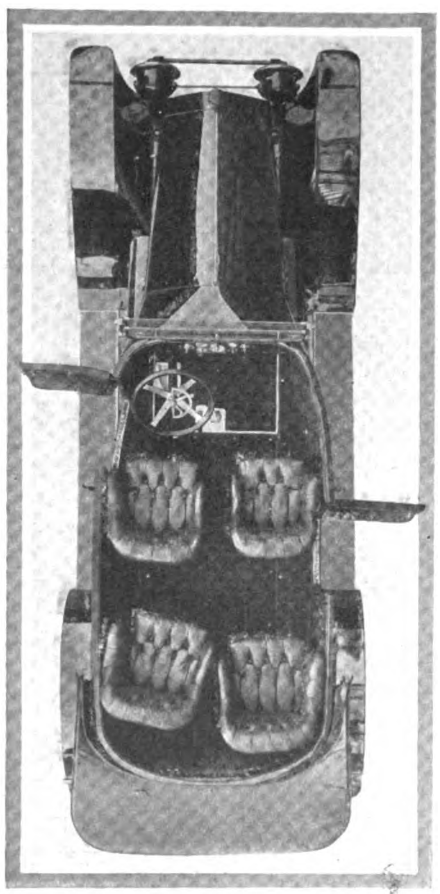
On the single chassis for 1915, not fewer than six different body types are fitted. Of these five are continuations of present styles with refinements, but the sixth is a new boat design which the company is introducing for the first time.

New Electrical System

The new cars are practically the same in price and essentially the same mechanically as the 1914, except for alterations as noted. Chief in these is an entirely new electrical equipment comprising the Eisemann magneto now used as the only source of current, and the Remy starting and lighting outfit, which replaces that formerly used. The Remy system is a 6-volt, double-wire one, with the starting and lighting units combined in one double-deck housing, but these are separate units so far as their operation is concerned. The cranking motor, a series-wound design, is capable of turning the engine at 100 revolutions per minute, even under adverse conditions. The reduction between the cranking motor and the crankshaft is 28 to 1.

Charges at 8 M.P.H.

As soon as the engine starts under its own power, the cranking motor is released and the engine drives the generator, which is the lower part of the double-deck unit. Between the generator and the crankshaft is a 2 to 1 reduction which allows the generator to start charging the battery at 8 miles per hour, and makes it capable of carrying the full lamp load at 12 miles per hour, at which speed the output is 12 amperes. The current regulation in the generator is by means of a bucking coil. Generator drive is by silent chain off the crankshaft.

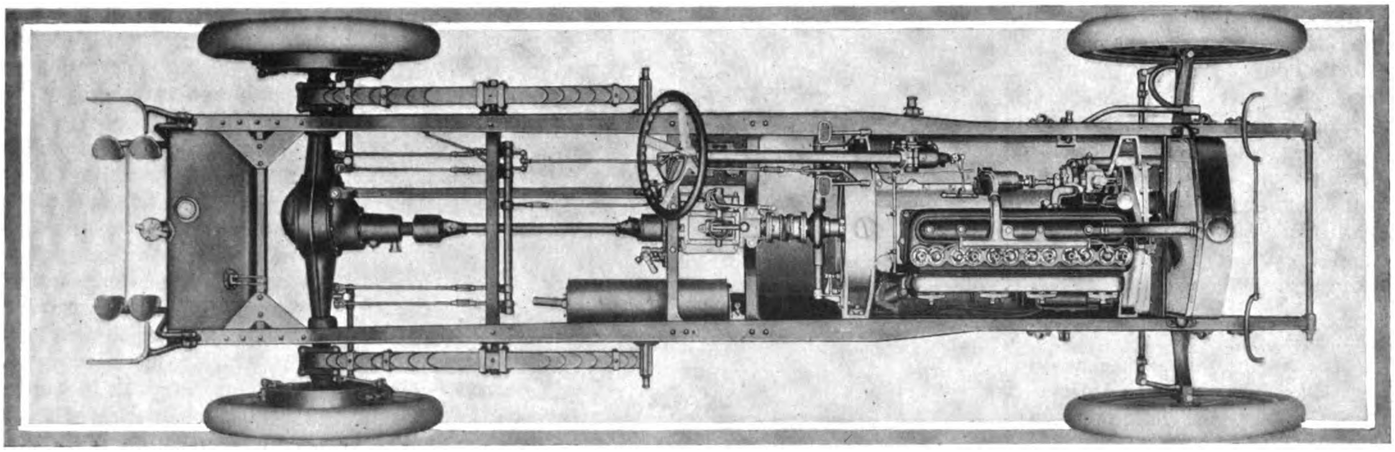


Plan view of boat body showing the novel arrangement of the doors and the individual chair seats that are movable

Most important in the body styles is that of the new boat type which was shown for the first time at the recent Michigan state fair. It has four deeply upholstered individual seats and one extra seat that folds into the rear extremity of the body. In form the body is similar to the upper part of the hull of a torpedo-stern motor boat. The four chairs are placed side by side, front and rear. Each chair is placed on a track that permits it to be moved forward or backward as desired. In addition there is a swivel arrangement by means of which the chair can be turned on its axis allowing the occupants to seat themselves tete-a-tete if they desire. The price of the new car fitted with the new body is $2,700.

In body work the streamline form has been adhered to throughout. The boat body is more extreme in this respect than the others. On all the other models the sides are straight while on the boat model it has a pronounced sweep. In addition to this body the company is continuing the four-passenger toy tonneau, five-passenger touring and two-passenger roadster, all listing at $2,375; a coupé at $2,750 and a six-passenger toy tonneau with disappearing seats, $2,500.

The cars are all fully equipped; tire pump, Collins curtains, extra demountable rim, windshield, horn, etc., being standard. Color is optional, but if not specified, National blue is furnished. Wheelbases of all but the roadster



Plan view of chassis showing the block motor, cantilever spring suspension and fuel tank location

model are 132 inches, the roadster model measuring 124 inches.

By following the modern trend in body work and making use of a mould rather than an angular body, the National company has in common with a number of other concerns, making a car of this size, clipped about 100 pounds from the body weight. In spite of this reduction in weight, the six-passenger body is longer and wider than in 1914. The extra seats fold into the backs of the front seats and are concealed when not in use by a leather flap that buckles over them. Another change is that the Willard battery is longer and narrower, making it possible to store it neatly in an accessible compartment beneath the splash guard.

Lighter Reciprocating Parts

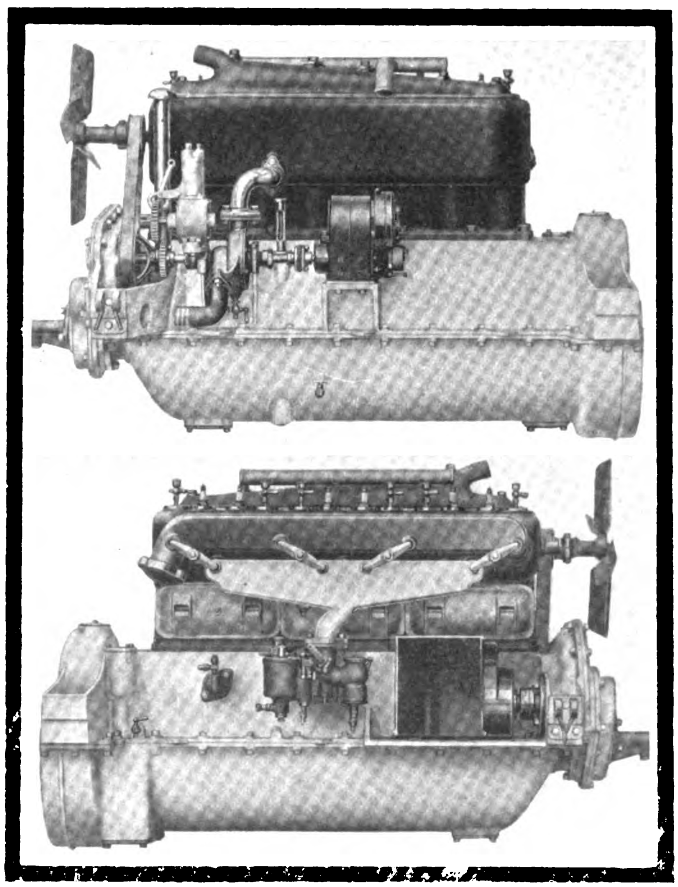
Twenty-five per cent. has been cut off the weight of the reciprocating parts of the motor for this season resulting in an increase in power and the elimination of vibration at high speeds. The crankcase is now a heavier casting adding still further to the rigidity of the construction. The oiling system remains the same in the principles of operation, but a vertical oil screen replaces the horizontal type and eliminates any chance of clogging because the oil cannot settle on the surface.

In the gearbox the travel of the sliding pinion has been increased by .25 inch. The purpose of this change is to make possible an easier gearshift. The bearings of the rear wheels are now larger. In place of carbon steel the springs are now of silico-manganese. Another alteration in the spring, which is a cantilever design, is that it is now practically flat, whereas on the former National the spring had a pronounced arch.

The 3.75 by 5-inch powerplant is a six-cylinder block design with L-head cylinders. The intake and exhaust manifolds are cast separately. The exhaust manifold is of gray iron. The intake is aluminum and is cored so that the waterjacket space registers with that of the manifold allowing the water to circulate about the intake passages to assist vaporization before entering the cylinders.

The waterjackets are arranged with baffle plates so that the water is led from a point beneath the valves where it enters and makes a circuit of each cylinder before reaching the outlet at the top. The cylinders are fitted with a cover plate that is removable, permitting of access to the water-jacket space.

The gray iron pistons are fitted with four rings, and have an oil groove and holes drilled to allow the excess oil to escape rather than to find its way into the top of the cylinder and cause smoking. The open hearth steel, case-hardened, piston pins are ground to their finished size, the holes are bored and reamed.



Upper—Left side of motor showing the location of the magneto water pump and power tire pump. Lower—Right side of motor showing the position of generator and arrangement of the piping

The connecting-rods, of open hearth steel, are I-beam in section and are drop-forged and heat treated. They are not offset and the upper bearing is fitted with a phosphor bronze bushing and the lower bearing is lined with babbitt against a bronze backing. Alloy steel bolts are used in holding the connecting-rod bearing caps in place.

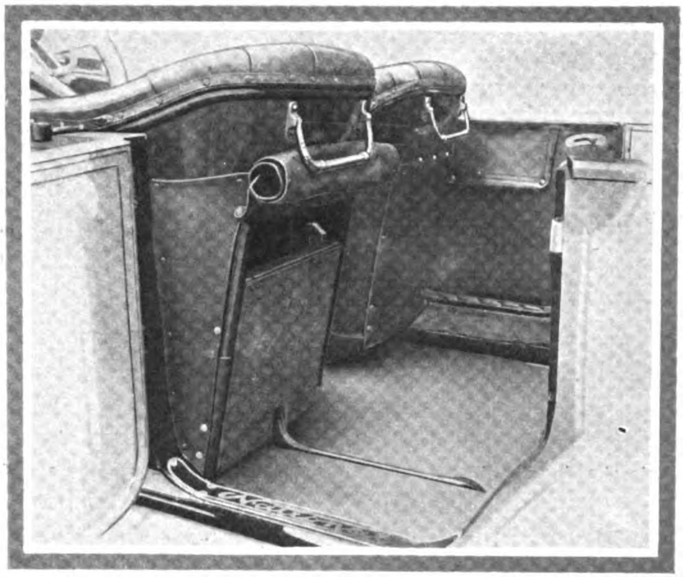
The crankshaft, also of open-hearth steel, is heat treated, and is balanced on a Norton running-balance machine. It is supported on four main bearings. Its diameter is 2 inches at all the bearing points except at the rear where it is enlarged to 2.125 inches to take care of the weight of the flywheel. The length of the front main bearing is 3.125 inches; of the two center ones, 2.5 inches, and the rear 4 inches. The diameter of the crankpins is 2 inches and the length of the crankpin bearings is also 2 inches.

The camshaft, carried on four bearings, has the front one made large to take the stresses of the drive from the timing gears. The connection between the cam gear and the shaft is made by means of a flange. The camshaft is completely inclosed and virtually runs in a bath of oil. The cams and shaft are a one-piece drop forging and the cams finished on a cam-grinding machine.

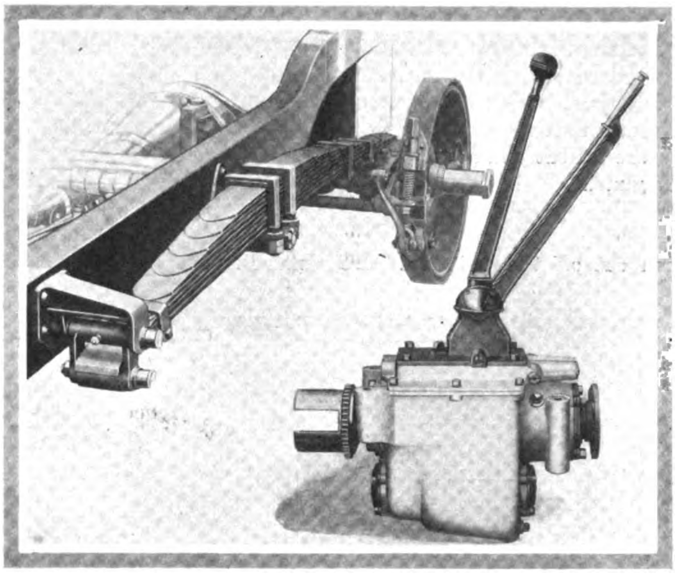
Valves All Enclosed

The entire valve mechanism is inclosed, the adjustment points being accessible by the removal of three cover plates. Each plate covers two inlet and two exhaust valves. The valves are of liberal diameter, 1 11-16 wide in the clear. The ends of the valve stems are hard and the push rods are of alloy steel. The stems and push rods work in separate removable bushings. The valve springs are oil tempered.

The oiling system is the same as that employed in 1914, in which the oil is carried in a reservoir in the lower half of the aluminum crankcase. From this reservoir it is pumped through a lead and separate tubes to each of the four main bearings. The oil which reaches the main bearings flows down on either side of the bearing into a series of splash troughs. When the level in these troughs rises to a certain height the excess is led back to the crankcase through overflow holes in the troughs. The filler tube for the oil reservoir is brought high up on the front end of the motor rendering it accessible. A float gauge is placed on the same side.



Method of concealing auxiliary seats on six-passenger body. They fold into the front seats and are covered by curtains



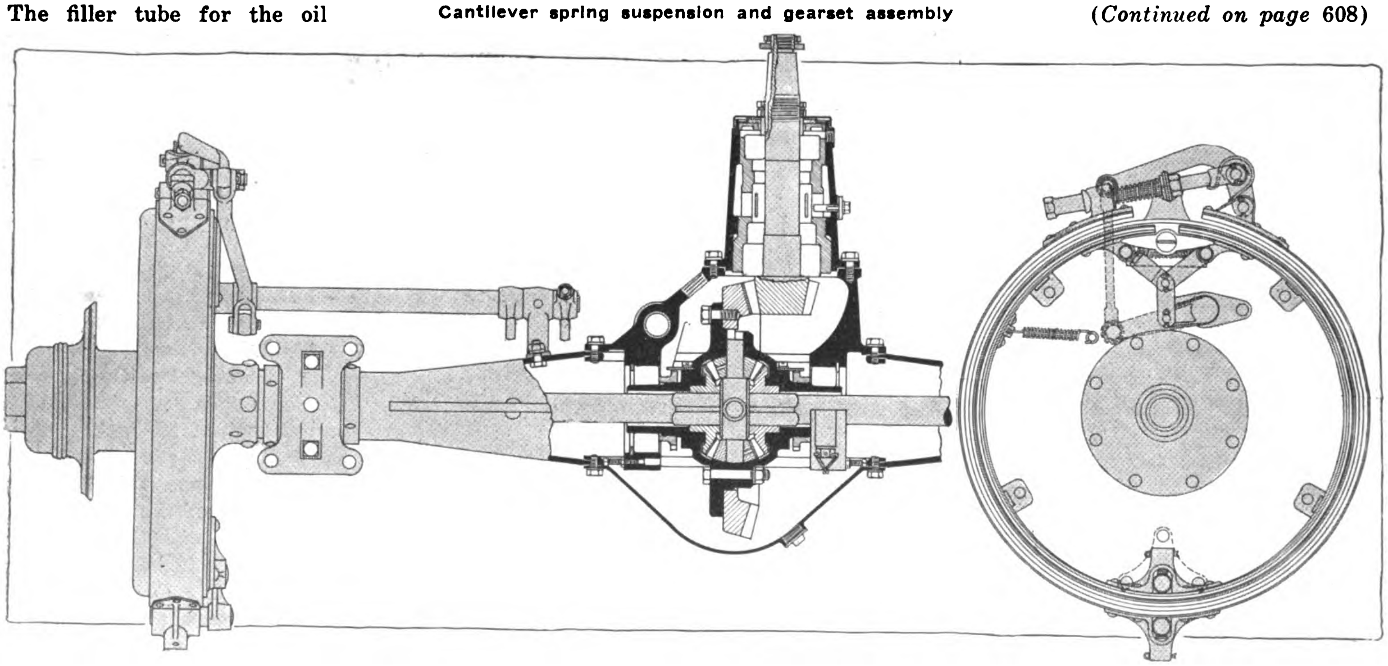
Cantilever spring suspension and gearset assembly

In the cooling system the centrifugal water pump placed on the left side of the motor at the forward end has the runner and bearings of bronze to avoid the tendency to corrode. Cooling is aided by means of a 16-inch steel fan, which is mounted on ball bearings. The fan bracket is movable for adjustment.

The gasoline system remains unchanged except that the newest Rayfield carbureter is fitted. This is the model G-3, 1.25 inch. The fuel tank is hung between the rear frame members and has a capacity of 21 gallons. The feed is by pressure, the pump for applying this pressure being mounted on the side of the motor and driven off the rear end of the camshaft. The gasoline tank is fitted with a gauge and the filler neck is extended back to provide for accessible filling.

Power is transmitted by means of a cone clutch, a type used in the National since its inception. Beneath the surface of the leather are flat springs which are compressed in engagement. These give a firm grip. The three-speed gearbox is the same design as previously used with the exception before noted on the increased travel of the shifter pinion. This increased

(*Continued on page* 608)



National rear axle showing the differential construction and details of the brake mechanism

More Graceful Lines on Waverley

(*Continued from page* 577)

bearings and the inner sides are kept dust proof by means of felt washers. The other bearings throughout the car, notably in the motor and the transmission units are annular balls.

The spring suspension is unique in that it employs the seldom-used, five-quarter elliptic both front and rear. A layout of this suspension is illustrated herewith. The engineers claim for this type of suspension all the advantages of the full elliptic for softness and of the cantilever in the absorption of road shocks.

A double set of expanding brakes is used on all Waverley cars, and in addition to this the driver has at her or his disposal a third, and very effective brake on the motor. The latter is a band contact type and the differential acts very effectively as an equalizer when this brake is used.

The replacement of the previous four-chair brougham, known as the 107 by the 109 model keeps the Waverley line of passenger cars at five bodies. These with their selling prices are as follows:

Model	Body	Price
109	Four-chair brougham	$3,150
104	Front drive, four passenger	2,900
105	Rear drive, four passenger	2,800
108	Limousine, five passenger, forward drive	3,500

The body work on the new model is the result of a special effort to put out the most luxurious possible town car at the price. The roof and panels are of aluminum. The length of the car over all is 149 inches, the extreme width 66 inches. Of the length 131 inches is taken up by the body. The wheelbase is 106 inches. All four seats are large enough to accommodate people of more than average stoutness. Two of the rear seats are 18.5 by 20 inches, the other rear seat is 23 by 20 and the driver's seat is 18 by 15.5. The road clearance is 10 inches and the step to the ground 14 inches.

The upholstering work is optional. It may be in any of the imported corded fabrics or of special limousine leather. The standard color is black with majestic blue panels, but the car will be painted to suit the demands of the individual. The tires are 34 by 4 inch front and 34 by 4.5 rear. They may be cushion or pneumatic at the same price.

New Velie Six, $1,595—Other Models

(*Continued from page* 591)

Propulsion in this new six is through the springs constituting what is commonly called the Hotchkiss drive. As assurance that the springs will not be overburdened the main leaf is made of alloy steel. The front springs are 40 inches long and the rear 52 both having leaves 2 1-4 inches wide. The wheelbase is 124 inches and the wheels fitted with 34 by 4 inch tires on Goodyear endless demountable rims for straight-side tires. The front wheel camber is 1 1-2 per cent.

The high spots have been reached in the matter of body style and equipment. The Biltwel body is the exemplification of the streamline idea. There is a graceful curve from cowl to a new-type of rounded radiator the sides are straight and the back, bell-shaped. The symmetry of the car has not been broken up by anything, for the designers have gone so far as to install a 20-gallon cylindrical gasoline tank in the rear. The top when folded back and covered gives a clean appearance for the top-cover also protects the bows. A feature of this body as well as the others of the line is that they are fitted with anti-squeak strips. Many owners who have had experience with new cars know that many cars will emit body squeaks for the first few months they are in service, but this inconvenience has been eliminated in the Velies by the use of strips at points where squeaks might occur.

No wires are attached to this body, hence it is an easy matter to remove the body without disturbing the wiring. This is due to the fact that a junction box to which all wires are attached, is employed.

Nothing seems to be lacking in the list of equipment. Besides the ordinary accessories, given, the new six is equipped with a Taylor Noil tire pump, a windshield with supports fastened to the body sills, auxiliary emergency battery for ignition, double headlights, gasoline gauge, inspection lamp, tire carrier, and electric horn with control button in the center of the steering wheel.

Two Bosch Magnetos—One Has New Distributer

(*Continued from page* 593)

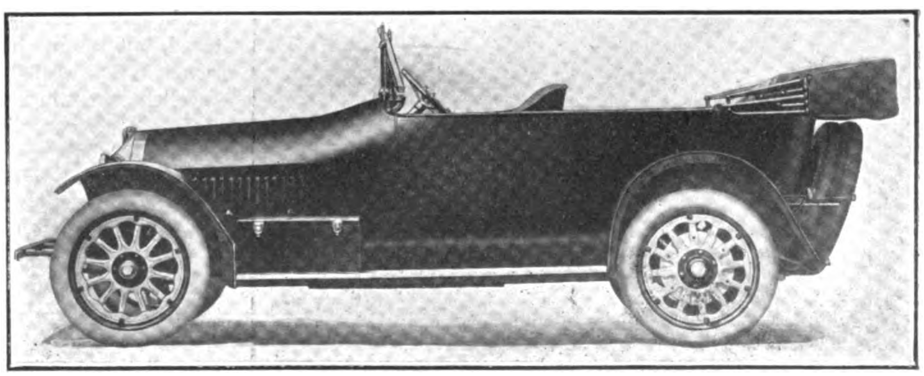
serted in its place it automatically closes the circuit and throws the vibrating coil into operation. It must be understood, however, that the system is not intended to displace the separate battery system as a source of running current. It is merely for starting purposes and at all other times is not in use.

One of the chief uses for a system of this nature is for women drivers who through the failure of the starting system due to a nearly-discharged battery are compelled to fall back on the starting crank. In an incident of this kind the motor could readily be started with a turn of the crank provided at least 4 volts are available.

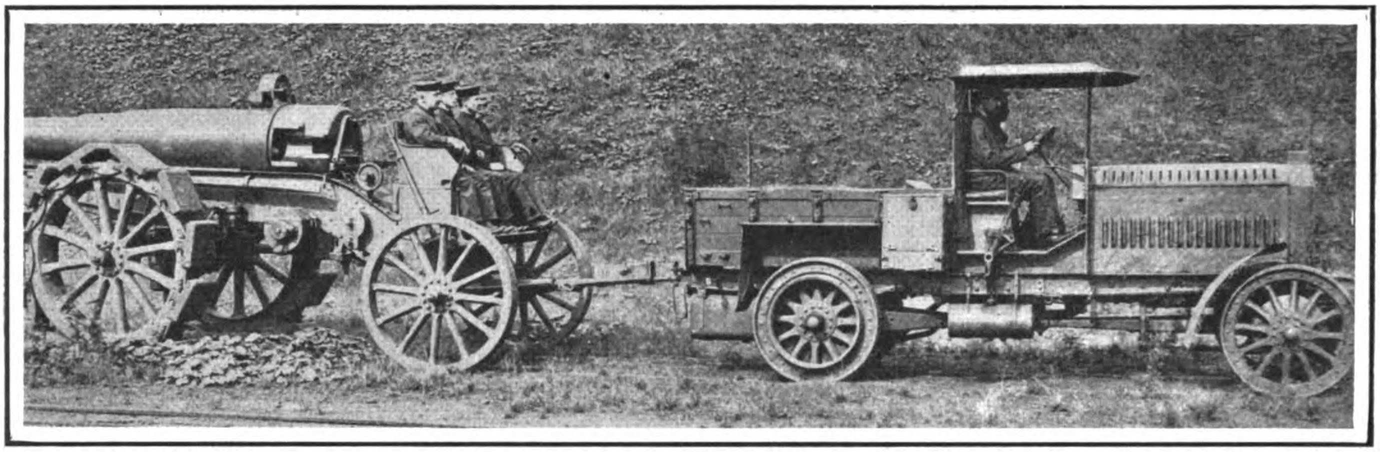
Cars not equipped with starting motors can also make use of the system to provide a means of easy starting without an entirely independent battery ignition. It is also possible to eliminate dash complications in the installation of the switch when there is no starting switch to make use of. A wiring diagram showing how this can be accomplished is given in Fig. 6. Only one wire running from the switch to the magneto is employed. When the switch is in the off position, this wire conducts the battery current from the vibrating coil to the magneto primary, thereby assisting the magneto at low or starting speeds. Fig. 3 shows the component parts of the system including the switch which can be built into the starting crank end of the motor.

Seven Passenger Pathfinder for $2,322

One more model has been added to the Pathfinder line. This is a seven-passenger car of distinctive design selling at $2,322. It is mounted on the standard Daniel Boone chassis, which was fully described in THE AUTOMOBILE, June 11. The extra tonneau seats on this car fold forward into the backs of the front seats.



New Pathfinder seven-passenger six selling for $2,322



Big German siege gun drawn by a powerful tractor. Note the traction blocks used on the trailer that carries the gun

Scenes Near Paris—From An Automobile

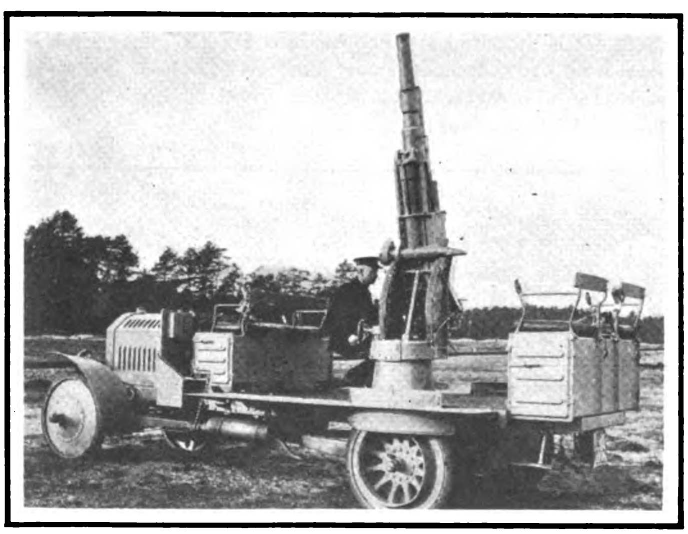
Roads from City Crowded With Refugees—Main Routes Barricaded—Buses for High-Speed Transport—Traveling Difficult

By W. F. Bradley

PARIS, Sept. 15—Playing at last out of Paris was a somewhat risky business, for nobody knew exactly at what moment the doors would be shut, holding those on the inside prisoners and making it difficult for those on the outside to get back again. Having placed an automobile just on the outside of the fortified wall, I was able to get away after the official shutting down of the city in preparation for a state of siege.

This was touring under full war conditions. Before I had been on the road 5 minutes a Maurice-Farman armored biplane was seen making its way over Paris.

That main road out of Paris was crowded with peasant refugees, obliged to leave their homes within the line of fire of the forts. In their lumbering wagons they carried everything they could possibly save: bedding, pieces of furniture, hens, ducks, rabbits, goats, birds. Such cattle as they possessed followed. Of automobiles there were none. Nearly everybody possessing a car had fled from Paris when the first alarm had been given that the city might be invested.



Special aeroplane gun mounted on a Mercedes truck

Ten miles out the scene changed. As everybody is aware, there is a belt of forts around Paris, each fort being connected up with its neighbor by suitable entrenchments. Naturally the forts themselves are invisible, but I was soon aware that I was in their neighborhood by a soldier appearing in the middle of the road and pointing a bayonet at my radiator. The road, which is dead straight at this point, was blocked by strong earthworks thrown up to a considerable height. There were two barriers, each one occupying half the road, but separated one from the other by about 8 or 9 yards. It is possible for vehicles to zigzag through, but no car could get through by surprise.

The main road being forbidden, a detour had to be made through country lanes. This brought me into sight of scientifically cut trenches in the beetroot fields. They were so disposed that one would never have suspected their presence even at a distance of a few yards. Half an hour on the lanes, and I was back again on the main road, still cut up by barricades. At frequent intervals a soldier stepped out, examined my papers, and ordered me on.

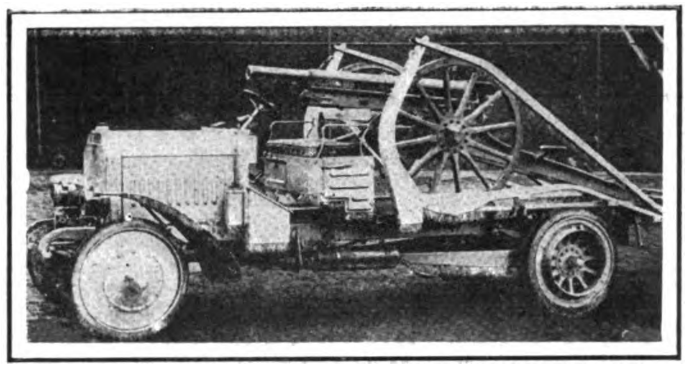
A couple of miles further on I had to draw in to one side to allow the passage of a convoy of Paris motorbuses transformed into meat wagons. They traveled in a procession of half a dozen each with the regularity of a train. All the bright paintwork had gone, the bodies were scratched and battered, but the mechanism had been kept in the best of condition. It is testified by all that these motorbuses are doing excellent work in keeping the troops supplied daily with fresh meat. They contribute considerably toward the rapid movements of troops necessary under modern war conditions.

A civilian traveling through a war ridden country cannot hope to maintain a high average. But even 15 miles an hour on a day's run is better than 5 or 6 miles on the few trains given up to non-combatants. A batallion of military cyclists had to be overtaken. It is a matter of time and patience, particularly when army trucks come along in the opposite direction from time to time, and it is necessary for the civilian to lose all the ground he has gained to give the army the right of way.

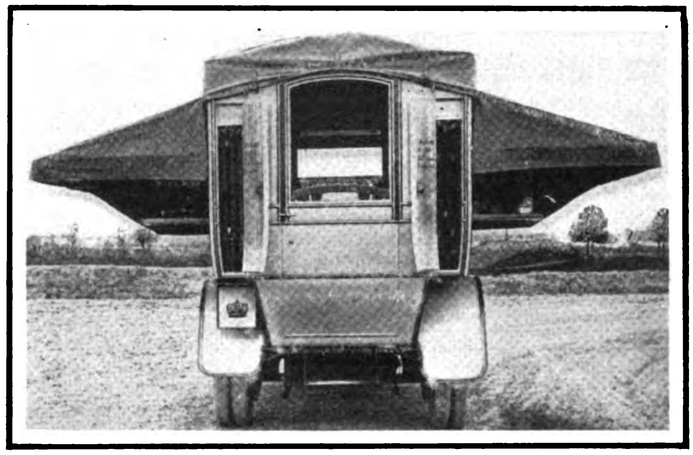
Late in the afternoon an important body of troops was met on their way to take up positions on the hills dominating the valley. It was necessary to get on the grassy bank and give them the whole of the road. For nearly an hour I had to stay there while cuirassiers, dragoons, artillery and stores passed along. The line of troops was broken from time to time by a convoy of automobiles.

The value of the French subsidy system was apparent in this service. All these vehicles had been requisitioned in the North of France, as was evident from the names of the owners on the bodies, and were put at the disposal of the troops who happened to be stationed in that neighborhood. They were all 2 1-2-ton Latil models, and although they came from different businesses the fact that they were of uniform power, speed, and capacity made it possible for them to give excellent united service.

It was necessary to cross the river Seine by ferry, at a point which shall also be nameless. To get to the river side required a considerable amount of patience and diplomacy. The civil guards on duty there would have much preferred a local pass to the one issued by the head authority in Paris. When they had been convinced against their will, I was taken over. At the same time a convoy of British motor lorries was crossing in batches of three and four. In conversation with the drivers it was learned that the army had got over its first difficulty by abandoning the vehicles which were not suitable for service in France. At the outset a number had been sent over without sufficient examination, and by reason of mechanical defects had become a drag on all the others. One division had abandoned fifty of these derelicts. Owing to the language difficulty and to the lack of knowledge of the country, the British vehicles had to be much more closely convoyed than the French. Each group had attached to it some type of car with an officer interpreter aboard. The French had no need of such service, and were only attended when operating in dangerous country.



Method of carrying artillery used by the German army



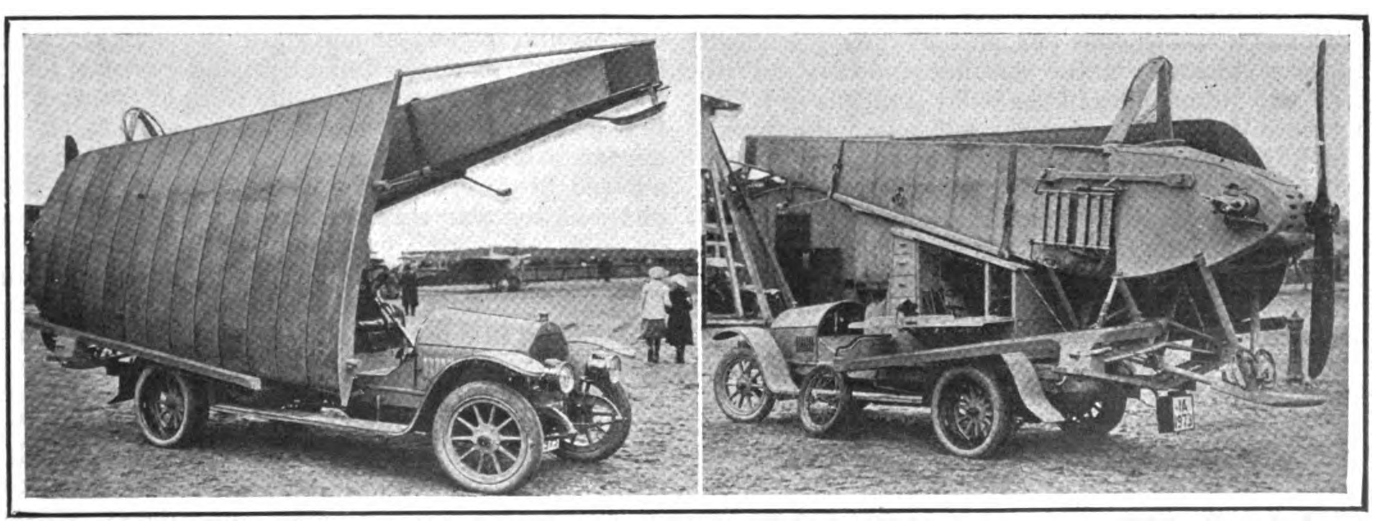
Special field kitchen employed by the Kaiser

Racing Drivers Have Important Rôles

PARIS, Sept. 1—Rene de Knyff, chairman of the Racing Board of the Automobile Club of France, who is of Belgian origin, has just been granted French citizenship and has been accepted as an automobile volunteer in the French army. De Knyff is driving a powerful Panhard-Knight and has with him as chauffeur M. Artauld who did some very fast work on a Panhard in the recent Boulogne meet. This car is working between Paris and the eastern frontier.

Arthur Duray, who is also of Belgian origin, has been accepted as a volunteer automobilist in the French army. Duray offered his services as soon as war broke out, but regulations obliged him to wait until the twentieth day. When he had donned the blue uniform and slung a revolver case over his shoulders he took the wheel of a Turcat Mery car and was sent the same day to the eastern frontier. Duray went with his usual boisterous joyfulness.

Practically all the men who took part in the recent Grand Prix at Lyons are now under military orders. The full Peugeot team is represented: Boillot and Rigal are driving cars; Goux is an artilleryman at Belfort. The Delage team has Duray and Guyot at the front, Bablot in the reserve, and Chief Engineer Michelat in charge of the headquarters staff automobile reserve. Champoiseau and Gabriel of the Schneider team are at the front. Tabuteau of the Alda Company is an aviator. Rene Thomas, the Indianapolis winner, was not eligible for military service and has been making every effort to be accepted as a volunteer. He has only just succeeded.



German monoplane mounted on a powerful Benz chassis. The wings are folded on one side and there is space for tools and repair parts

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$20,000,000 from Gasoline

THE government purposes by its emergency war tax measure to raise $20,000,000 revenue in 12 months from its tax of 2 cents per gallon on gasoline, motor spirits, naphtha and every other motor fuel which can be used in hydro-carbon engines.

According to the present scheme of taxation, the gasoline motor industry is to pay approximately one-fifth of the entire emergency war tax, which it has been estimated will approximate $100,000,000 or not more than $120,000,000 per annum.

This is a tremendous burden that the government purposes placing on the gasoline industry. With 1,500,000 automobiles in use today it means in round numbers that each motor car will average approximately $15 or more. A large share of this burden will fall on commercial vehicles which are used in the regular avenues of industrial transportation.

The automobile industry has been one of the most progressive and revolutionizing industries of the current century, and it is rather unnatural to look for one of the vital industries of the country to pay so heavily for an emergency war tax. Every citizen expects that luxuries should be taxed, in fact, that they should pay the majority of the tax, but here we find a new industry being called upon to carry nearly one-fifth of the entire burden.

The present schedule of taxes as drafted by the Ways and Means Committee places a burden on one form of transportation but not on another. In a word, if the transportation of passengers and freight is to be taxed, then all means of such transportation should be taxed alike. If we tax gasoline we should tax coal, we should tax wood, we should tax electric current, we should tax natural gas, we should tax producer gas, we should tax all of the provender consumed by horses and other animals of transport; in fact, we should tax everything that serves as a fuel or force in transportation.

There is no reason why the gasoline motor vehicle should be selected as one particular form of transportation to pay a war revenue tax. The gasoline vehicle is as much a utility today as the steamboat crossing the ocean, as our limited trains, as our freight trains, as our trolley cars, as our horse trucks, as our horse cabs, in fact as any means of transportation. None of these can be looked upon as luxuries; they are necessities.

The present European war is proving that the motor vehicle is one of the great factors in it. This is the first great motor war. The motor vehicle is superceding the horse in practically every arm of the service except cavalry. Why then, in all fairness, should we tax the gasoline which these vehicles use, and not tax the gunpowder used in the ammunition in the war, not tax the food used by the men fighting on either side, not tax the Red Cross supplies which are playing their part in the war.

The present agitation for a tax of 2 cents per gallon on fuel is both unreasonable and unjust. The makers and users of gasoline motor vehicles stand prepared to carry their share of this war revenue tax, but they do not stand prepared to carry one-fifth of it and let other means of transportation not using gasoline as a fuel go free. This is a case which calls for plain justice. If the gasoline truck hauling gravel for the contractor must pay a tax of 2 cents per gallon on its fuel, then the trolley car on the city street should pay its ratio on electric current used; then the electric truck used in hauling freight must pay its share; then the passenger and freight elevator in the skyscraper must pay its share. The owner of the horse vehicle who drives down Fifth avenue to his office must pay his share. All must contribute if one contributes.

This is a movement in which manufacturers, dealers and owners should unite in using their influence, not in opposition to raising revenue for a war tax, but in objecting to one form of transportation being singled out to carry such a share of the burden while other forms of transportation are allowed to go scot free. They should oppose this phase of the war revenue tax on the ground of the injustice of levying on such a necessity in life as transportation. It enters into every phase of our existence. It plays its part in all of the food we eat. It is needed in our every movement in life excepting when we walk, in both business and in pleasure. Transportation is the life blood of the present age. It is the greatest movement of the centuries. We have no more right to tax it than to tax the telephone, the telegraph, the wireless, or the post office, or parcel post. All are alike. All are equal in the mission they have to perform.

Congress May Tax Gasoline 2 Cents

WASHINGTON, D. C., Sept. 21—*Special Telegram*—The war revenue tax bill introduced into the House today provides a tax of 2 cents per gallon to be assessed against the producer on gasoline, naphtha, and other products used for motor power. Should this tax be imposed it will mean that approximately one-fifth of the total war revenue tax will be raised from this 2 cents per gallon on different fuels for motor use.

If this provision is enacted into law, the method of collecting the tax will be in accordance with the rules and regulations formulated by the Commissioner of Internal Revenue with the approval of the Secretary of the Treasury. The bill is to become effective on the date of passage, but the stamp tax section will remain in operation only until December 31, 1915. The tax on gasoline evidently will remain in force indefinitely.

The war revenue tax bill will be taken up in the House of Representatives on Sept. 24 under a special rule to make it a privileged matter. An effort will be made to limit debate on the measure. According to information from the ways and means committee gasoline will be taxed 2 cents a gallon, but there is a probability that the Senate will throw this out of the bill and substitute some sort of a federal tax on motor cars not used in business.

The proposition to put a tax on gasoline is sure to arouse a storm of protest, and while the House may jam the proposition through, it is believed almost certain that the Senate will vote to eliminate the House provision. The matter will then go to conference and some highly interesting developments may be looked for.

The measure, as it will be presented to the House of Representatives, contains scores of items to be taxed, many of them taken bodily from the Spanish war tax of 1898, but a welcome relief to business men is the absence of a stamp tax on checks. The members of the Ways and Means Committee left out this troublesome item because it had been found by Treasury Department experts that the business of the country had increased to so great an extent that items other than checks could be taxed slightly and bring up the total of the bill's results to about $105,000,000 in a year.

Republican members of both the House and Senate have gone on record in opposition to any war tax measure. The Democrats hope to rush the bill through the House and the big fight against the bill will be in the Senate.

Just what sort of a tax the Senate will attempt to place on pleasure motor cars is unknown at this time. Members of the finance committee, which will handle the Senate bill, decline to give any information on the subject.

The emergency war tax bill was ordered reported to-day by the Ways and Means Committee and will be called up in the House Thursday. The Rules Committee will meet tomorrow to frame rules to rush the bill through the House committee. The Democrats added an amendment to the gasoline section, the words motor spirits being added so that the section will embrace all products used for motor power. The committee expects gasoline to produce $20,000,000.

Important Papers Scheduled for Truck Convention in Detroit

NEW YORK, Sept. 22—The first draft of the program for the Motor Truck Convention to be held in Detroit, Mich., October 7, 8, 9 and 10, shows that papers of particular interest will be handled by representatives of the different truck makers on all days of the convention. The Wednesday afternoon program is framed largely for truck manufacturers. On Thursday the papers scheduled are of special interest to both manufacturers and dealers. Friday is dealers' day and the subjects on the program for that day treat with practically all the difficult problems that the motor truck dealer is face to face with.

No other subject will attract greater attention than the tire question for motor trucks which is scheduled for Thursday, October 8. J. E. Hale, of the Goodyear Company, and S. V. Norton, of the Goodrich company, are listed to handle different aspects of the truck question.

Such important questions to motor car makers and dealers as traffic engineering, how to calculate costs, the trading evil, etc., are the subject of papers by well qualified truck manufacturers.

Up to this date the entire program is not complete, but the program as promised by the different representatives who have been asked to assist is as follows:

WEDNESDAY, October 7. Afternoon Session—2:30 to 5:30:—Time Payment Plans for Trucks, Walter B. Parker, Commerce Co., Detroit, Mich.; Territorial Lines for Dealers, T. R. Lippard, Stewart Motor Corp., Buffalo, N. Y.; Evils of Overloading and Overrating for Trucks and Permissible Body Rates, H. W. Alden, Timken-Detroit Axle Co., Detroit, Mich., and John Utz, Perfection Spring Co., Cleveland, Ohio.

THURSDAY, October 8. Morning Session—9:30 to 12:30:—Lists, Discount for Quantity Business, Discounts for Parts, etc., M. L. Pulcher, Federal Motor Car Company, Detroit; Traffic Engineering, R. W. Hutchinson, Sternberg Mfg. Co., Milwaukee, Wis., and E. L. Shoemaker, Denby Motor Truck Co., Detroit, Mich.; Export Selling Methods and Requirements for Motor Trucks, J. B. Crockett, New York City.

THURSDAY, October 8. Afternoon Session—Sales Assistance to Dealers, C. W. Moodie, Standard Motor Truck Co., Cleveland, O.; Standard Tire Sizes, J. E. Hale, Goodyear Tire & Rubber Company, Akron, O.; Cost and Evils of Overloading and Overspeeding in the Truck Tire Field, S. V. Norton, B. F. Goodrich Co., Cleveland, O.

FRIDAY, October 9. Dealers' Day—Manufacturers' Guarantee of Service to Owners, W. L. Day, General Motor Truck Co., Pontiac, Mich., will champion this from the makers' viewpoint, and J. H. Thompson, Thompson Auto Co., Detroit, Mich., from the dealers' viewpoint: Central Market Reports, H. M. Allison, Chicago Auto Traders Exch., Chicago, Ill.; The Trading Evil, W. K. Chilcott, General Motors Truck Co., Pontiac, Mich.; Demonstrations, necessity and Charges, J. A. Ayers, General Motors Truck Co., Detroit, Mich.; The Driver's Relation to Successful Motor Truck Operation, C. P. Cary, Federal Motor Truck Company, Detroit, Mich.; How to Calculate Costs, R. W. Hutchinson, Sternberg Mfg. Co., Milwaukee, Wis.

Olympia Show Abandoned

LONDON, ENGLAND, Sept. 21—*Special Cablegram*—Owing to the war, the annual Olympia show, scheduled for November, will not be held. The Institution of Automobile Engineers will carry on its regular program of sessions but all papers will as far as possible have relation to the position of the industry in regard to the war.

The sale of light cars for home use is practically dead. Export trade, however, in light cars is fairly brisk and it is only this trade that is keeping the factories building small cars, open.

Such firms as Rolls-Royce, Siddeley, Starr, Austin, and others making small cars are today turning their attention to the construction of commercial vehicles, and other firms building passenger cars are doing machine work for the makers of heavy commercial vehicles. A considerable proportion of all plants is employed exclusively for government contracts.

The commercial vehicle industry is booming. All types of commercial vehicles with a load capacity of under 3 tons are finding ready sales, these naturally going to business houses to substitute horse haulage.

All builders of commercial vehicles of 3-ton capacity and over, such as, Leyland, Thorneycroft, Dennis, Straker, Karrier, Page-Field, Maudslay, Wolseley, and Daimler, are busy in the construction of vehicles for the government. The supply does not meet the demand. These companies have generally turned their entire factories over to the commercial vehicle use, that is, where a fraction of the factory has been engaged in making passenger vehicles, this fraction is now manufacturing trucks.

Greece to Purchase 300 Trucks

NEW YORK CITY, Sept. 22—There is now before the War Department of the Greek Government a project to purchase between 300 and 400 motor trucks at a cost of $1,000,000 to $1,200,000. The Kissel Motor Car Co., Hartford, Wis., last week shipped 50 trucks to that country.

Cars Preempt Farm Machinery at Wisconsin State Fair

Many Cars Introduced in Mammoth Machinery Hall—A Special "Automobile Day" —Many Factory Men at the Exhibit

MILWAUKEE, WIS., Sept. 19.—The display of motor cars at the 1914 Wisconsin State Fair at Milwaukee from September 14 to 18, inclusive, was the most pretentious exposition of this kind that the State Board of Agriculture, managing the fair, has yet been able to muster. The mammoth concrete Machinery Hall was filled with car exhibits, which crowded out the usual farm gas engine and power machinery displays of former years and obliged these to go into tents adjoining. As a further recognition of the motor car, the board of agriculture set aside one full day as Automobile Day.

This was the first time that the fair board really went out to muster exhibits of cars and the result is so satisfactory that there is no doubt that with a little more work the board can present a motor show each September that will rival or excel the big Milwaukee show in the Auditorium every January. The display last week brought to Milwaukee nearly as many big factory men as the winter show and it cannot be questioned that the state fair show showed better pecuniary results than the winter show can ever hope to, by reason of the enormous number of prospective buyers, farmers and up-state city folk who visit the fair each year.

The fair show served to introduce to Milwaukee and Wisconsin people a large number of cars never seen before or never shown in public expositions prior to this time. This class included the Briscoe, Lewis VI, Haynes light six, the new R. C. H., the new Mitchell light four, the new Imperial light four, the Jeffery Chesterfield six, the new King, Oldsmobile, Moline-Knight, Paige, Chandler, Chevrolet, Reo, Stan-Ford, Cartercar, Regal, KisselKar, Oakland, Overland, Hupmobile, Moline-Knight, Paige, Chandler, Chevrolet, Reo, Stanley steamer, Buick, Case and Detroiter.

The truck division was a feature, and displays were offered by the Stegeman, Menominee, Crown, Jeffery, Reo, Kissel, Overland and Buick. The Jeffery Quad gave exhibitions of its marvelous powers and abilities in mud, sand, ruts and hills in a special plot of ground in the fair park.

Big Interest in Cars at Canada Exposition

TORONTO, ONT., Sept. 10—In spite of the strain imposed by the conflict in which the mother-country is engaged, Canada and Canadian financial conditions are well reflected in the Canadian National Exhibition held in this city.

When the Canadian National Exhibition opened, on August 31, 4 weeks after the declaration of war, Canadian trade anxiously watched with what enthusiasm the public would become interested. Results were most satisfactory. Under normal conditions, about 1,000,000 people visited the exhibition, coming from all parts of Canada. The first week, because of unpleasant weather, the attendance was not up to standard, but the second week motor cars, the barometers of public confidence, indicated by the amount of interest centered upon them that Canada was bearing up and that the automobile trade for the coming year would find it, as ever, an excellent market.

At the close of the exhibition, the exhibitors almost to a man declared themselves very well pleased with results and sales and expressed the belief that the outlook for a good year's business in the automobile trade could not be brighter under the circumstances.

Henderson Bros. Rejoin Cole Co.

INDIANAPOLIS, IND., Sept. 23—*Special Telegram*—C. P. Henderson and his brother, R. P. Henderson are again to be associated with J. J. Cole in the Cole Motor Car Co., this city. The Hendersons will be in charge of sales and advertising as in the past, taking up their new duties October 1. Homer McKee, former sales and advertising manager of the company, is entering the advertising business on his own account and will continue to handle the Cole account in connection with the Mahin Advertising Agency.

46 Cars to Be Shown at St. Louis Show

ST. LOUIS, MO., Sept. 20—At the eighth annual automobile show which will be held at Forest Park Highlands, October 5 to 10, under the auspices of the St. Louis Automobile Manufacturers and Dealers Assn., space has been drawn for the following 46 different makes of gasoline cars:

Oldsmobile, Metz, Empire, Jeffery, National, Lyons-Knight, Havers, Crescent, Studebaker, Paige-Detroit, Premier, Lozier, Mitchell, Hupmobile, Cole, Empire, King, Oakland, White, Jackson, Kissel Kar, Regal, Stevens-Duryea, Meteor, Buick, Pierce-Arrow, Packard, Ford, Dorris, Hudson, Reo, Chevrolet, Locomobile, Chandler, Overland, Marion, Peerless, Mercer, Franklin, Marmon, Winton, Chalmers, Saxon, Stearns-Knight, Auburn and Velie. There will also be shown the following electric vehicles: Waverly, Woods, Rauch & Lang, Baker and Detroit electric.

J. C. Weston Made Tire General Sales Manager

NEW YORK CITY, Sept. 22—Joseph C. Weston has been made general sales manager of the United States Tire Co., succeeding J. D. Anderson, who has resigned. Although the title is new to Weston, who long has been connected with the United States company, latterly as Central District Manager, his duties will not be strange to him, for during the past few months he has been acting general sales manager in the absence of Anderson in Europe. For the present, Anderson will remain in an advisory capacity.

Weston's prominence to the head of the sales organization is a logical one for he has a veteran's experience in the tire business, dating back to the old Morgan & Wright days. For years he was secretary of the Morgan & Wright Co.; when the United States Tire Co. was formed he was appointed Western district manager, his headquarters being in San Francisco. Later, he was appointed Central district manager, succeeding A. I. Philp.

Weston is exceedingly well-liked in the trade both for his universal good nature and ready smile and for his business acumen. There are few men in the tire business who are better known to the trade in general.

General Motors Sells More Cars; Margin of Profit Cut

NEW YORK CITY, Sept. 19—The annual report of the General Motors Co., for the year ended July 31, 1914, shows gross sales of $85,373,303, as compared with $85,603,920 for 1913. The 1914 sales represent the sale of 10 per cent. more cars at correspondingly lower prices. The net profits were $7,947,413, a decrease of $336,727 from last year's figures. The balance after the payment of the accrued interest on the 6 per cent. notes was $7,249,734, or a loss of $209,737, while the undivided profits, after the payment of the preferred dividend, were $6,201,055, a decrease of $209,882. This added to the previous profit and loss surplus made a total of $9,146,434, a gain of $1,472,902. There was charged off $2,457,007, leaving a final profit and loss surplus of $6,689,428, an increase of $3,744,048.

The total value of the real estate, plants and equipment appraised at $21,515,065.26 is entered for a net amount of $15,432,916.58 the difference or $6,082,148.68 being reserved for depreciation. For patents, agreements, etc., there is recorded $471,200; for miscellaneous investments, $352,734.50; the total current and working assets, $28,841,402.02. A total of $7,934,198.14 is marked as good will and is explained as being the excess of the appraised value over the book value of the capital stock of the subsidiary companies, less the reserve.

President Nash in his statement to the stockholders says:

"The net profits of $7,947,412 are, after deducting all expenses of General Motors Co., and also after deducting $944,099, a sum deemed sufficient to cover depreciation of buildings and equipment.

"In view of the considerable undivided surplus income for the year your directors have deemed it wise to write off $972,419 from the book value of patents, agreements, etc., and also to appropriate from surplus the sum of $1,483,208 as an additional reserve for depreciation of plants and equipment. The above amount written off from patents, agreements, etc., comprised the entire sum carried in that account by all subsidiary companies except the McLaughlin Motor Car Co., Ltd. General Motors Co.

owns slightly less than one-half the capital stock of that company, whose agreements, etc., $471,200, are being written off in annual instalments.

"The sole outstanding funded debt of the company July 31, 1914, consisted of $7,852,000 6 per cent. first lien notes, maturing Oct. 1, 1915, being unpaid balance of the original issue of $15,000,000 of these notes dated Oct. 1, 1910. In September, 1913, the company paid the balance of $1,000,000 due Oct. 1, 1913, on account of the sinking fund, and in the spring of 1914 paid in advance the full $2,000,000 sinking fund instalment due Oct. 1, 1914. This $3,000,000, together with interest thereon and a small additional payment from the proceeds of property sold, was applied by the trustee to the purchase of $3,083,000 notes, leaving outstanding $7,852,000.

"Aside from these notes, the only indebtedness of the company and its subsidiary companies on July 31, 1914, consisted of current accounts payable of $3,772,123, composed wholly of the normal obligations for merchandise, etc., and $1,000,247 liabilities accrued, but not due, for pay-rolls, taxes and interest on funded debt.

The income account compares as follows:

	1914	1913	1912
Net profit sub. cos.	†$7,947,413	$8,284,140	$4,838,449
Gen. Motor's share	7,819,968	8,184,053	4,746,757
Interest on notes	570,235	724,581	850,463
Surplus	7,249,734	7,459,471	3,896,293
Preferred dividend	1,048,679	1,048,034	1,040,211
Surplus	*6,201,055	6,410,937	2,856,088

*Equal to 37.57 per cent. on $16,501,783 common stock as compared with 38.90 per cent. on $16,476,783 previous year.

†After deducting manufacturing, selling and administration expenses and maintenance and depreciation.

The profit and loss account follows:

Profit and loss surplus July 31, 1913	$2,945,379
Surplus for 12 months to July 31, 1914	6,201,055
Total	9,146,434
Plants and equipment	1,483,208
Patents, agreements, etc	972,419
Sundry adjustments	1,380
Total deductions	$2,457,007
Profit and loss surplus July 31, 1914	6,689,428

The consolidated balance sheet of General Motors Co. and subsidiary companies directly connected with the manufacture of automobiles and parts, as of July 31, 1914, compares as follows:

Assets

	1914	1913	1912	1911
Real est., plts, eq'p.	$21,515,065	$20,458,978	$19,280,889	$17,632,682
Pat. agreements, etc	471,200	1,508,672	1,871,436	2,049,831
Misc. invest.	352,735	367,063	560,500	854,803
Cash	13,452,663	6,236,251	3,080,921	4,054,844
Notes & accts rec.	3,358,791	3,449,335	4,229,112	4,639,076
Inventories	11,642,370	18,170,907	17,578,366	17,303,715
Prep'd exp.	387,578	412,756	422,736	191,179
*Good will	7,934,198	7,934,198	7,934,198	7,663,938
Total	$59,114,600	$58,538,160	$54,958,159	$54,388,072

*Representing excess of appraised value over book value of stock of sub companies owned, less reserve.

Liabilities

	1914	1913	1912	1911
Pfd. stock	$14,985,200	$14,985,200	$14,936,800	$14,393,500
Com. stock	16,501,783	16,476,783	16,371,183	15,822,330
Funded debt	7,852,000	10,935,000	12,452,000	14,002,000
Outstanding capital stock	573,000	578,000	578,000	1,436,000
Sur. sub. cos.	431,142	409,252	413,839	1,169,527
Accts payable	3,772,123	4,821,774	2,852,022	2,143,847
Liabilities accrued, not due	1,000,247	1,048,970	929,854	641.767
Notes payable	......	300,000	600,000	......
Res. for pf. div.	262,241	262,526	261,394	335,848
Reserved for special purposes	7,047,436	5,775,305	4,299,472	3,203,076
Surplus	6,689,428	2,945,379	1,262,595	1,240,175
Total	$59,114,600	$58,538,160	$54,958,159	$54,388,072

July Exports Only $500,000 Less than Year Ago

Exports for 7 Months Also $500,000 Lower —Increase in Exports of Gasoline

WASHINGTON, D. C., Sept. 20—Automobile exports from this country for the 7 months ending July, 1914, have fallen off $500,000 compared with 1913, or from $17,760,733 to $16.818,422, about 3 per cent., though there has been a very slight increase in our export of commercial vehicles. For the respective months of July, 1913 and 1914, exports were $1,736,253 as against $1,249,819, a decrease of almost $500,000.

For the 7 months ending July, 1913 and 1914, gasoline exports, however, have increased 70 per cent., or about $5,000,000, the value going from $7,445,589 to $12,621,406.

Tires fell off from $379,273 in July, 1913, to $341,617 in 1914, the total 7 months showing a decrease of from $2,545,169 to $2,102,092.

Imports of motor cars also decreased in 1914. Comparative figures for the months of July show $81,678 for 1913, as against $26,168 for 1914. The total for the 7 months is $768,521, as against $178,631. Automobile parts imports, however, went from $151,856 to $602,829.

DETROIT, MICH., Sept. 21—The usual semi-annual dividend of 3 1-2 per cent. on its preferred stock has been declared by the General Motors Co. It will be paid November 1 to stock on record October 15. The company will mail checks.

Imports	July—				Seven Months Ending July—			
	1913		1914		1913		1914	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, and Parts of:								
Automobiles.........No. dut..	37	$81,678	13	$ 26,168	320	$768,521	104	$178,631
Parts of (except tires)....dut..	..	17,510	..	104,338	...	151,856	...	602,829
BY COUNTRIES								
France.................No..	16	34,085	4	8,543	120	276,702	46	88,709
Germany...............No..	6	13,880	3	6,755	72	191,274	9	15,128
Italy....................No..	3	6,831	1	1,000	50	102,204	18	22,798
United Kingdom..........No..	3	11,817	3	4,072	27	83,349	13	28,979
Other countries...........No..	9	15,065	2	5,798	51	114,992	18	23,017
Total................No..	37	81,678	13	26,168	320	768,521	104	178,631

Exports	July—				Seven Months Ending July—			
	1913		1914		1913		1914	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles:								
Commercial...	44	$103,612	50	$106,400	662	$1,150,649	443	$648,241
Passenger.....	1,720	1,632,641	1,265	1,143,419	16,528	16,610,084	18,499	16,170,181
Total......	1,764	1,736,253	1,315	1,249,819	17,190	17,760,733	18,942	16,818,422
Parts	....	$394,850	....	$420,975	$2,893,753	$3,530,777	....	$3,911,018
BY COUNTRIES								
Automobiles:								
France.......	47	33,281	16	15,803	567	429,133	1,044	625,636
Germany.....	132	98,420	16	17,364	761	678,462	1,063	799,552
Italy.........	39	31,932	16	8,640	222	198,300	228	147,388
United King.	300	232,792	227	183,988	2,970	2,250,040	4,967	4,087,763
Other Europe.	166	148,275	152	130,227	1,298	1,128,107	2,366	1,876,114
Canada......	207	348,174	257	386,234	4,733	6,289,041	3,356	4,069,621
Mexico	30	39,487	2	1,647	142	255,287	54	65,974
West Indies	35	33,170	40	35,033	286	286,838	320	286,063
South America	222	247,544	90	62,288	1,732	1,963,328	872	709,239
British Oceania	277	240,734	311	237,780	1,873	1,827,690	2,587	2,233,471
Asia-Oceania.	154	144,472	115	121,896	1,445	1,410,087	1,179	1,110,001
Others......	155	137,972	73	48,919	1,161	1,044,420	906	807,600
Total......	1,764	1,736,253	1,315	1,249,819	17,190	17,760,733	18,942	16,818,422

	July—				Seven Months Ending July—			
	1913		1914		1913		1914	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Tires:								
Belgium......	....	$15,137	....	....	....	$98,769	....	$301
Germany.....	....	36,123	....	$6,090	....	421,564	....	81,917
England......	....	153,819	....	156,961	....	776,118	....	889,793
Canada.......	....	85,001	....	99,514	....	807,424	....	649,764
Mexico.......	....	13,165	....	4,218	....	77,397	....	32,140
Philippines ...	....	16,195	....	10,953	....	74,867	....	67,106
Others......	....	59,833	....	63,881	....	289,030	....	381,071
Total......	....	379,273	....	341,617	....	2,545,169	....	2,102,092
*Gasoline:**	Gallons		Gallons		Gallons		Gallons	
Belgium......	....	....	865,928	104,252	721,989	43,319	2,688,528	322,714
France.......	....	....	6,444,140	713,256	....	....	18,912,827	2,313,903
Germany.....	....	....	....	....	....	....	3,753,361	464,410
Italy.........	....	....	....	....	....	....	1,650,245	191,937
Netherlands...	....	....	....	....	3,494,189	461,616	3,950,000	493,750
United King.	....	....	3,731,682	373,258	....	....	21,434,074	2,324,160
Other Europe.	549,250	91,213	1,450,750	179,903	13,044,294	1,661,863	4,276,701	591,294
Canada......	4,511,012	643,790	2,780,343	254,600	21,898,262	2,939,307	15,371,129	1,616,582
Argentina....	300,000	41,850	670,145	113,517	777,099	135,703	9,762,802	1,665,302
Brazil.......	2,213,425	408,312	475,890	84,684	8,073,448	1,456,965	2,252,523	419,305
British Oceania	....	....	356,220	61,119	146,001	24,103	4,361,344	852,546
Others.....	481,106	100,749	2,106,760	296,444	3,527,479	722,713	7,979,543	1,365,503
Total......	8,054,793	1,285,914	18,881,858	2,181,033	51,682,761	7,445,589	96,393,077	12,621,403

* Not stated for periods in which no figures are shown.

Mayor Mitchel Vetoes Separator Repeal

NEW YORK CITY, Sept. 21—The ordinance requiring the use of separators in garages, to keep gasoline and oils from leaking into the sewers, is still in effect, the Mayor having recently vetoed the bill placed before him by the Board of Aldermen, which would have repealed this ordinance.

The only alternative for the garagemen and dealers, who are conducting the fight, is to take the matter again to the Board of Aldermen and ask that they pass a new bill over the veto of the Mayor. To do this a favoring vote of two-thirds is necessary.

Those fighting the bill claim that little or no gasoline leaks into the sewers, and what does is greatly diluted by water. That the explosions which occur are caused by illuminating gas leaks, and that furthermore, although the separators cost from $500 to $1,000 each, they are not efficient in overcoming the evil, if it does exist.

Mayor Mitchel, basing his ideas on the report of the fire department and contentions of the sewer employees, maintains that the ordinance must be carried out.

Detroit Police May Regulate Taxi Stands

DETROIT, MICH., Sept. 18—A new ordinance will be submitted to the city council next week, having already been adopted by the council committee on ordinances, and if finally passed will enable the police commissioner to decide where taxicab and automobile stands may and may not be located.

The commissioner thinks that property owners have no right to receive compensation from automobile or taxicab owners and it has been shown that many derive a large revenue therefrom. It is claimed that one downtown property owner has been receiving about $1,500 a year from the renting of space in front of his property in a leading thoroughfare.

Another ordinance will be submitted regulating the rates to be charged for motor cars rented by the hour. The maximum fare is to be $3.00 an hour for a five-passenger car and $4.00 per hour for car seating more people.

Standard Not Guilty of Monopoly

NEW YORK CITY, Sept. 21—The Standard Oil Co. has not violated the Seven Sisters act passed in the State of New Jersey while President Wilson was governor and tending to check monopoly. The Crew-Levick Co., Jersey City, an independent, charged that the Standard was charging a low rate where there was competition and a high rate where there was none. The court, in arriving at its decision, took into consideration the competition of the Gulf Refining Co., which has been engaged in a not entirely one-sided price war with the Standard company and has taken some of the latter's customers.

Lozier Co. Charged with Insolvency

DETROIT, MICH., Sept. 20—Lee E. Joslyn, referee in bankruptcy, was to-day appointed custodian of the property of the Lozier Motor Co. by U. S. District Court Judge Tuttle, pending the hearing to take place next Wednesday, when it will be decided if the company should be declared bankrupt or placed in the hands of a receiver.

An involuntary petition was filed by three parts makers. According to the Lozier company's attorney, the company does not admit itself insolvent. According to a statement of the company's standing in December, 1913, the total assets then amounted to $4,067,051 and the total liabilities to $1,572,667.

The capital stock of the company consists of $2,500,000 in common and $500,000 preferred 7 per cent.

Cotton Traded for Cars in Georgia

ATLANTA, GA., Sept. 18—Confident that business conditions in the country are improving steadily and that the future demand for cotton will be exceptionally heavy and that consequently there will be big sales, the Forsythe Motor Co., of this City, distributor of the Stearns-Knight cars, will accept cotton in payment for automobiles. The company has been running the following advertisement in a local paper:

Forsythe Motor Co., distributor of Stearns-Knight cars, will accept properly certified warehouse receipts for cotton, upon a basis of not less than 10 cents a pound, middling cotton, in settlement for automobiles.

This cotton will be held until February 1, 1915, and if at that time it can be sold for more than 10 cents a pound the original owner will receive the increase, less the cost for holding.

If the cotton does not sell for as much as 10 cents a pound we will bear the loss.

We offer the following cars for immediate delivery: Five-passenger National, seven-passenger Fiat limousine, five-passenger Stearns-Knight, four-passenger Stearns-Knight, Pope-Toledo raceabout, Babcock electric, seven-passenger Cole.

Nebraska Wheat, 142 Per Cent. of Average

OMAHA, NEB., Sept. 20—The United States National Bank of Omaha has just compiled its annual estimate of the size and value of the crops raised this year within the boundaries of Nebraska. These figures were taken in conjunction with the reports of the agricultural departments of the United States and Nebraska.

The figures show that the wheat crop that has already been housed is 142 per cent. of the five-year average and is 69,735,000 bushels. The advance in prices, due to the European war, gives an added value of $35,000,000 to the wheat alone.

The big corn crop, although only 82 per cent. of a five-year average, is still more than 150,000,000 bushels, and the war prices have advanced the value of this crop something like $30,000,000. Then the demand for oats, alfalfa, hay etc., for the horses of the armies of Europe has sent prices away up above normal and has added a number of millions of dollars to the Nebraska farmers' bank account.

Hudson's August Shipment 1,697 Cars

DETROIT, MICH., Sept. 21—During August, 1914, the Hudson Motor Car Co., has shipped 1,697 Hudson cars, or 897 more than during August, 1913. During the first two weeks of September of this year shipments totalled 1,250 cars or five times as many as during the corresponding period of 1913. Everything indicates a continued increased activity at the Hudson plant and by October 1, it is planned to have between 2,700 and 3,000 cars shipped.

CHICAGO, ILL., Sept. 21—J. F. Reddick, formerly a director of publicity with the Goodyear Tire & Rubber Co., Akron, O., has been appointed advertising manager of the Stromberg Motor Devices Co., of this city.

Marmon on High Goes 355 Miles in New England

BOSTON, MASS., Sept. 19—Frank E. Wing, New England, distributor of Marmon cars, made a new touring record in the demonstrator of the 1915 medium six this week. He drove

Market Reports for the Week

No important changes occurred in this week's market reports. Tin has a fluctuating week, its highest quotation being at $32.00 and its closing price at $31.65, at a gain of $0.40 per 100 pounds. Copper exports have been normal. Last week exports of coper from New York City and Baltimore aggregated 1,737 tons. Since the first of September total exports from Atlantic ports have amounted to 11,897 tons. Lead is quiet and barely steady. A reduction was announced in Kansas petroleum from $0.65 to $0.55 per barrel.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.10	.10	.10	.10	.09	.09	—.01
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	......
Bessemer Steel, ton	20.50	20.00	20.00	20.00	20.00	20.00	......
Copper, Elec., lb.	.12	.12	.11⅞	.11⅞	.11⅞	.11⅞	—.00⅛
Copper, Lake, lb.	.12¼	.12¼	.12⅛	.12⅛	.12⅛	.12⅛	—.00⅛
Cottonseed Oil, bbl.	5.80	5.81	5.85	5.77	5.84	5.60	—.20
Cyanide Potash, lb.	.32	.32	.32	.32	.32	.32	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.93	.93	.93	.93	.93	.93	......
Lead, 100 lbs.	3.85	3.85	3.85	3.85	3.85	3.85	......
Linseed Oil	.60	.60	.60	.60	.60	.58	—.02
Open-Hearth Steel, ton	20.50	20.00	20.00	20.00	20.00	20.00	......
Petroleum, bbl., Kans., crude	.65	.65	.65	.65	.65	.55	—.10
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	.68	.66	.65	.65	.65	.65	—.03
Silk, raw, Ital.	..	4.60	..	..	4.60	..	......
Silk, raw, Japan	..	3.80	..	..	3.80	..	......
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	31.25	31.50	31.62½	31.75	32.00	31.65	+.40
Tire Scrap	.05	.05	.05	.05	.05	.05	......

the car from Boston through to Bretton Woods, up over Tug-of-War hill in Crawford Notch, and then down to Boston again through the other route via Merrimac Valley, a distance of 355 miles, with the gear speed shift lever sealed in high gear. It was the first time any car has ever attempted the feat. The car carried four people, and was not prepared especially for the trip. The party left Boston at 5.20 a. m., Wednesday and reached Bretton Woods at 11 p. m., starting back at 12.30 reaching Boston at 7.15. With the time taken out for breakfast at Portsmouth, filling with gasoline at Rochester and Franklin and the time spent at Bretton Woods, the actual time was about 11 hours. Tug-of-War hill in Crawford Notch is the famous hill that broke the hopes of a lot of contestants, in the early Glidden tours, who had to be towed up.

On the Glidden tours the trips to Bretton Woods from Boston was divided into 4 days, 2 up and 2 down, with night stops at Portsmouth and Concord, half way cities, but Mr. Wing did it in a daylight to dusk trip, and had he wanted to speed could have made it in 10 hours. He averaged about 11 miles to the gallon of gasoline.

2-Cent Postal Rate Suggested for S. A.

WASHINGTON, D. C., Sept. 21—The Post Office Department is actively co-operating to stimulate trade between the United States and South and Central America. Postmaster-General Burleson has under consideration a plan making the 2-cent rate for letter postage effective throughout the Western Hemisphere. Today he issued an order directing the Third Assistant Postmaster-General to suggest immediately to the representatives of the Latin-American countries, with which the United States does not now transact money order business, the desirability of concluding conventions for that purpose. These countries are Argentina, Brazil, Columbia, Dutch Guiana, Paraguay and Venezuela, in South America and Guatemala, Nicaragua and Panama in Central America.

E. V. A. A. Completes Convention Program

NEW YORK CITY, Sept. 21—The program of the Fifth Annual Convention of the Electric Vehicle Assn. of America, which will be held on October 19, 20 and 21 at the Hotel Bellevue-Stratford, Philadelphia, Pa., is complete.

Some of the articles that will be read at the convention are as follows: October 19, afternoon, "Progress of the Electric Vehicle," by J. H. McGraw; "Electric Vehicles in Parcel Post Service," by W. P. Kennedy; in the evening, F. Nelson Carle will speak on "Special Applications of Electric Trucks; October 20, morning, "Electric Vehicle Performance," R. B. Grove; October 20, afternoon: "Electric Fire Apparatus," Chief G. S. Walker; October 21, morning: "The Design and Performance of Electric Vehicle Motors," H. S. Baldwin; and October 21, evening, "European Development of the Electric Vehicle Industry," P. D. Wagoner.

Regular Vacuum Oil Dividend

NEW YORK CITY, Sept. 22.—The Vacuum Oil Co. has declared the regular semi-annual dividend of 3 per cent., payable October 31, to stock of record October 15.

NEW YORK CITY, Sept. 19—The Willys-Overland Co. declared a regular quarterly dividend of 1 3-4 per cent. preferred, payable October 1, to stock of record of September 22.

HARTFORD, CONN., Sept. 20.—The Colonial Auto Co., Studebaker distributor, has adopted the 50-hour-free service plan. All purchasers of 1915 Studebakers will be given coupon books representing 50 hours of free service. The plan originated with Russell P. Taber, the Reo distributor.

Sphinx Small Car for $695

NEW YORK CITY, Sept. 22—The Sphinx Motor Car Co., York, Pa., has announced a five-passenger touring car selling for $695 with standard equipment, including an electric generator and starter, electric lights, windshield, and spare rim. Wire wheels will be put on for $25 extra.

This new car has a 112-inch wheelbase and a tread of 54 1-2 inches, with a four-cylinder monobloc motor, delivering 28 horsepower. This motor has enclosed valves, detachable head and a camshaft with integral cams. The bore is 3 3-8 inches and the stroke 5 inches. It is claimed that the car will give 25 miles to the gallon of gasoline, and for oil, 250 miles per quart.

Cantilever springs, both front and rear, are used. Thermo-syphon cooling, shaft drive and a streamline body are features.

Operations were started this week in the large three-story brick factory building, North Duke street and the Pennsylvania railroad, formerly occupied by the Hart-Kraft Motor Car Co.

A Child's Seat for Saxon's

DETROIT, MICH., Sept. 18—A novel seating arrangement has been provided by the Saxon Motor Co., which gives accommodation in the Saxon light car for a child in addition to two adult persons.

The child's seat is an additional equipment to the new cars and is placed near the dashboard and fronts the two adult seats. It is neat and compact and when not in use may be closed. It does not interfere with either of the other passengers. It is provided at a cost of $10.

Allen Co. Elects; To Build 2,000 Cars

FINDLAY, O., Sept. 19.—The Allen Motor Co., Fostoria, O., has had its annual election of officers, resulting as follows: President, E. W. Allen; vice-president, Gratton Baker; second vice-president, J. E. Wright; third vice-president, P. J. Cristy; treasurer and general manager, W. O. Allen; secretary, A. E. Wyant; general superintendent, L. A. Summers. The company's business the past year amounted to $800,000, and it will complete 2,000 cars this year.

Purchases Cotton for Automobile Dealers

TOLEDO, O., Sept. 21—John N. Willys, president of the Willys-Overland Co. has purchased a bale of cotton for each of the 400 Overland dealers in the South. Mr. Willys says that it is his intention to buy an additional bale of cotton for each Overland car purchased during the 2 months ending November 17.

BOSTON, MASS., Sept. 23—A meeting of stockholders of the Walpole Tire & Rubber Co. has been called for September 29, when it is understood directors will signify their intention of serving in that capacity if the company is reorganized and taken out of the hands of receivers.

New Pullman for $695

YORK, PA., Sept. 22—Announcement was made this week by the Pullman Motor Car Co. of a new model, to sell at $695. It is almost identical in design with the Light Six 6-48 with refinement details, only much smaller. The car has a four-cylinder engine capable of developing about 30 horsepower, one man top, cantilever springs, demountable rims, electric lights and electric starter. It is the plan to build the new model in a touring car and roadster. Deliveries of the new car will begin to be made in limited quantities about November 1.

NEW YORK CITY, Sept. 21—H. W. Hayden, general manager of the Pullman Motor Car Co., announces he has completed arrangements with the Drouet & Page Co., Inc., to represent the Pullman in the New York territory, including northern New Jersey, Greater New York, Westchester, Putnam and Orange counties.

1915 Paterson Complete, $1,485

FLINT, MICH., Sept. 14—The W. A. Paterson Co., announces that the price of its 1915 six-cylinder car is $1,485, completely equipped. The motor is a Northway cast in block with 3 1-2-inch bore, 5-inch stroke, having L-head valves. The carbureter is a Stromberg and the Delco starter, lighting system and magneto is used. The wheelbase is 124 inches and the wood wheels are fitted with 34 by 4-inch tires, both on the front and rear. The car will be equipped with left drive and center control. The axles are Weston-Mott, floating. The equipment will be standard and includes a motor driven air pump.

Since the announcement last week of the new four-cylinder Paterson the company has decided that it will build these cars with a floating rear axle instead of a semi-floating and that a Stromberg carbureter will be used.

Hearing Against Pope Co. Oct. 1

HARTFORD, CONN., Sept. 20.—Richard J. Goodman, a committee of the superior court, is to hear the claims presented against the Pope Manufacturing Co. and has made the following assignment of claims hearings: Thursday, October 1, Hancock Mfg. Co. and the Mogul Co.; Monday, October 5, Edwin J. Blake; Monday, October 12, the claims of Albert L. Pope; C. E. Walker and W. C. Walker.

New York City Trade Boosters

Assemblage of Big Village Boosters and friends at Fred. Wagner's farm at Smithtown,

Upper — Imbibing refreshments at the second station in the novel cigar-drink - signature gymkhana

Middle—The New York baseball team. From left to right, standing — H. A. Bonnell, umpire; E. D. Studebaker, D. Swandee, E. J. Sullivan, R. H. Johnston, Captain; C. Doty, J. Bestar, Geo. W. Greiner; sitting, T. W. Sneed, W. C. Poertner

Lower — The shoe race

Annual Outing of Big Village Boost Game—Five Motor Car Con

NEW YORK CITY, Sept. 19—Following the custom established several years ago, that portion of the New York City automobile trade which goes to make up the organization known as the Big Village Motor Boosters, held its annual outing at Fred. Wagner's Long Island farm at Smithtown today. Nearly 200 dealers and their guests assembled. They were conveyed to the picnic ground in 43 automobiles.

Automobile Events Prominent

The program for the day was a lengthy one and in contradistinction to other programs of a similar kind, contained a fair proportion of events which required the use of automobiles. Of the fifteen contests which were decided, five were for motor car drivers. These were as follows: Forward and reverse race in which the driver was required to drive forward about 50 feet, reverse and drive backwards to the finish line; speed guessing contest, in which the speedometer was covered and the driver was required to cover a specified distance in a secret time; gymkhana race in which the driver drove to station 1, removed his coat and lighted a cigar, drove to station 2 and uncorked and drank a bottle of liquid refreshment, drove to station 3 and signed his name, put his coat on and buttoned it and drove to station 4, the finish; potato race in which a companion to the driver dropped six potatoes into as many baskets, the one having the greatest number of potatoes in the basket and completing the race in the shortest time to win; slow speed on high gear race.

N. Y. Dealers Win Baseball Game

Between these various automobile contests there were 10 athletic events and a baseball game between a team of New York dealers and a team of Brooklyn dealers. The New York men won, the final score being 10 to 1. Following the athletic program, a clam-bake brought the day to a close.

The summary:

Wheelbarrow race: First heat won by C. Smith and G. Sullivan; second heat, E. G. Baker and Isacson; third heat, S. Marks and Arthur Haines; fourth heat, D. Beecroft and N. Lazarnick. Final won by S. Marks and Arthur Haines.

Golf driving contest—Won by R. Godwin

Caper on Starter Wagner's Farm

Long Island, Saturday, Sept. 19. Nearly 200 dealers and their guests were there

ers Draws 200 Dealers—Baseball tests — Ten Other Events

(200 yards); second, G. Sullivan; third, Alfred Keeves.

Fat man's race, 50 yards—Won by M. A. Noonan; second, F. G. Hill; third, J. Kirk. Time 5 sec.

Three-legged race—First heat won by E. D. Studebaker and J. S. Bestar; second heat, J. Brietenbach and G. Arbogast; third heat, M. W. Colwell and E. H. Burgin. Final, J. Brietenbach and G. Arbogast; second, E. D. Studebaker and J. S. Bestar.

Fifty-yard dash—Won by E. D. Studebaker; second, G. Arbogast. Time, 5 1-5 sec.

Sack race, 50 yards—Won by Gene Sullivan; second, G. Arbogast. Time 12 2-5 sec.

Automobile Sports Hotly Contested

Forward and reverse automobile race—Won by A. Hartog (Packard) 15 2-5; second, H. B. Mall (National), 16 2-5; third, Geo. B. McCutcheon (National coupé), 17 sec.; fourth, J. Brietenbach (Chandler), 17 4-5; fifth, M. E. Le Bon (Jeffery) 20 1-5.

Secret time contest—Won by H. B. Mall (National), time, 22 sec.; second, A. Hartog, (Packard), time 21 4-5 sec.; third, R. H. Johnston (White), time, 23 3-4 sec. Secret time, 22 sec.

Gymkhana race—Won by Fred. Miller (Packard), time, 1:26 4-5; second, tie, W. C. Poertner (National), and H. B. Mall (National), time, 1:24 4-5; third, D. Beecroft, (White), time, 1:45 3-5.

Shoe race—Won by E. C. Blake; second, D. Beecroft.

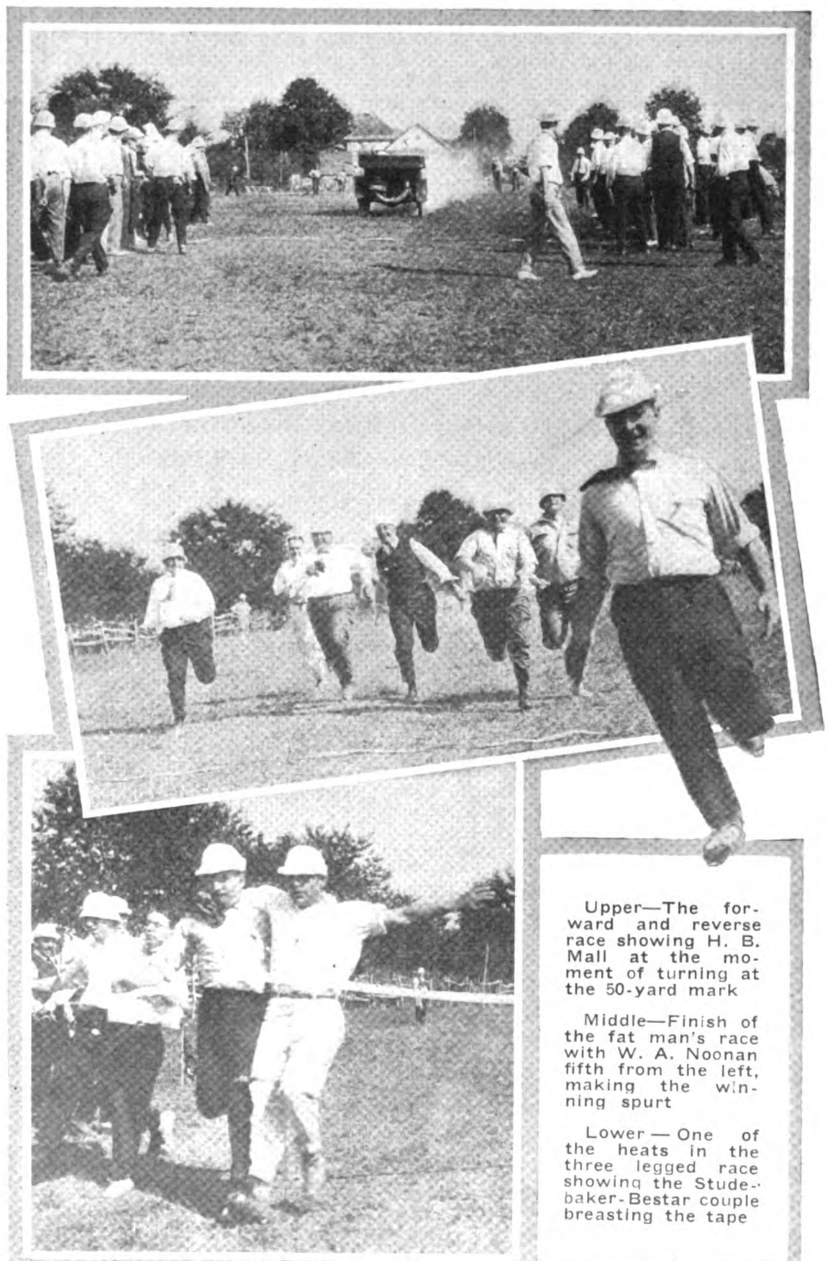
Slow speed on high gear—Won by Chas. A. Hopfensack (Chandler), 23 2-5 sec.; second, E. C. Blake (Packard), 20 3-5 sec.; third, R. H. Johnston (White), 20 1-5.

Geo. Robertson Cup—Won by W. Parkinson.

Poertner Wins Potato Race

Potato race—Won by W. C. Poertner, driving a Jeffery and with Roebensteik as bomb thrower, won, his time being 14 4-5 seconds, with 5 potatoes in the baskets.

Throughout the whole of the program good fellowship prevailed. The staging of the Booster's outing was placed in the hands of a number of committees, who gave freely of their time that the event might be a success. The commissary department was under the direction of H. A. Bonnell.



Upper—The forward and reverse race showing H. B. Mall at the moment of turning at the 50-yard mark

Middle—Finish of the fat man's race with W. A. Noonan fifth from the left, making the winning spurt

Lower — One of the heats in the three legged race showing the Studebaker-Bestar couple breasting the tape

Burman and Oldfield Smash Mile Track Records

ST. LOUIS, MO., Sept. 20—Barney Oldfield, driving a Fiat Cyclone on the Maxwellton mile track in this city, today broke two existing records when he covered the mile in 44 seconds flat, and drove 5 miles in 3:40 2-5. The previous existing mile record of 46:40 was made by Oldfield in a Christie at Bakersfield, Cal., August 27 last year.

The previous 5-mile record was held by Louis Disbrow in a Simplex and was 4:06:58, made at Cleveland, September 14, 1912.

Oldfield's new records were made today at the postponed Labor Day meet of the St. Louis Automobile Racing Assn., which has promoted several track meets during the season. The Maxwellton track can scarcely be considered a conventional 1-mile dirt track in that it is more nearly circular than the ordinary track. Its curves have a radius of 675 feet, whereas the ordinary radius of the mile track is 400 feet. The curves are banked to 8 1-2 degrees. Timing was done by the Stewart Indianapolis timer, which was leased for the occasion. It will remain for the Contest Board at the American Automobile Assn. whether Oldfield's two records will be allowed, but it would seem that there should not be any reason why they should not. The meet was under the direction of W. P. N. Stevens, Contest Board representative from Kansas City, Mo., who is entirely familiar with track contests.

SPRINGFIELD, ILL., Sept. 19—Burman made mile dirt-track records today at the Illinois State Fair, when he traveled 20 miles in 17:10 3-5 and 25 miles in 21:17 3-5. These records for a circular track were formerly held by Louis Disbrow, who made 20 miles in 17:57 at San José, Cal., and by Barnes, who did 25 miles in 22:07 at Portland, Ore.

$7,000 Prizes at Oklahoma Fair Races

OKLAHOMA CITY, OKLA., Sept. 19—With $7,000 in prize money, Oklahoma City offers a program of dirt track automobile racing at the state fair beginning Sept. 19 and ending Oct. 3, with Louis Disbrow, Heine Ulbricht, Fred Horey, Johnny Raimey, Joe Cleary, former Texas Ranger, "Mad Lou" Heineman and Eddie Hearne scheduled to start.

Elkhart Parades at Lincoln Highway Dedication

INDIANAPOLIS, IND., Sept. 21—A section of the Lincoln Highway, which has just been improved, was formally dedicated at Elkhart last Wednesday. This is five-eighths of a mile long and is the first section in Indiana to be completed. As a part of the program, there was a parade of 286 motor cars over the pavement.

Studebaker's Sales Triple in 2 Weeks of September

DETROIT, MICH., Sept. 21—As an evidence of national prosperity the Studebaker Corp., has made public the record of the actual sales made by its 13 branches in the country during the first 2 weeks of this month. The result shows sales aggregating $1,118,447 as against a total of $373,411 for the corresponding 2 weeks in 1913. There is thus a gain this year of $745,066, and the total increase of business is 300 per cent.

The sales made by each branch during the first 2 weeks of September this year and last year were as follows:

Branch	1914	1913
Chicago, Ill.	$ 278,433	$ 73,570
Minneapolis, Minn	148,464	55,825
Kansas City, Mo.	139,386	26,554
Philadelphia, Pa.	76,761	12,735
Omaha, Neb.	69,306	14,463
Boston, Mass.	67,553	25,685
Dallas, Texas	56,901	16,269
Atlanta, Ga.	51,168	11,882
St. Louis, Mo.	50,505	46,073
New York, N. Y.	46,018	25,344
San Francisco, Cal	45,571	30,776
Portland, Ore.	45,071	13,354
Detroit, Mich.	43,340	20,381
Total	$1,118,447	$373,411

While these figures show the results of only one manufacturer, they give a fair idea of the business conditions in certain parts of the country. Thus it will be seen at once that it seems that in the Western States the demand for motor cars is much heavier than in the East.

One Six—National Offering for 1915

(*Continued from page* 596)

travel has necessitated lengthening the shaft .25 inch.

On the stock cars the wheels are wood although wire-wheel equipment will be fitted at an additional cost of $125. The tires are 36 by 4.5. The drive is taken through the main leaf of the rear spring and is heavily constructed for that purpose. Easy riding is insured by a comparatively large number of thin leaves. There are eight leaves in the cantilever. The springs are linked at the forward end and swivelled at the center; that is, the fixed point of the spring is at its center and the play is given at the extremities. The tensile strength of the steel used is 120,000 pounds to the square inch. The spring measures 53 inches over all.

The Automobile Calendar

Sept. 15-Oct. 11...New York City, Commercial Tercentenary Celebration
Sept. 23-Oct. 3....Oklahoma City, Okla., Show, Oklahoma Automobile Association.
Sept. 26.........Kalamazoo, Mich., 100-Mile Track, Inter-State Fair.
Sept. 27.........Pleasanton, Cal., Track Meet, Alameda County Fair Assn.
Sept. 28-Oct. 3....Salem, Ore., Automobile Show, Oregon State Fair.
Oct. 3-10........Cincinnati, O., Show.
Oct. 3...........Fresno, Cal., Track Meet, Fresno Co., Agricultural Assn.
Oct. 4...........St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 5-12.........St. Louis, Mo., Show, Forest Park Highlands.
Oct. 7-8-9-10.....Detroit, Mich., First Truck Convention of Motor Truck Manufacturers', Dealers' and Owners' Organization; promoter, Motor Truck Club of America.
Oct. 7-17........New York City Electric Vehicle Show, Grand Central Palace.
Oct. 10..........Medford, Mass., Track for Light Cars, Combination Park.
Oct. 10-17........Boston, Mass., New England Light Car and Cyclecar Show, Horticultural Hall.
Oct. 17..........Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-24........Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1....Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21....Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26........Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31........Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.............El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 8-9.........El. Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11........Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 26..........Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4.........New York City, Annual Meeting of the American Society of Mechanical Engineers.
Jan. 2-9.........New York City, Annual Automobile Show, Grand Central Palace
Jan. 3-10........Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16........Philadelphia Automobile Show.
Jan. 23-30.......Chicago, Ill., Automobile Show, First Regiment Armory.
Jan.30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb. 15-20.......Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22..........San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13.......Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn. Boston Commercial Motor Veh. Assn.
Mar. 7...........San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 14..........San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

VOL. XXXI NEW YORK—THURSDAY, OCTOBER 1, 1914—CHICAGO No. 14

The AUTOMOBILE

Tax Gasoline—Tax Coal, Oats

Gasoline Tax To Yield $12,000,000 Annually—Horse Tax Would Yield $365,000,000

If One Fuel Is Taxed All Should Be

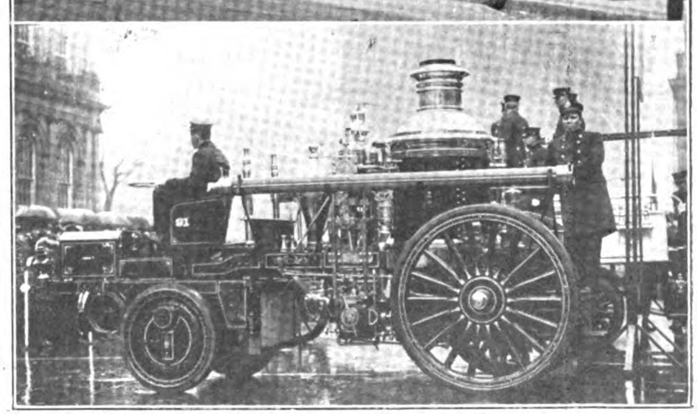
By J. Edward Schipper

Horse carriage not taxed; taxicab may pay

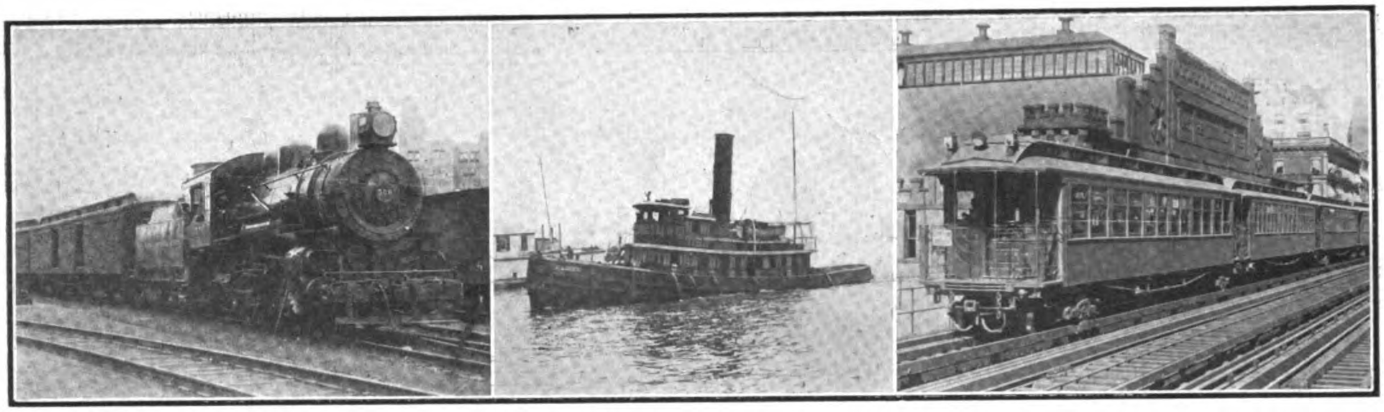
OUR Government wants to raise $12,000,000 through a tax of 2 cents per gallon on gasoline. If the food for horses were taxed on the same proportion it would amount to $1,000,000 per day or $365,000,000 per year.

Statistical reports from the Department of Agriculture give the ratio of horses to peopie in the United States as .21 to 1. There are now more than 90,000,000 people in this country and hence more than 18,000,000 horses. Regarding food as the fuel of the horse, each animal uses 65 cents worth a day, or approximately the equivalent in money value of 4 gallons of gasoline. At this rate if an equal tax were made each horse would be taxed 8 cents a day and the yield to the Government would be more than $1,000,000 per day, or $365,000,000 per year.

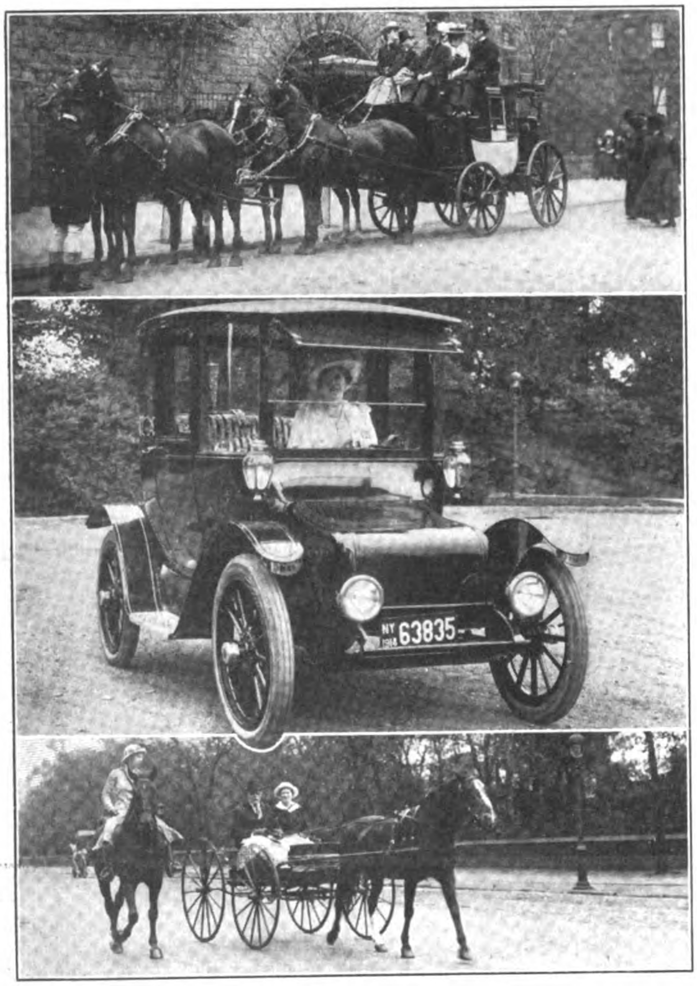
Because the automobile is economical and does not use the same amount of food or fuel as the horse a tax rate is put upon it that would be out of all proportion to that which would be applied to horses even were they taxed. The Government would not expect a yield of $1,000,000 a day or $365,000,000 a year from horses. But if an automobile used the same amount of fuel as a horse, that is the rate at which the proposed tax would work out. Regarded in this light it is nothing more than a tax on economy.



While the horse fire engine is slower, it is not taxed; the motor fire apparatus might pay a duty



Three classes of vehicles that would not suffer under the proposed legislation, locomotive, towing vessel and elevated train



Luxurious methods of travel that would pass untaxed

The proposed tax on gasoline will double the cost of motoring so far as taxation is concerned. To explain: In the State of New York a man owning a 30-horsepower touring car pays an annual registration fee of $10. If he travels 7,500 miles and averages 15 miles to the gallon he will use 500 gallons of gasoline. At the proposed tax of 2 cents per gallon he will have handed the Government another ten dollar bill at the end of the touring season. His annual fees for the privilege of using his car are doubled, are $20 instead of $10.

The operator of a 3-ton truck who drives 10,000 miles in a year, will use approximately 2,000 gallons of gasoline. At 2 cents per gallon the tax will be $40 a year in addition to his $5 registration fee.

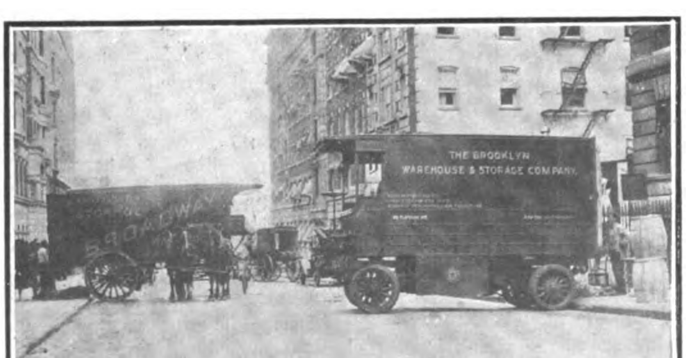
There are 1,500,000 motor vehicles now in use in the United States. The average vehicle travels 4,000 miles in a season. To be conservative it will travel 10 miles per gallon. In other words, it will use 400 gallons in a season, paying a tax according to the proposed rate of $8 per year.

NOT LESS THAN $12,000,000 WILL FIND ITS WAY FROM THE POCKET OF THE MOTOR-USING PUBLIC INTO THE HANDS OF THE STATE IN A SINGLE YEAR.

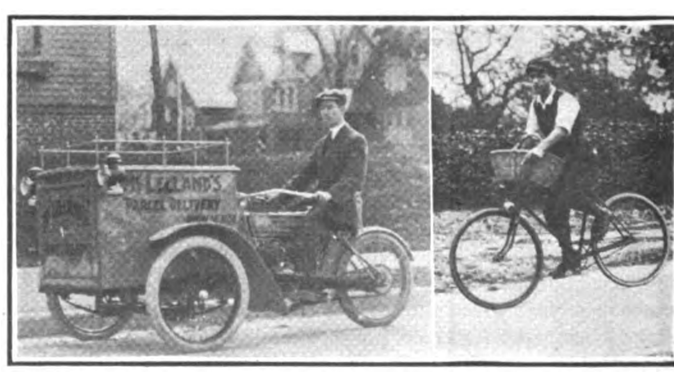
The American citizen is patriotic and is willing to stand behind the Government and meet the demands of taxation, when that taxation is just, without a murmur. The $12,000,000 which is drawn from the automobile user during the year would doubtless be paid without protest were it not for the seeming unfairness of a tax which recognizes one class and ignores another. The citizen who owns a fleet of motor-moving vans has to compete with another who owns a fleet of horse-drawn vehicles. The Government proposes to tax the progressive man who has displaced his horses by the more modern method and not to tax the one who employs the less efficient vehicle.

It should not be the purpose of those in authority to place a tax upon the factors of efficiency in any man's business.

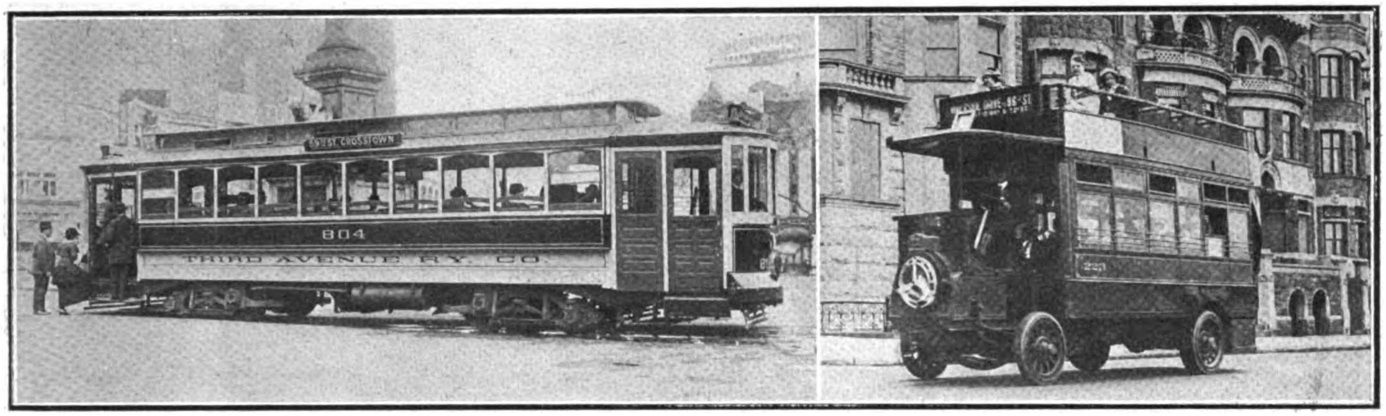
A lady stepping from her luxurious residence into her waiting electric is carried to the door of her jeweler, purchases a pair of ornamental and expensive earrrings and returns to



The gasoline van taxed, the electric untaxed



Delivery by motor vehicle would be taxed; by bicycle, not



The trolley does not pay a tax on its fuel, while the motor bus would if the new law went into effect

her home after a trip in which there has been no industrial good gained for the community, insofar as the method of propulsion of her vehicle is concerned. That is, had she taken a passenger bus the same effect would have been accomplished. Her trip has been an untaxed luxury. On the other hand a family moving its household effects from the city to the farm and employihg the gasoline truck has according to the reasoning to be inferred from the proposed tax committed an act which should net an income to the Government. One type of vehicle is taxed, the other is not.

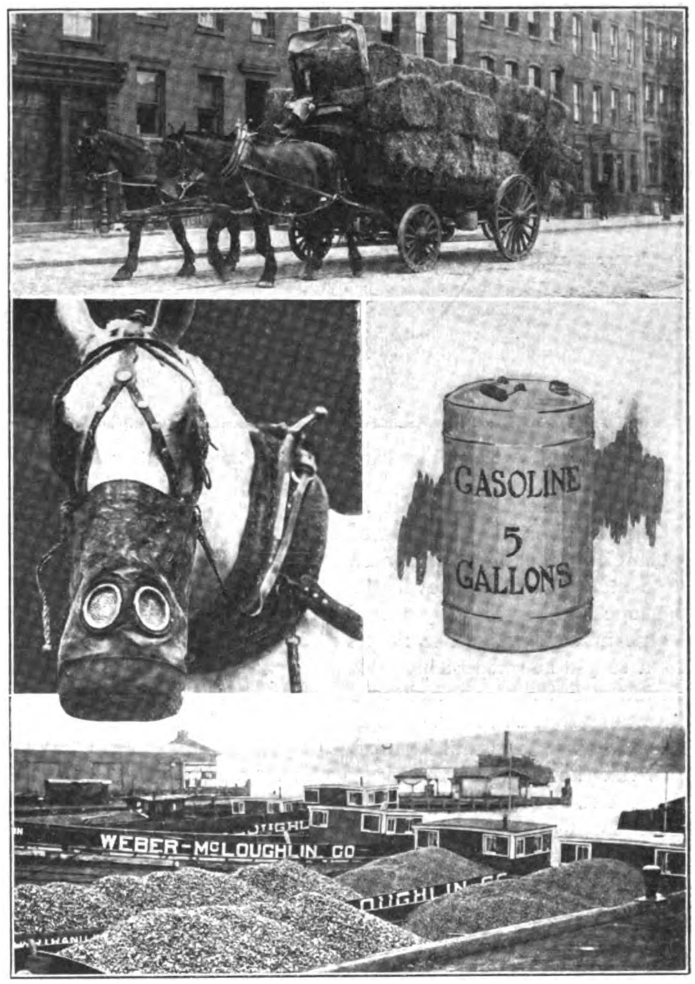
If the grocer delivers our groceries by gasoline truck he is taxed. If he employs a bicycle, an electric, or sends a boy on foot, he is not.

This analogy can be carried beyond the motor car industry. The fisherman, on the banks oi Newfoundland earning at great risk to himself and with small returns for his efforts an income from the sea, makes use of the motor dory. He uses gasoline for fuel and therefore should be taxed according to those who propose the suggested legislation. On the other hand the millionaire, who cruises about the sea in his palatial steam-yacht not seeking the treasurer of the ocean for profit or as a means of eking out his existence, is not taxed.

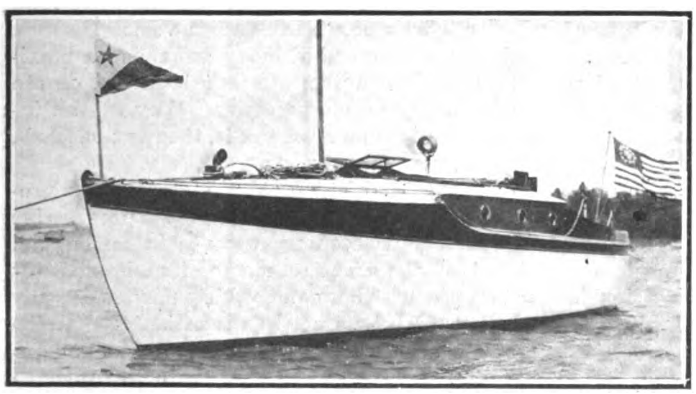
Tax One, Tax All

IF WE TAX GASOLINE, TAX COAL, WOOD, COKE, CRUDE OIL OR PRODUCER GAS.

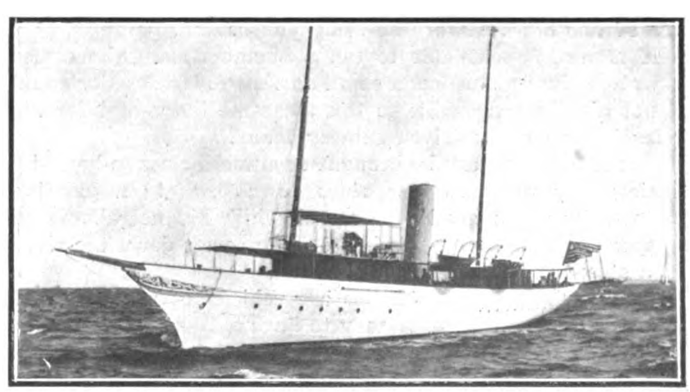
There can be no explanation why these fuels are not taxed, unless it is they are not used to propel automobiles. When the automobile originated it was the sport of the wealthy. The idea was engendered in the minds of those who witnessed the industry in its early stages that the owner of a motor car was of necessity a person of wealth. That idea is the seed which has created the growth of the idea which has now borne fruit in the proposal of a tax on the prime necessity of the automobile user. The horse is to the horse-drawn vehicle what the motor is to the motor-driven vehicle. Potentially, both are engines. Both need fuel. What the gasoline is to the motor, oats and hay are to the horse. Yet our government



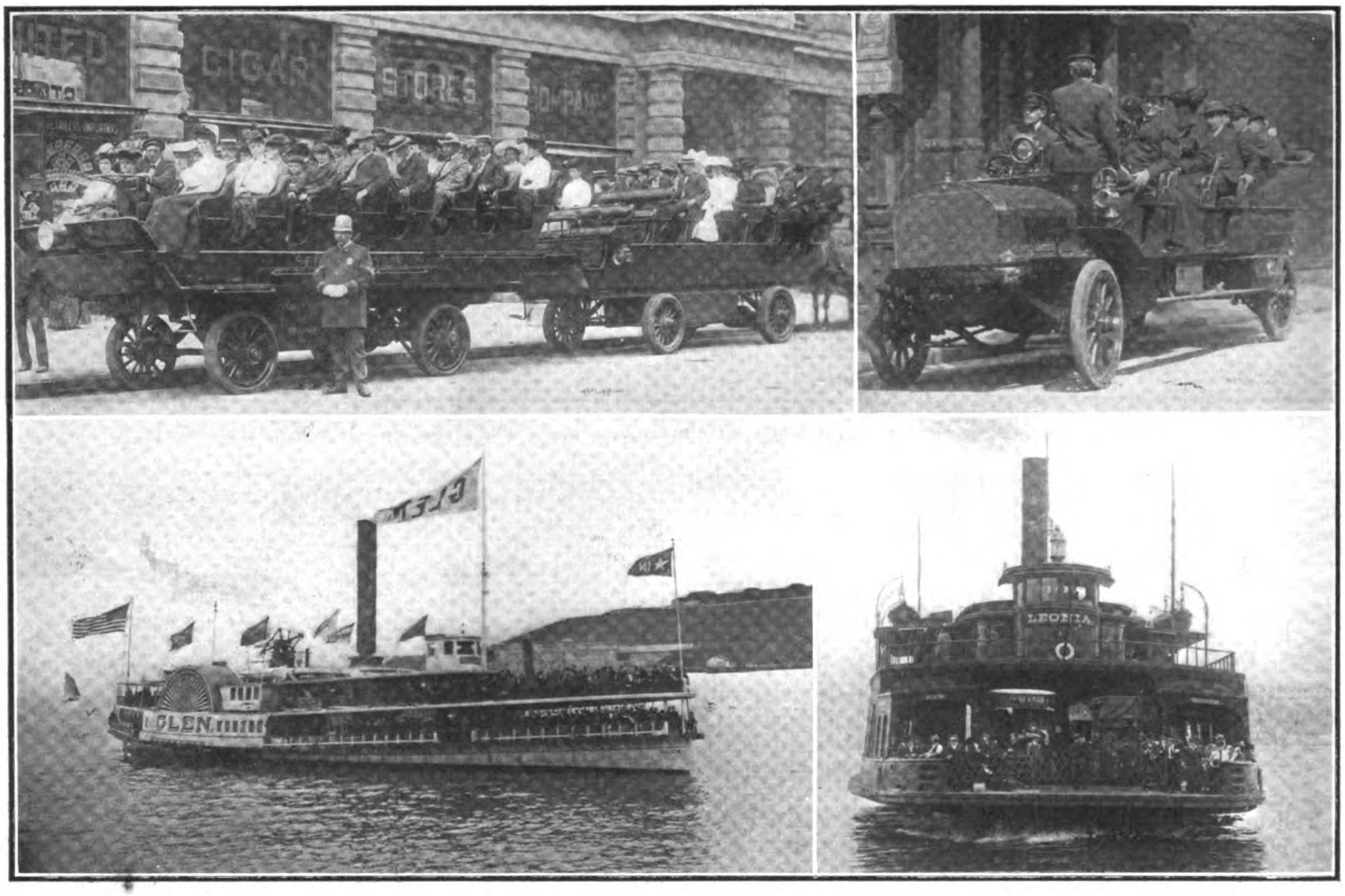
Hay, oats and coal are fuels that would not have to pay. A 5-gallon can of gasoline would net the government 10 cents



Gasoline launch would pay a duty of 2 cents per gallon



Steam yachts use coal and would not be taxed



Electric sight-seeing buses would not be taxed while gasoline ones would. Excursion boats and ferryboats would be on the free list

would tax the gasoline but not the oats, hay or other fuels.

There can be no intention of an attempt to drive the transportation plan of industry back to the wasteful quadruped. The motor car has proved its service to the governments of Europe and our country does not fail to recognize its immense value in times of peace as well as war. Gasoline has risen at a single bound to a position as a war-time necessity equal in importance to railroads and horses. Yet it is the only war necessity that is taxed. The question can be justifiedly asked, if we can tax one munition of war why not tax others? Why not tax the food for the mules when we are taxing the food for the motors? Both do the same work.

If the Government desires to raise $12,000,000 per year on fuels and then spread this tax over all the industrial fuels that are used, it would be found that the motorist would bear but a small percentage of the total. In our large cities, where millions are carried daily from their homes to their daily tasks, electricity plays the most important part in the transportation total. If it seems fair to tax the moving of household goods when they are moved by gasoline, would it not be also fair to tax the same people when they are making use of another fuel for the same purpose?

If it seems reasonable to tax a business man who comes downtown in a motor bus a small amount for each ride, would it not also be reasonable to tax the same individual for his rides in an electric-driven subway train?

The comparison can be brought even more close to home by asking why the man who rides down town in a gasoline motor-driven bus should be taxed while his neighbor who happens to take an electric bus or who comes down the river in a steam yacht, is not.

The 1,500,000 motor vehicles are vehicles of necessity and not luxuries. If it is necessary to have a 20-hour train from Chicago to New York, if it is necessary to have express trains on our subways, if it is necessary to have express service on our elevated railroads; then, it is equally necessary to have our gasoline cars which will carry the business man from his suburban home to his office with the greatest comfort and the least expenditure of time.

The business man considers it an economic investment to travel with the comforts of the limited train and save 4 or 5 hours besides. It is an equally economic investment for the business man to use his motor vehicle every day.

If it is necessary to have our fast freights to carry merchandise it is equally necessary to have our motor trucks that can deliver similar merchandise from the hub of our metropolis to the fringe of suburbs within a zone of 50 or 75 miles.

IN THESE FIELDS THE GASOLINE TRUCK IS AS GREAT A NECESSITY AS THE FREIGHT LOCOMOTIVE.

Why tax gasoline and not coal, why tax a motor vehicle and not a railroad train?

We insist on the fastest train for mail service. Our trans-Atlantic steamers are paid to make high speeds while serving the Post Office. Between offices in our great cities motor trucks are allowed to travel with special traffic privileges to make the best possible time in carrying on the vast mail business of industry. Why do we tax such a vehicle?

The intensified business method of today demands the maximum of out-door life. The automobile has been one of the greatest factors in supplying his necessity. Why tax an instrument of health? But, if we must tax it, then tax baseball, horse racing, golf, boating, tennis, etc.

It is a tax on the essence of progress. It is a tax on progressiveness because it is used only by the most progressive in business. It is a tax on economy because in commercial lines economy has been the great reason for its adoption. It is a double taxation because the motor vehicle now has to pay a state tax and very often it is a triple taxation in that the state collects money, sometimes the city and now the government would also take its turn in gathering an added revenue from this necessity.

Europe Orders 1,000 More Trucks

Both Belligerents and Non-Combatant Nations Send Emissaries To Buy American Commercial Vehicles—Quick Delivery Wanted—Order of 1,000 Trucks 2 Weeks Ago Officially Confirmed

NEW YORK CITY, Sept. 30—That European countries are deeply concerned in purchasing motor trucks from America has been again demonstrated this week, when an emissary of a European country arrived in America with direct orders from his government to purchase 1,000 motor trucks for the earliest possible delivery. These are to be 2-, 3- and 5-ton types. This fact coupled with similar requirements announced 2 weeks ago of European countries needing 1,000 trucks gives direct evidence of the stimulating influences on American truck business of the present war. In addition to these two large requirements, there have been many smaller shipments within the last month aggregating 200 trucks, so that the grand total of American trucks needed today by European countries, several of which are not belligerents, is 2,200.

Demand Is for 2, 3 and 5 Ton Trucks

SOUTH BETHLEHEM, PA., Sept. 30—The fact that European countries had their emissaries in America to purchase 1,000 motor trucks, which was published in THE AUTOMOBILE 2 weeks ago, has now been officially confirmed by the Bethlehem Iron & Steel Co., South Bethlehem, Pa., which has become the purchasing department of these foreign governments not only for the motor trucks, trailers and wagons, but also for such army supplies as horseshoes, army blankets, horse blankets, medical supplies, etc.

Buyers Are Increasingly Active

These emissaries of foreign governments, after making their headquarters in New York, invaded South Bethlehem, where the normal purchasing department of the steel company was set aside, and the entire executive department, including the board of directors, became a purchasing department of the whole for these various products.

As stated 2 weeks ago, the demand is practically for 2-, 3- and 5-tontrucks, many with trailer arrangements. The most popular military truck ranges from 2- to 3.5-ton capacity, as this is closely allied with the subsidized European truck.

Quick delivery is wanted on the majority of the merchandise ordered, due to the coming winter and the general military operations in Europe. It is now known that 150 motor trucks have been shipped from ports on the North American Continent during the past 10 days, and buyers from other foreign governments have arrived within the past week.

C. of C. Protests 2-Cent Gasoline Tax

NEW YORK CITY, Sept. 30—The National Automobile Chamber of Commerce has sent out letters of protest to members of the United States Senate against the tax of 2 cents a gallon on gasoline, naphtha and other similar products obtained from crude, partially refined, or residuum oils and suitable for motor power, as provided in the war revenue bill that was passed in the House of Representatives.

The National Automobile Chamber of Commerce points out that this is an excessive tax of 15 to 20 per cent. on a necessity and not a luxury; that the great majority of automobiles today are bought and used by farmers and others of moderate means, and that the tax will fall upon the consumer and not the producer of gasoline.

T. R. Lippard, president of the Stewart Motor Corp., Buffalo, N. Y., states, "We are strongly opposed to the gasoline tax because it puts the burden on such a small percentage of the people. The taxation should be borne by the majority instead of the few. Less than 2 per cent. of the people own automobiles and they are big users of gasoline automobiles. They are at present heavily taxed by the states or their own municipalities."

James L. Geddes, president of the Kelly Springfield Motor Truck Co., Springfield, O., states, "I believe the proposed tax on gasoline unwarranted as gasoline cannot possibly be considered a luxury. It is just as much a necessity as coal or any other fuel."

Car Owners Protest Proposed Taxation

WASHINGTON, D. C., Sept. 30—*Special Telegram*—The Senate finance committee is holding daily sessions on the war emergency tax bill and Chairman Simmons hopes to report the bill to the Senate before the week end.

Now that the committee is talking of substituting for the gasoline tax a tax on automobiles, to be measured by horsepower, owners of motor cars are beginning to be heard from. Senators and House members are receiving letters warning them that the automobile is no longer a luxury, but a necessity.

Members are being reminded in these protests that to tax automobiles would mean taxing trucks and vehicles used by merchants and business houses, and that this would be a tax on business in another guise.

A hot blast on the automobile tax came today from a Western preacher, Rev. V. M. Elston, Griswold, Ia. He denounced the proposed tax on gasoline and also the proposed automobile tax. He said gasoline was used by farmers and others for power purposes and its use was by no means confined to automobiles. As for the automobile tax, he informed Senator Kenyon that automobiles had become a necessity, whereas a lot of benighted folk seemed to be laboring under the idea it was still a luxury.

New Peerless Four for $2,000—Six $2,250

CLEVELAND, O., Sept. 29—Announcement has just been made by the Peerless Motor Car Co., of a lighter line of four- and six-cylinder cars which will supplement the large 48-horsepower sixes the company has been building for several years. The new four and six are styled "all purpose cars" as they are intended to perform equally well in touring work as for city driving. The four is offered at $2,000 and the six at $2,250.

The Peerless company places special emphasis upon the fact that these new cars are of European design, having small bore, high speed engines, that of the four being 3 3-4 by 5 and of the six 3 1-2 by 5. The wheelbases are 113 and 121 inches, respectively.

The bodies are streamline and very handsome. The front seats are of the individual type, making it possible to pass between them to the rear compartment.

Spiral bevel gears are used in the rear axles of these Peerless models as well as in the larger cars of the line. Some of the other features are left drive and center control, gearset of three-speed type in unit with motor. Gray & Davis cranking and lighting in connection with a 60-ampere-hour storage battery, multiple-disk clutch, vacuum gasoline feed from rear tank and the regular form of Peerless platform rear springing.

The equipment includes one man top, rain vision windshield, demountable rims with one extra, Stewart speedometer, tire pump, electric horn, and tools.

Complete description of these new Peerless models will appear in an early issue.

Packard Shipments Increase 75 Per Cent.

NEW YORK CITY, Sept. 30—The Packard Motor Car Co., Detroit, Mich., has increased its shipments for the last 2 months 75 per cent. over the corresponding time last year.

Comparing the Six With the Eight

Six Is Simpler and Lighter—Two Carbureters Almost a Necessity on Eight—Little Difference in Running Between the Six and Eight

By S. I. Fekete
Hudson Motor Car Co.

DETROIT MICH.—Editor THE AUTOMOBILE:—The recent advent of the eight-cylinder motor in America strongly recalls the situation of a few years ago when the six-cylinder motor was at a similar stage of its development. Should two more cylinders added to a six produce as great an improvement as did the addition of two to the four-cylinder motor a few years ago, then there would be grounds for believing that American manufacturers would be called upon in the future to meet a popular demand for an eight-cylinder motor.

The ascendency of the six-cylinder motor over the four was not established until after several years of educational work to familiarize the buying public with such features as, the effect of overlapping power strokes, smoothness, silence, flexibility and perfect balance.

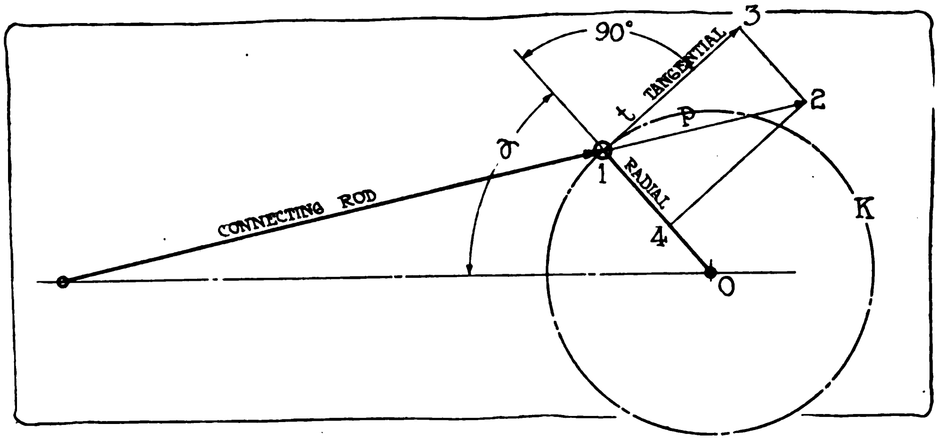


Fig. 1—To determine the magnitude of the tangential force when the crankpin is at any given angle from the center line of the cylinder. Line 1-3 is the tangential component and 1-4 the radial. It is first necessary to understand this tangential portion of the resultant force before considering what is to follow

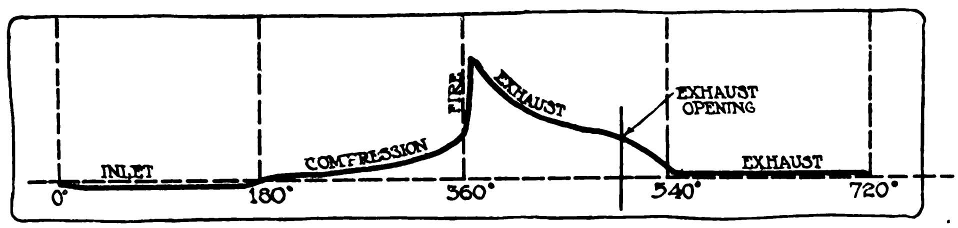


Fig. 2—The working forces acting in one cylinder for a complete cycle plotted on the 720 degrees of a cycle as a base and considering the pressures as ordinates. The pressure thus plotted may be taken from an indicator diagram. The first quarter, or 180 degrees, of the cycle is negative work on account of suction

Perfect Balance in Six

THE PUBLIC HAS THUS COME TO KNOW THAT NOT ONLY ARE THE VIBRATIONS DUE TO EXPLOSION PRESSURE, AND ACTION OF RECIPROCATING PARTS EQUALLY WELL BALANCED IN THE FOUR AND SIX, BUT ALSO THAT THE OCTAVE OR SYNCHRONIC VIBRATIONS OF THE FOUR ARE PERFECTLY BALANCED IN THE SIX.

The assimilation of these engineering principles would not have been alone sufficient to give the six its present dominance were it not for the fact that the six has in actual use adequately fulfilled claims which theory advanced in its favor.

The pioneer designers of six-cylinder motors based their designs upon extensive theoretical research in which they investigated by graphical means the advantages to be obtained by various cylinder numbers, groupings and firing orders.

The six-cylinder motors accomplished all that their engineers anticipated and eventually received the almost unanimous endorsement of that most skeptical and discriminating of critics—the buying public.

ANY MULTIPLE-CYLINDER MOTOR WHETHER OF TWO, FOUR, SIX OR EIGHT CYLINDERS IS THEREFORE NOT AN INVENTION BUT A DEVELOPMENT BASED UPON COMPARISON OF THE RELATIVE ADVANTAGES OF GROUPINGS OF CYLINDERS TO REMEDY CERTAIN DEFECTS, AND TO GAIN CERTAIN APPRECIABLE ADVANTAGES OVER A MOTOR OF FEWER CYLINDERS.

Six vs. Eight

So far as the overlapping power stroke in six-cylinder and eight-cylinder motors is concerned, it is true that the six does not get its second cylinder into action until later than the eight, but this in reality is fortunate because the second cylinder of the six comes into action at a point where the negative forces are at a maximum, whereas in the eight-cylinder motor the overlap comes in a place where the negative forces are at a minimum. This fact will be proven later in this article by means of diagrams.

Different from Aviation

The imitative tendency of human nature might lead the buying public to the conclusion that because multi-cylinder motors have been used to a large extent in aerial navigation they are equally desirable for automobile use. This impression is somewhat fallacious because the requirements of terrestrial and aerial transportation are essentially different. In aerial work gasoline economy is unessential and the important factors are safety and high power ranging from 80 to 200 horsepower. To both these factors the multi-cylinder motor is best adapted; to high power because by dividing a large piston displacement among several cylinders lower bearing pressure and stresses are obtained; to safety because with a motor of ten or twelve cylinders the misfiring of three or four cylinders does not imperil the iife of the aviator, while with a motor of four cylinders his only safety would lie in his ability to plane back to earth.

In the case of an automobile motor these two requirements are entirely absent, so that imitation of aerial methods provides hardly sufficient reasons for adoption.

The De Dion eight-cylinder motor is much heavier per unit of piston displacement than a six. When multiplicity of parts, intricate connecting-rod and magneto construction and complications in the lubricating and carbureter systems are considered, it would appear that manufacturing costs would be higher.

In this connection it is almost a necessity to use two carbureters to obtain efficient carburetion because of the fact that the manifolding and firing order is such that it is practically impossible to utilize the momentum of inflowing gas column on account of the action of the next cylinder which begins to take in gas when the preceding cylinder has reached only half of its travel.

Fours Are Out of Balance

In the case of a four-cylinder motor the octave vibration is synchronous and is therefore absolutely out of balance.

The six is perfectly balanced as regards octave vibrations.

The octave vibrations of the eight V-type are nearly in perfect balance and are in perfect balance in the eight all-in-line.

By octave vibration is meant vibration due to the non-infinite length of connecting-rod. That is to say when the piston is at half of its travel the connecting-rod is not yet quite 90 degrees on the crank circle from the vertical.

The present state of the art permits making six crankshafts in all respects the equal of eight throw cranks as regards vibration and deflection.

Reason for Diagrams

The surest way of finding out what results that a certain cylinder grouping will give is by a combined graphical representation of the functions of the cylinders not only as individuals, but also when acting simultaneously. The illustrations in this article are used for this purpose.

IF THE DIAGRAMS THUS PRODUCED SHOW HARMONY AND BALANCE BETWEEN POSITIVE AND NEGATIVE WORK, ONE CAN DERIVE FROM THEM INFORMATION WHICH WILL GUIDE IN DESIGNING A MOTOR TO GIVE DESIRED RESULTS.

The Vibration Pole

Inasmuch as the amount of vibration is the essential factor in comparing motor types, let us proceed to study this side of the subject.

If a well-balanced motor is running smoothly and we disconnect a spark plug it immediately becomes apparent from the sound that something is irregular.

To graphically duplicate the above conditions we may plot two tangential diagrams, the first representing all cylinders firing and the second representing one cylinder not. The first will represent the normal function of the motor and the second the impaired function. That is, the first diagram will consist of a series of undulations repeated at regular intervals while the second diagram will have similar undulations but at regular intervals one will be lacking and impair the harmony of the diagram.

The tangential diagram might therefore in popular parlance be termed the criterion of the motor, and from it we may derive conclusions as to the running qualities of the motor.

The obviously smoother running qualities of a six over a single-cylinder motor are accurately reflected in the tangential torque diagrams of the two, the curve variations in the six being small as compared to those of the single-cylinder because of the more uniform torque of the six.

Best Motor Defined

A motor which runs with the least injurious action of reciprocating parts and with the most uniform power acting constantly on the crankshaft is the best and smoothest running. A horizontal line is the graphical representation of such an ideal condition and it is approached only by certain types of electric motors. Such a line indicates no fluctuation.

The most complete information for exhaustive study of motor performance is offered by its tangential torque diagram and it clearly represents the working functions of the motor, both of reciprocating and rotating parts, including such items as:

Pressure variation during working stroke due to increase of gas volume.

a.—Acceleration of piston.

b.—Influence of acceleration and deceleration on the inlet, compression, working and exhaust strokes.

c.—Back pressure during exhaust stroke.

d.—Negative pressure in the inlet manifold.

e.—Character of pressures changes between crankpin and connecting-rod.

Not only are the above functions shown for each cylinder, but their simultaneous action in all the cylinders is revealed by this tangential torque diagram. *Therefore, if we have two motors of the same bore, stroke, compression, reciprocating and rotating part weights, the tangential diagram affords a fair and impartial means of comparing their performance.*

Need of Flywheel

Only motors, whose torque throughout each revolution is uniform, are capable of rotating with uniform angular velocity. Inasmuch as no existing gas motors possess constant magnitude of torque it is necessary to add a flywheel to approximate anywhere near uniform

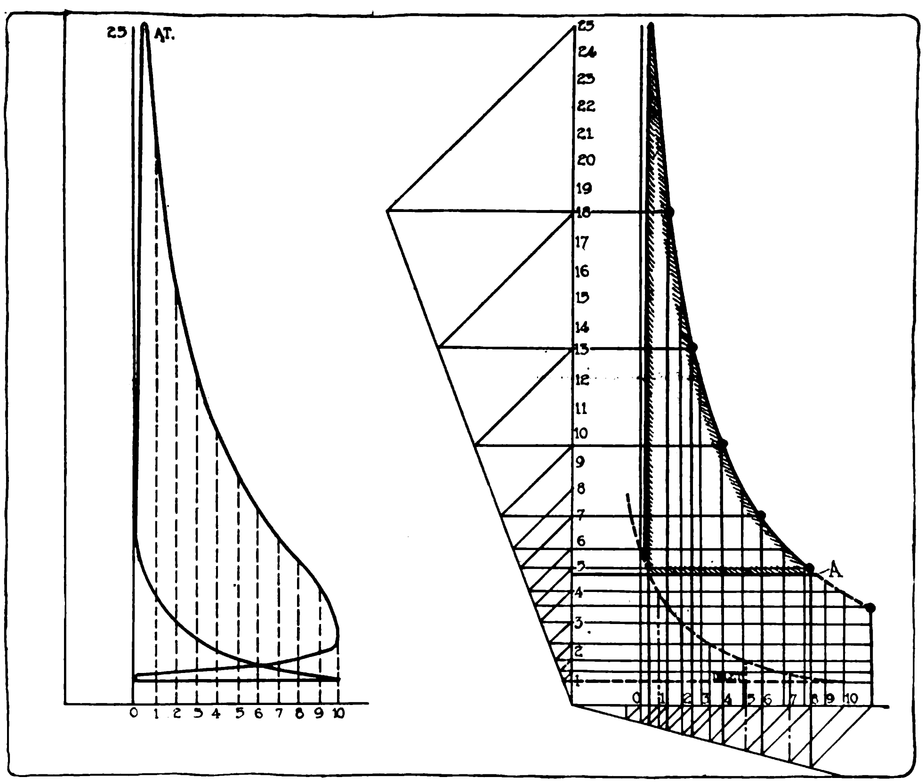


Fig. 3—Left—To take account of the pressure acting in a cylinder an indicator card is used. This shows positive and negative work, the only positive work being that done by the expansion of the gases after ignition. For later plotting purposes the base line has been divided into ten parts

Fig 4—Right—A theoretical work diagram for a single cycle. For purposes of comparing the negative work of different cylinder systems, the ignition pressure is considered to be 25 atmospheres. This merely serves to magnify the negative work and cannot be done except on a comparative basis. The only abnormal feature of the diagram is the exhaust line A; which is straight and at a height of 5 atmospheres. This corresponds to 75 pounds

Fig. 5—Left—Diagram of the inertia forces which act to oppose the motion of the masses; namely, piston, piston pin and upper end of connecting rod. These forces are neutral at middle of stroke and reach their maximum at top or bottom of the stroke. The diagram is plotted on one stroke as a base line

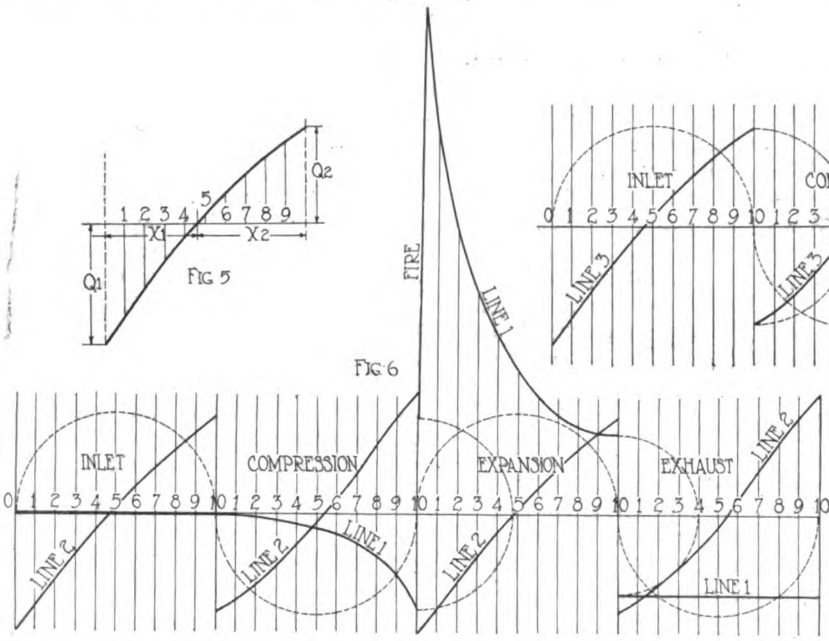


Fig. 6—Combining the inertia force of one cycle with the working forces acting due to the four steps of suction compression expansion and exhaust in a cycle. Line 1 shows the working pressure of Fig. 2 plotted to the same scale as the inertia forces, line 2, which are shown separately in Fig. 5

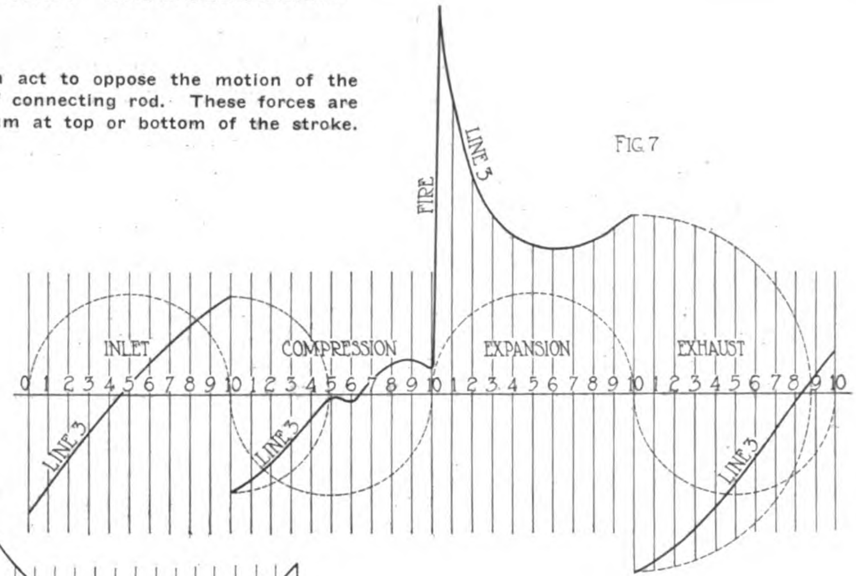


Fig. 7—Right—The algebraic sum of the ordinates of curves 1 and 2 shown in Fig. 6 combined at each vertical line and curve drawn through the resulting points. This curve is line 3 and shows actual pressure on piston, taking into account inertia forces as well as working forces. Positive pressure above and negative below zero line

angular velocity, and while in a multiple-cylinder motor it is impossible to detect with the eye any variation in the angular velocity, this nevertheless exists.

As an illustration of this variation, let us consider the example of a large single-cylinder stationary gas engine, the speed of which is regulated by a hit-and-miss governor. The explosions being considerable distance apart, it is possible from the general sound to detect that the motor speeds up just after an ignition and slows down before the next.

The purpose of the flywheel then is to distribute over the rest of a cycle the energy imparted to it at the time of the explosion stroke and inasmuch as the diameter and weight of any flywheel are necessarily constant, the only possible way in which it can accumulate energy is by increasing its speed. Conversely then any substraction of energy from the flywheel can only be accomplished at the expense of a decrease in speed.

CONSEQUENTLY, WHILE THERE IS NO READY MEANS OF DETECTING IT, A VARIATION IN ANGULAR VELOCITY OF THE FLYWHEEL EXISTS AND THIS IRREGULARITY OF MOTION IS TRANSMITTED TO THE RECIPROCATING PARTS AND CYLINDERS WHOSE REACTIONS TO THESE INTERMITTENT MOTIONS IS ONE CAUSE OF VIBRATION.

Use of Tangential Diagram

A tangential torque diagram, therefore, affords a very logical and clear means of comparing power overlap, and frequency and amplitude of torque changes. It has been used as a means of determining torque variations and for thereby computing flywheel weight to overcome as far as possible these variations. It may be used equally as well to compare torque variations of six and eight-cylinder motors.

Determination of tangential pressures, Fig. 1. The angle which the crankpin makes with the centerline of cylinder when at a given point on its path.

Line 1-3 is the magnitude of tangent force.

This magnitude is, therefore, on the same scale as that chosen to represent the pressure along the connecting-rod.

The working diagram of one cylinder could be represented in a continuous diagram such as Fig. 2.

The magnitude of pressure in the cylinder can be taken from an indicator diagram. Before this diagram can be made to correctly represent all the features we desire we must divide the work represented upon it into two classes, positive and negative.

The positive work is that produced by explosion pressure on the piston.

The negative work is that consumed in the motor itself. The only positive work is the expansion work.

To take account of these two quantities we proceed as follows:

First—Divide the indicator diagram by ten or more equally spaced vertical lines representing crank angles, Fig. 3.

Second—Plot the continuous diagram from an indicator diagram, Fig. 2.

Inertia Forces

Third—Draw a continuous diagram representing the pressure on crankshaft caused by the moving masses such as piston, piston pin and upper end of connecting rod, Fig. 5.

Fourth—Superimpose the continuous indicator diagram, Fig. 2, and the diagram, Fig. 5, representing pressures caused by moving masses, lines 1 and 2, Fig. 6.

Fifth—Take the algebraic sum of the ordinates of these two curves at each vertical line and a curve drawn through these points will give a combined continuous diagram representing actual pressures on piston, positive pressures being plotted above the zero line and negative below, line 3, Fig. 7.

If we now take the pressures represented by the above ordinates at each interval throughout the entire cycle we may, by the method shown in Fig. 1, determine the magnitude of their components acting tangent to the crankpin circle. The magnitude of these tangential increments, represented by t, may be plotted on our previous system of ordinates and the curve drawn through will then give a graphical representation of the tangential forces acting on one crankthrow for the complete cycle, Fig. 8.

For a multiple-cylinder motor the individual curves of tangential forces may be plotted one upon another in the sequence in which the cylinders fire, and arranged their proper angular distance apart on the developed crank circle. The resultant curve for the given number of cylinders may be plotted by taking the algebraic sum of the ordinates at each interval and passing a curve through them. Fig. 10 is the resultant curve of a four, Fig. 11 of a six and Fig. 13 of an eight so obtained.

This line will correctly represent the fluctuations of power in the given system of cylinders and by correctly interpreting it we shall be able to understand the functional ability of that system.

In order to compare the negative work of the different cylinder systems, Fig. 4 represents a theoretical diagram for a single cycle, the curves being constructed on the theory that they are adiabatic in character. Imagine the ignition pressure to be 25 atmospheres and the compression 5 atmospheres. The only abnormal feature of the diagram is the exhaust line which is straight and at the height of 5 atmospheres. In other words, it is assumed that the piston pushes the gases out against this back pressure. This is, of course, not actually the case, but the artifice was adopted solely for the purpose of exaggerating the negative work. This negative work is a large factor in determining the minimum tangent pressure, and as this minimum point is the one which is essential in comparing four, six or eight, it is desirable to accentuate that point as strongly as possible.

In parallel with this exaggerated diagram a correct diagram has been shown in which it will be seen that the minimum tangential pressure point is somewhat obscured, Fig. 9.

Figure 16 is a chart representing the conditions under which the six-cylinder diagram was constructed, and shows what is taking place in each cylinder at any time.

When the four versus six-cylinder controversy was at its height, illustrations similar to those shown in Figs. 16 and 17 were frequently employed to show the value of overlapping power strokes and we shall in the near future probably see similar pictures representing overlap of eight cylinder power strokes. While in the case of the six-cylinder motor these charts were approximately correct they would, in the case of the eight-cylinder V or all-in-line type motor, have a somewhat fictitious appearance. Such a chart for the latter motor would certainly show a beautiful overlap of power, but the fallacy of this is that in such a chart the negative work has been entirely neglected.

Interpretation of Diagrams

Returning to Figs. 11 and 12, both diagrams show equally enlarged negative

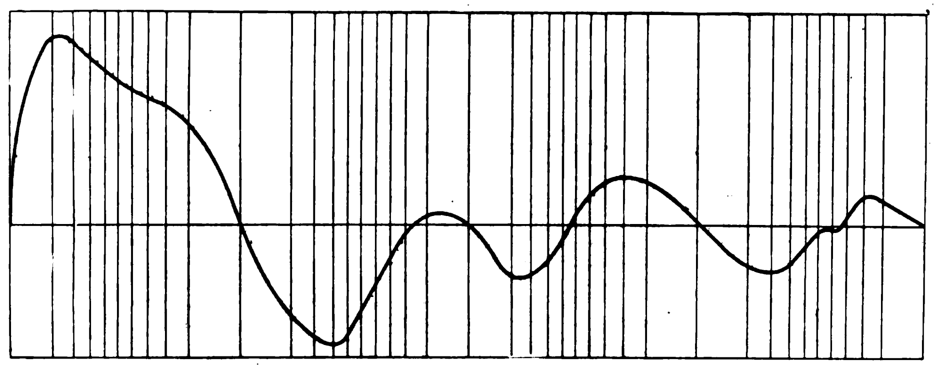


Fig. 8—Taking pressures at each of the ordinates in Fig. 7, at each interval of the cycle and determining the tangential components as in Fig. 1, the magnitude of these is here plotted on the same scale of ordinates to give the curve shown. It is a graphic representation of the tangential forces acting on one crank for a complete cycle. Those above base are positive forces, and below, negative.

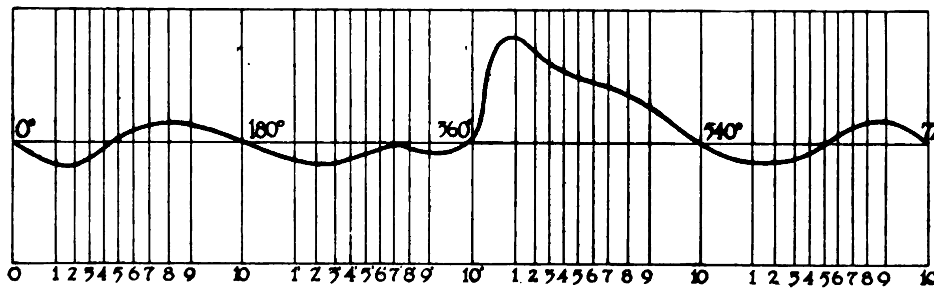


Fig. 9—This diagram has been secured in exactly the same way as Fig. 8, only the negative pressures are correctly drawn. This diagram is shown in order to make clear why the negative pressures are exaggerated. Since the negative work is a larger factor in determining the minimum tangential pressure and as this is essential to a compression of fours, sixes or eights, it must be better accentuated than a normal diagram will do it.

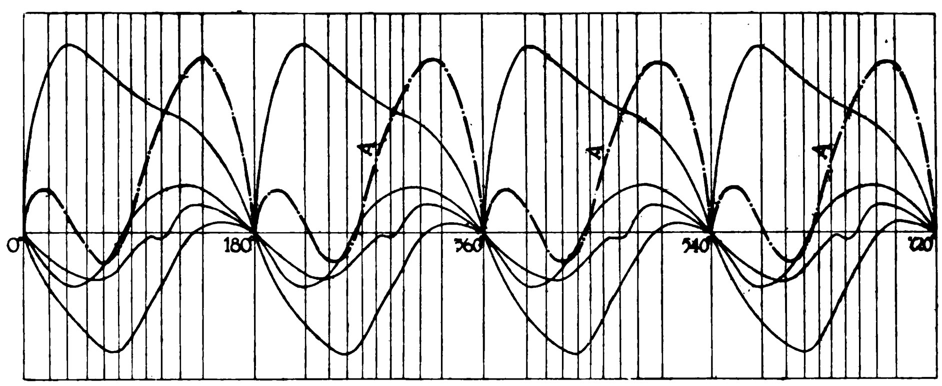


Fig. 10—This curve is the curve resulting from superimposing the tangential diagrams of four cylinders on the one cycle base line. That is, four curves similar to Fig 8, exaggerated negative pressures, are placed on the 720 degrees in order as they act in the cylinders, and then the ordinates added algebraically to get the resultant curve A, broken line, which is the combined tangential diagram for four cylinders

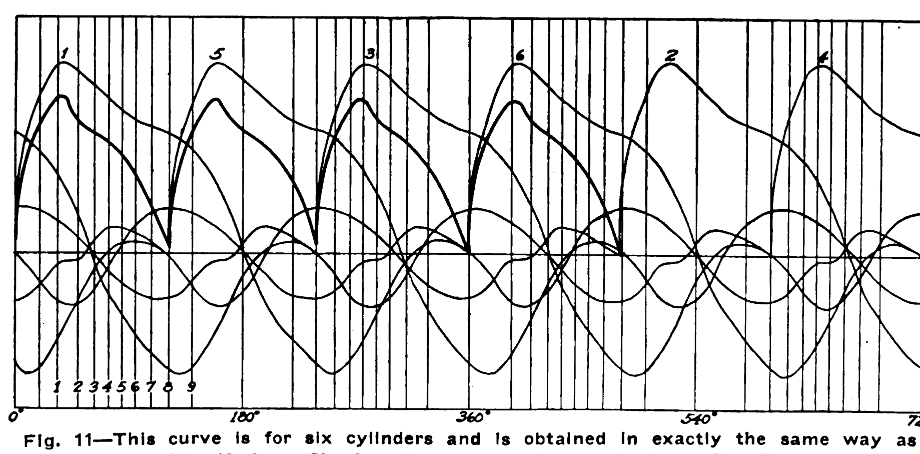


Fig. 11—This curve is for six cylinders and is obtained in exactly the same way as Fig. 10, from Fig. 8. The resultant line is the heavy line B

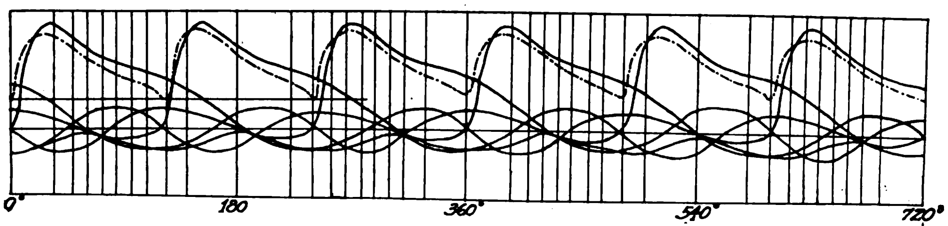


Fig. 12—The resultant of negative forces is shown in its relation to the resultant impulse curve of power forces (dotted). Although the six does not get its second cylinder into action until later than the eight, the second impulse begins when most needed, i.e., when negative forces are maximum. That is at point A, the second cylinder gets into action when the greatest negative force is acting at point B. The resultant of negative forces is obtained by adding algebraically all the negative ordinates of Fig. 12

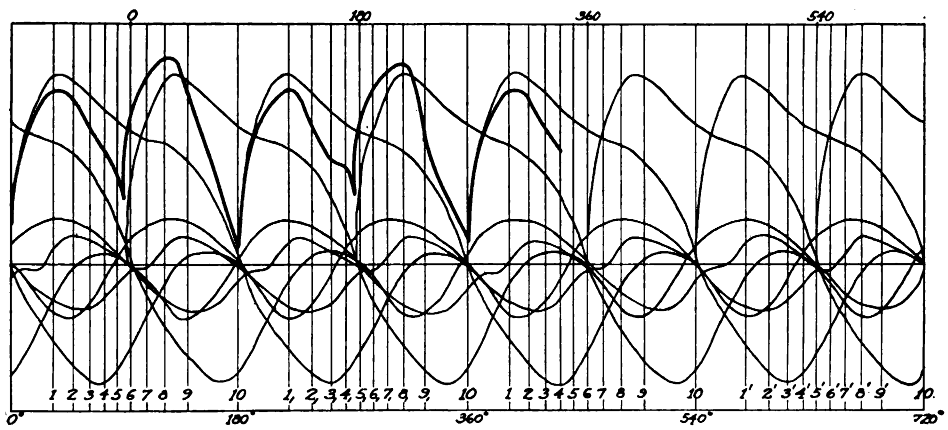


Fig. 13—This figure shows the resultant tangential diagram for eight cylinders combined in the same way as Figs. 10 and 12 from Fig. 8. The resultant line C, only a part of which is completed, shows the pressures acting at any part of the cycle as a result of the influence of 8 cylinders, considering inertia forces and working as well. We have already seen how this is done. The negative pressures are exaggerated as already explained

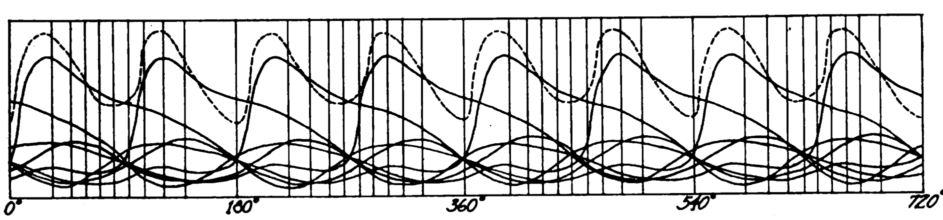


Fig. 14—A similar comparison as Fig. 13, only with an eight-cylinder motor. The overlap A comes where the negative forces are at a minimum B, or when least advantageous. The resultant of negative forces is obtained by adding all the negative ordinates of Fig. 14

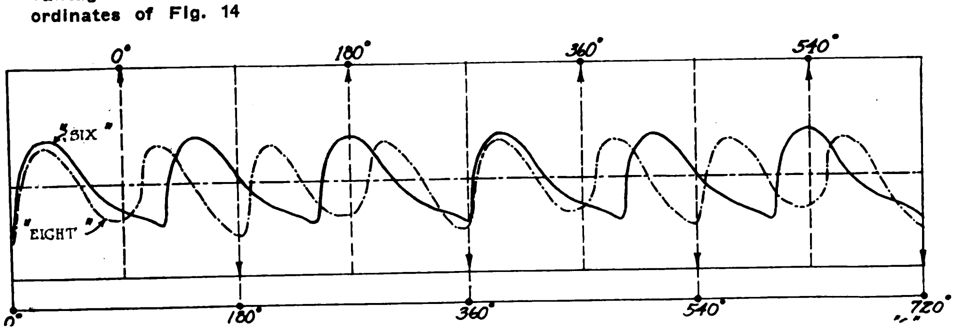


Fig. 15—A chart of superimposed power output curves of six and eight obtained as Figs. 10, 12 and 14 were obtained. Curve M is an eight, while curve N is for a six of equal displacement, power and stroke. It therefore has a larger base. The periodicity of the eight is shorter, but the amplitude is about the same. In one revolution the six has three waves and the eight four. This gives 1-3 more impulse, but not a third more torque. That is, the total of positive work of the two is the same. It is often claimed that the torque of an eight of the same power is 1-3 greater than of a six. This may be best seen by integrating and comparing the useful work inside both curves

forces, both motors have same bore and stroke; the eight has two more cylinders and consequently gives a proportionate increase in power. Upon examination we find the points of minimum torque to be approximately the same with both six and eight, which fact is due to the action of the negative forces. That is, the minimum torque ordinates of both curves are about the same.

As regards overlap of power strokes, the six does not get its second cylinder into action until later than the eight, but this actually proves to be fortunate because it comes into action at a point where the negative forces are at a maximum. This will be seen in Fig. 13 where the resultant negative force is shown below the zero line.

In the eight the *overlap comes in a place where the negative forces are at a minimum.* Fig. 14 shows this in a similar way to Fig. 12.

As was previously mentioned, exaggerated diagrams were made for the purpose of showing that the minimum torque of an eight-cylinder motor having same bore and stroke as a six with two extra cylinders acting is no higher than the minimum torque of the six with two less cylinders.

On an Equal Power Basis

The highest peak of the eight-cylinder tangent curve is higher than that of the six because of the two additional cylinders. Although, Figs. 11 and 13 represent motors of same bore and stroke, to be absolutely fair let us in Fig. 15 represent a six and an eight V or all-in-line type of the same stroke and piston displacement, the six consequently having a larger bore.

In Fig. 15, which is a summary of previous curves, we find that the power output of both six and eight-cylinder (either V or all-in-line) motors should be the same because if they are of same displacement the integral of both curves should be the same. The periodicity of the curve is shorter on the eight than on the six, but the amplitude is about the same. In one revolution the six has three waves, while the eight has four, which is one-third more impulse, but by no means a third more torque. That is, the sum total of positive work of the two motors in the same revolution is practically the same, instead of being the often-claimed 33 1-3 per cent. greater amount in the eight. This may be seen by integrating and comparing the useful work shown by both curves. Whether this could be considered an advantage or not is open to question. If there is any advantage, it is apparently small, and not near as much as the advantage gained by going from four to six, for the four has an absolutely dead period.

From what is revealed by the foregoing curves it is questionable if the advantage gained is sufficient to justify the eight-cylinder construction.

Various types of curves have been developed for eight-cylinder motors, some nearly straight lines, while at the same time similar curves for the six showed comparatively wavy lines.

It would appear that such curves have been slightly conventionalized or else the negative forces have been somewhat neglected. Had they been taken into con-

(*Continued on page* 649)

Yellow Rays Are Non-Glaring

Yellow Headlight Rays Do Not Affect Eye—Objects More Easily Seen In Colored Light

By J. W. Esterline

INDIANAPOLIS, IND., Editor THE AUTOMOBILE:—The danger of operating an automobile at night on city streets or country roads with brilliant, dazzling, blinding headlights is proven by the many accidents recorded monthly, caused by the driver running off the road while blinded with the headlights of an approaching car. Because of this situation the present controversy on non-dazzling headlights must be considered from the standpoint of the country as well as the city; and further, it must be considered from the standpoint of safety to the motoring public, as well as to other classes of traffic.

It is equally dangerous to motorists and the public to drive on city streets or country roads at night without headlights. The almost world-wide agitation against dazzling headlights is indicative of an interest in and the demand for a type of headlight which will meet the requirements of night driving on city streets or country roads.

The requirements of a headlight which will satisfactorily meet all these conditions are varied and difficult to embody in a single piece of simple apparatus. The manufacturer is called upon to produce a lamp which the driver riding behind can clearly see the street or road ahead and which persons approaching or crossing the path of the car can see at a good distance.

Some cities have passed ordinances prohibiting the use of headlights, and while this doubtless reduces the discomforting blinding, it seriously increases other dangers. There can be no objection to plenty of light if that light is not blinding, and it is positively safer to pedestrians and drivers to use the headlights, if the light they give is such as to cause no discomfort or danger.

Headlights a Necessity

The rays of a headlight are a silent warning to persons walking, and to drivers of horse-drawn or motor vehicles, of the approach of a car from behind. The light from a car approaching an intersection of streets obviates many collisions, and the sweeping of the rays of a car making a turn is a most effective signal of the driver's intentions. In the darker streets of cities, it is positively dangerous to require motor cars to operate without headlights.

A brilliant headlight sufficiently dimmed to be non-blinding, gives no driving light. Since it can be instantly controlled by the driver, the presence of a police officer is almost necessary to insure its use. Because it does not give a good light to drive by, the driver does not dim his lights except when compelled to. When they are dimmed to the point where they are not blinding, the light is so faint that it is useless as a warning signal.

While it is possible for the authorities to control the situation somewhat in the larger cities, the only satisfactory solution which will give adequate protection in the country, is the use of a headlight which will give a sufficient driving light and at the same time be non-blinding.

It will be interesting to note the reasons why we can see better in a yellow light, and why the blue and violet rays set up an almost immediate irritation.

When we look at the human eye, Fig. 1, we see through

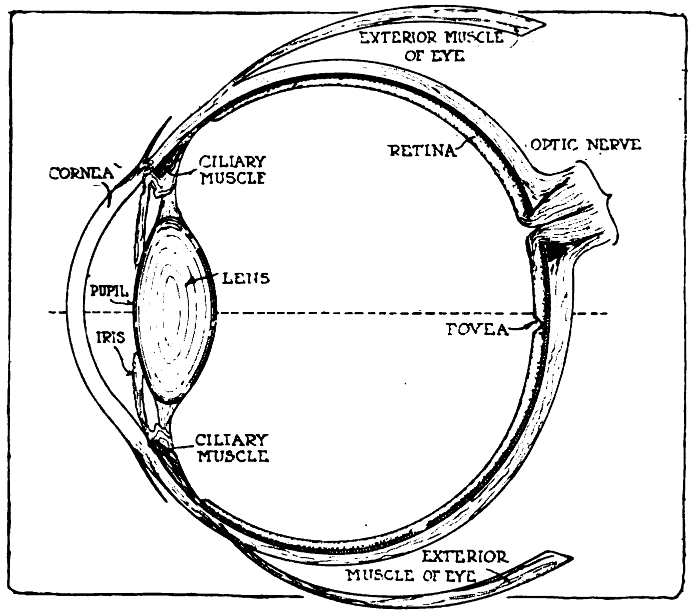


Fig. 1—Construction of the human eye. The pupil is shown at the left and the retina at the right

the clear, transparent cornea a circular colored portion, the iris. In the center of the iris is an opening, the pupil. This opening has the property of enlarging itself or contracting, according to the amount of light striking the eye. Thus, when we pass from a dark room into a brilliantly lighted room, the pupil almost instantly contracts.

It is significant that the contraction in passing from darkness into bright light is accomplished almost instantly, whereas the enlargement in passing from bright light into darkness is accomplished comparatively slowly. This strongly indicates that the function of the pupil is protective rather than regulative, which accounts for the fact that when we look into the front of a brilliant headlight for an instant we are unable to see anything else in our path.

It should be noted, also, that the range within which the pupil can enlarge itself or contract, is much narrower than the range of light intensities to which the eye is normally exposed. In other words, the protection offered by the pupil is only partial, and is not sufficient to entirely protect the eye from the bright conditions of illumination to which it is often exposed.

The Eye Construction

Close behind the pupil in the human eye, Fig. 1, lies the crystalline lens, whose function is of course similar to that of a lens in a camera. There is, however, this important difference in operation. The clearness of the image formed by the lens of a camera is maintained, whether the object is far or near, by changing the distance between the lens and the ground glass, or sensitized plate. Obviously in the human eye such changes cannot be made. The clear focus of near or distant objects is therefore accomplished by changes in the curvature of the crystalline lens. Around the outside of the lens runs a ligament, and this ligament is attached to the ciliary muscle. By contraction or relaxation of the ciliary muscle a greater or lesser curvature of the lens is accomplished.

The crystalline lens is non-achromatic. In other words, it does not bring the red rays, the yellow rays and the blue and violet rays simultaneously to a focus at the same point. Light not brought to a focus at the right point produces a blurred image, as we know from the observation of the ground glass plate of a camera when the lens is moved out of adjustment.

Yellow Ray Gives Vision

In ordinary white light, the yellow rays are brought to a focus on the retina; the blue and violet rays, in front of the retina, and the red rays, just behind it. The distinct element of ordinary vision is, therefore, given by the yellow rays, the blue and violet rays serving only to blur the sharp outlines of the visualized object. This blurring is not always detected by close observation, but it is sufficient to require a sufficiently increased intensity of illumination on the visualized object in order that the exact outline and finer details of the object may be seen distinctly. It is clear, therefore, that the yellow is the useful part of white light and that the violet and blue can be dispensed with without altering our ability to see distinctly and with an attending degree of comfort to the eyes.

Let us suppose that we are viewing an object which is illuminated entirely by a greenish-yellow light. Let us further suppose that the intensity of illumination is just sufficient to disclose some certain detail of the object. If, now, the object be illuminated by the same intensity of white light, instead of the greenish yellow light, the fine detail previously observed can no longer be seen. A higher intensity is required to disclose this detail.

Detail in Vision and Color

Expressed in scientific terms, we can say that visual acuity, or the ability to distinguish fine detail, is in a considerable degree dependent upon the color value of the light by which the object is illuminated.

It has already been pointed out that the crystalline lens is non-achromatic. When, therefore, light having rays of all colors, as in the case of white light, is reflected from the object to the eye, the blue and violet rays are brought to a focus in front of the retina, and the red rays directed toward an imaginary focus behind the retina. The red, blue and violet rays serve, therefore, to blur the otherwise sharp image formed by the yellow rays on the retina.

Now, when the object is illuminated by monochromatic light, that is, by a light of a single color, the rays are brought to a sharp focus on the retina, and there is no blurring effect. In other words, the non-achromatic lens can adapt itself to any color of light, but in the presence of light of all colors, combined in approximately the proportion of white light, it adapts itself to the yellow rays.

Research has conclusively established that monochromatic light enables detail to be distinctly seen at a lower intensity of illumination than when the object is viewed by white light.

It has also been established that different colors of monochromatic light vary in their power to disclose detail.

Yellowish-Green Light for Detail

The power of disclosing maximum detail with minimum illumination seems to be possessed by a yellowish-green color.

From the above it will be clear that we can see more distinctly with the same light, or equally distinctly with less

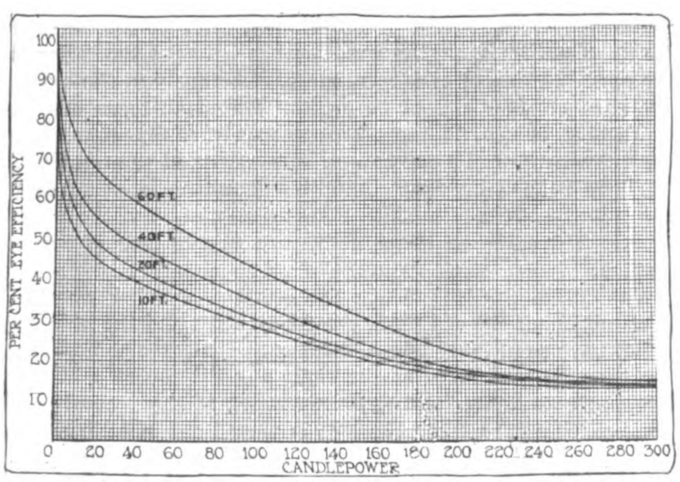


Fig. 2—Curves showing the relation between the efficiency of the eye and the candle power of the light at various distances from 10 to 60 feet

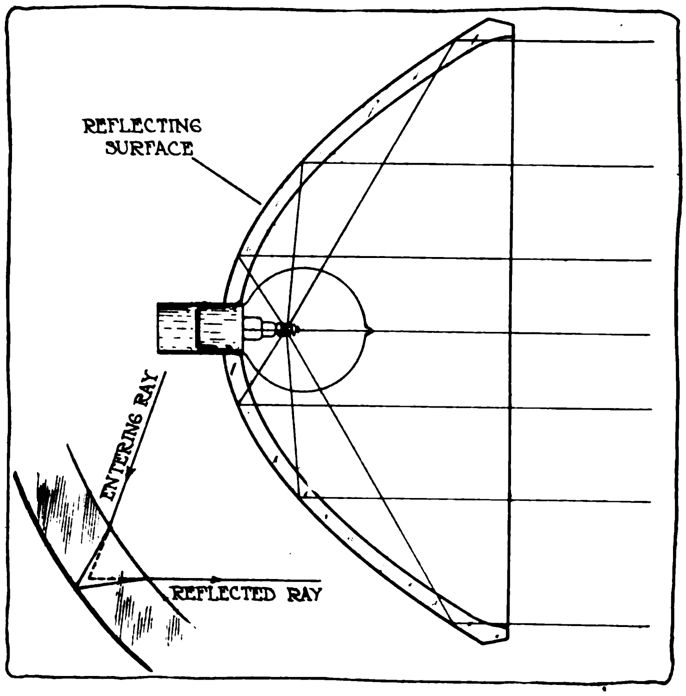


Fig. 3—Diagram showing the rays of light reflected from an ordinary headlight. In the left corner is shown the path of the ray through the glass. The dotted lines show the apparent path of the ray due to the difference in index of refraction between the air and the glass

illumination, if that light be of a greenish-yellow color.

The influence of colors of light has been studied by a number of able investigators, among whom Laporte, Broca, Dow, Bell, Ashe and Luckiesh have done especially notable work.

Cuts Eye Efficiency

In considering the question of headlights for night driving, it must be borne in mind that the human eye when constantly subjected to an intense white light reflected from the road quickly loses its efficiency. In other words, the brilliancy of the light itself reflected back into the eye of the driver, soon lowers the efficiency of the eye to a point where the ability to see is less than it would be if the light were less brilliant.

The lowering of the eye efficiency depends upon the total amount of light which enters the eye, and upon the angle with the line of vision at which each integral portion of light enters the eye.

Eye Efficiency and Brilliancy

The curves in Figure 2 show the relation between the efficiency of the human eye and the intensity of light entering the eye at 0 degree angle with the line of vision. Curves are given for the source of light at different distances from the eye. It will be observed that a very small intensity of light entering the eye along the line of vision materially cuts down the efficiency of the eye. When the intensity of the beam reaches 300 candlepower the efficiency has been tremendously reduced. These curves show clearly why when a beam of several thousand candlepower shines directly into the eye, it is impossible for the driver of a motor car to see anything in his path, since an increase of from 20 to 300 candlepower in the beam of light entering the eye lowers the efficiency from 70 to 12 per cent.

The curves also show that the efficiency of the eye is very little affected by the distance of the light source or light reflecting object from the eye.

Steinmetz on Optics

Dr. C. B. Steinmetz, eminent engineer and physicist, in "Radiation, Light and Illumination," has the following to say concerning blinding, irritating light:

"The light which enters the eye is converted into heat, and

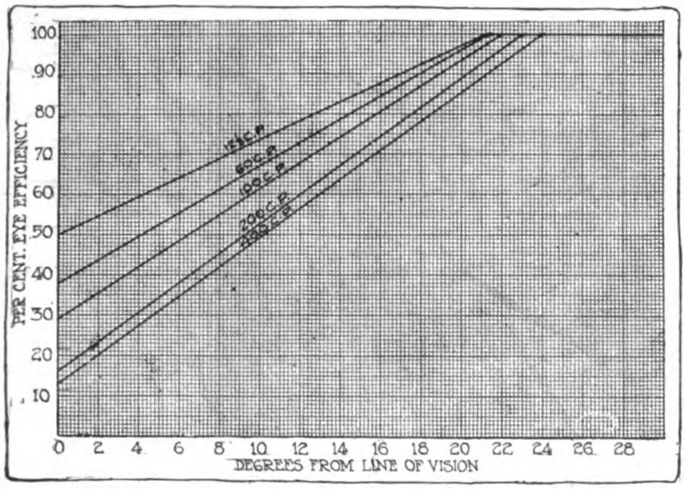


Fig. 4—Curve showing the relation between the efficiency of the eye and the angle at which the light strikes it

if its power is considerable, it may be harmful or even destructive, causing inflammation or burns. This harmful effect of excessive radiation is not incident to any particular frequency, but inherent in radiation as a form of energy. It is, therefore, greatest for the same physiological effect, that is, the same amount of visibility, for those frequencies of light which have the lowest visibility or highest power equivalent, that is, for the red and the violet, and least for the green and yellow, which for the same amount of visibility represent least power. Hence, green and yellowish-green lights are the most harmless, the least irritating to the eye, as they represent the least power.

"The human organism has by evolution, by natural selection, developed a protective mechanism against the entrance of radiation of excessive power into the eye; at high intensity of illumination the pupil of the eye contracts and thus reduces the amount of light admitted, and a sudden exposure to excessive radiation causes the eyelids to close. This protective mechanism is automatic; it is, however, responsive to long waves of radiation, to the red and yellow light, but not to the short waves of green, blue and violet light. The reason for this is apparently that all sources of excessive radiation which are found in nature, the sun and the fire, are rich in red and yellow rays, but frequently poor in rays of short wave length."

Government for Yellow Light

The United States Bureau of Standards in Bulletin No. 28 recommends a yellow light as causing the least fatigue, as follows:

"A light yellow screen is very effective in eliminating a purple haze in viewing distant objects and thus heightening contrast in an otherwise 'flat' field. The extreme contrast produced by the direct reflection of sunlight on water cannot be avoided (being nearly non-selective), but the maximum intensity may be reduced at the sacrifice of the low lights, or the glare may be 'softened' with a yellow or orange screen which eliminates the more fatiguing blue and violet."

The Master Mechanics Association of the steam railroads of the United States, conducted a series of tests for 9 months on different types of lamps for railway use. From the report of this committee, we quote one paragraph which is of particular interest, coming as it does from the committee appointed to report on this subject, as it bears out what has already been said about the ability to see in different kinds of light:

"The headlights listed above were first tested to ascertain the distance at which dummies could be seen with the dummies standing abreast between rails. Three dummies were used—one dressed in dark blue overalls and jumper, known as the 'dark dummy'; one dressed in blue and white striped overalls and jumper, known as the 'medium dummy,' and one dressed in white overalls and jumper, known as the 'light dummy.'

"The ability to see dummies with lamps of moderate intensities is fairly well established by the visibility curves, and that there is no apparent difference in the ability to see the dummies with a given intensity of light, whether the source is oil, acetylene or incandescent lamps.

"It will be noted, however, that with arc lamp No. 19, with 60,000 apparent beam candle power, the dark object could be seen only 557 feet. Calculating from the visibility curve of the dark dummy for oil, acetylene and incandescent lamps, the dark dummy would be seen at the same distance with an apparent beam candle power of only about 14,000. This effect can be attributed only to the predominance of short violet waves in the arc rays to which the eye does not readily respond."

Cutting Out the Glare

In the "Golden Glow" headlights, non-blinding is secured by altering the *quality* of the light given by the incandescent lamp, and by this means the glaring effects are greatly reduced without appreciably altering the illuminating qualities.

In this type of lamp, a golden green parabolic glass reflector is used, the color being obtained by a special mixture in the manufacture of the glass.

Green, Orange and Yellow Needed

It is also equally well established that the colors of light of ordinary vision are the green, orange and yellow. For these reasons it is possible to remove the violet and blue rays from a beam of light, rendering it much softer and less irritating, without seriously affecting its illuminating qualities.

In the manufacture of the Golden Glow reflector, the ingredients used in making the glass are such as to give it a golden green color. The lamp bulb being in front of the reflector, and the silver reflecting surface on the back of it, it is necessary for the light in passing from the bulb to the reflecting surface to go through the glass, and on leaving the reflecting surface, it passes through the glass a second time. Fig. 3.

The colored glass subtracts from the beam of light given by the bulb all of the rays above the green, *i. e.*, the violet and the blue, and passes those of all colors below it, so that while the light given by the filament of the lamp itself is a brilliant white, the beam of light from the headlight is a golden yellow with a slight tinge of green.

We have already stated that the lowering of eye efficiency depends upon the angle at which the light enters the eye. Figure 4 shows the relation between the efficiency of the eye and the angle with the line of vision of the beam of light causing the depression. These data are of the highest value since they show that the lowering of the efficiency of the eye ceases when the angle between the beam entering the eye and the line of vision is 24 degrees or more.

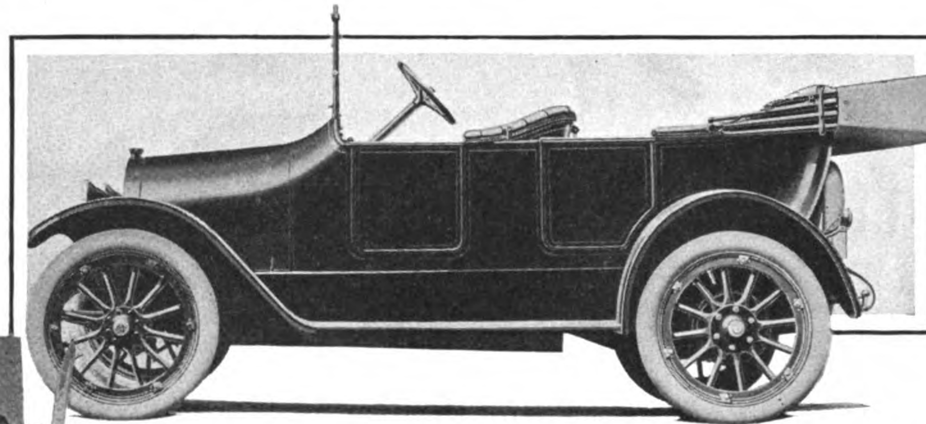
This means that on the assumption that the lamps on a motor car are on a level with the eye and that the rays leaving the lamp are parallel, all objectionable blinding would be overcome by tilting the lamps so that the beam leaves the lamp at an angle of 24 degrees below the horizontal.

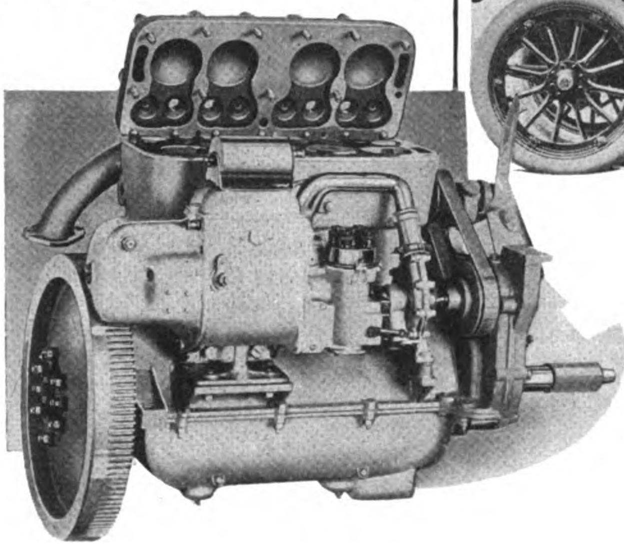
It is a fact that the eyes of persons approaching are usually somewhat above the plane of the lamps so that in most cases a tilting of the lamps by an amount equalling 15 degrees is sufficient.

Numerous tests made by this company indicate that by using a greenish yellow light, which is the light in which the eye works most efficiently, and by slightly tilting the lamps, a satisfactory roadway illumination is obtained which is not objectionable to other kinds of traffic, and which adds materially to the safety of all forms of traffic.—J. W. ESTERLINE, President the Esterline Co.

One Cartercar Model for 1915

Friction Drive Continued —Price Unchanged— New Chassis Continuation of This Year's Smaller Model—





Above—Cartercar five-passenger touring car selling for $1,250. Left—Motor with detachable cylinder head and combined starting and lighting system mounted on the right side and at the rear of the pump

A POLICY of concentration has been adopted by the Cartercar Co., Pontiac, Mich., for the coming season which has resulted in the decision to market but one model of chassis to be known as model 9. This year was given over to the manufacture of two chassis, models 5 and 7, the former higher in price and larger than the latter.

The new model 9 is practically a continuation of this lighter model 7, though it has undergone some refinement both mechanically as well as in outward appearance.

Friction drive remains practically unchanged, it having proven satisfactory in the hands of Cartercar users in practically its present form for many years.

Price Not Changed

There has been no change in price, the new model 9 selling for $1,250 with full equipment just as did its predecessor, model 7. Only two bodies are supplied, a roadster and a touring type. These are up to date, and in changing to the streamline form the Cartercar Co gets into line with present-day demands of the buying public. Body fashion dictates a sloping hood, cowl rounding gracefully to it, round-top radiator, smooth-sided body, domed fenders with protecting edges fastened with concealed rivets, the elimination of side lights, etc. And in every one of these respects, the Pontiac concern has met these dmands in thoroughly commendable manner.

One change in the general body construction is the addition of a door to the right or drive side. This year there is no entrance here, and in order to accommodate this, the throw of the speed lever and emergency brake lever has been brought a little forward.

Lower Gear Ratio

The gear ratio in the rear axle has been lowered from 3.45 to 1 to 4 to 1. This makes the work of the motor somewhat easier and really gives the car more pulling power.

Tires have been increased from 32 by 3 1-2 to 33 by 4 inches. In addition, the rears are now non-skid, as against plain treads heretofore.

So as not to make any difference in the reduction ratio between motor and wheels, the copper tranmission disk has been decreased in diameter 1 inch which makes up for the increasing of the tire diameter by 1 inch.

Although the motor is practically the same in design as in 1914, being 3 1-2 by 5 inches, and having its cylinders cast in a block of L-head form with detachable head, it is really more powerful due to a slight increase of valve size and other slight changes. The valves now are 1 13-16 inches in diameter in the clear as compared with 1 11-16 inches formerly.

Wires in Flexible Conduits

Another noteworthy refinement is the placing of all wires within flexible conduits to protect them against any of the hundred and one conditions which would result in short circuits, broken circuits and the like. Aside from the efficiency of this type of wiring it makes a much cleaner and neater job.

The Cartercar motor is of conventional form with valves all on the left along with the intake and exhaust manifolds, the latter running back to the exhaust pipe above the intake which is of the two-branched type. The power plant rests upon two frame cross members which are arched downward. It is really three-point suspended from these cross pieces, there being two points of attachment to the rear member by means of integral projections from the upper half of the horizontally split crankcase, while the front of the engine rests upon the forward member at one point only.

The motor develops about 30 horsepower at 1,700 revolutions per minute and its cylinder dimensions give it a piston displacement of 192.5 cubic inches.

Detachable Cylinder Heads Used

The detachable head construction is noteworthy in that it allows for the complete exposure of all of the pistons and cylinders together with valve pockets and valves by the removal of the steel holding bolts. Between cylinder block and head there is interposed a copper gasket.

The working parts are standard in every respect, and are machined to close limits as well as being accurately balanced against vibration which is the enemy of quietness and smooth running. There are three main bearings for the crankshaft and three for the camshaft, both of which are drop forgings of high-carbon steel. The cast iron pistons carry three rings each. Valves are of the standard form seating at 45 degrees, and operating through the intermediary of adjustable tappets working against the cams. The camshaft and generator and pump shaft are operated by helical timing gears completely housed at the front. There are two valve covers inclosing the valve mechanisms, and in these covers there are vents which communicate through the tappets with the crankcase and thus serve as breathers.

The motor dimensions are:

Pistons, length, 4½ inches.
Connecting-rod length, 10⅝ inches.
Piston pin bearing, ⅞ by 1⅞ inch.
Connecting-rod lower bearing, 1⅝ by 2¼ inches.
Front crankshaft bearing, 1⅝ by 3 7/32 inches.
Center crankshaft bearing, 1⅞ by 2⅜ inches.
Rear crankshaft bearing, 1 15/16 by 3 7/16 inches.
Front camshaft bearing, 1⅛ by 2 inches.
Center camshaft bearing, 2⅛ by 1 inch.
Rear camshaft bearing, 1 by 1¾ inches.
Flywheel diameter, 14 inches.

The cooling system is of the positive circulation type in which a centrifugal pump driven by the same shaft as the generator and on the right side of the engine, is employed. A large tubular radiator and three-blade, belt-driven fan do their part in the cooling.

The splash system of lubrication finds efficient application and uses individual troughs under each cylinder into which the rod ends dip. A plunger pump, operated from the camshaft, supplies these troughs from the oil base and keeps them at a constant level.

Three-Function Delco Used

The electrical part of the Cartercar is cared for by the standard form of combination Delco unit which incorporates the three functions of cranking, lighting and ignition. The ignition distributer is an integral part of the unit and the ignition current is supplied by the generator in conjunction with the storage battery. The cranking is done by the meshing of the gears with teeth in the rim of the flywheel when the pedal is pressed. This operation also transforms the unit into a motor, sends current from the storage battery and as soon as the pedal is released, the motor-generator returns to its normal condition as a generator.

Friction System Unchanged

The Cartercar drive system is of very simple form as shown in the chassis illustrations. Due to the fact that it is of friction type, a clutch, which is essential to every ordinary type of car, is dispensed with as is also the gearset with its usual three speeds forward and reverse.

From the flywheel, which is not inclosed, there is a short shaft extending back to the copper-alloy transmission disk which has a diameter of 19 1-4 inches in the new car. Due to the positive connection between this disk and the flywheel, the disk rotates at the same speed as the crankshaft and is in the same plane as the flywheel.

Back of this disk and mounted at right angles to it is the fiber-faced friction wheel, 21 1-4 inches in diameter. This wheel is mounted on a cross shaft on which it slides, the shaft having a bearing on either frame side member. At the right side the shaft carries a sprocket over which a silent chain runs and conveys the power back to the rear axle.

Thus when friction disk and wheel are in contact, friction causes them to roll together and connection is then made between motor and rear wheels through the intermediary of the differential gears in the rear axle.

The construction of the drive mechanism is very substantial and efficient from a power transmission point of view. The disk shaft and housing for the driving release spring are carried on a couple of frame cross pieces, and the shaft ahead of them is provided with two universal joints. The driving chain running from wheel shaft to axle is fully inclosed by a housing which is horizontally split into two halves and which bolt to the differential housing through flanges.

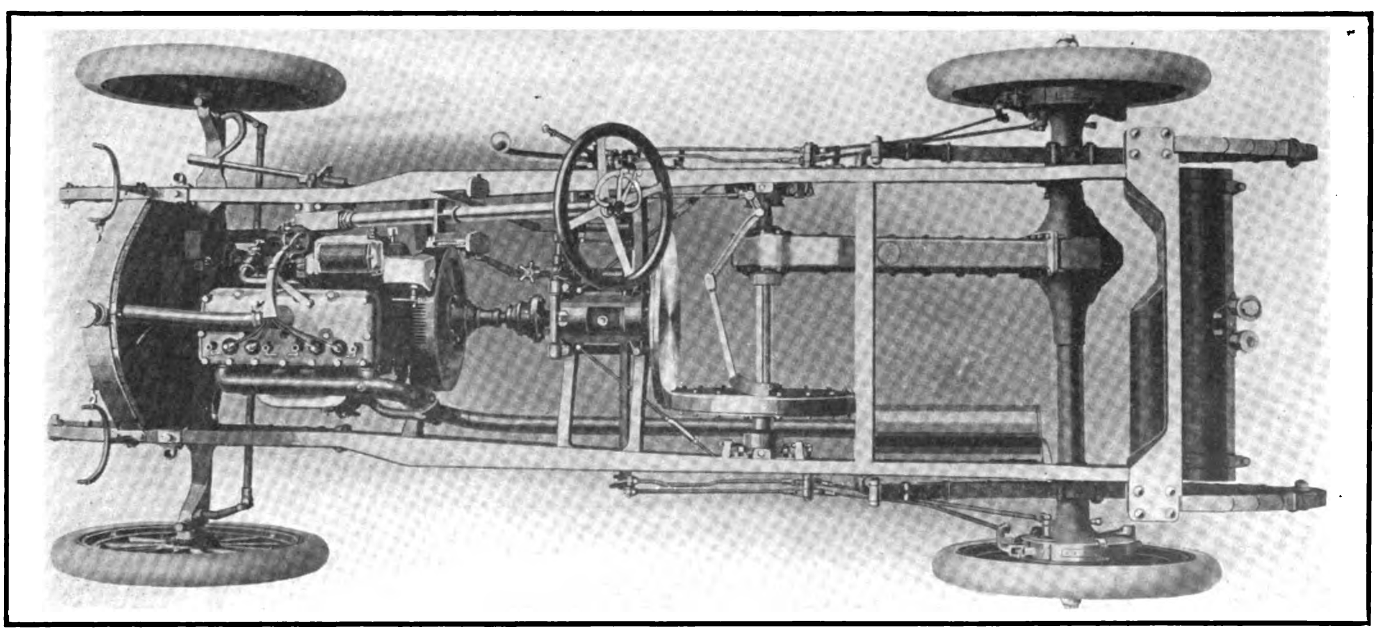
The rear axle is of the three-quarter floating type with bevel gear differential within the ring sprocket over which the chain runs. Single bearings are placed under the rear hubs, and Hyatt bearings are used for the differential.

The wheelbase of the model 9 Cartercar is the same as model 7, measuring 106 inches. The tread is 56 inches with an option of 60 inches for Southern roads.

Steering and control are on the right as heretofore, the gear being of the worm-and-nut type, operating from a 17-inch wheel carrying spark and throttle levers and horn button.

In connection with the new bodies, a convenient arrangement of the various instruments on the instrument board is made. These are all grouped within easy reach of the driver, and night driving is made convenient by the dash lamp which illuminates them.

The equipment includes a rain vision ventilating windshield, top with quick-acting curtains, demountable rims with one extra, electric horn, speedometer, gasoline air gauge, license tag holders, full set of tools and jack.



Plan view of chassis showing the location of the motor, and the details of the friction transmission and enclosed silent chain drive

Many Car Makers Strain Tires By Overloading Them

The Automobile Engineers' Forum

Car Maker Dictates Sizes—Oversize Popular Equipment—Absorb Shocks Better

BATAVIA, N. Y.—Editor THE AUTOMOBILE—We do not feel that the criticism that tires perish through cutting and not through wearing away of the tread is well founded as an argument in favor of not using oversized tires, for the reason that in the first place an oversized tire is less liable to suffer from injury by cuts or stone bruises which fracture the fabric, than the tire equipment which at the present time most car manufacturers elect arbitrarily to use on their product.

Car Maker Dictates Sizes

This latter point is the main reason why oversized tires are needed at all. The manufacturer of cars seems to occupy the enviable position of being able to dictate to most tire manufacturers what sized tire equipment they are to figure on, if they want his business, and the tire manufacturer for one reason or another generally figures the way the car manufacturer insists he shall, and this in spite of the fact that the tire manufacturer publishes a schedule showing the load capacities of these tire sizes.

Oversized tires would not be necessary at all if, in the first place, car manufacturers used sizes on their original production which carried this production, and if tire manufacturers either did, or were in the position to, compel the car manufacturer to equip with tires adequate to the weight strains.

It is just as logical for a car manufacturer or a consumer to say that there is no economy in an oversized tire as to claim that a 20-horsepower engine in a car weighing 4,500 pounds is adequate by comparison with a 40 or 50-horsepower motor for the same car. The 20-horsepower motor would probably move the car, but it would be seriously strained in doing it, just as an undersized tire is strained in carrying the same car.

The car manufacturer for the past year or two has shown an inclination to recognize the need of oversized tire equipment, and has bettered the condition which led some years ago to the production of oversized tires.

Oversize Soon to Be Regular Equipment

The car buyer is pretty well educated these days when it comes to knowing what size tires a car of given weights should be equipped with. The car buyer generally gets what he insists upon getting, even if he has to pay extra for it. What he pays extra for this year is generally next year's regular equipment, and the time is not far distant, apparently, when all manufacturers by reason of greater knowledge of the needs of the case, coupled with the element of competition, will practically eliminate the need of a tire which today is called an oversized tire, and what now is known as "oversize" will in all probability be regular.—W. P. BERRIEN, sales manager, Batavia Rubber Co.

Recent Racing Experience Favors Use of Oversize Tires

RUTHERFORD, N. J.—Editor THE AUTOMOBILE—We have found the oversize tires to give better service and considerable more mileage, easier riding than the smaller tires. Our tests have been made on various cars, and we can refer you to one case on a Chalmers coupé on which the double oversize was used with proper change of rims. Besides easier riding this set of tires stayed on the car over 15 months, giving something from 7,000 to 8,000 miles on the rear. We can also cite an instance where last year at Indianapolis the Mercedes driven by Ralph Mulford used oversize tires in the rear. The result is a published fact that the tires went through the 500 miles without any tires changed.

Previously the racing cars used about a 4-inch cross section and 4½-inch in the rear. The size tires used this year were anywhere from ½ to 1 inch larger in cross section. We cite a particular case with the foreign cars in which they used a 35 by 6-inch tire while last year they used 35 by 4½. Smaller tires make ruts in the road and are more liable to cuts than the larger casings. The larger cases have more tread than the smaller ones, and have greater carrying capacity and air space. More tires are damaged on the curves than on the straight away. The tires have a rolling effect on curves and if the cross sections are not large enough they will suffer severe cuts and blow out. The general public is beginning to realize that oversize tires are better and more economical.—BRAENDER RUBBER & TIRE CO.

Oversize Tires Have More Cushion and Absorb Shocks Easily

AKRON, O., Editor THE AUTOMOBILE:—We note that there has been some criticism on the oversize tire on the grounds that the average tire perishes from cutting and not from wearing away on the tread. This would seem to be an argument in favor of the oversize tire which has more cushion and naturally absorbs shocks and bruises to better advantage.

The manufacturers of a car necessarily adopt some standard equipment which their engineers and the tire people consider adequate to carry the weight and give satisfaction generally.

Conditions Determine Requirements

Take, for example, twenty cars that are shipped to many different sections of the country. Probably the tires on seventeen of these cars stand up and make a good showing, but the tires on three of the cars give trouble continually. It simply means that the different conditions under which these three cars are used make it necessary to use larger tires in order to secure the expected service.

The oversize tire was primarily designed and intended for these exceptions, but it is becoming a practice among experienced car owners to use the oversize tires generally and in many instances to specify them as original equipment for their new cars.

Firestone oversize tires have an extra thickness of fabric and rubber, consequently the added strength and larger air cushion of approximately 30 to 40 per cent. insure distinct advantages. The resiliency of the larger tire adds to comfort, reduces vibration to the mechanism of the car and the traction slippage on the rear wheels is less.

There is not enough difference in the extra weight of oversize tires to cause any difficulty with power, differential or rear axle. These are important things to consider, particularly with a small car.

Added strength, resiliency and mileage without expense or inconvenience of changing wheel equipment are features which mean more certainty and pleasure to motoring.—L. GREENWALD, Manager Service Department, Firestone Tire and Rubber Co.

Does Not Favor Oversize Tires—No Complaints

MILLTOWN, N. J.—Editor THE AUTOMOBILE:—In regard to oversize tires, we think it advisable to use tires made especially to fit the rims on which they are to be used.

While we are not in favor of oversize tires, we might add that we have heard no complaints from those who use them.—MICHELIN TIRE CO.

Compares 6 vs. 12-Volt Controversy to 110 vs. 220-Volt

CLEVELAND, O.—Editor THE AUTOMOBILE:—In regard to the respective merits of the six volts vs. 12 volts wire system, we are unable to express any opinion as to which is the better. From a battery maker's standpoint it makes no difference which system is used.

We think you can compare this to the illuminating system. We doubt if there is any advantage—of one over the other between the 110-volt and 220-volt. In illuminating systems there might be a slight advantage in favor of the 220-volt system due to the fact that the loss due to wiring would be less on account of the higher voltage. There is no doubt but what it would be a good thing if every one would adopt one standard, but, as outlined above, we can see no advantage of one system over the other, when everything is considered.—T. A. WILLARD, Willard Storage Battery Co.

Replies to Readers—Gives Formula for $250 Automobile

DETROIT, MICH.—Editor THE AUTOMOBILE:—I notice in your issue of September 10 an article asking for information on my Automo Pill. This request is misleading and very inconsistent. However, the articles have accomplished their purpose in one instance at least.

Reviewing the subject in every detail and refraining from sarcasm, which seems to be the basis of Mr. Britt's query, I will say I have never mentioned or prescribed the pill remedy, and were it not for the fact that Mr. Britt is all wrong, I would not be able to give any information, as he seems to answer every query he asked to suit himself.

Mr. Britt asks do I want everything standardized and continues by asking if I realize that it spells stagnation, but in another way. Why not tell us the other way. I do want everything standard that I can have standardized. To explain more fully and prove why, I will give an example of what standardization means. Supposing that all other concerns start making Ford cars identical with the present Ford in every respect. The first thing noticeable would be a reduction in price, next an increase in demand, due to reduced cost; next a refinement in detail; next better and more complete equipment and shortly we would have our ultimate two-hundred-and-fifty-dollar car fully equipped and instead of the present demand of 500,000 cars per year, we would be obliged to furnish 5,000,000. Does this look like stagnation? We will then be able to stop into any first class hardware store and buy a part just as easy as we now buy a bolt and nut for a carriage or wheelbarrow.

In query 2, Mr. Britt asks, "Is it fair to say that the U. S. Government is throwing away money when testing fuel," and answers his query by telling us that alcohol is too high in price for a long time to come. It is very evident that Mr. Britt is not aware that the Wood Waste Distillery Co. of Wheeling, W. Va., is today making a small machine that will produce 5 gallons of alcohol from one bushel of corn, which with corn at 60 cents per bushel, the average price, figures 12 cents per gallon. Does this not prove conclusively that alcohol is not too expensive; on the contrary, alcohol is cheaper and far superior to gasoline in every way, providing it is used in a properly designed engine.

Regarding the self-starting, the elimination of gears, clutches, etc. If Mr. Britt will look in the official gazette, Jan. 28, 1902, Patent No. 692,218, he will find a description of an engine that will fulfill all the above requirements, that weighs 110 pounds, develops on brake 15.7 horsepower at 2,000 revolutions per minute and is not of the Knight type either, this being impossible, as the Knight type of motors is four-cycle. Mr. Britt continues, "Strange to say, all things are best under but one condition and to produce a motor that will be equally economical under all conditions will be a feat worthy of my best efforts." How simple. All we have to do is run our present motor at a constant speed at which it operates most economically, to obtain the very result Mr. Britt so much desired.

Again, he says, "I am surprised to hear that, when I thought it was well understood, that of all the gear systems, the internal gear was the least efficient." It is a serious thing to think sometimes. In order that Mr. Britt will know I herewith give the comparative efficiency of the different gears:

Spur gears, 95 to 98.1. Efficiency tests made by Westinghouse Mfg. Co., *American Machinist*, May 5, 1910. Internal gears, 94.7 to 97.9. Foot Brothers Wks., Chicago, Ill. Bevel gears, 71 to 84, Brown & Sharp Mfg. Co. Spiral 20 to 85, depending on angle of tooth, Brown & Sharp Mfg. Co. Worm and worm wheel, 45 to 90, depending on angle and lead.

Considering that an internal gear has 25 per cent. more bearing surface on teeth than spur gears, it is very evident that the internal is for the horsepower transmitted the most efficient of all, rather than the least.

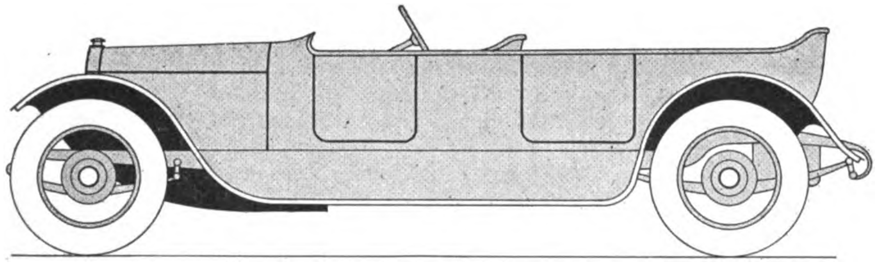
Mr. Britt then gives us the information that there is no difficulty in driving each wheel separately, but goes on to tell us we must have excessively heavy motors to do so; we must have, mind you, and here the Ingersoll Rand Co. and the Chicago Pneumatic Tool Co. are making air motors, developing 10 horsepower and weighing less than 50 pounds.

I presume I am still tantalizing Mr. Britt when I tell him that we have in use several thousand engines, of the Diesel, Secor and Hornby type, that do not use a carbureter at all.

In conclusion I will ask Mr. Britt to read a very interesting letter article on page 486 of the September 10 issue on the Two Stroke Cycle Ideal, which may help him digest this pill idea.—WILLIS A. SWAN.

A $1,000,000 Speedway for Minneapolis

MINNEAPOLIS, MINN., Sept. 26—Incorporation papers were filed last week in South Dakota for the Twin City Motor Speedway Assn., $1,000,000, of which Francis H. Wheeler, of Indianapolis, is president, and the company plans to have the first races on the new speedway near the famous Hamline dirt track July 4. Dr. C. E. Dutton, representative of the contest board of the A. A. A., is secretary of the company and is expected to manage the races. W. D. MacLeith, of St. Paul, is the architect. Meanwhile the Minnesota Motor Speedway Co., in which H. C. Moore, of Chicago, is interested, is selling stock with headquarters at the Hotel Dyckman.



The Rostrum

Wants to Eliminate Spark-Lever Misuse

EDITOR THE AUTOMOBILE:—There are so many drivers who use, or misuse, the spark lever that I believe a contrivance of the following description would eliminate the general practice of drivers of putting the spark lever three-quarters around on the quadrant, and leaving it there through all conditions of driving. Sit beside an operator and see how he handles the spark lever.

I believe that the spark should be advanced in direct proportion to the engine speed after a predetermined minimum retard and maximum advance. By this I mean a position where the spark should occur in the stroke of the piston when the engine is idle and also when delivering its maximum output.

Attached to a shaft on the engine, crankshaft, pumpshaft, etc., a solid or flexible shafting transmits the revolutions to a dial on the dash. This dial graduates from 0 to 20; 0 represents the engine idle or ready for cranking, spark fully retarded, and 20 the engine running at maximum speed, spark fully advanced.

The mechanism on the dash works exactly like a speedometer only instead of graduating the face in "Miles," graduate it in any desired number of parts. The combined number of parts equals the throw of the finger or minimum and maximum revolutions per minute.

The spark lever is now fully retarded and the spark set to occur in the stroke of the piston just as prearranged, and to also fire the charge, when the spark lever is fully advanced, at just that point in the stroke where we predetermined it was best practice when the engine is delivering its greatest horsepower.

Quadrant in Twenty Parts

The spark lever quadrant is divided into twenty or the same number of parts as the dial on the dash. It is not necessary to use guess work where the spark should be set, nor wait for a knock and then hurriedly retard the spark which is nine out of ten times retarded too far. Simply glance at the dial and set the spark lever opposite the number on the quadrant which the finger on the dial indicates.

I realize the automatic spark advance is ideal, but my contrivance costs a great deal less and still has the advantage of leaving the spark manipulation under the complete control of the operator. With the automatic spark there is a chance of the governor going out of commission, with good chances for a broken arm. At the least, faulty ignition would result.

You may answer me by saying that most of the later cars have self-starters. I acknowledge that, but there are very few cars that go an entire season without having to resort to the cranking handle snugly resting in some obscure corner of the tool box or under the seat.

Elmhurst, L. I. GEORGE W. GAY.

Deprecates Driving on Left

Editor THE AUTOMOBILE:—I inclose clipping from a recent issue of the Hartford Courant—read it—noting the portions underlined:

"George M. Landers, democratic candidate for lieutenant governor, had a run in late this afternoon with Fred N. Tilton, proprietor of the Atlantic Screw Works in Hartford—not politically, but automobilwise. Neither was hurt, although the circumstances were such that they considered *their escape from serious injury miraculous.*

"The traffic on the river road was unusually heavy and Mr. Landers's car was making slow progress. At the crest of a hill near the home of Cornelius B. Noyes in what is known as the Walkley Hill District, he hugged the side of the road to avoid a collision with a Ford car which was coming in the opposite direction and which Mr. Landers and Mr. Tilton aver, was taking up too much of the road. *Mr. Tilton, who had been traveling in back of the Ford car, was annoyed by the "road hogging" tendencies of the driver of the Ford car,* and turned his car to the left, as is the custom on the road in passing other cars. In doing this, however, he found himself confronted by Mr. Landers's machine. He tried to steer clear of the car and avoid going down a deep ditch, but was unsuccessful in getting by and struck the runabout so that the wheels of both machines were locked. The force of the impact was sufficient to put both cars out of commission, but not to throw them off into the ditch."

It interests you and everyone else connected with THE AUTOMOBILE. It is a sorry emphasis on the fact that many drivers of left-hand-drive cars do and will persist in driving to the left of the center of the highway.

In commenting on this fault I have exhausted all the choice brands of profanity I learned as a kid in the high school. I saw those two cars and believe me—talk about the Cathedral at Rheims—say—they were a sad sight, and it is a wonder no one was killed.

For the benefit of some of the good fellows who are driving the left wing of the Ford and allies, I wish you and others would nail to the mast of each editorial column the slogan—"Keep to the Right!" You'll agree with me it would go a long way to insure safety first.

Middletown, Conn. CHARLES H. COLES.

Use of Two Casings Unsuccessful

Editor THE AUTOMOBILE:—I notice in your issue of September 10, Mr. W. B. Duling's letter asking for others' experiences in using casings over other casings and wish to state that the writer has tried to get service out of old casings which were rim-cut and tread in good shape by putting same over another casing of which the tread was not so good, but have never been able to get casing to stay on for more than 5 or 6 miles, and would say that it is too much of a job to put casing on and inflate the other one every 5 miles.

If any of your readers have found a satisfactory way to keep outside casing intact, would appreciate hearing how it is done.

Gadsden, Alabama. L. C. KYLE.

Troubled With Slipping Clutch

Editor THE AUTOMOBILE:—I have a 1911 ——— model 30 roadster. It has a multiple-disc clutch which never fails to slip or let go entirely on a hard pull or any other pull after it gets warmed up. The oil splashes through from transmission to some extent, which has been taken into account in experimenting. No kind of oil, thick or thin, much or little, does any good. The only success comes from using heavy oil which makes it drag badly when cold and then slip when warm. The heavy oil seems to help hold the plates until warm, contrary to most disc clutches. All adjustments are all right and a stronger spring did not help. As you probably know, this clutch has given trouble on all cars of this model. The factory advised new discs, which helped for about a week, proving it is the slightly rough surfaces that tend to make the plates hold and roughening the plates is the temporary remedy practiced where these cars are in use. The discs in this clutch are about ten in number, 3-16 or 1-4 inch thick and about 6 inches in diameter. The front bearing depends on oil, splashed by the clutch for its lubrication, although a grease cup could be easily fitted.

There is no clutch brake. Will you kindly give me your opinion on the following:

—1—Will it help this clutch to double the number of plates, using thinner ones, of course?

2—Should alternate steel and bronze be used?

3—Could all steel be used?

4—Can you suggest any other probable remedy whatever?

Olympia, Washington. IVAN L. CREED.

—Your clutch trouble is probably due mainly to worn out disks, although there may be other difficulties also. One or more new disks should be added to compensate for the wear.

It is also of great importance to use a proper lubricant. A heavy oil is not desirable, but you should use a mixture of kerosene and a light lubricating oil. One-third kerosene and the rest lubricating oil is recommended.

1—We would not advise you to use double the number of plates but to just add one plate. The clutch does not need surface, but the slipping is due to the fact that on account of wear in the plates not enough pressure can be produced by the spring. This can be overcome in the manner suggested, namely, by putting in another disk.

2—Alternate steel and bronze disks might give better wearing qualities, but as already stated there is no necessity in putting in more than one new disk.

3—This is answered in two.

4—This is answered in the first paragraph.

Explanation of Cone Clutch Operation

Editor THE AUTOMOBILE:—Will you please explain the working of the cone clutch? Illustrate it if possible.

Canton, Ohio. R. EDWARDS.

—1—A typical cone-clutch construction is shown in Fig. 1. One member of the clutch is the flywheel itself and the other is the clutch spider which in this case consists of a sheet steel stamping faced with leather. The spider is made to rotate with the flywheel by forcing it against it by means of the coil spring shown.

Should Use 1-Inch Carbureter

Editor THE AUTOMOBILE:—1—What size carbureter should a person have for a 3 1-2 by 4-inch four-cylinder engine? I am using a model L 1-inch Schebler and I have tried every way to adjust it so that the cylinders will all hit on load, but as soon as I pull the throttle open it begins to miss. I have had new rings in, the valves ground and have had the best here to try and adjust it, but cannot get it any better. I even sent it back to the factory and had all new parts put in thinking that they might have done something to it in the garage they ought not to have done, but still it is no better.

Portsmouth, O. J. HOWARD SUTTON.

—1—A 1-inch carbureter is correct for your motor. Possibly the mixture should be heated or there is a leak in the intake manifold. Also inspect the ignition system carefully. See that the spark plugs are cleaned, in good condition and the gaps 1-32 of an inch. All insulation should be good, all connections tight, and no short circuits. The breaker points should be in proper adjustments and all brushes should make good contact and contacting surfaces should be clean. It is possible that there is a short circuit or a loose contact in the switch.

Points in Overhauling a Car

Editor THE AUTOMOBILE:—Will you please tell me what to do to overhaul my car? I have a general idea as to how the work should be done, but I want to make sure that I do not miss anything and would also like advice on any work that I may not be thoroughly familiar with.

Mt. Vernon, N. Y. H. W. F.

—A book could be written on this subject, but we will try to cover the main points briefly.

There are three considerations of prime importance in overhauling a car; thorough cleaning, adjustment of parts for wear and replacement of parts which cannot be adjusted.

Flush Cooling System

Under the first heading comes the flushing of the cooling system to remove any grit or dirt that has collected. At the same time, it should be noted whether there are any loose pieces that might obstruct the passageways. Grease and dirt in the cooling system may be removed by using a solution of washing soda in hot water. Stir in as much washing soda as will dissolve. It is not advisable however, to allow this solution to come into contact for any length of time with the aluminum parts. Spark plugs should be carefully cleaned, the carbon removed from the cylinders and the motor should be flushed with kerosene to remove any gummed oil.

Clutch Cleaned

The clutch facing should be cleaned with kerosene and if it is of leather, it should be soaked in neats-foot oil to soften it.

The gearset should be thoroughly cleaned. This is especially desirable because during the operation of the car a certain amount of grit collects from the lubricant. The same advice applies to rear axle and wheel bearings.

The various wearing parts should be adjusted or replaced depending upon how badly they are worn and whether any adjustment is necessary. The amount of wear that is allowable depends somewhat on the parts. If it is enough to be noticeable when shaken by hand, they should be adjusted or replaced. For instance if there are shims between the caps and the connecting-rod ends, one or more of these should be removed as required,—or if not, a slight amount of material should be removed.

Care must be taken, however, not to draw these caps up too tight. This advice applies to all other plain bearings. Where

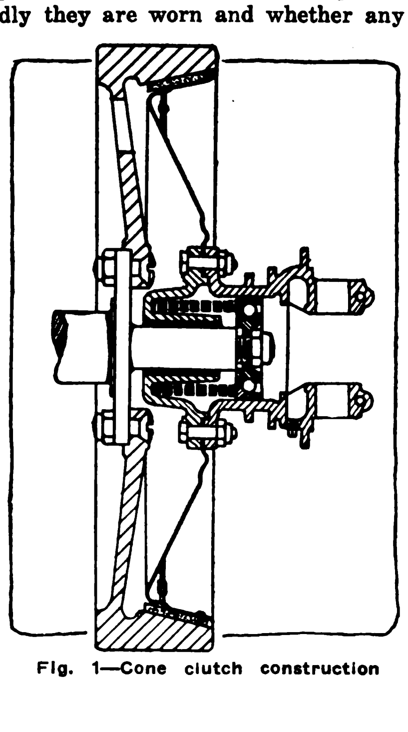


Fig. 1—Cone clutch construction

a bearing is badly worn, sometimes this adjustment will not be sufficient and the bearing will require rescraping. This, however, should be done by a man who has had experience.

Some types of ball and roller bearings are adjustable, while others are not. Cup and cone ball bearings can be adjusted and also conical roller bearings. Care must be taken, however, in adjusting these bearings not to draw them too tight. They should be just tight enough so that there is no play but not so they will bind.

The adjustment of the steering gear depends largely upon the type used as in other adjustments, it should only be made tight enough to remove the play. The brakes should be drawn up as tightly as possible and yet not enough so that they will dry.

The valves should be ground to remove the pits, and after this is done the push rods adjusted until there is about 1-100-inch clearance between every valve stem and push rod.

Valve Caps Are Stuck

Editor THE AUTOMOBILE:—I have an E. M. F. 30, 1912 model, and started to overhaul the motor, but found the caps over the valves were put in with white lead on the threads, which is so hardened that it is impossible for me to remove them. Can you suggest some method for removing these without breaking them?

Akron, Ohio. LOUIS GIEBEMATH.

—This is an unusual difficulty. Soften the white lead, if possible with kerosene, or oil, and if this will not loosen them up, force will have to be exerted. You should be able to start them with a cold chisel and a hammer.

Information on 1910 Cadillac

Editor THE AUTOMOBILE:—1—Kindly inform me how to determine when the front wheels are out of alignment? Also what can I do to straighten them up?

2—If the axle knuckle is bent, should it be heated? Should it be allowed to cool naturally, or must it be tempered in water? And how long?

3—What causes my car to jerk or miss? When starting it runs all right on first and second speeds, but so soon as I go into third or high gear it starts to run in a jerky manner. If I go back into second speed and push on the accelerator a little to give the engine more speed, for about half a square, and then go into third or high speed it will run all right.

My car is a 1910 Cadillac, in good condition. The spark plugs are clean and spaced correctly. The magneto was cleaned and adjusted and timed by a Cadillac man. This instrument is a Splitdorf low tension. Would this trouble come from the magneto and coil or carbureter? I have a new model K. Schebler carbureter, put on about six months ago. I have tried both rich and lean mixtures, but with the same result. This trouble has not been evident during the past week. Do you think it was the mixture, magneto or coil?

4—At this time of year should the air on the main intake pipe be heated by hot air pipes taken from around the exhaust pipe, or should the hot air pipe be disconnected? The auxiliary air is not heated.

Philadelphia, Pa. JOHN P. TULL.

—1—The alignment of the front wheels can easily be determined by measurement. With the wheels pointing approximately straight, measure the distance between the two wheels, at the front and rear. They should be ¼-inch nearer at the front, but not any more. The adjustment is made by shortening or lengthening the tie rod.

2—It is best to replace the axle knuckle if it is bent.

3—It seems most probable that the motor is missing or at least does not run smoothly at low speeds.

Adjust the spark gaps on the plugs to 1/32 inch, tighten all wiring connections, and look for short circuits caused by poorly insulated or bare wires.

See that the brushes on the magneto are in good condition and adjust the breaker points, if they need it. There may be a temporary short circuit in the switch at times.

Adjust the carbureter carefully. The air valve is for high speed and the needle valve for low.

Test the compression. It may be that the valves need grinding, or there is a leakage past the pistons or the valve stem guides.

4—It is better to heat the air all the year round.

White Steamer Boiler Clogged

Editor THE AUTOMOBILE:—I have a 1908 White Steamer, model K, and as you know the sides of the hood over the motor are ventilated. Here is where I made my mistake. I closed these openings to improve the appearance of the machine. On August 19, I made a trip to Palmyra, N. J., from Camden. After I had run two thirds of the distance, my engine overheated and stopped. I then opened these ventilators on side of hood, left it stand about 10 minutes and started off again, pumping oil to cylinders continually for about a mile. The result being, my boiler stopped, clogged, I think, from an excessive amount of oil. Can you tell me what will clean the boiler or remove the obstacle? The steam supply shut off instantly. I have used washing soda and lye. I can get a small quantity of water in the boiler by means of a hand pump.

Camden, N. J. ROBERT W. MAY.

—To overcome this difficulty, it is necessary to heat the part which has been stopped up and turn through it alternating sand and compressed air blasts. You had best go to the nearest White service station to have this done.—ED.

Valve Timing of Hotchkiss Motors

Editor THE AUTOMOBILE:—1—Kindly let me know the correct valve timing for Hotchkiss cars of the following types: 1905, motor type J; 1907, motor type T; 1914, motor type A D 6.

2—Where can I obtain a crankcase bottom for a 1915 type J, Hotchkiss motor, other than from Paris?

Roxbury, Mass. SAMUEL S. MARKOW.

—1—The actual time of the opening and closing of the valves of these models is unobtainable but if you desire to set the valves correctly, this may be done by bringing the piston, on one cylinder, 1-16 inch beyond top dead center. Then set the intake camshaft so that the intake valve in this cylinder is just ready to open. This applies to the J and A D 6 models, which have L-head motors. The T has a T-head motor and while the instructions given apply to the intake camshaft the exhaust camshaft remains to be set. This shaft may be timed without moving the pistons. Set the shaft so that the exhaust valve on this cylinder is at the point of closing.

2—It is impossible to obtain a crankcase for this model at the present time. We would advise you to have your present crankcase welded. If you have the facilities for doing this, proceed as follows:

The metal can be welded either with or without a flux, but it is preferable to do the work without one for the reason that the flux hardens the metal. The reason for using the flux is that it makes the solder more fluid and therefore it is a little easier to do the work, but when all the conditions are right and with a certain amount of experience the operation can be performed almost as readily without its use and with the result that a much stronger joint is formed between the edges of the members.

Before welding, the metal should be scraped and cleaned and if the stock is more than .25 inch thick, it is advisable to chamfer the edges. Pieces that are of such shape as to undergo strains when heated at the fracture should be heated all over by placing in a charcoal fire, using natural draft. The temperature should be between 300 and 400 degrees below the melting point. This can be determined in two ways. The heat should be sufficient to melt the solder stick or cause a drop of water to sputter on its surface.

When this is done remove the piece from the fire and cover it with asbestos sheets leaving an opening where the weld is to be made.

The oxygen acetylene flame should be reduced or softened by using an excess of acetylene to a degree that will be indicated by the extension of the acetylene cone to 1 to 1.5 inches beyond the white cone. This excess of acetylene does not injure the aluminum but merely lowers the flame temperature to the most desirable point. Sufficient pressure should be used on the torch to force the melted solder well through the fracture so that a ridge of solder will be formed on the other side.

An iron rod hooked at the lower end should be used to puddle the solder into the crack and this rod should be wiped frequently so that it will not become coated. After the joint is made the piece should be turned over and the ridge of metal on the other side should be smoothed off by means of the torch and puddle iron.

The secret of a successful weld lies in making thorough preparations and in doing the actual welding with almost feverish haste. The solder should be applied as soon as the piece is removed from the fire and if the application of molten metal to the crack is not continuous until the work is completed the joint will crack on cooling.

After the weld is made it should be covered completely to protect it against drafts and allowed to cool slowly.

Magneto Timing Advanced for Racing Cars

Editor THE AUTOMOBILE:—1—Is a magneto timed the same for racing as for touring?

2—How large a gap should the breaker points have and what determines the size of gap?

Sterling City, Calif. ELMER MARIAN.

—1—The setting of the magneto is generally advanced on racing cars, the amount depending somewhat on the speed of the motor and design of the magneto. It is quite usual to set the magneto so that the breaker points separate when the piston is 1-2 inch below top dead center.

2—The size of the spark gap depends somewhat on the magneto, the adjustment for different instruments varying between 1-64 and 1-32 inch. If the parts are adjusted so that the gap is too large the motor will not operate at slow speeds or at least will miss, while if the gap is too small missing will occur at high speed.

In the former case the breaker points either are set so that they do not touch at all or so that poor contact is made. This condition also occurs when the points become badly worn and jagged and this is the reason that when the magneto has been used for some time the motor will miss at slow speeds and it becomes necessary to smooth off the points and readjust them. This trouble is aggravated because the voltage generated by the magneto is at its lowest and for this reason the motor will run better on the battery, providing a dual system is used.

At high speed there are two factors to consider. If the gap is too small there is danger of the current arcing; that is, when the points separate a spark is produced. When this occurs the motor misses.

This is due to the fact that the voltage is greatest at high speeds and therefore while the arcing occurs under these conditions the points are not close enough together so that it will occur at slow speeds. It will not occur at slow speeds because the voltage is less.

Too large a gap may cause missing, for the reason that the inertia of the breaker arm is so great that the spring cannot bring the points together and close the circuit before the next break begins to occur. Furthermore, with the points far apart the hammering action is more pronounced and the points flatten out.

Companies That Manufacture Automobile Heaters

Editor THE AUTOMOBILE:—Do you think it is possible for automobile manufacturers to run a pipe line from the exhaust to small flat heaters on the floor to warm the cars in the winter? We appreciate the removing of the exhaust away from the floor for summer driving but it seems that heaters could be arranged at not a very great additional expense for the winter.

2—Do you think that the detachable top, such as the Kisselkar has, will gain favor?

Detroit, Mich. A SUBSCRIBER.

—1—It is not only possible to heat an automobile in the way you suggest but there are many devices on the market for this purpose. Among these may be mentioned the Four-In-One heater manufactured by the Auto Heater Co., of America, 1148 Bedford avenue, Brooklyn, N. Y.; The Garrison combined Heater & Muffler manufactured by the Garrison Gasoline Engine Specialties Co., 251 East Richmond street, Philadelphia, Pa.; The Radio Auto Heater made by the Milwaukee Auto Specialty Co., 715 Chestnut street, Milwaukee, Wis.

Hot water heaters that obtain their heat from the exhaust are made by the Peerless Radiator Co., Gibbs, Idaho and the Robinson Auto Heater Co., Milwaukee, Wis.

Foot warmers that employ a special fuel in the form of briquette are manufactured by the American Electric Co., State and 64th streets, Chicago, Ill., and by Lehman Brothers, 10 Bond street, New York City.

2—It is very difficult to give an answer to this question, because there are so many considerations affecting this.

Picric Acid Increases Power

Editor THE AUTOMOBILE:—As I remember, the racing cars, or even owners desirous of getting more mileage and power, use a certain amount of kerosene with picric or citric acid. Am a little hazy on this subject and will you please advise me what per cent. is used or whether the ingredients are as per the above. Or what is used for this purpose?

New York City. EVERETT WARD.

—Using picric or citric acid or ether in motor fuel gives a much snappier explosion and therefore more power. The proportion is about 1 pint of any of these to 5 gallons of gasoline. It is necessary, however, to keep the spark down. Racing drivers do not adulterate their gas this way as it is against the rules of the A. A. A.

Questions on Buick Model 21

Editor THE AUTOMOBILE:—1—Will you please explain how to adjust the bevel pinion and large bevel driving gear on the Buick model 21? W. R. C.

New York City.

—1—The beveled gear on this model is adjusted as follows: First remove the small plate on the axle housing back of the pinion. This gives access to a nut which may be turned to the right or left as desired. Tightening this nut will force the bevel closer to the crown gear and thus compensate for the wear.

The Engineering Digest

System for Choosing Gear Speeds and Securing Easy and Natural Shifts Under All Conditions

STRONGLY FAVORING HOGBACK POWER CURVES

ENGINEER F. ACHILLES, of Mannheim, Germany, advances the following new viewpoints with regard to the simplest method for determining suitable proportions among the different gear speeds of a motor vehicle:

Usually the idea of horsepower as a unit dominates when the work of an internal-combustion motor is under consideration, but for the present purpose something is gained by analyzing the work output of the motor more closely and mentally dissolving the horsepower unit into its constituent elements, force and velocity. Fig. 1 serves to keep before the mind the great difference which exists between the so-called theoretical power curve, which is a straight line based on an assumed proportionality of power and number of crankshaft revolutions per minute, and the curve showing the power which can be actually delivered; also the difference between the theoretical curve representing either force or torque as being independent of motor speed and therefore as a straight horizontal line and, on the other hand, the actual torque curve, which drops considerably toward the high-speed limit of any given motor.

From the torque available at the crankshaft it is easy to determine the curve representing the forward pull at the rim of the driving wheels for any one of the gear speeds, with a given diameter of driving wheels as well as a given direct transmission ratio determined by the bevel gear proportions. This is done in Fig. 2 for three assumed total gear reductions, and the drawing serves to fix in the mind those actual relations between the motor power curve and the different curves representing the pull at the wheelrims, which are of importance for the choice of the intermediate gear proportions.

It is first noticed that the maximum wheelrim pull occurs at a certain motor speed and drops off more or less rapidly with either increasing or decreasing number of revolutions.

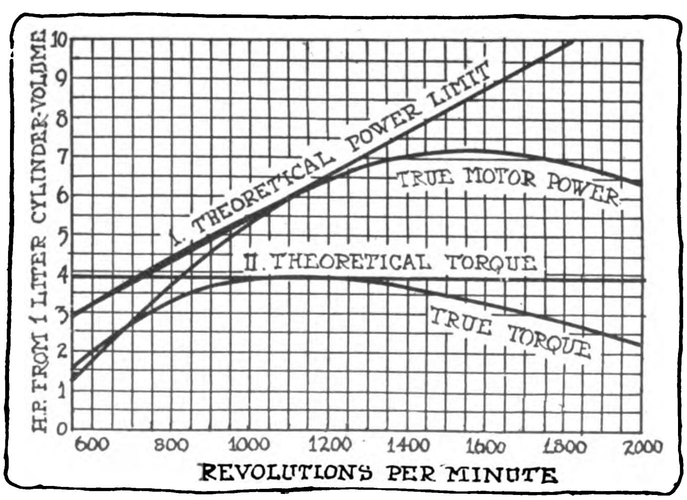


Fig. 1—The first elements determining driving comfort

Turning to the motor power curve, it is seen that it rises when the speed giving the highest wheel pull is exceeded and then again declines, first to the same level as at the speed giving maximum wheel pull and still more at further increase of speed. The efficient range of the motor is therefore naturally limited to the zone between the speed giving maximum wheel pull and the higher speed giving the same power but a considerably smaller pull. The two verticals in Fig. 2 indicate the limits of this zone. The meaning of these relations is clearly that at the low-speed limit of the efficient range strong traction power is available at low vehicle speed, while at the other limit only a smaller traction resistance can be overcome at the higher vehicle speed. In the operation of a motor vehicle it follows that the vehicle runs fast, when the traction resistance is small, on any given

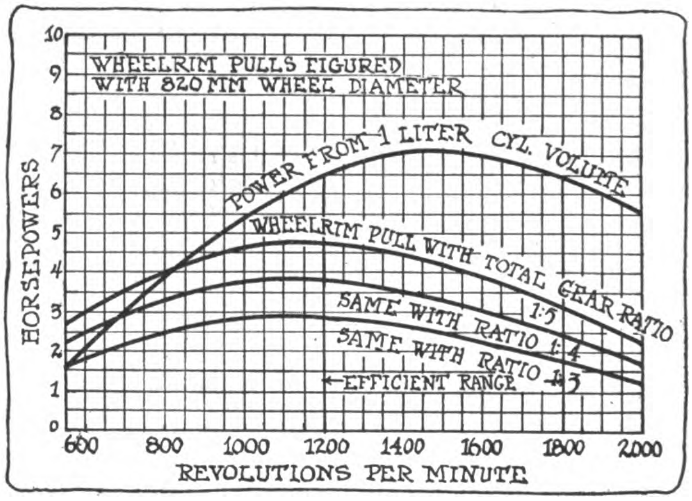


Fig. 2—Type of power and torque curve relations making for continuity of vehicle speed

gear, and the motor speed high, and that, if the resistance increases, both motor and vehicle slow down until finally the required wheelrim pull equals the maximum pull for the gear that is in mesh. Then it becomes desirable to shift to the next gear under such conditions that the reduced pull at the upper efficiency limit of the new gear suffices for overcoming the existing resistances by means of the higher motor speed coupled with the greater gear reduction. If it is now demanded that the available pull at the high limit of the new gear shall correspond with that obtained at the low limit of the previous higher gear—and this is the condition for smooth continuity in the driving conditions—then the proportion of the two gears must be chosen equal to the proportion between the wheelrim pulls at the two limits of the efficient range.

As, on the other hand, the traction resistance depends upon the vehicle speed, the demand should be made that no change in vehicle speed shall occur by reason of the shifting of the gears, in order that no sudden change in the required wheelrim pull may result. From this follows the second condition for a correct choice of the gear proportions; namely, that the total transmission ratios on the different gears also must be in the same mutual proportions as the motor speed figures at the two limits of the efficient range.

Altogether it is thus to be observed:

The proportion between two successive gear speeds must be chosen so as to be exactly the same as that between the available wheelrim pulls at those limits for effective operation of the motor the numbers of revolutions for which stand inversely in the same proportion as the wheelrim pulls.

This can be expressed more easily in the formula:

$$\frac{U_1}{U_2} = \frac{Z_2}{Z_1} = \frac{n_1}{n_2}$$

in which U signifies the total transmission ratio, Z the wheelrim pull and n the number of revolutions.

If the gear speeds are chosen so as to stand in these mutual relations, the motor must always work efficiently, and uniform transitions, accommodating themselves to the force and vehicle speed of the previous gear, will be obtained. And wherever in practice the gear proportions have not been chosen on this plan, the motor will automatically tend to adjust itself to the same manner of operating, unless a throttling of its power is the result, with the accompanying less profitable utilization of its possibilities.

When the two limits of the efficient range have been determined in accordance with this plan, and one turns

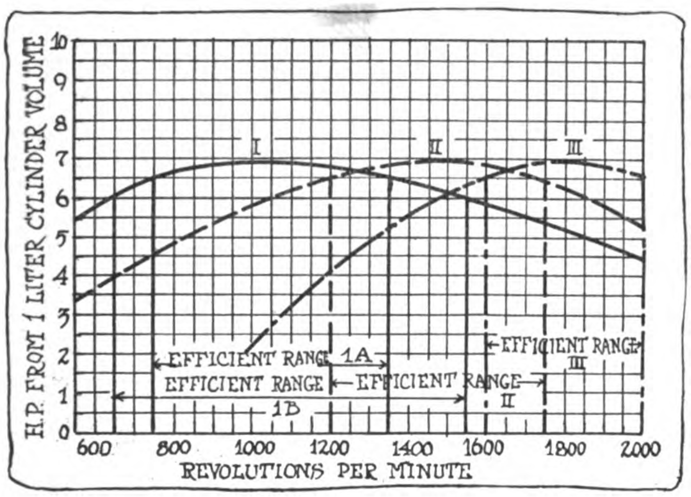


Fig. 3—Illustrating effect of motor type on gear ratio

again to examine the brake-power curve in this connection, it becomes plain that the power output always must be the same at these two limits if the wheelrim pulls are to be inversely proportionate to the motor speed figures. This would naturally be supposed to be the case, but it follows also from the equations expressing values for the wheelrim pull at the two limits, for a total transmission ratio X. For the lower limit this equation is: $Z_1 \,.\, X = \frac{716\, N_1}{n_1}$

and for the upper limit $Z_2 \,.\, X = \frac{716\, N_2}{n_2}$

[These are derived from the basic formula for deriving torque from horsepower:

$$M = Pr = \frac{60 \times 75\, N}{2\pi}\ \frac{N}{n} = 716.197 \frac{N}{n}$$

in which M is torque, N horsepower, P brake pressure in kilograms, r the radius in meters, n number of revolutions. Z in this case of course corresponds to M.—Ed.]

It is seen by dividing the first by the second equation that to have $\frac{Z_1}{Z_2} = \frac{n_2}{n_1}$, horsepower N_1 must equal horsepower N_2.

The range of motor speeds to be utilized is therefore determined by limits at which the horsepowers, N_1 and N_2, are equal, as in Fig. 2.

This is illustrated by examples in Fig. 3. The slow-speed

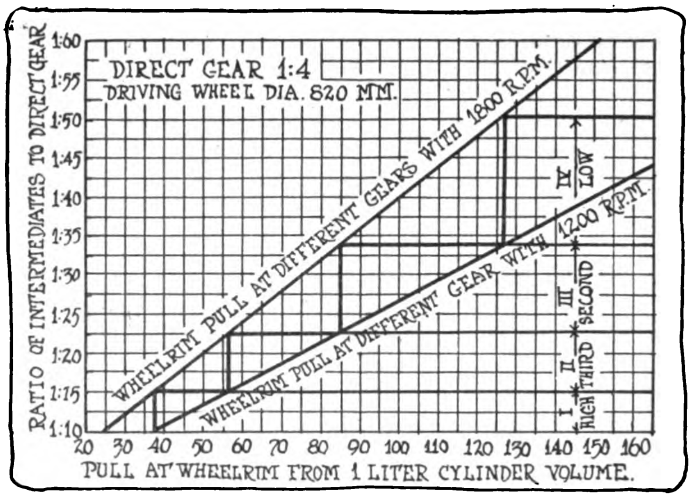


Fig. 4—Chart for ascertaining car's road ability in advance

motor represented in brake-power curve I is to be utilized in one case with a minimum output of 6.5 horsepowers per liter of cylinder volume. The motor speed limits lie then at 750 and 1,350 revolutions, and the efficient range is that marked I. A. The proportion between these figures is 1.8, and the division into gear speeds must be made with this factor. In the case indicated by the efficient range I. B the same motor is to be utilized down to an output of 6 horsepowers, and the range of motor speeds must accordingly be extended from 650 to 1,550 revolutions per minute. The proportion regulating the gear speeds consequently becomes 1,550 divided by 650, or 2.38.

The medium-speed motor represented in curve II when utilized above 6.5 horsepowers ranges from 1,250 to 1,750 revolutions per minute and requires a proportion of 1.46 in the gears, while curve III of a high-speed motor, ranging from 1,600 to 2,000 revolutions, calls for gears proportioned with a progressive factor of only 1.25. [The diagram is slightly misleading by ignoring the difference in power which would be expected from 1 liter of cylinder volume in three motors of very different speeds, but for mere illustration purposes this discrepancy is evidently not essential.—Ed.]

In this connection there is yet to be observed that the lower limit of the motor speed range must not extend beyond the peak of the wheelrim pull curve. On the contrary, to be assured of sufficient power at a gear change to maintain the vehicle speed unchanged, the wheelrim pull curve must decline steadily from the low limit toward the high limit of motor speeds.

In accordance with all the foregoing, the method of choosing the gear speeds for given conditions is now characterized by the following proceedings: (1) Tracing the power curve of the motor from brake tests, (2) constructing the curve of the wheelrim pull or torque according to the total transmission ratio—equal to that of direct gear—and the diameter of driving-wheels, (3) determining the number of motorshaft revolutions at which maximum driving torque is obtained, and (4) choosing the low-limit motor speed, preferably a little higher than that giving maximum torque, whereafter the high-limit motor speed is chosen at the number of revolutions beyond the power peak giving the same power as the low limit speed. The proportion between these speed figures is the proportion to be incorporated in the gears to obtain continuity of vehicle speed with varying traction resistance. If this proportion is changed, the range of motor speeds to be utilized is changed automatically in practice.

An example may be taken from Fig. 2. The efficient range there lies between 1,200 and 1,800 revolutions, the wheelrim pulls with the assumed transmission ratio of 1 to 4 amount to 36 and 24 kilograms respectively, the power at both limits at 6.5 horsepowers, and the proportion 1,800 : 1,200

= 36 : 24 = 1.5 : 1 must also be that of the gear ratios.

Assume that the proportion in gear ratios is chosen 1.4 : 1 instead, then the utilized range of motor speeds will be changed to from 1,240 to 1,740 revolutions and other values correspondingly. If, to get the extreme maximum of wheelrim pull, which is obtained at 1,150 revolutions, the low limit is placed at the same point, the other limit will be extended to 1,850 revolutions, and the factor of gear progression will become 1.6 : 1. Are thus the two limits determined, the available wheelrim pulls can be figured out and consequently also the maximum grades which the vehicle will be able to climb on each of the gears, if the different traction resistances are also considered. To this end it is only necessary to chart the wheelrim pulls according to their values for each of the gear speeds, as is done in Fig. 4.

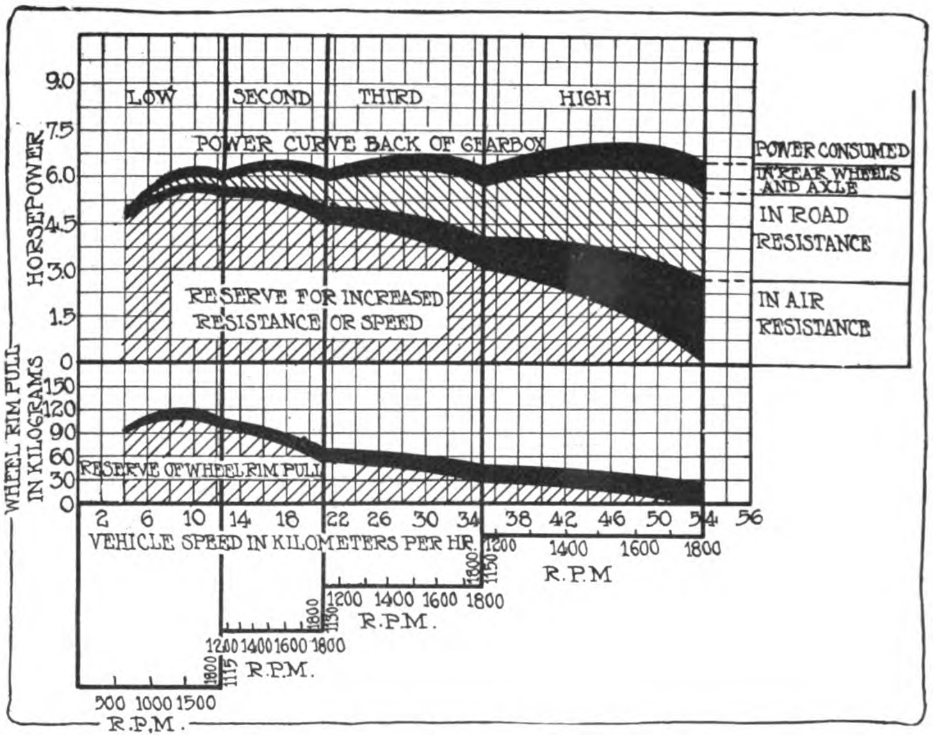


Fig. 6—Image of complete driving conditions with proper gear ratio

The plainest moral of the foregoing lies in the evident influence upon the gear proportions of the brake-horsepower curve. The motor designer must draw his inferences from these relations. From the presentation so far made the motor designer will be able to perceive offhand what range of the power curve in reality can be utilized in the driving of a car. It cannot be the object to design a motor so that it will produce power at a rate which continues to rise with increased number of revolutions. The important thing, on the contrary, so far as driving-results are concerned, is to get the maximum power development well within the limit of motor speed, the latter being first determined according to constructive and other requirements—in other words to get a hogback power curve. It can be secured by adjustment of the carbureter.

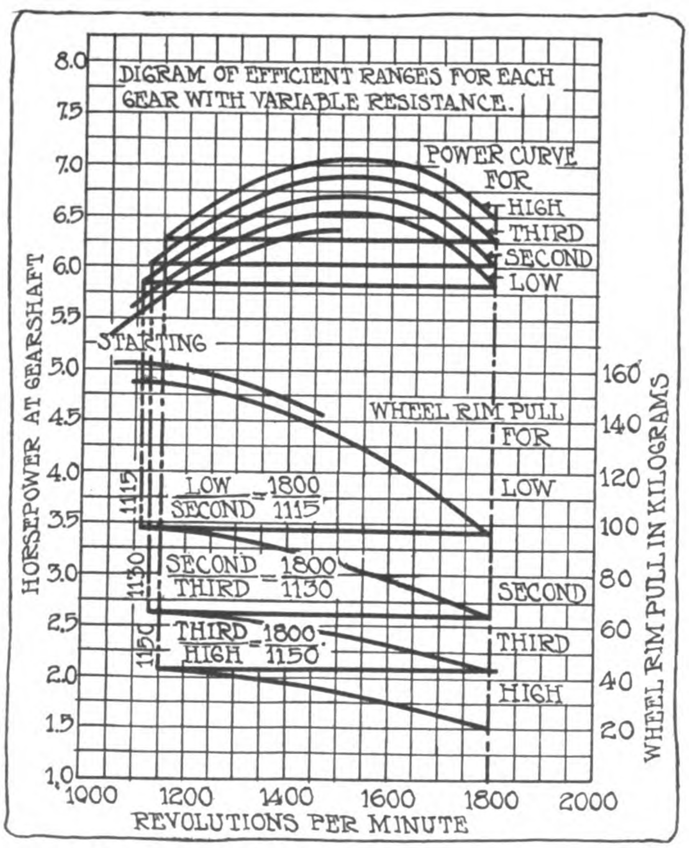


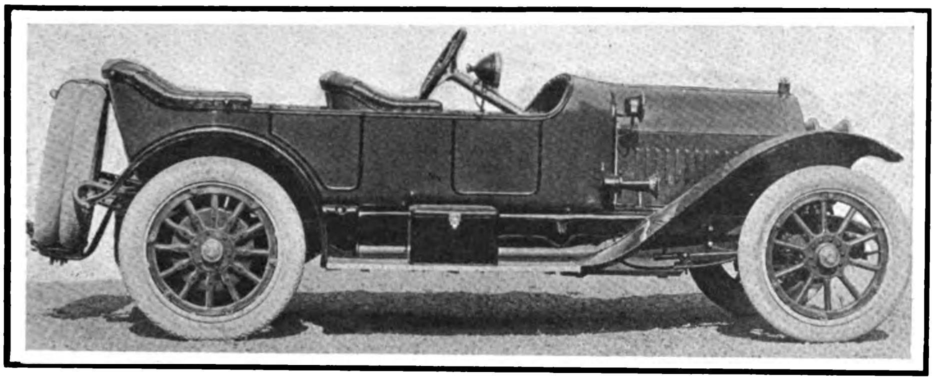
Fig. 5—Illustrating allowance for variations in transmission efficiency

With regard to the influence upon the gear proportions of the efficiency curve of the vehicle as such, it is notable that it is only changes in the driving-resistances which are taken care of by a change of gear, and these depend only upon the movements of the vehicle. For this reason, to determine the gear proportions it is the power output at that point in the transmission system which must be considered where the power losses cease to depend upon the motor speed alone and where the resistances to be overcome begin to depend upon the vehicle speed alone. The point in question lies always back of the gearbox. The power curve to be used is therefore the brake-power curve minus resistances in gearbox.

In most cases it should be sufficient to assume a constant loss for all the gears. Minor variations occur, however, as between direct gear and the spurwheel transmissions, and such variations can be taken into account by choosing the proportion between two successive steps of the corresponding power curves to coincide with the proportion between the motor speeds at the upper limit of the lower gear and at the lower limit of the next higher gear, both of which give the same power. In this process certain rules may be adopted with regard to the limits of the efficient range. It can be established, for example, that the motor must not exceed a certain maximum speed. Then the curve for the first gear, by which the ratio is fixed, is determined by the identical power output required at the beginning of the next gear. On the other hand, it is also possible to start the curve from a different number of revolutions for each of the gears, with due consideration of the location of the maximum torque. In Fig. 5 there is given an example of this manner of laying out the gear proportions with allowance for the difference in the transmission efficiency for each of the gears.

All in all, the viewpoints presented for the selection of gear proportions seem to take all conditions of interest into definite account. A continuous image of the practical effects and the transportation movements resulting from the application of the method to a definite set of vehicle conditions has been constructed in Fig. 6, and may stand as an example of what may be done in other cases by introducing the values proper for each.—From *Auto-Technik*, April 11.

Small Four Runabout Is Newest Stutz



Stutz bull dog, a four-passenger body on the large four chassis

Also Light Four-Passenger Body on Larger Four Chassis —Small Four Has Block Motor

TWO new cars have been added to the Stutz line, one an entirely new model with a different design of motor mounted on a smaller chassis than any yet put out by the Stutz company. The other is a four-passenger speed body, placed on the same chassis that has heretofore been fitted with the Bearcat and roadster bodies.

The new small four is entirely typical of its manufacturer in every particular save for the L-head motor which marks the first departure of the Indianapolis concern from T-head practice. Another departure is that the cylinders are cast in block, whereas in all former Stutz cars the four cylinders were cast in pairs.

New Torque Tube Support

The use of block cylinders has enabled the designers to considerably shorten the chassis, cutting the wheelbase down to 108 inches, whereas the Stutz Bearcat is 120 incnes.

Another change that has been made to accommodate the shortness of the chassis is in the connection of the forked yoke of the forward end of the torque tube. Instead of having this connection made to a cross frame member a face plate has been bolted over the rear end of the clutch housing and the connection of the torque yoke made to that.

In all other particulars the features that have characterized Stutz design in the past have been maintained. The clutch is a cone, power transmission is through a three-speed gearbox, the rear system is a Stutz, the front axle Timken and the drive and control are on the right. The selling price of this new four, which is known as the H. C. S., is $1,475

It is built only as a speedster and although not fitted with a top or windshield it is ironed for the former and can be fitted with the latter if desired. Speedometer and Hartford shock absorbers are mounted on this car as regular equipment as on all models. The completeness of equipment is a feature.

The other new Stutz is known as the Bulldog. It is also a speed model and is mounted on the same chassis as the Bearcat. In fact, it is the same as the Bearcat in every particular except that the body is a four-passenger one and while the Bearcat is supplied in both four and six cylinders the new model only comes as a four. The price is $2,250.

Being a speed model, neither top nor windshield is fitted to the Bulldog. The body is low-hung with high flush sides allowing the passengers to sit low.

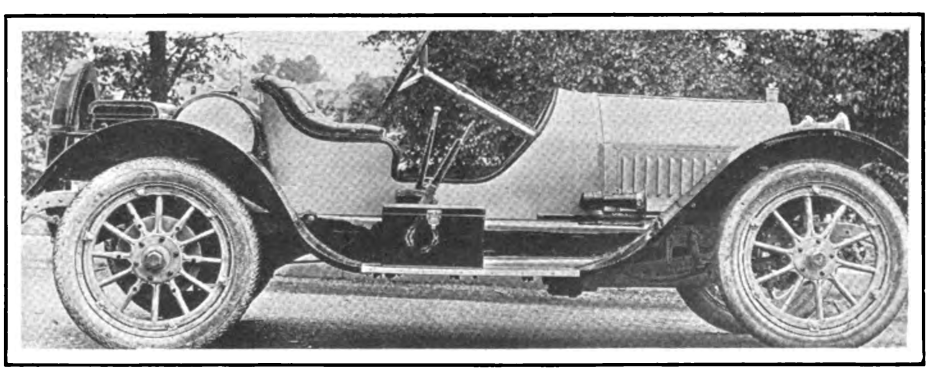
With the addition of the two new models the line has been brought to a point where the purchaser has a choice of ten cars.

On the 130-inch chassis there is a six-passenger touring and a six-passenger sedan. Outside of the choice of two bodies on this chassis the purchaser has his choice of a six- or four-cylinder motor. The two motors are interchangeable the bolt holes for anchoring the four-cylinder motor to the chassis are in the same positions as those which hold the six. This choice of two motors and two bodies gives a selection of four cars of 130-inch wheelbase.

On the 120-inch chassis the purchaser has a range of five cars. In the Bearcat model, which has been one of the Stutz leaders for the past 2 years, the same option of four or six cylinders is offered as on the larger chassis. The motors are also interchangeable and the parts throughout are designed to take care of the needs of the six-cylinder motor. When the four-cylinder motor is fitted there is no great difference in power as the difference in cylinders is made up by the larger bore and stroke of the four. The roadster is also made in fours and sixes and the Bulldog only in fours.

The tenth model is the last to be introduced to the line and, in fact, the Stutz company has only just commenced to ship them to its dealers. This is the H. C. S. It is intended for that class of purchaser who desires a speedy roadster of light weight. The prices of the ten models are as follows:

Model	Wheelbase	Cylinders	Price
Touring	130	Six	$2,400
Sedan	130	Six	3,800
Touring	130	Four	2,275
Sedan	130	Four	3,675
Bulldog	120	Four	2,250
Roadster	120	Six	2,125
Roadster	120	Four	2,000
Bearcat	120	Six	2,125
Bearcat	120	Four	2,000
H. C. S.	108	Four	1,475



Small Stutz roadster selling for $1,475

Like all the other Stutz cars the small four is equipped with a Wisconsin motor. In this instance a block-cast, power-plant with L-head cylinders marks a change from the former cars bearing this name. The valves are on the left and are covered by two removable cover plates held in place by knob screws.

Integral Intake Manifold

The new engine differs from previous motors used by the Stutz company in that it is a high-speed type of fairly high stroke-bore ratio. The bore is 3.75 and the stroke 5 inches, giving a stroke-bore ratio of 1.33. The casting is exceptionally compact including the water intake manifold and the inlet as a unit. The gases before entering the cylinder are preheated in this manner, both by the water from the radiator and by the heat radiated through the walls of the casting. The exhaust manifold is cast separately.

The cooling system is thermo-syphon, whereas on all the other Stutz cars the water is pump-circulated. On the H. C. S. engine the water outlet manifold rises through a bolted-on header from the cylinders and the waterjackets are large to give the free-flow demanded by this system of cooling.

Oiling is force feed with the oil pumped from the reservoir in the base of the engine to the three main bearings and through the hollow crankshaft directly to each of the crank bearings. It is then thrown off into the cylinders in the form of a spray that maintains a supply of lubricant in the motor.

Ignition and Lighting in One

It is in the electric equipment of the car that another noticeable change has been made. Instead of the combined starting and lighting unit with a magneto for ignition, the two-unit idea has been kept and a combined unit used for lighting and ignition with a separate starting motor. The starting and lighting equipment is manufactured by the Remy company as in the past. The lighting-ignition generator is mounted on the left side of the motor and the cranking motor at the rear right meshing with a gear on the flywheel only when needed to start the engine. The cranking motor is a simple series design capable of spinning the engine under normal conditions at 100 revolutions per minute.

As the H. C. S. is only made in the speedster design with a large cylindrical gasoline tank mounted behind the seat, the gravity system of gasoline feed is employed. The carbureter is the Stromberg G. 1-inch size. It is fitted with hot-air intake.

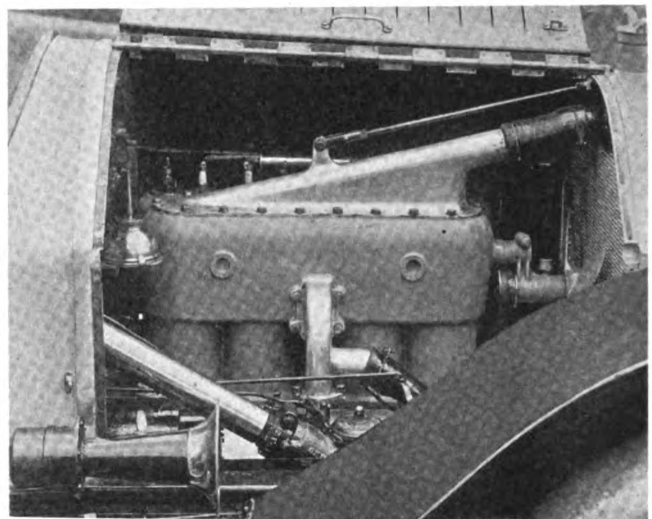
A leather-faced cone clutch with spring inserts beneath the leather is employed. The clutch pedal, as well as that for the brake, has an adjustment feature by means of which the length is adjustable. The entire variation in the length of the pedals totals 2.5 inches. Behind the clutch housing is bolted the face plate which takes the forked end of the torque tube as previously mentioned.

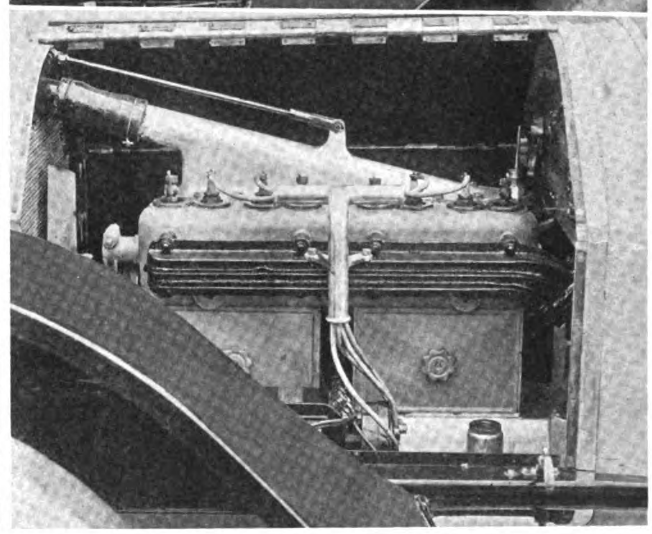
Gearbox on Rear Axle

The rear system employed in this car is the same as that which has formed a part of Stutz cars ever since they were introduced. The three-speed gearset is mounted just forward of the differential housing parallel to the torsion tube which incloses the drive shaft. While the forward end of the drive shaft runs on roller bearings, F. & S. annular ball bearings are used throughout the gearbox and on the outer ends of the axle shafts. The inner ends of the axle shafts are fitted with roller bearings of the tapered variety capable of taking the end thrust as well as the load.

The steering gear used in the H. C. S. is a Gemmer and in this particular the new car is similar to the older ones. Following Stutz practice the steering gear is mounted on the right and the control of the car is also on the right.

The brakes are double internal expanding operating on a drum bolted to the rear wheels. The wheels carry 32 by 4-inch tires. They are wood on the stock cars. The springs are semi-elliptic.





Upper—Right side of new small Stutz roadster known as the H. C. S. Lower—Left side of motor

The body resembles the Bearcat very closely. It is built along racing lines but instead of having the seat directly on the frame as in the Bearcat it is raised slightly above and there is a small sill which is a continuation of the downward sweep of the deep cowl. Although the body is ironed for a top none is fitted as the idea of the car is not to be used for a touring design but as a speedy raceabout. If desired, however, both a top and windshield could be fitted. The gasoline tank is carried on the rear deck and a trunk is fitted behind that. The spare tire is carried on the rear.

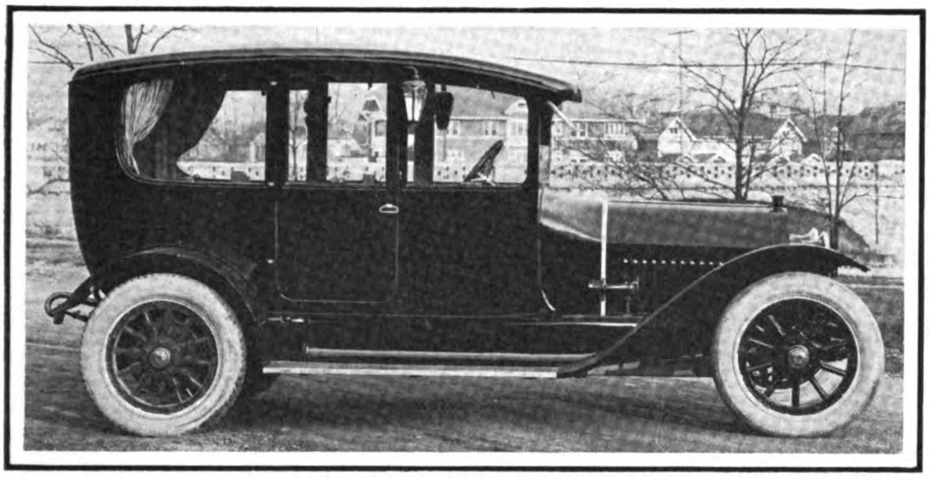
The 4.75 by 5.5-Inch Motor

The four-cylinder motor for the cars mounted on the 120 and 130-inch chassis is a T-head design with the cylinders in pairs and measuring 4.75 by 5.5 inches. The maker claims a horsepower of over 60 on the block at 1,500 revolutions per minute. The cylinders are offset .75 inch.

The crankshaft, .40 per cent. carbon steel, is carried on three main bearings. The push rods are roller type and the entire valve action is inclosed by an aluminum housing which is split in the center.

4 by 5-Inch Six Motor

The six-cylinder motor for the 120 and 130-inch wheelbase cars is of the same general construction as the four-cylinder except that it has a smaller bore and stroke, being a 4 by 5.



Stutz six-passenger sedan mounted on either a four or six chassis

The six-cylinder motor is also a T head and has the cylinders cast in threes. It has all the main features of the four, such as hollow crankshaft, force-feed oiling, large valves, and four-bolt connecting rods. The valves are inclosed by aluminum plates in the same manner as in the four-cylinder engines, except that instead of being held by a spring, the cover plate is removable by unscrewing a thumb nut.

The crankcases of both the four and six-cylinder motor are aluminum castings with the upper half supporting the main bearings by webs cast integrally and the lower half acting as a cover for the working parts and carrying the oil reservoir which in the case of the four has a capacity of 7 quarts.

Magneto Ignition Used

The lighting, starting and ignition equipment on the four and six-cylinder motors is similar. Ignition is accomplished on all fours except the H. C. S. by Bosch high-tension, double-type Z R magnetos, and on all the six-cylinder cars by Eisemann dual. This marks a change, however, from previous practice as some of these cars were furnished with low-tension magneto ignition.

The starting and lighting systems employed on the entire line except the new H. C. S. model as described, are the Remy motor-generator type. In these instruments the winding is such that below a certain speed the action is that of an electric motor while above that speed they act as a generator. On the average they start charging the storage battery at a car speed of about 15 miles per hour.

The clutch, gearbox and rear axle used on all these cars is the same in all essential details as that described for the H. C. S. model, the horsepower capacity of the transmission units being increased to take care of the greater strains imposed by the heavier and more powerful cars.

The tire sizes of all the cars on the 120-inch wheelbase cars are 34 by 4. On the 130-inch cars they are 34 by 4 for the touring in both four and six cylinders and 34 by 5 for the sedan. Wire wheels are furnished on these models at an extra cost of $100.

A wide choice of body colors is offered. The new H. C. S. comes in monitor gray, azure blue and Mercedes red; the Bearcat in gray, Mercedes red, vermilion and yellow; the roadster the same as the Bearcat; the new Bulldog, battleship gray with red upholstery. Azure blue with black or Mercedes red with red; the touring, ultramarine blue and maroon, and the sedan, ultramarine blue with Brewster green.

Model H. C. S.

Crankshaft diameter	1.75	inch
Rear crankshaft bearing length	4	"
Front and center bearing length	3	"
Big end bearing length	2.25	"
Piston pin diameter	1 3-16	"
Valve diameter	1 11-16	"

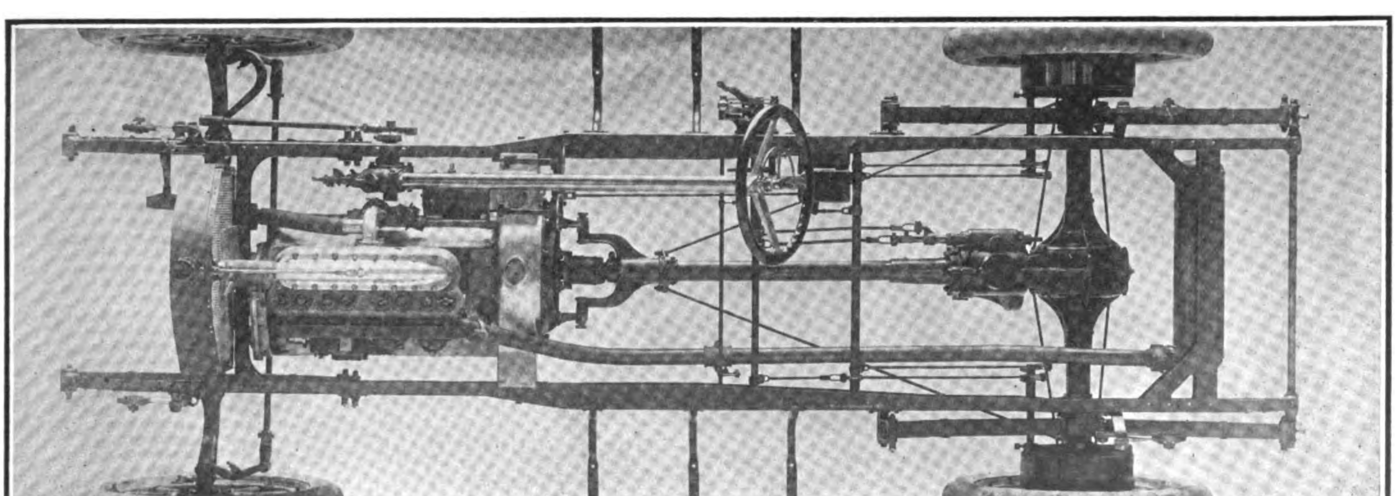
Prizes for N. Y. Automobile Parade

NEW YORK CITY, Sept. 27—The New York Commercial Tercentenary Commission has appropriated a fund of $10,000 for the automobile pageant to be run in connection with celebration on the evening of October 28. Of this amount, $5,000 will be in the form of awards, trophies and medals for decorated cars in the various divisions of the pageant.

William C. Poertner, who was recently asked to be chairman of the automobile committee, has retired in favor of J. E. Thompson. Merle L. Downs has been made secretary.

August Imports in N. Y. Port, 74 Cars

NEW YORK CITY, Sept. 28—The Custom House Statistical Bureau has published a detailed table of merchandise in bond on September 1, 1914, for the district of New York. This report states that seventy-four automobiles, valued at $146,610, were imported in the month of August, compared with seventy-eight automobiles, valued at $156,582, for the same period in 1913. Automobile parts imported were valued at $21,727 against $9,330 in 1913.



Plan view of small four-cylinder Stutz model H.C.S. The mechanism is divided into two units, the motor and clutch at the front and the gearset and differential at the rear

Smooth Exterior on New Eisemann

Single Magnets Used—Breaker Mechanisim Simple—Greater Factor of Safety—Hot Spark at Low Speeds

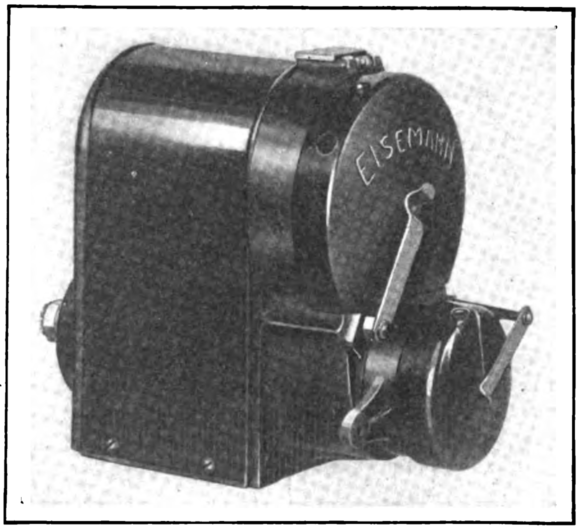


Fig. 1—Smooth and simple exterior of new Eisemann high-tension magneto

THE Eisemann Magneto Co., Bush Terminal, Brooklyn, N. Y., has placed on the market a new waterproof magneto which is styled type G and which differs in a number of respects from all other Eisemann magnetos. The new instrument is of the straight high-tension type, no provision being made for battery ignition. It is made for both four and six-cylinder motors of all sizes. It is chiefly remarkable for its extreme simplicity, the fewness of its parts and the intensity of the spark which is produced at exceptionally low armature speeds.

In appearance the new instrument is quite different from its predecessors. It is exceptionally smooth and compact. The magnets are covered by a sheet steel housing which is pressed into place in such a way that the joints are perfectly tight. The distributer housing is smooth, the terminal connections being inside. In fact the whole instrument is infinitely simpler in both construction and appearance than the older types of Eisemann magnetos.

Single Magnets Used

In construction the magnets are essentially the same as have been used in the past. Due to a more efficient winding of the armature, however, it has been found unnecessary to use double magnets. The distinctive Eisemann pole piece construction is retained. It is largely due to this that a strong, hot spark is obtained at very low speeds. The pole pieces themselves are in the form of wedges with their thickest parts at the center of the armature, as is shown by the accompanying illustration; consequently the armature is at no time isolated entirely from the pole pieces.

Magnetism Concentrated.

This construction causes the magnetic lines of force to be drawn from the extremities of the pole pieces toward the center of the core which results in the entire volume of the magnetic lines of force passing through the winding without being diffused. In addition this makes possible a somewhat wider range in timing the spark. Furthermore the armature acts as a keeper for the magnets and thus prevents their demagnetization.

Although the armature winding in the new instrument is practically unchanged, long experiment coupled with experience has produced a more efficient proportion between the secondary and the primary. At the same time the current collecting slip ring has been shifted to the end opposite to the end it occupies in other Eisemann instruments. This change has resulted in bringing all of the vital parts of the instrument to one end where they are all readily accessible by the simple expedient of removing the distributer housing and the breaker box.

Larger Safety Factor

In designing the new armature a much greater factor of safety has been allowed for. Instead of being placed between two closely spaced insulating rings, the slip ring R, Fig. 2, has considerable space between it and the insulating material at either side. At the gear end this insulating ring M is very thick and in order to obviate the possibility of the spark jumping to the gear in the case of a disconnected high-tension lead the insulating ring is deeply corrugated; thus its thickness is proof against the possibility of the spark piercing through and the corrugations prevent the spark jumping across the top.

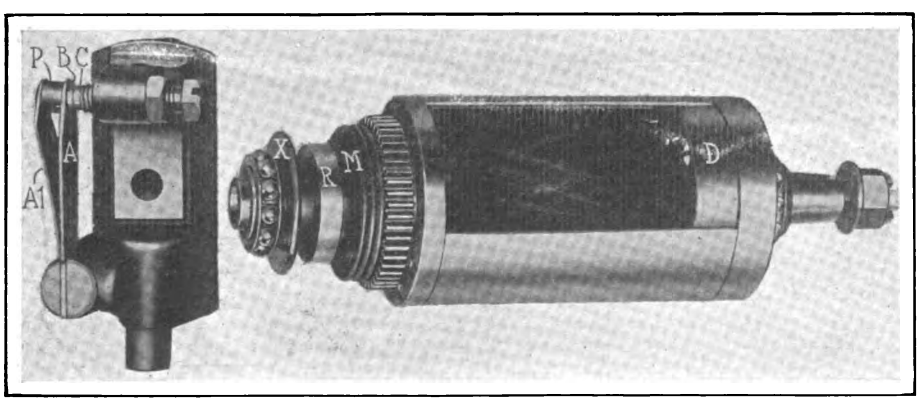


Fig. 2—Left—Detail of breaker mechanism. Right—Armature showing slip ring R and insulating rings M and X

The insulating ring X at the opposite side of the slip ring is similar in form to that ordinarily used but is slightly thicker and there is considerable space between it and the ring. The slight change in wiring has permitted the use of a smaller and more compact condenser which is housed in such a way that injury, except by direct intent, is practically impossible; otherwise the armature is standard, the core being built up of T-shaped castings pressed together with a quantity of laminations directly in the center where the magnetic influence is strongest. After winding, the armatures are shellacked and placed in an oven at 180 degrees Fahrenheit. This process is repeated three times, after which the winding is considered to have had the last vestige of moisture removed and to be impervious to water or oil.

The circuit breaker, Figs. 2 and 5, is entirely new. Instead of being a comparatively heavy arm, there is a very light spring A which carries one of the platinum contacts B and which rotates with the armature shaft; the other contact C is mounted in the part which supports the spring.

The auxiliary spring A1 is merely for the purpose of slightly increasing the pressure between the contact points; it is separated from the main spring by a fibre plug P in order to eliminate the possibility of trouble resulting from static conditions.

Made integral with the breaker box there is a small cylinder D with two fibre inserts E and a third felt insert F, the latter serving merely for lubricating purposes. As the breaker mechanism rotates with the armature, the spring A wipes alternately against the fibre inserts D and E, thus making and breaking the primary circuit. The simplicity of this mechanism is only one of its noteworthy features. As there are no bearings, it is impossible for wear to cause irregular firing and as there is nothing to stick, possibility of trouble on this account is positively eliminated. Another very valuable feature is that owing to the exceptional lightness of the parts there is no battering of contacts which, consequently, may be expected to wear a correspondingly longer time.

New Distributer

The distributer has come in for complete revision. As already has been noted, there are no connections outside. The high-tension leads enter tapered holes in the top of the distributer block, the stripped ends being wrapped around large threaded studs. Over the wire is placed a washer W, which is tabbed to prevent it from turning when the nut N

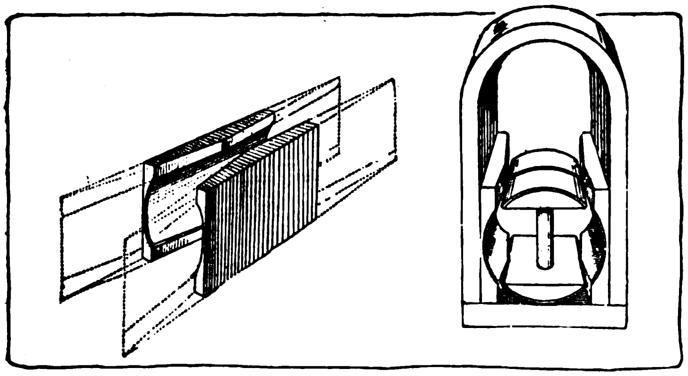


Fig. 3—Tapering pole pieces used to concentrate the lines of force

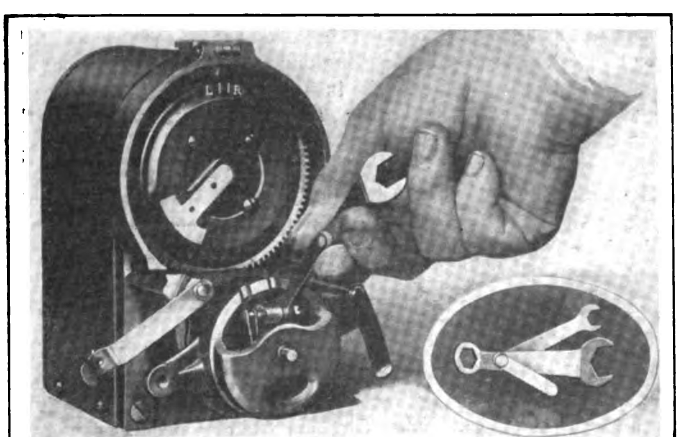


Fig. 4—Adjusting the breaker gap. A special wrench is furnished for this purpose

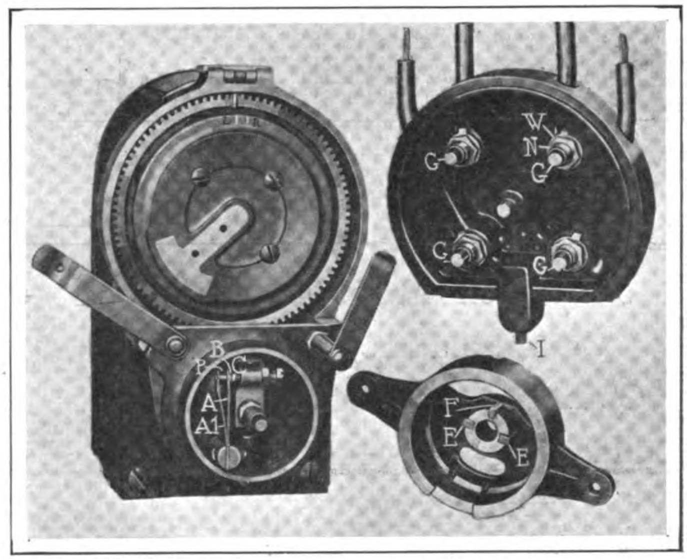


Fig. 5—Details of distributer and breaker construction

is screwed down. Before the leads are attached they are forced into their respective holes and as they are a tight fit it is impossible for moisture to enter.

The high-tension distributer contacts G as well as the ground connection H are carbon—light springs being used to insure perfect contact with the distributer arm.

The distributer arm is inserted in the disk with which it rotates touching in turn the high-tension lead contacts. The location of the current collecting slip ring in its present position has made possible the elimination of a large number of parts heretofore necessary. The current collecting brush I is mounted in the distributer block and is removed with it, exposing the slip ring when the block is taken off. This makes it unnecessary that the current be led from one end of the magneto to the other as has been the case in the past.

Another excellent feature of the new instrument is that installation and timing have been simplified to the greatest possible degree. On the distributer gear there are two marks, one for left hand engines and one for right hand engines. In timing the magneto it is merely necessary to place one piston in firing position and turn the distributer gear until one of the marks, depending upon the direction of the rotation of the crankshaft, is in line with a screw in the distributer covering.

Electrics to Set New Mileage Records

New York City, Sept. 28—For the purpose of demonstrating the possibilities of the modern electric vehicle, both of the pleasure car and motor truck types, the New York Electric Vehicle Association has perfected plans for the running of a series of mileage tests during the Electrical Exposition and Motor Show in New York, October 7th to 17th. These tests will be run on the board track, which is laid out each year on the third gallery of the Grand Central Palace, for the purpose of showing electric vehicles in action during the show.

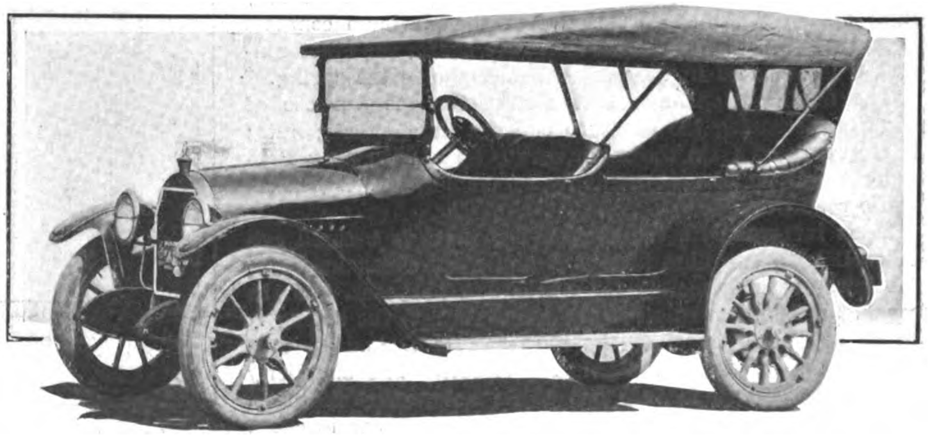
One of the tests will be for the greatest mileage on a single charge of the battery. It is open to all types but will probably be contested by runabouts, with one or two possible entries of light delivery vehicles. The present record is said to be 244.7 miles, made on the streets of Cleveland, Ohio, in 1911. The road record is 176 miles made recently in a run from Boston to New York.

A second test provides for a continuous day and night run throughout the ten days of the Show. This is to be accomplished by having two batteries to be used alternately, or by giving one battery the required number of short "boosts." This test is for commercial vehicles, as the results achieved will be most profitable for this type. As yet there is no record for a test of this nature and the one established during the Show is certain to attract wide attention.

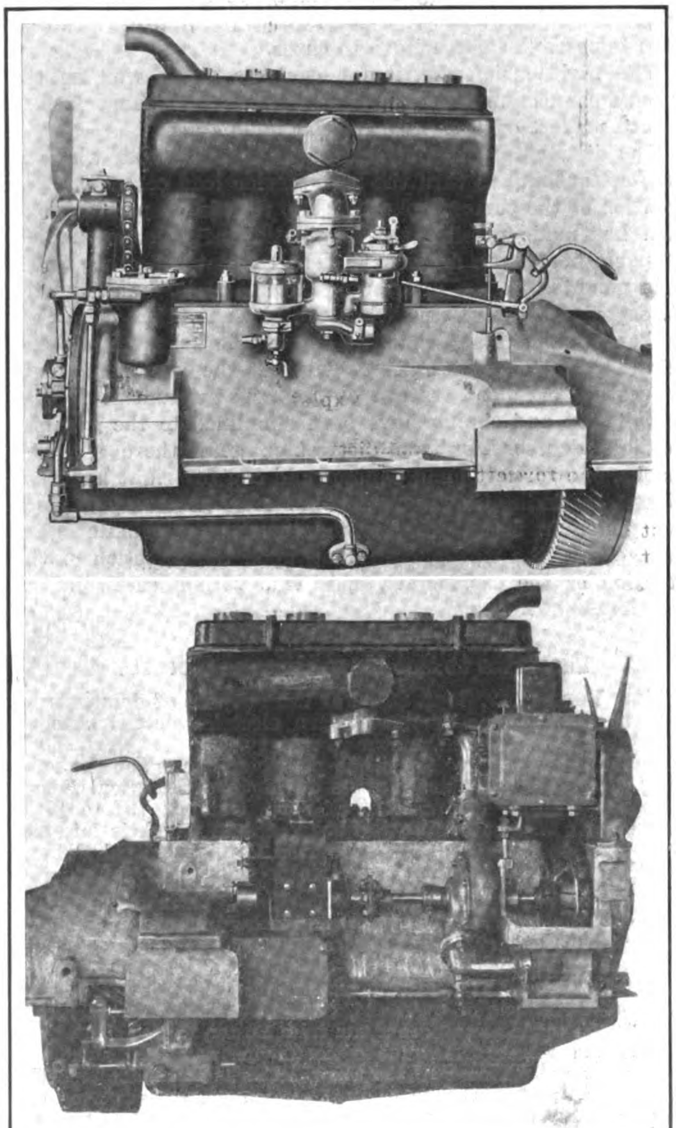
In addition, the New York Electric Vehicle Association is offering two handsome cups for road runs to be held during the Show, one for pleasure cars and one for motor trucks.

Stearns-Knight Four for $1,750

High-Speed Motor Has 3 3-4-Inch Bore and 5 5-8-Inch Stroke—Counterbalanced Crankshaft—Tubular Connecting-Rods—Gear-box Brake—Cantilever Springs



New four-cylinder Stearns-Knight five-passenger touring car which, with complete equipment, including electric starting and lighting, sells for $1,750



Upper—Intake side of new Stearns-Knight motor, showing integral intake manifold. Note automatic lubrication control interconnected with carbureter

Lower—Exhaust side of new Stearns motor, showing integral exhaust manifold and mounting of high-tension Bosch magneto and Gray & Davis system

A FOUR-CYLINDER, high-efficiency, high-speed Knight motor in a five-passenger touring car at $1,750 is a most important trade announcement in these days when the battle among six-cylinder, four-cylinder, and eight-cylinder is rapidly growing acute.

This is what the F. B. Stearns Co., Cleveland, O., is doing. The factory has already started production on 1,500 of these $1,750 cars for 1915. The first lot of 500 started through the factory in August, production is well under way today and demonstrators have already been shipped to dealers.

The new four-cylinder job with a motor 3 3-4 by 5 5-8, a wheelbase of 119 inches, 34 by 4-inch tires, weighing complete with all equipment 3,100 pounds, and having a rear axle gear ratio of 4 1-2 to 1, shows 45 miles per hour continuous speed on the brick roads around Cleveland, with a cabriolet body for two passengers. As a cabriolet, the price is $2,250, and as a limousine $2,850. All use the same wheelbase.

Many Features of European Design

To produce a Knight motor of the latest design for $1,750, as a five-passenger touring car, marks the début of a new era in Knight-motored vehicles in America. Heretofore they have sold much above this mark. But besides a lower price, the Stearns company incorporates in this new motor many other features found in the high-efficiency, high-speed, four-cylinder motor of Europe which are new in America. These include the counterbalanced crankshaft, counter weights being used to overcome bearing wear, caused by centrifugal force. The connecting-rods are hollow to give lighter weight, and on the lower ends are extensions for balancing purposes. An exceptionally light casting is used for the cylinder block, the wall thickness being only 5-32 inch. The aluminum crankcase is very rigid.

The new chassis introduces many other features new with Stearns such as integral intake and exhaust manifold, a single ignition system using a high-tension magneto, a service brake on the rear of the gearbox, cantilever rear springs, spiral bevels in the rear axle, pressed steel housing for the rear axle, gasoline tank in the cowl, and a reverse cone clutch.

A Real Factory-Made Car

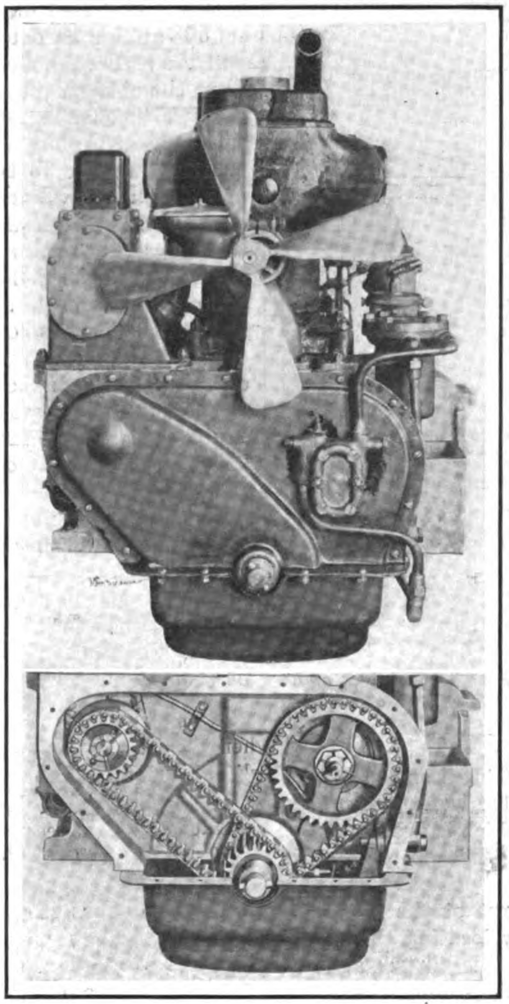
A remarkable aspect of this new Stearns Knight is the fact that it is a factory-made car in every sense of the word, and not an assembled car. The Stearns factory produces nearly all of the parts. For example, the motor is made entire in the plant with the exception of magneto, starting and lighting units and silent chains. The company manufactures the crankshaft, eccentric shaft, connecting-rods, pistons, and does all the work on the forgings and castings entering into the motor. The gears and shafts for the gearset are factory products. This category also includes rear axle, steering gear, front axle, etc. The Stearns company does not manufacture the forgings or castings entering into the car, but does all the work on the manufacture of these.

Many Stampings Used

Considerable use has been made of stampings because they are lighter in weight than forgings and castings which might be used in their place and they are cheaper to manufacture. Some of the stampings include, in addition to the base of the crankcase and the timing chain cover, brake drums, differential cover, rear axle and many smaller parts.

Rigid Crankcase

Considering the various chassis constructions and details, first comes the general design in which the motor, clutch and gearbox constitute a unit construction supported at four points on the frame, at the corners of the motor, and in which the heavy-section, aluminum casting forming the top of the crankcase also divides at the rear, leaving an opening for the flywheel and back of this carries the gearbox as a unit. This construction is one of the foundation stones in this motor design in that rigidity in the crankcase has been considered a necessity for efficiency in high-speed motor work in both foreign and American practice.



Upper—Front view of new Stearns-Knight four showing mounting of fan, carbureter and lighting generator. Lower—Interior view of timing gearcase on new Stearns-Knight

Light Weight an Aim

The block cylinder casting is a symmetrical design with its integral manifolds on opposite sides. The castings have uniform wall thickness throughout of 5-32-inch, which is in keeping with European practice. The base of the crankcase is a steel stamping and stampings are used as covers for the timing chains driving eccentric, magneto and pump shafts. This use of stampings is a part of the general engineering scheme of the car to reduce weight wherever possible and also to reduce construction cost.

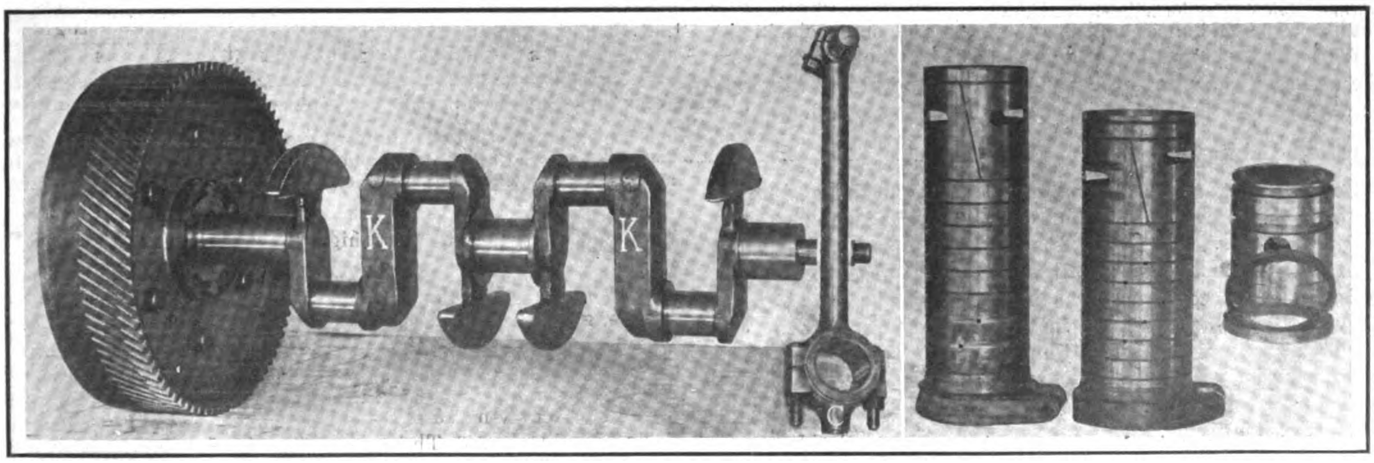
Counterbalanced Crankshaft

The most important feature of the counterbalanced crankshaft with its four integral crescent-shaped weights, is the two particularly heavy crank cheeks K used in order to give the required rigidity. All three of the main bearings are 2 1-2 inches in diameter and the lengths are, rear 4 1-2, center 2 3-4, front 2 3-8. The four crank pin bearings are 2 inches in diameter and are 2 3-8 inches long.

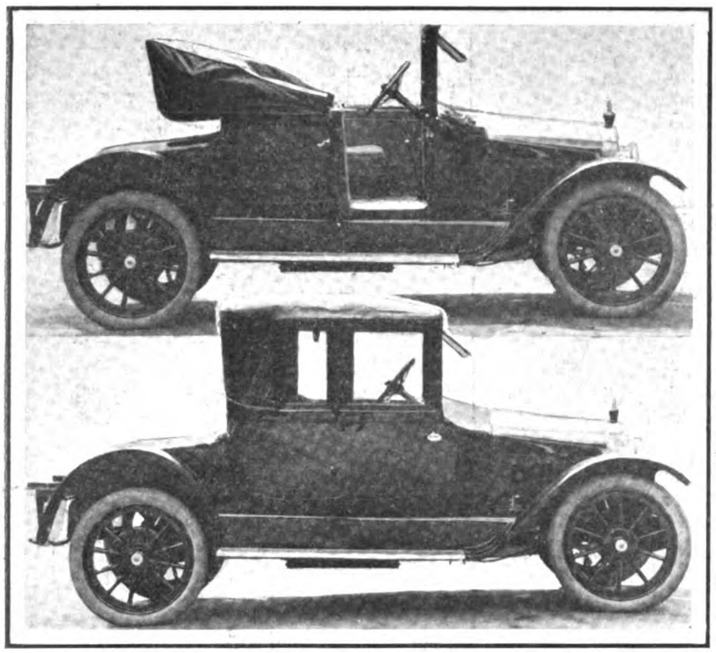
Stress Eliminated

The balance weights are used not to put the crankshafts in rotary or dynamic balance, for it is in rotary balance and also dynamic balance without these, but these are added to eliminate the stress on the bearings due to centrifugal force at speeds above 1,200 revolutions per minute. It has been found in high-speed motors that at continuous speeds above this point, the bearings wear, due to pressure not from the explosions and not from the actual weight of the crankshaft and other parts carried, but to irregular, centrifugal force on the shaft. This can be explained by the comparison of swinging a weight attached to a string around your finger. The faster you swing the weight the stronger is the tendency for it to fly away. With a single weight on a string the pull is always in the direction of the weight. If, however, we arranged two weights, one diametrically opposite the other, and then swung them in a circle, the centrifugal force of one would neutralize that of the other. This is what the counter-weights are used for. By neutralizing this centrifugal force inherent in the shafts without the weights, the wear on the bearings is eliminated.

Another factor is the tubular connecting-rod used for the



Left—Counterbalanced crankshaft used in new Stearns-Knight four-cylinder motor, showing the integral crescent-shaped weights, of which there are four. Two very heavy crank cheeks K are used for rigidity. Right—Cast iron pistons used in new Stearns-Knight four motor



Upper—New Stearns cabriolet with top folded. Lower—The same car with the top raised. This car sells for $2,250 and is mounted on the new Stearns-Knight four chassis

first time by Stearns. These rods are lighter than the I-beam type, an object desired in high-speed motor work, and on the connecting-rod cap is a short stub tube which is used to assist in getting better balance in the motor. The object of this extension is that the center of gravity of the entire connecting-rod mass at the lower end is brought at the center C, which is the center of the crankpin. By locating the center of gravity of this mass at the center of this pin vibration is eliminated which would be set up were the center of gravity at any other point than C. The hollow connecting-rods have a wall thickness 5-32 inch, and the hole is 5-8 inch.

Pistons are cast-iron ones with considerable length and slightly concave on top. The two rings are carried above the wristpin and the piston has considerable wearing surface between these rings which is used to prevent slapping and give a quieter motor. Each piston groove contains three rings, a broad inner one and two narrower ones outside of it.

As in all other Knight motor types, the two reciprocating sleeves are used, these being cast iron constructions with the usual annular grooves for lubrication and two sets of ports at the upper end of each sleeve, the ports on the one side for the exhaust and the opposite for the intake. These sleeves have a total reciprocation of 1 inch and are driven by short connecting-rods from an eccentric shaft. Morse non-adjustable chains drive this shaft and the magneto and pump shaft, the arrangement being triangular with a third short chain from the magneto shaft to the Gray & Davis generator. This may be seen in the illustration in the center of page 639.

Constant Lubrication

For the first time Stearns has eliminated the system of motor lubrication in which movable troughs are used, one under each connecting-rod. Instead is a non-splash system with varying pressure to all of the crankshaft, crankpin, wristpin, and eccentric shaft bearings, and a mist to the sleeves. The oil pressure is interconnected with the throttle, so that at normal speeds of 15 miles per hour the oil pressure is 20 pounds, yet when the throttle is open, there is an increase in pressure until 60 pounds is reached, at which point there is a safety valve which prevents a higher pressure. The prime object of this lies in the fact that a constant film of oil is desired in all of the bearings all the time.

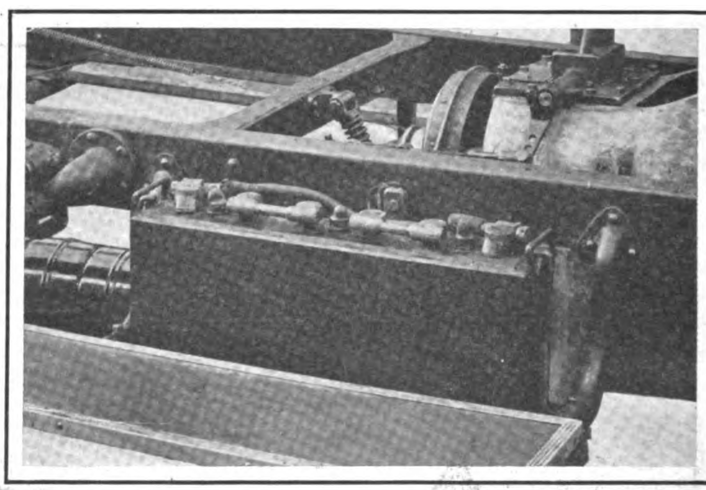
The oil system is conspicuous in that the parts are largely external: The gear pump is located externally at the front where it is driven direct from the eccentric shaft. It draws its oil through an external pipe from the crankcase base, and delivers it through another external pipe to a large cylindrical filter chamber on the left front of the motor. From this filter it flows through a 7-8-inch pipe incorporated in the crankcase and having branches to the three bearings of the crankshaft as well as to the forward end of the eccentric shaft and also to the water-pump shaft. The crankshaft is drilled so that oil is forced direct to the crankpins and lower ends of the connecting-rods, and thence through the hollow connecting-rods into the hollow wrist pin. The wristpin has brass end plates to prevent an excess flowing out against the sleeves and thus causing smoking.

Still another feature to prevent smoking due to too much oil rising through the connecting-rods and escaping through the wristpins, is that a small hole is drilled near the lower end of each connecting-rod.

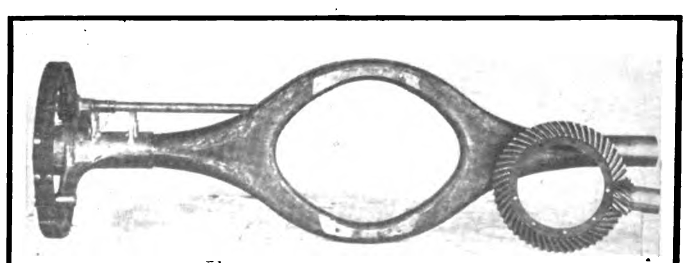
Three elements enter into the electrical system: First, the Bosch, single high-tension magneto gives an ignition system with one set of plugs and wiring reduced to the minimum. Starting and lighting are cared for by a Gray & Davis starting motor and a Gray & Davis generator. The starting motor, located under the right rear motor arm where its engaging pinion meshes with spiral teeth on the flywheel, is geared 30 to 1 to the crankshaft and is capable of spinning a cold motor 84 revolutions per minute.

The generator for the lighting system is mounted at the right front where it is driven by silent chain from the pump and magneto shaft. It has a ratio of 3 to 1 of the crankshaft and starts charging the battery at 12 miles per hour. The complete system is a 6-volt one with an 80 ampere-hour Willard battery in which the three cells are placed in line thereby giving a battery case that can be suspended on the right between the frame and the running board.

The clutch, incorporated in the flywheel, is a leather-faced one with springs operating under the facing. The reverse position of the cone, which moves backwards to engage in-



Neat disposition of the batteries on the Stearns-Knight new four. The three cells are placed in line, thereby permitting their suspension on the right between the frame and running board



Axle stamping used in new Stearns four for lightness and strength. The bevel gear and drive pinion are shown at the right stead of forward, has been done solely to simplify the disengaging connection.

Three forward speeds and one reverse are afforded in the gearset, which is compactly housed in the extension of the casting forming the crankcase. There are end plates for carrying the bearings. Double-roll, annular ball bearings are used for the main shaft and Hyatt's for the countershaft, reverse shaft, and where the forward end of the main shaft is supported within the pinion, from the shaft connecting with the clutch.

Power is conveyed from the gearbox through a propeller shaft having but a single universal joint which is at its forward end. Instead of conventional bevel gears in the rear axle, the spiral bevel is used, this giving a quieter drive.

The rear axle is a new design with Stearns in that the stationary portion is a diamond-shaped steel stamping of 7-32-inch stock, and having an opening into which the differential housing is secured. In external appearance the axle is not unlike the present steering axle, but is lighter, due to the stamping. The shafts can be withdrawn without dismantling the axle.

Brake Behind Gearbox

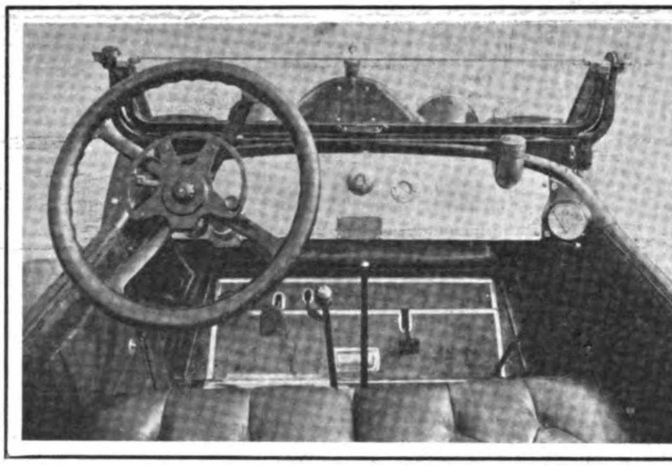
An innovation in the brake arrangements is placing the service brake on a drum immediately in the rear of the gearbox. This drum, measuring 10 1-2 by 2 inches, is so located as to be practically over the large rear bearing of the main shaft of the gearbox on which it is carried. The contracting bands faced with fiber are brought together by a wedged-shaped piece which is drawn forward by a horizontal rod passing through a tube in the gearbox and at its forward end couples direct with the pedal, giving a very direct pull. On this rod, at the rear of the wedge piece, is an adjusting nut, and to the rear attaches a spring which pulls it backward when the pedal is released. There is also a vertical spring which tends to separate the ends of the brake bands. The end of each brake band carries a small roller which bears on the inner face of each arm of the wedge.

Emergency Brakes on Rear Wheels

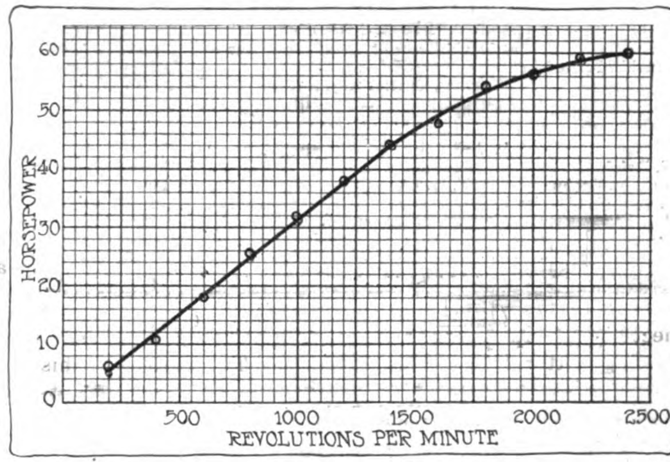
The emergency brakes are expanding malleable iron shoes which bear on pressed steel drums attached to the rear wheels. These drums are 7-32-inch stock and measures 15 by 1 1-2 inches.

The cantilever spring is new and the springs are shackled at their forward ends, have a pivoted bearing support on the frame at the center, and at the rear fit to a bolt beneath the axle. The leaves are 2 1-2 inches wide and the spring measures 50 inches in length. The pivoted central support is not exactly in the center but positioned 23 inches from the front end and 27 from the rear. The drive of the rear axle to the car is through the long leaf of the spring rather than through radius rods. A pressed steel torque member parallels the propeller shaft and has the usual front end support.

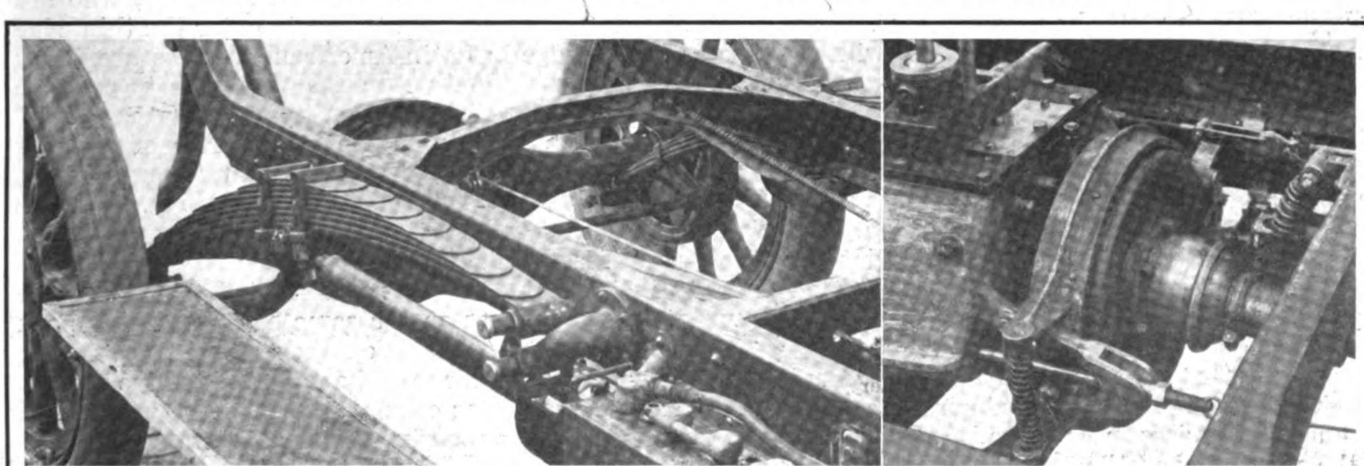
The steering system has been developed to meet the requirements of a car selling at medium price. The steering gear is manufactured by Stearns as are the other parts of the system. On the wheel are the spark and throttle levers above the wheel and a center control button which, when pressed, pounds the electric horn, and, when turned, controls the lights. An ignition cut-out is provided above the wheel. Within the steering column, instead of there being the usual concentric tubes, one to carry the spark control, another the throttle control, etc., there is a series of four rods. One of these rods carries the spark control, another the throttle, and a third the switch and horn.



Dash and control features of new Stearns four touring car



Horsepower curve of new four-cylinder Stearns-Knight motor



Left—Rear construction of new Stearns showing cantilever springs. Right—Gearbox brake which is a feature of the new car

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Too Many Tire Sizes

ENGLAND is having more trouble in the present war with too many different diameters and sections of solid rubber tires for trucks than with the mechanical defects of these trucks. There are not fewer than 120 different tire sizes at present in use on the British trucks doing service in the war zone. Carrying an adequate supply of spare tires is in itself a herculean task, but there is still the other task of the manufacturer, in that he has not on hand for ready distribution enough of the different sizes to meet the requirements.

Necessity always has been and still will continue to be, the mother of invention, and war has always been a great stimulator of ideas, and a force to bring about in relatively short time movements that it frequently requires years to accomplish. The British car maker as well as the British tire maker has been slow in the work of standardization, both have lagged behind the work America has done in this regard. The present war has demonstrated how imperative it is to have standardized parts, not only in cars but in equipment.

Last summer the Society of Automobile Engineers took hold of the problem of reducing the number of pneumatic tire sizes in America. The original draft of the plan of operation contained about eight different sizes and about six different diameters for over-size tires, making a total of fourteen or fifteen. The makers have agreed that better results could be had with fifteen different tire sizes than with the forty-seven different sizes that they manufacture at present. Cutting from forty-seven to fifteen sizes would mean economy to the tire maker, but it would mean greater economy to the tire users, by way of possibly cheaper tires, greater stock of all sizes in the different depots and perhaps a better adjustment of the tire to the load or weight of car, than is now had.

But our S. A. E. can go further, and, cutting a leaf from the book of experience in the present war, start vigorously on the work of cutting down the number of sizes of solid tires. The lesson that Great Britain is experiencing is one that should be quickly seized upon, the sooner the better. Fewer sizes of solid tires will mean much to the truck owner, who may find difficulty in getting a ready supply of tires in all parts of the country.

The Latin-American Sale

SANE business is one of the greatest requirements of today, when makers have found the doors of Europe closed to their passenger car business and it becomes necessary to develop fields in Latin America or other lands not directly affected by the present hostilities.

This is no period to stampede business in new fields. It is impossible. Rather this is a most opportune moment to begin the missionary work in the twenty or more Latin-American countries. These countries offer excellent fields for business but you need something more than a Spanish catalogue and a moving picture film of your factory to secure that business.

It is hard to do business with a man when his banker has failed him. Just at this moment South America's bankers have gone back on it, because those bankers are European countries at present at war. With conditions in South America such that a three-months' moratorium was the first necessity on declaration of war, how can the American maker expect to pursue his old policy of getting money for his automobile as soon as it is loaded on the ship in New York harbor; and yet some makers, who are at the present moment trying to enter the thin edge of the wedge in Latin-American business are today boasting that South America will have to come to their terms and buy cars on this pre-pay basis.

It is foolish to play the ostrich rôle of sticking your head in the sand and imagining you are safe, because you cannot see the other party. This is almost a parallel of what some of our American countries are doing.

Instead of this we must meet Latin American countries at least on the same basis that European countries met them when they started developing their business. We must be prepared to give credits, and not short ones either, but some that will extend as long as nine months, perhaps twelve. Credit accommodations are needed today in every one of the twenty Latin-American countries. We have to aid in financing these lands before they can buy our merchandise.

Some automobile manufacturers have already announced that business cannot be done this way; that the automobile industry is different from all other industries; that although credit accommodations have been necessary in other mercantile lines yet such are impossible in the automobile industry. Perhaps with several companies it may be impossible at the present, but the situation remains, that we will have to meet Latin Americans more or less on their own methods of doing business.

Credits of sixty and ninety days have not been injurious to European trade in the past. The draft at this period covering the value of the goods, which the buyer in a Latin-American country must accept and endorse and which his banker holds until collection is due, has proved satisfactory in the past. Failure to meet such a draft is equivalent to action in bankruptcy. Europe has found this system satisfactory and America will, it is almost a certainty, have to meet the requirement of South American business in the same way.

The maker who wishes to entrench himself in South America should start now. He must start in a sane business-like manner, not with any whirlwind campaign, with cut prices and large press advertisements, but rather with a good stock of cars, with a better stock of parts, and with a force of mechanics who know the car, know how to drive it and how to take care of it. The salesman must establish confidence as the first requisite of business.

New York S. A. E. Discusses Tire Abuse

NEW YORK CITY, Sept. 24—Two interesting papers were presented at the S. A. E. meeting held at the Automobile Club of America tonight. This was the first Fall meeting of the Metropolitan Section. One of the subjects presented had to do with the causes and effects of tire abuse, illustrated with many lantern slides. It was presented by Mr. L. Greenwald, of the Firestone Tire & Rubber Co., Akron, O. The other paper dealt with tire fabrics and was given by H. Van R. Scheel, of the Brighton Mills.

In Mr. Greenwald's paper many points that affect tire economy were brought out. One slide showed the effect of applying the brakes too suddenly, causing the wheels to slide. The tread was roughened and torn so that its life was materially lessened. The same effect might be brought about by a clutch that did not engage smoothly or by careless use of the clutch in starting the car.

Several illustrations of worn and loosened treads caused by wheel irregularities were given. Wheels out of round, or out of alignment, loose demountable rims, bent axles or spindles, bent steering arms, etc., were mentioned as causes of the quick deterioration of the casings. The canting of the wheels was mentioned and it was stated that practice varied greatly in this particular. The maximum amount was 1 1-8 inches and the minimum 1-4. That is to say that the distance between the top and the bottom of the front wheels was this much greater at the top than at the bottom. With more than 1 1-8 inches the tendency was to tear the tread loose in a short time.

Another slide showed the tread of a racing tire that had been worn away in a short time due to the high speed alone. Such a tire can be made almost as good as new by retreading, because the fabric is still in good condition. The wearing away of a racing casing is due to both the tearing action that the tread is subjected to and also the heat which in many cases softens the rubber so that it loses its strength and melts away, so to speak.

Temperature in Touring 150 Degrees

The temperature in ordinary touring is not over 150 degrees Fahrenheit and sometimes not more than 130, while in racing it is not believed that the temperature goes above 200, unless the tires are underinflated. It is difficult to obtain relable data on this phase of the subject, because it is almost impossible to determine the temperature with accuracy.

Damage due to running in car tracks takes the form of cuts in the sides of the tread and there is a likelihood that the fabric is broken also. A small amount of driving in car tracks will not hurt the tires appreciably, but the continued practice of this will result in the trouble described. After the tread becomes cut, moisture and dirt enter and in time loosen the tread from the fabric. Meanwhile, any broken places in the tread are becoming worse, so that a premature blowout due either to rotted fabric or a weakened tread results.

Underinflation not only produces cracks in the sidewalls of the casing but it also has a tendency to loosen up the top of the tread by wave effects set up in it. Furthermore the beads of the tire are weakened by the extra strain.

Fifteen to 18 pounds per inch of tire section in the front and 15 to 20 pounds in the rear is the correct amount.

Reliners are advisable only when used in old shoes, and then only when properly manufactured and of good material.

Many examples of careless application of tires and tubes were given. One slide showed the effect of putting the flap of the tire next to the tread with the result that the tube was chafed and punctured. Another showed where a straight sided tire had been put on a clincher rim without filler rings, the result being that the walls of the shoe were broken. A similar example was one in which a clincher tire was placed on a wheel with reversible rings, but the mistake was made of only reversing one ring. The result was that the side walls gave out.

Too much lubricant was shown to be just as serious as too little. A lump of soapstone will cause chafing and heating and a puncture may result. On the other hand, too little lubricant causes the tube to stick to the casing and permanent stretching of the tube results. This effect is due to the fact that when the tube sticks to the casing the continual working of the latter takes the elasticity out of the former and it takes a permanent set. The set of the tube is due to the heat developed.

Graphite Good but Dirty

Flake graphite is undoubtedly the best lubricant, but it is objectionable because it is so dirty. For this reason mica or soapstone are generally used. The lubricant should be rubbed well into both shoe and tube.

Pinched tubes are caused by a portion of the tube becoming caught under the shoe or else the tube becomes doubled back on itself with the result that it chafes and blows out.

When it is found that the tires wear on the side walls due to ruts, they should be rebuilt before the fabric is injured, and if it happens that the wall on only one side is worn away additional life may be obtained by reversing the shoe.

Driving a tire flat causes chafing of the walls, strains the bead, and bends the tube double and cuts it. The amount of the injury depends in a large measure, however, on the care with which the driving is done.

Oil on garage floors softens the rubber and loosens the fabric.

Overloading is much the same as underinflation, it causes the breaking down of the side walls.

Loosening of the tread is generally due to the neglect of cuts. After a cut appears, moisture and sand enter and rot and wear away the fabric and the rubber until part or all of it is loosened. The remedy is simply to repair the cuts as they appear.

Following this the paper on tire fabrics was presented. Mr. Scheel of the Brighton Mills stated that Sea Island cotton was superior to all other materials for tires because it has greater flexing qualities, stands heat better and is believed to be somewhat self-lubricating, due to the slight amount of oil secreted in the fibres. He showed how the present fabrics were evolved and brought to their present state of excellence. In the beginning the fabrics were light and cut parallel to the threads, but experience showed that heavier material was required. It was also found that when the fabric is cut on the bias so that the threads make an angle of 45 degrees with the rim greater strength and wearing qualities were secured for the reason that the stresses are distributed more evenly over all the threads.

U. S. Appoints Seven Commercial Attaches

These Will Go To Foreign Countries To Open Markets for American Manufacturers

WASHINGTON, D. C., Sept. 26—Motor car manufacturers who are making a play for foreign trade will be interested to learn that the Department of Commerce has recently appointed seven commercial attachés, who will be sent to European, South American and Asiatic cities to carry out plans of the bureau of foreign and domestic commerce for aiding American manufacturers to broaden their foreign markets.

The appointments are: C. W. A. Veditz, Philadelphia, to Paris; Prof. Lincoln Hutchison, University of California, to Rio de Janeiro; Irvin W. Thompson, North Carolina, to Berlin; Dr. Albert Hale, Indiana, to Buenos Aires; A. H. Baldwin, former chief bureau of foreign and domestic commerce, Washington, to London; A. I. Harrington, Ohio, to Lima, Peru; Julian H. Arnold, consul general at Hongkong, to act for China.

No time for the departure of the new appointees to their posts has been made, owing to the troubled situation abroad. The early departure of the South American attachés is planned, but the opening of the offices in London, Paris and Berlin will be delayed for a time.

S. A. E. Annual Meeting at Show Time

NEW YORK CITY, Sept. 30—The 1915 annual meeting of the Society of Automobile Engineers will be held in this city early in January during the time of the automobile show.

The divisions of the Standards Committee are now resuming active work. The next convention of the Standards Committee will be held during November, the sessions of the meeting probably extending over 3 days, upon which reports of divisions will be submitted and considered.

The Ball and Roller Bearings Division still has under consideration the matter of recommending a list of stock of sizes of roller bearings, eliminating many of the sizes now listed by manufacturers.

The Carbureter Fittings Division is making a close study with a view to determining whether it is feasible or advisable to recommend standards in addition to the present S. A. E. standard carbureter flange dimensions, to cover the application of side-outlet carbureters. The problem in question is radically different from anything the Carbureter Fittings Division has so far attempted in the way of standardization.

In response to the very few complaints that have been received, the makers of wood wheels for trucks have been asked to present their views on the thickness of S. A. E. felloe bands, and will probably attend the meeting at which the subject will be taken up by the Commercial Car Wheels Division.

The Iron and Steel Division has under consideration, modification and extension of steel castings specifications.

A report from the Lock Washers Division is expected on the question of whether the smaller sizes of the S. A. E. standard light series are too light.

The Miscellaneous Division will endeavor to establish a standard of speedometer drive-shaft ends at an early date. It has also been furnished by the authorities of practically all of the States of the Union with data as to the elements of license pads that govern the size and location of attaching devices.

It is expected the Clincher Automobile Tire Manufacturers' Association will at an early date act upon the matter of establishing a new rim size for the 36 by 5-inch tire.

W. A. Frederick, as chairman; W. R. Strickland and W. F. Herst were appointed a sub-committee to consider bell housings standardization. It is the view of the Standards Exchange Division, after investigation that five sizes of bell housings can probably be concentrated upon.

A sub-committee to take up with the Automobile Engine Manufacturers' Association the matter of arriving at accepted practice as to motor supports was appointed as follows: A. F. Knoblock, chairman; C. B. Rose and W. A. Frederick. The above-mentioned sub-committees are charged with consideration of fly-wheel diameters, tailshaft details, etc., and all other matters connected with the interchangeability of units where engines and transmissions are involved.

The Seamless Tubes Division has been discontinued, Chairman H. W. Alden having recommended that this be done.

The schedule of meetings of the Metropolitan Section is based on the work of its Research Committees, six of which have been appointed to investigate various subjects. The proposed program is as follows:

October 29—Report of Research Committee on Electric Transmissions, David Beecroft, chairman.

November 24—Report of Research Committee on Engine Characteristics, Robert McA. Lloyd, chairman.

Supplementary subject: Eight-cylinder Motors.

(Date advanced to Tuesday on account of holiday.)

December 29—Report of Research Committee on Engine Governors, A. J. Slade, chairman.

Supplementary subject: Magneto versus Dynamo Ignition.

January 28—Report of Research Committee on Greases, H. M. Martin, chairman.

Supplementary subject: Asphalt vs. Paraffin-Base Lubricants.

February 25—Report of Research Committee on Kerosene Carbureters, A. B. Browne, chairman.

Report of Research Committee on Non-Electric Continuous-Torque Transmissions, L. M. Dieterich, chairman.

Lozier Reorganization Is Probable

DETROIT, MICH., Sept. 30—*Special Telegram*—While the inventory started by the Detroit Trust Co., temporary receiver for the Lozier Motor Co., is not completed, conditions to date are satisfactory and will more than likely lead to reorganization shortly. At a directors' meeting, President Joseph M. Gilbert was authorized and directed to file an answer in the U. S. Court stating that the company was not insolvent 4 months prior to the filing of the petition by certain claimants who had claimed insolvency 6 months prior to filing of their petition.

DETROIT, MICH., Sept. 25—Judge Tuttle of the United States District Court, has named the Detroit Trust Co. temporary receiver for the property of the Lozier Motor Co., and officials of the trust company are now busy both in Detroit and in Plattsburg, N. Y., making an inventory of the company's property.

In the court Judge Tuttle suggested to all interested that an effort be made for a reorganization of this old and so well known automobile company, and it appears from what attorneys and creditors say that the effort at re-establishing the Lozier Co. upon a sound basis may succeed.

What South America Needs Most

WASHINGTON, D. C., Sept. 29—"**What is needed at this hour in Latin America is not so much a supply of the manufactured products of the United States, although required in considerable quantities, but money, loans and advances, credits on purchases, and markets at reasonable rates for raw products which usually go to Europe.**"

This sums up the South American situation as interpreted by the Pan-American Union which recently obtained cable reports from thirty-four different cities in South America and Central America on business conditions in twenty of these Latin-American countries.

Champion and Jeffery-Dewitt Consolidate

TOLEDO, O., Sept. 25—The Champion Spark Plug Co., the largest manufacturer of spark plugs in the world, and the Jeffery-Dewitt Co., Detroit, one of the oldest spark plug manufacturing companies in the country, have consolidated and the business of the companies will be conducted from Toledo, from where the J-D and Reliance spark plugs, which have been made by the Detroit concern, will hereafter be marketed in addition to the Champion plugs.

The Jeffery-Dewitt Co. will be devoted from now on exclusively to the manufacture of porcelain and porcelain products.

Recently the Champion plant has been greatly enlarged through the addition of 40,000 square feet of floor space and the spark plug machinery and equipment of the Jeffery-Dewitt company will all be moved to this city. At present the Champion company has a daily output of 25,000 spark plugs, but this will be increased, probably by 5,000 to 10,000.

The Jeffery-Dewitt company, which has a capacity of more than 35,000,000 pieces of porcelain per year, is said to make better porcelain than the imported.

The Jeffery company was organized in 1907, having started in business in Newark, N. J., and employed at that time twenty-five to thirty men. At present its force is about 400 men.

NEW YORK CITY, Sept. 29—A. B. Cordner, W. A. Allen and David Wills have formed the Motor Devices Co., to handle automobile accessories. They have incorporated for $30,000.

Ford Adds Coupelet—Sedan—Chassis, $410

Better Finish and Novelties in Design in New Body Models—Gills Make Hoods More Attractive

DETROIT, MICH., Sept. 29—This year the Ford company is going after the closed car business more strenuously than ever by offering a coupelet and sedan on the regular model T chassis. These are the best finished bodies the Ford company has ever put out and the prices are $750 for the coupelet and $975 for the sedan. The other closed car model, the town car, is continued at $690.

The appearance of these new Fords is very attractive and besides the new bodies, the hoods have been provided with gills which add a distinctive touch. This gill feature is not applied to the regular open models, which remain the same as they have been, for the time being at least.

The coupelet is of the regular convertible type which has become so popular. The top may be folded back to make substantially an open runabout of the car, while when the top is raised and the door windows in place, it is a completely closed-in affair similar to a coupé. The top is of genuine leather and the lines of the body such that it should make a strong appeal. The seat is broad and wide and has deep upholstery, while doors are roomy with the glass in a sliding sash and slipping down into the panel, protected by waterproof flapper. Triple hinges are fitted to the doors to assure alignment.

The windshield is of special design, being double ventilating, the top section swinging outward or inward, while the bottom section swings only outward. When closed both sections are rigid. The entrance to the rear of the body is by hinged tailboard, lifting from the bottom, providing room for a suitcase, inflated tire or other articles. The cowl connects the hood to the dash in graceful line.

The sedan makes a nice town car, and provides seating for five. The rear seat has room for three, while there are two individual seats in front. The right hand front seat is on a pivot and folds back out of the way when not in use. Upholstery is of cloth.

There are two wide doors which open to the front, have triple hinges as in the coupelet, while an attractive windshield is also fitted. This has three sections, two at the top and one at the bottom, the driver getting plenty of air in bad weather while still protected. As in the coupelet also, the cowl slopes to the hood. Curtains of roll type are fitted to the windows, and the glass in the doors may be dropped by means of straps. The glass has no sash or woodwork around it.

Deliveries on the coupelet will commence about October 1 and on the sedan about November 15.

The Ford company has also announced that it will henceforth furnish chassis without body for $410. These may be used either by fitting delivery or other commercial bodies or special bodies. Heretofore when a customer wished only a chassis, the dealer has been obliged to purchase either a runabout or a touring car and remove the stock body. This he has then been obliged to carry in stock until he found a call for it. The new arrangement should therefore be of special advantage to the dealer as well as to the buyer who wants to fit a special passenger body or use the car for commercial work.

Many Makers Buy Bales of Cotton

NEW YORK CITY, Sept. 30—A movement has been set on foot, with the object of benefiting the cotton industry of the South, for all who can do so to buy a bale of cotton and hold it till the South recovers somewhat from the war depression. A number of our largest automobile manufacturers have taken part in this movement, buying large quantities of cotton themselves and instructing their agents to buy as well.

It is doubtful whether this movement will really be of benefit to the cotton industry, according to prominent bankers and cotton men of New York City, who define it as poor business and poor economics, and ask why we should not start similar movements to benefit the other industries of the country which are suffering depression due to the European war. These men also state that there is danger that people buying cotton at the present price will lose money on it.

Among the prominent automobile, accessory and supply manufacturers who are taking part in the movement are: Goodyear Tire & Rubber Co., Akron, O., Hudson Motor Car Co., Hupp Motor Car Co., Saxon Motor Car Co., Studebaker Corp., Detroit, Mich., Willys-Overland Co., Toledo, O., Partin Mfg. Co., Chicago, and Valentine & Co., New York City.

Motor Print Absorbs Motor Life

NEW YORK CITY, Sept. 28—The Motor Print Co., Philadelphia, Pa., publisher of *Motor Print*, the well-known monthly motorists' paper, has purchased *Motor Life*, another popular monthly motoring paper published by J. A. Wittmann, New York. *Motor Life* will be merged into *Motor Print* under the name of *Motor Print*. *Motor Life* subscribers will, beginning with the November issue, receive *Motor Print* which will incorporate some of the departments of *Motor Life*.

The great similarity in the nature of the two magazines makes it possible to merge these two strong motor monthlies. The clientèle of both is found with the motor car user and the consumer in general. Their circulation is national, and broadly distributed from ocean to ocean.

The Philadelphia publication office of *Motor Print* at 418-420 Sansom street, will continue to be the publication office of *Motor Print* after *Motor Life* has been merged with it.

COLUMBUS, O., Sept. 25—According to the announcement of the Ohio Agricultural Commission, automobile displays will play an important part in the first mid-Winter fair to be held at the Fair Grounds, Columbus, January 9 to 15.

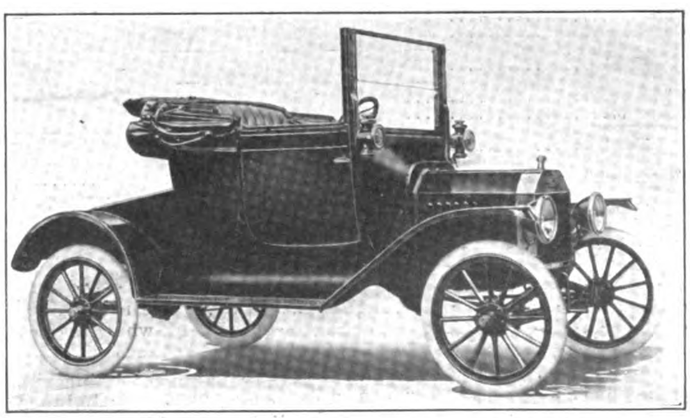
Denby Co. Announces New 1-Ton Truck

DETROIT, MICH., Sept. 24—In addition to its ¾-ton truck recently announced by the Denby Motor Truck Co., this company will also place on the market a 1-ton truck, identical in construction to the smaller one, the only difference being heavier springs and larger tires. The price will be $1,600, or $100 more than the 1,500-pound truck.

DETROIT, MICH., Sept. 29—C. T. Chenovert and Beckwith Havens, export and assistant export managers of the Denby Motor Truck Co., start today on a 2-years' demonstration trip around the world in a 1,500-pound Denby truck specially fitted for outdoor camping. From here the route leads to Vancouver via Chicago, Davenport, Omaha, Kansas City, Denver, Salt Lake City, Stockton, Los Angeles and the coast. From Vancouver the truck will be shipped to Honolulu, thence to New Zealand, Australia, Dutch East India, Asia, Japan. All of these countries will be given extensive demonstrations. Before starting for Europe all the South American countries will be visited.

New Sale for Wisconsin Engine Co.

MILWAUKEE, WIS., Sept. 28—On petition of the Bosch Magneto Co. and the Titusville Forge Co., Judge F. A. Geiger of the Federal Court at Milwaukee has ordered the sale of the property of the bankrupt Wisconsin Engine Co., Corliss, Wis., to be set aside and a new proceeding of sale held. Judge Geiger declares the former proceeding intolerable and says E. O. Nye, referee in bankruptcy, is guilty of gross irregularities. The plant brought $120,000 at the former sale and the referee's fee was $1,200. The petition of Bosch and Titusville stated that the sale was held without due notification of all creditors, including themselves.



New Ford Couplet selling for $750. Note louvres in hood

British Exports $17,204,-475 in 8 Months of 1914

LONDON, ENG., Sept. 15—During the first 8 months of 1914 ending August 31, the total value of the British automobiles, chassis, parts, motorcycles and parts thereof exported to foreign countries was $17,204,475, while the total value of the imported cars, motorcycles, parts and accessories totaled $27,474,700 or $10,270,225 more than what the British manufacturers exported.

As a comparison with the United States export and import business the total for the first 8 months of this year are not available, but those for 7 months show that during that period the American motor car and parts manufacturers exported such goods to the value of $20,729,440 and imported only $781,460. Judging from the way exports have been increasing it is fair to estimate that during the eighth month of this year the value of the exports totaled fully $2,500,000 which would bring the total export trade of the American makers during 1914 up to August 31, to $23,229,440 or $6,-000,000 more than the British manufacturers' business.

British Export Business for 1913 and 1914

1914	August Number	August Value	Eight Months Number	Eight Months Value
Cars	437	$657,885	4,123	$6,548,420
Chassis	80	163,860	845	1,885,980
Total	517	$821,745	4,968	$8,434,400
Tires	...	$110,380	.....	$1,820,330
Parts	...	192,955	.....	2,693,610
Total	...	$1,125,080	.....	$12,958,340
Motor cycles, tires, accessories	1,324	....	14,231	....
Total	...	$1,510,685	.....	$17,204,475

1913	August Number	August Value	Eight Months Number	Eight Months Value
Cars	610	$947,250	4,760	$7,367,925
Chassis	97	166,020	837	1,600,975
Total	707	$1,113,270	5,597	$8,968,900
Tires	...	$226,155	.....	$2,468,820
Parts	...	277,500	.....	2,628,355
Total	...	$1,616,925	.....	$14,066,075
Motor cycles, tires, accessories	1,130	....	11,428	....
Total	...	$1,955,495	.....	$17,323,195

British Import Business for 1913 and 1914

1914	August Number	August Value	Eight Months Number	Eight Months Value
Cars	122	$147,650	6,385	$7,466,160
Chassis	97	96,990	5,861	6,935,750
Total	219	$244,640	12,246	$14,401,910
Tires	...	$140,005	.....	$7,646,880
Parts	...	122,305	.....	4,662,255
Total	..	$506,940	.....	$26,711,045
Motor cycles, tires, parts.	97	....	2,179	....
Total	...	$555,335	.....	$27,474,700

1913	August Number	August Value	Eight Months Number	Eight Months Value
Cars	504	$659,505	4,706	$6,033,120
Chassis	679	785,505	5,539	6,537,950
Total	1,183	$1,445,010	10,245	$12,571,070
Tires	...	$1,183,935	.....	$9,153,435
Parts	...	408,870	.....	3,849,325
Total	...	$3,037,815	.....	$25,573,830
Motorcycles, tires, parts..	80	....	1,323	....
Total	...	$3,134,235	.....	$26,498,480

Overland Net Earnings, $5,864,858

NEW YORK CITY, Sept. 29—The Willys-Overland Co., Toledo, O., has issued its report for the year ended June 30, last. The income account follows: Net earnings, $5,864,858; reserve for contingencies, $300,000; interest on floating debt, etc., $333,583; total deductions, $633,584; balance net income, $5,231,274; preferred dividend, 7 per cent., $350,000; balance for common, $4,881,274; common dividends, 11 per cent., $2,200,000; balance, $2,681,274; provision for retirement for preferred stock, $250,000; surplus, $2,431,274; previous surplus, $3,070,959; total surplus, $5,502,233.

The balance sheet, as of June 30 last, follows:

Assets—Property investment, $22,291,784; investments in and advances to affiliated companies, $2,156,029; materials and supplies, $7,116,433; balance due from European distributing agent, $656,199; accounts receivable, less reserve, $2,929,660; notes receivable, $1,301,771; miscellaneous investment, $53,525; cash, $2,112,-760; deferred charges, $119,679; total assets, $38,737,840.

Liabilities—Preferred stock, $5,000,000; common stock, $20,000,-000; capital stock, sub-companies, $12,825; real estate mortgages assumed, $131,500; bills payable, $3,900,856; accounts payable, $1,-727,202; payroll and salaries accrued, $174,570; customers' deposits, $287,111; taxes and interest accrued, $102,260; reserve for quantity and other rebates to customers, $682,005; reserve for car repairs under guarantee, $30,000; preferred stock dividends due, $87,500; reserve fund, $1,099,778; profit and loss surplus, $5,202,-233; total liabilities, $38,737,840.

The balance available for the common stock is equal to 24.40 per cent. on the $20,000,000 outstanding.

S. G. V. in Reorganization Receivership

READING, PA., Sept. 28—With a view to reorganizing, certain officials of the S. G. V. Co., Reading, Pa., a Pennsylvania corporation, applied for a receivership last week. R. E. Graham, president of the S. G. V. Co., and vice-president of the S. G. V. Co. of Delaware, a holding company, was named. A creditors' meeting will be held today, after which, it is anticipated, that the factory, which has been temporarily shut down, will resume operations and work will be begun on the plan of reorganization. The receivership proceedings are intended to dispose of the holding company, which has a liability charge against the held company. Assets are said to be about double the liabilities.

Chandler Declares Extra 10 Per Cent. Dividend

CLEVELAND, O., Sept. 28—*Special Telegram*—A special dividend of 10 per cent. on the common stock of the Chandler Motor Car Co., the second dividend paid on the common stock within 90 days, was declared at the regular meeting of the board of directors today. In addition to the common stock dividend the regular quarterly preferred stock dividend of 1.75 per cent. was declared. After the payment of these dividends the company still had a surplus equal to the amount of its original cash capital.

Although the company has been manufacturing cars for less than 2 years the report of the treasurer of September 1 indicated a remarkably successful business. The sales manager's report showed a let up in business early in August at the beginning of the foreign war, but since that time sales have shown a healthy increase and the factory is now running on full production, with reports from all sections of prospects for a large Fall business. Even the South, which 30 days ago was affected by the cotton situation, is showing increased orders and the business from the grain-producing sections and the Pacific Coast is breaking all records.

Automobile Committee for N. Y. Tercentenary

NEW YORK CITY, Sept. 26—It has been decided by the Automobile Committee in charge of the Commercial Tercentenary automobile pageant on the night of Wednesday, October 28, to hold a contest for King and Queen of the pageant. This is to be decided by vote and is to be done in an unique way. The plan adopted for the coming contest is to allow each registered owner of an automobile in New York State one vote for King and Queen. Governor Glynn's acceptance of the Committee's invitation to ride at the head of the automobile pageant and review it from the Court of Honor, was welcomed by the Committee and other high officials will be invited to ride with the Governor.

The Automobile Committee has been made up and is composed of a number of sub-committees, totaling more than fifty members altogether. Elmer Thompson is chairman; George H. Duck, vice-chairman; M. L. Downs, secretary, and William C. Poertner, chief marshall. The chairmen of the sub-committees form the Executive Committee and include the following: Automobile Manufacturers Committee, Alfred Reeves; New York Automobile Dealers and Garages, M. J. Budlong; Brooklyn Automobile Dealers and Garages, Herbert L. Carpenter; Automobile Dealers and Clubs, A. G. Batchelder; Tires and Accessories, William M. Sweet; Importers, Emanuel Lascaris; City, State and Inter-State Departments, Commissioner William J. Lee; Transportation, Light and Power, R. W. Meade; Hotels and Amusements, H. M. Swetland; Clubs, Societies and Lodges, G. Murray Hulbert; Motorcycles, F. M. Baker; Automobile Daily Press, John C. Wetmore; Automobile Trade Press, Julian C. Chase.

N. Y. Dealers Fight Separator Repeal Veto

NEW YORK CITY, Sept. 28—The dealers and garagemen of New York City are preparing for the final move in their fight against the gasoline separator ordinance. They will attempt to have it repealed over the veto of Mayor John Purroy Mitchel.

The Board of Aldermen by a vote of 57 to 1 repealed the law which compels the installation of separators in garages, but the Mayor vetoed the repeal, explaining his act in a lengthly message.

The garage interests will appear this week before the general welfare committee of the Board of Aldermen and will offer evidence in refutation of the statements made in the message. Following this hearing the committee will report its recommendations to the Aldermen and the board will vote again on the measure. A three-quarters vote is necessary to pass the repeal over the Mayor's veto, but the garagemen have hopes of success. The vote will be taken October 6.

The main contention of the garagemen, that the separators do not operate at all successfully, was not touched upon in the Mayor's message, and this will be brought out with renewed emphasis in the present proceedings. Following the veto, the garage interests of the city held a consultation after which President R. H. Johnston of the Automobile Dealers' Association issued a statement which summarizes the testimony which will be given before this week's committee hearing. It follows:

The old officers of the New York Garage Association were retained at the annual meeting of the association held Thursday, September 24, at the Hofbrau Haus, New York City, and the gasolene separator question and the prospective raising of storage prices were discussed.

The garagemen have entered anew into the trade's fight against the separator, and will continue in an effort to have the repeal of the obnoxious ordinance passed over the veto of Mayor John Purroy Mitchell.

The proposed storage change consists in raising storage $5 a month and putting gasolene on a 5-cent profit basis. Heretofore storage has shown little or no profit, the profit of the garage business being derived from gasolene. But filling stations with their low prices have made a profitable storage almost imperative, and Thursday, October 1, it is planned that rates on the West Side, at least, be increased.

Rates are in two grades—A and B. A rates apply to the more modern buildings and will be $30 and $35; B rates will be $35 and $40.

The officers are: President, Louis J. Joscelyn, Joscelyn Garage; vice-president, William Burrows, Niagara Garage; secretary, Charles H. Potter, Uptown Garage; treasurer, William M. Haradon, Royal Garage. Directors: Bronx—W. L. Byrnes, Byrnes Garage; C. A. Otten, Bronx Garage. Washington Heights—H. L. Hulse, Hulse Garage; S. W. Childs, (new) Childs Garage. Upper West Side—William M. Haradon, Royal Garage; J. Bierman, Manchester Garage. Lower West Side—Ben Blumenthal, (new) West End Auto Palace; Morris Segall, Apthorp Garage; James S. McIntosh, McIntosh Garage. East Side—William Burrows, Niagara Garage; Joseph Stafford, Duford Garage. Downtown—Louis J. Joscelyn, Joscelyn Garage; Frank S. Hannah (new), 49th Street Garage. Harlem—Charles H. Potter, Uptown Garage; Charles Strathman, Strathman Automobile Co.

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SAN FRANCISCO, Sept. 25—The latest figures given out by the California motor vehicle department are 114,657 licenses issued to automobiles up to September 20.

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DETROIT, MICH., Sept. 25—The Bower Roller Bearing Co., this city, has declared its semi-annual dividend of 5 per cent.

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BATAVIA, N. Y., Sept. 25—The Batavia Rubber Co. has declared a quarterly dividend of 1 1-2 per cent. on the preferred stock and a quarterly dividend of 1 per cent. on the common stock and an extra dividend of three-fourths of 1 per cent. on the common, payable October 1.

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Standard Oil Case Before Grand Jury

JERSEY CITY, Sept. 25—Assistant Prosecutor G. T. Vickers of Hudson County today declared that the complaint against the Standard Oil Co. by the Crew-Levick Oil Co., which was dismissed by Judge Mark A. Sullivan on September 21, would be submitted to the grand jury.

In a statement today he said: "The complaint against the Standard Oil Co. for having violated one of the so-called 'Seven Sisters' acts will be submitted to the present grand jury at the earliest possible date, giving that body the benefit of all the testimony available to the state."

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Government May Buy Trucks Next Spring

WASHINGTON, D. C., Sept. 26—It is likely the government will be in the market early next year for a big fleet of motor trucks. Postmaster-General Burleson is conferring with a special committee of postmasters and post office department officials looking to the substitution of government-owned motor trucks for screen mail wagons.

Contracts for screen wagon delivery in thirty leading cities expire next June and will not be renewed if the department decides that motor trucks are more economical and efficient.

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N. Y. City Wins Taxicab Stand Fight

NEW YORK CITY, Sept. 29—The fight of the large taxicab operating corporations and the more pretentious hotels against the establishment of taxicab stands in front of the hotels by the New York City authorities has ended in favor of the city. Ornamental signs this week are being placed in front of all hotels and at all points where the city desires cabs stands. Each sign states the number of motor and horse cabs that may occupy the stand.

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Ohio Tail Lights to Be Green?

CLEVELAND, O., Sept. 28—At a meeting of the legislative committee of the Ohio State Automobile Assn. held in this city it was decided to introduce bills at the next session of the legislature for the following purposes: Requiring all vehicles to carry lights at night, requiring tail lights to be green instead of red, reducing the dealers' license to $10, and requiring the elimination of headlight glare on country roads as well as on city streets.

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BOSTON, MASS., Sept. 29—Gray and Davis, Inc., have declared their regular quarterly dividend of 1 3-4 per cent. on the preferred stock, payable October 1, 1914, to all stockholders of record at the close of business September 22. President William Gray reports that the factory is operating day and night.

Market Reports for the Week

This week's markets showed a downward tendency in prices. A weaker tone prevailed this week in most of the quotations. Most of the metal markets showed a decline. None of the prices showed a gain. In the rubber market further importations from Brazil are reported. The market retained a very steady tone. Only one change occurred in the oils and lubricants markets, and that was a decline of $0.02 for linseed oil. The rest of the markets were generally steady. The shipments of some of these products have been successful. The Norwegian bark Grande, has been engaged to take 6,000 barrels of refined petroleum, from New York to Copenhagen.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.09	.09	.09	.09	.09	.09	......
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	......
Bessemer Steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	......
Copper, Elec., lb.	.11⅞	.11⅞	.11⅞	.11¾	.11	.11⅘	—.00¾₀
Copper, Lake, lb.	.12⅛	.12⅛	.12⅛	.12⅛	.12	.12	—.00⅛
Cottonseed Oil, bbl.	5.65	5.65	5.65	5.65	5.63	5.50	—.15
Cyanide Potash, lb.	.32	.32	.32	.32	.32	.32	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.93	.93	.93	.93	.93	.93	......
Lead, 100 lbs.	3.85	3.75	3.75	3.75	3.75	3.75	—.10
Linseed Oil	.58	.58	.56	.56	.56	.56	—.02
Open-Hearth Steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	.65	.65	.65	.65	.65	.65	......
Silk, raw, Ital.	..	4.60	..	..	4.60	..	......
Silk, raw, Japan	..	3.72½	..	..	3.72½	..	......
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	31.50	31.12½	31.00	30.875	30.875	30.75	—.75
Tire Scrap	.05	.05	.05	.05	.05	.05	......

116 Franklin Sixes Average 11 M. P. H. on Low Gear

Dealers All Over Country Drive Under All Conditions for 8 Hours and 54 Minutes

SYRACUSE, N. Y., Sept. 26—One hundred and sixteen six-cylinder Franklin cars, driven by dealers in as many different cities, ran all day long on low gear Thursday, September 24. These 116 cars covered about 100 miles each in the average time of 8 hours 54 minutes, which is at the average speed of approximately 11 miles an hour. The average consumption of gasoline was 12.01 gallons and of oil about 1.17 gallons. James Sweeten, Philadelphia dealer, completed the 100 miles in 6:55, which averages 14.4 miles per hour and is the fastest time made.

Of the 116 cars to start, but one failed to finish. The Pittsburgh, Pa., dealer was forced to stop after covering 95 miles because of magneto trouble.

The tests were made under widely differing conditions. The highest temperature encountered was in Redlands, Cal., and in Concord, N. H., where the thermometer registered 92 degrees Fahrenheit. The lowest temperature was in Fort Dodge, Ia., where the mercury stood at 52 degrees.

In holding this national demonstration, which follows the national fuel economy demonstration which was run off May 1, and in which 94 Franklin cars averaged 32.8 miles to the gallon of fuel, the Franklin Automobile Co., Syracuse, N. Y., had in mind not so much a plan to make plain that the Franklin system of direct cooling by air will cool, for that fact already is well established.

That there might be no doubt of the authenticity of the test, it was officially observed and the records sworn to before a notary public at the conclusion of the run. Each car carried, in addition to the driver, two observers who in a great many cases were high civic officials and in others were newspaper men.

The routes which were chosen for the test included some of the hardest which could be found in the territories of the various dealers, and the runs were made regardless of weather and road conditions. Thus, for instance, the Bar Harbor, Me., dealer was obliged to make four detours through rough pasture land; The Wilkes-Barre, Pa., dealer finished at the top of the famous Giant's Despair Mountain; the Denver, Col., dealer climbed to the top of Berthoud Pass and finished on Lookout Mountain at an elevation of 11,500 feet; the Greensburg, Pa., dealer drove continually in rain; the Carthage, N. Y., dealer also drove in pouring rain and by way of adding a feature finished with a little girl standing barefoot on top of the engine bonnet; the Pittsfield, Mass., dealer finished at the top of the Jacob's Ladder; the Los Angeles, Cal., dealer negotiated what is considered to be the hardest climb in the State and finished at the top of Wilson's Peak at an altitude of 5,800 feet.

The cars that were used for the test were stock demonstrators, and in making the 100-mile run on low gear their engines turned over the equivalent of 336 miles on high gear.

Kansas City Dealers Hold 6-Day Tour

KANSAS CITY, MO., Sept. 25—Fourteen motor cars—all stock models of the 1915 lines—proved their worth in the second annual trade winning tour of the Kansas City Motor Car Dealers in a 6-day run through Kansas last week. The cars left Kansas City in the mud of a 5-inch rain that had fallen in a cloud-burst the night before.

One day of the trip was given over to the Kansas state fair at Hutchinson, at which the cars were parked and demonstarted. The cars that made the trip were the Chevrolet, Paige, Mitchell, Case, Paterson, Jackson, Allen, Krit, Pathfinder, Oldsmobile, Briscoe, Buick, Chandler, Car Nation and Saxon. The route took in Ottawa, Emporia, Newton, Hutchinson, McPherson, Salina, Manhattan, Topeka and Lawrence. Stops were made at each place and the cars demonstrated to local prospects and dealers.

Denver Show and Races Make Big Hit

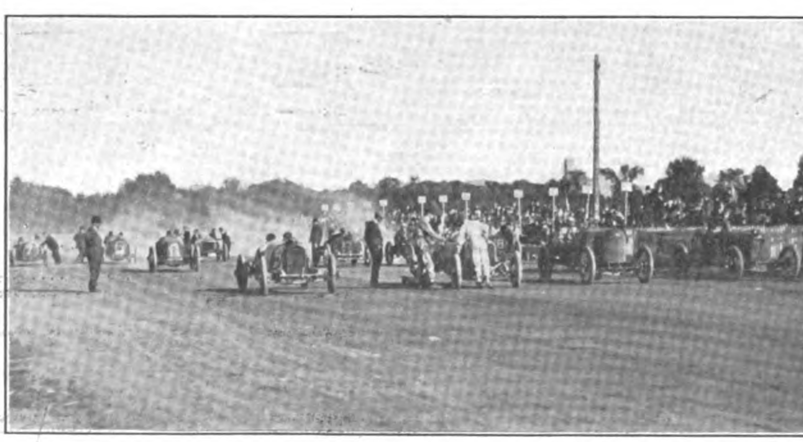
DENVER, COLO., Sept. 26—Thirty-one cars were exhibited in Denver's first fall automobile show yesterday and today, and the event was so well attended that some of the dealers are already urging that it be made an annual affair. The show and 2-day race meet combined were attended by nearly 10,000 people.

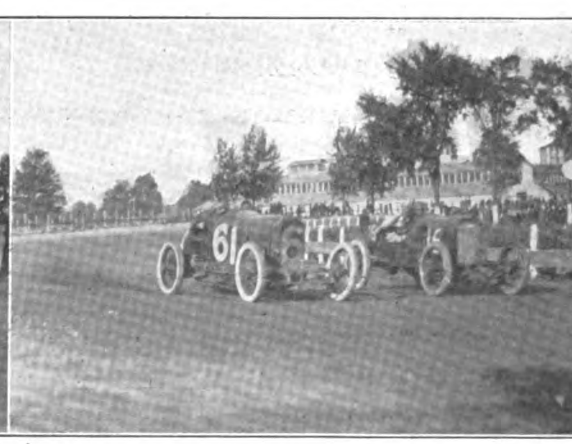
The makes shown were the Empire, Hudson, Pathfinder,

Name of City	Miles Traveled	Gallons Gasoline Used	Gallons of Oil Used	Temp.	Weather and Road Conditions
Abilene, Texas	100	12.3	.6	60°	Fair
Akron, Ohio	104	7	.4	64°	Mud
Albany, N. Y.	100	12	.9	62°	Clear
Amboy, Ill.	100	14	.8	65°	Clear
Atlanta, Ga.	102	10.5	.7	64°	Heavy
Auburn, N. Y.	100	14	.8	58°	Muddy
Baltimore, Md.	100	12	1.8	82°	Bad
Bar Harbor, Me.	112	14	.5	80°	Rough
Billings, Mont.	100.7	10	1.3	80°	Fair
Binghamton, N. Y.	100.5	9	.8		Muddy
Boston, Mass.	100	16.2	1.6	87°	Clear
Bridgeport, Conn.	100	8	1.2	84°	Clear
Buffalo, N. Y.	104	14.5	2	58°	Rain
Calgary, Alberta	100	10	.3	80°	Clear
Canton, Ohio	100	11.2	.7	65°	Fair
Carbondale, Pa.	100	12.5	1.2	62°	Rough
Carthage, Mo.	100.7	11.1	1.5	75°	Clear
Carthage, N. Y.	100	11	1.6	68°	Heavy
Cherokee, Ia.	100	11.2	.9	56°	Fair
Chicago, Ill.	100	12	1	56°	Clear
Cincinnati, Ohio	100	12	1.2	67°	Fair
Cleveland, Ohio	100	11.5	.9	65°	Clear
Colorado Spgs., Col.	109.5	12.5	.9	65°	Hilly
Columbia, S. C.	100	11	1.3	80°	Showers
Columbus, Ohio	100	11.5	.8	54°	Rain
Concord, N. H.	100	12		92°	Clear
Cortland, N. Y.	100	13.7	1.3	57°	Mud
Cumberland, Md.	101	10	1.3	67°	Rain
Dallas, Texas	100	14	1.2		Clear
Dayton, Ohio	100	12	.7	64°	Fair
Denver, Col.	118	14.5	1	63°	Clear
Detroit, Mich.	106	12	2.5	55°	Rain
Duluth, Minn.	100	16.5	1	44°	Bad
Eau Claire, Wis.	100	15	1.3	62°	Windy
Elizabeth, N. J.	100.1	11.5	1.5	86°	Hot
Erie, Pa.	100	15	1.2	80°	Muddy
Fall River, Mass.	100.5	12.5	.9	65°	Hot
Forsyth, Mont.	100	19.5	1	75°	Fair
Fort Dodge, Ia.	100	9.2	.8	52°	Clear
Fort Plain, N. Y.	100.4	12	2	58°	Fair
Galesburg, Ill. Car 1	100	10.5	1.3	70°	Clear
Galesburg, Ill. Car 2	100	12.5	1.3	70°	Clear
Geneva, N. Y.	101	10.2	1.2	58°	Rain
Georgetown, Texas	100	15.7	1.2	73°	Fair
Grand Forks, N. D.	100	10	1	54°	Clear
Great Falls, Mont.	100.1	10	1.1	76°	Clear
Greensburg, Pa.	100	11.5	2	65°	Bad
Greenville, S. C.	100.8	13.5	1.9	76°	Showers
Hampton, Va.	100	8	2.5	82°	Fair
Hartford, Conn.	100	11	1.2	80°	Clear
Hoosic, N. Y.	100	11.9		60°	Clear
Houston, Texas	100	18	1.5	75°	Muddy
Ishpeming, Mich.	101.5	10.5	1	56°	Heavy
Kankakee, Ill.	100	11	.6	74°	Fair
Kansas City, Mo.	100	10.6	2	71°	Fair
Kingston, N. Y.	101.5	17	1.6	70°	Cloudy
La Crosse, Wis.	102.5	12.5	.7	66°	Fair
Laramie, Wyo.	100	9.8	.7	78°	Clear
Lexington, Ky.	105	8.2	.7	78°	Hilly
Lincoln, Neb.	104	21		70°	Fair
Los Angeles, Cal.	108.5	11	1.5	62°	Clear
London, Ont.	100	8.4	1	68°	Muddy
Louisville, Ky.	100	10	1	67°	Clear
Milwaukee, Wis.	100	10	.9	54°	Dry
Minneapolis, Minn.	100	13	.6	58°	Sand, hilly
Moline, Ill.	100	11	2	67°	Clear
Montreal, P. Q.	100	9	1	59°	Muddy
Nashville, Tenn.	100	13	1.2	67°	Fair
Newark, N. J.	100	11	.9	81°	Clear
New Bedford, Mass.	100	16	1.2	75°	Dry
Newburg, N. Y.	100	10	.9	74°	Clear
New Haven, Conn.	100	11.2	1.2	80°	Sand, hilly
New York City	100	10.6	.8	81°	Dry
Norwich, N. Y.	100	11.5	3	58°	Bad
Oil City, Pa.	100	12	.9	58°	Mud
Oklahoma City, Okl.	114.7	11	.4	74°	Clear
Pawnee Neb.	100	10.5	1	72°	Clear
Pendleton, Ore.	100.6	14	.5	56°	Clear
Peoria, Ill.	100	11	1.2	75°	Clear
Philadelphia, Pa.	100	12	1	82°	Roads bad
Phoenix, Ariz.	100	11	1	78°	Clear
Pittsfield, Mass.	100.5	9	1.3	69°	Cloudy
Pittsburgh, Pa.	95*				Rains
Portland, Me.	100	12	1	80°	Hilly
Portland, Ore.	101.3	11	1.2	74°	Fair
Providence, R. I.	100	10.2	1.3	80°	Clear
Putnam, Conn.	100	14		86°	Fair
Redlands, Cal.	100	10		92°	Fair
Rochester, N. Y.	100	9	1.2	80°	Rain
Rockford, Ill.	100	11.5	1.1	65°	Hills
St. Louis, Mo.	130.7	14.7	1.1	72°	Hills
St. Paul, Minn.	100	15	1.5	48°	Fair
San Angelo, Tex.	100	11.7	.8	62°	Fair
San Antonio, Tex.	102.7	12.9	1.2	86°	Fair
San Diego, Cal.	100.3	16.5	1.6	76°	Fair
San Francisco, Cal.	113.5	12.5	1.6	70°	Bad
Saranac Lake, N. Y.	100	20.2	1.2	80°	Rain, hilly
Scranton, Pa.	100	14.7	1.4	61°	Rough
Seattle, Wash.	103	11	1.2	56°	Fair
Sharon, Pa.	100	11	1.2	60°	Muddy
Shreveport, La.	100	16	2.1	66°	Clear
Sioux City, Ia.	100	8	1.0	85°	Fair
Sioux Falls, S. D.	100	11	1.2	75°	Fair
Springfield, Ill.	100	12	1.0	85°	Fair
Springfield, Mass.	106	12.7	.5	86°	Fair
Springfield, Mo.	100	11.8	.9	70°	Clear
Syracuse, N. Y.	104	10	2.0	58°	Rain
Utica, N. Y.	105.2	11	1.0	58°	Bad
Walla Walla, Wash.	101.7	12	1.2	56°	Rain
Walton, N. Y.	100	11.5	1.3	57°	Fair
Washington, Ia.	100	12.5	1.2	72°	Wet
Waterloo, Ia.	100	12.2	1.4	69°	Clear
Wilkesbarre, Pa.	100	12	1.2	71°	Showers
Worcester, Mass.	100	14	1.1	86°	Clear
Yankton, S. D.	100	10.2	.8	70°	Clear
York, Pa.	100	12	1.2	71°	Rough
Youngstown, Ohio	100	7.2	1.2	80°	Muddy

*Accident to magneto prevented finish.

Results of Franklin low gear test





Left—Cars lined up before the start in Kalamazoo, Mich., 100-mile race. Right—Burman and Newhouse fighting it out on a turn

Studebaker, Regal, Briscoe, Winton, Jeffery, Buick, Abbott-Detroit, Chalmers, Detroiter, Crescent, Chevrolet, Maxwell, Overland, Moon, Hupmobile, Ford, Franklin, Reo, Oldsmobile, and the Fritchle, Baker and Rauch-Lang Electrics.

There were hundreds of visitors from outside of Denver and many prospective sales developed. The dealers are highly pleased with the outlook for the 1915 business and believe the show and race meet will prove a substantial trade stimulant.

The results of the races were as follows:

Five-mile, Gaston Morris, Buick, first; time, 5:21; Bob Murray, Buick, second, 5:30; E. W. Swanbrough, Mercer, third, 5:38 1-2. Fifteen-mile, Harold Brinker, White, first, 15:15 1-5; Bob Murray, Buick, second, 16:04 4-5; Gaston Morris, Buick, third, 16:05. Twenty-five-mile, Harold Brinker, White, first, 26:39 1-5; Bob Murray, Buick, second, 27:04 3-5; Steve Elmore, Stutz, third, 27:07 1-5. Morris made an exhibition mile in 1:01 flat in an effort to meet Barney Oldfield's record of 54 1-5 for the Overland course.

Other entrants in the motor car events were A. C. Wagner in an Amplex, G. M. Edwards in a Palmer-Singer, Ben Knott in an Empire, H. M. Condit in a Hupmobile and H. N. Isenberg in an Abbott.

A fifteen-mile event started yesterday was stopped after the tenth lap on account of an accident killing one of the drivers, E. W. Swanbrough. He went into a bad curve with his Mercer so close to three bunched cars just ahead that he was blinded by the terribly heavy dust and crushed when his car swerved from the track and tore through a fence. He died on the way to the hospital.

Burman and Peugeot Star at Kalamazoo Century

KALAMAZOO, MICH., Sept. 26—Burman, driving his French Peugeot, gained new laurels in the century dash staged by the Kalamazoo people today. He took down the first prize of $1,000 in gold coin and established new world's records for 75 and 100 miles.

It cannot be said that Burman's victory was easily gained, for it was not. Eddie O'Donnell, in one of the Duesenbergs, kept up the fight and trailed the Peugeot closely. Ralph DePalma, after leading for thirty-six laps, had been forced to quit on account of trouble with his eyes. O'Donnell led Burman for fifty-nine laps, at the end of which the Duesenberg driver was forced to stop to change a flat tire. Then Bob went to the front and never was headed, although O'Donnell, after a quick tire change, made up considerable lost ground and at the finish was considerably less than a lap back of the leader.

Burman's time for the century was 1:34:29 2-5, which shot a big hole in the mark of 1:40:02 established by Ralph DePalma at Brighton Beach last Labor Day. O'Donnell also got inside DePalma's mark when he finished the race in 1:35:32 3-5. Newhouse in the Delage driven to victory by Thomas in the last 500 mile race at Indianapolis, landed third money in 1:50:45 3-5 while Jack Callaghan in the Keeton finished fourth in 1:51:14.

In addition to the above named money winners, the race was contested in by Billy Carlson in a Maxwell, Wilbur D'Alene in the Marmon, Erwin Bergdoll in the Benz, Tom Alley in a Duesenberg, Will Tidemarsh in the Great Western, Grover Bergdoll in the Erwin and "Cap" Kennedy in the Cornelian, a Kalamazoo product not much larger than a cyclecar. Still running at the finish were D'Alene, Carlson, Alley, Grover Bergdoll and Kennedy. Erwin Bergdoll went out of the contest with a broken intake valve, Tidmarsh's car was eliminated by motor troubles and DePalma was forced out when dust laden with the calcium chloride with which the surface of the track was treated got into his eyes. DePalma's accident was unusual and unfortunate and through it the contest was robbed of a leading factor.

DePalma's Hard Luck

The field was bunched the first time around and at the signal DePalma and O'Donnell shot into the lead on even terms. DePalma opened up a slight gap on O'Donnell the next time around and from that point until his accident he held the advantage, the Duesenberg driver back of him in spite of efforts on the part of O'Donnell to grab the lead. DePalma turned the twenty in 18:45, the twenty-five in 23:22, the thirty in 28:06 and the thirty-five in 32:46. On the thirty-sixth lap it was seen that something was wrong with DePalma for he slowed up on the backstretch and rolled slowly around to his pit. He climbed out, tore his goggles from his eyes, covered them with his hands and rushed for a can of water in the pit. Wearing a pair of defective goggles, the dust had worked inside and filled his eyes with calcium chloride which burned the optics. Several doctors came to DePalma and removed the irritant, but in the meantime O'Donnell and the rest had gained seven laps and Ralph's case was hopeless.

Burman, as far as appearances went, might have been running his car along steel rails laid on the track, for he never varied 3 inches from a certain path, except when he would swing to the side to pass another car. He never slowed up and the rhythm of his motors was never broken for an instant. He had no tire trouble either and following the finish of the race and after skidding around four hundred turns his Nassau tires showed no wear whatever.

The summary:

CAR	DRIVER	TIME	M.P.H.
Peugeot	Burman	1:34:29 2-5	63.6
Deusenberg	O'Donnell	1:35:32 3-5	62.9
Delage	Newhouse	1:50:45 3-5	54.2
Keeton	Callaghan	1:51:14	54
Marmon	D'Alene	Still running	
Erwin Special	G. Bergdoll	Still running	
Deusenberg	Alley	Still running	
Maxwell	Carlson	Still running	
Cornelian	Kennedy	Still running	
Great Western	Tidmarsh	Out 47th lap	
Benz	E. Bergdoll	Out 24th lap	
Mercedes	DePalma	Out 36th lap	

Comparing the Six With the Eight

(*Continued from page* 618)

sideration, the eight-cylinder curves would not have been so straight.

Further, considering the increasing cost of fuel, it would seem a doubtful step to lower the thermal efficiency by increasing cylinder numbers and cutting up the volume of gas into still smaller units, and by so doing increase the areas exposed to heat in proportion to cylinder volume.

Again, the decrease in cylinder bore means still smaller valves with higher frictional resistance to the inflow of gas and consequent lower volumetric efficiency.

Time to Solve Problem

When we consider the various features of vibration, thermal and volumetric efficiency, manufacturing costs and multiplicity of parts, the eight-cylinder motor either V type or all-in-line would appear from this theoretical investigation to have considerable of a task to justify itself.

If practical tests should, however, prove the eight to have an appreciable advantage over the six, there is no doubt but that American manufacturers will show no hesitation about building this type should there seem to be any considerable demand from the automobile buying public.

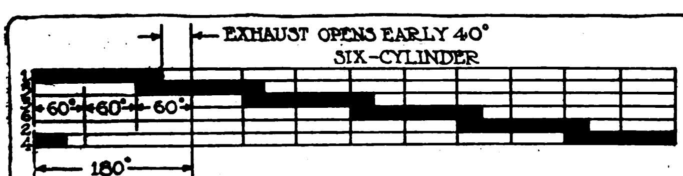


Fig. 16—Chart of overlapping power impulses which is approximately correct for a six

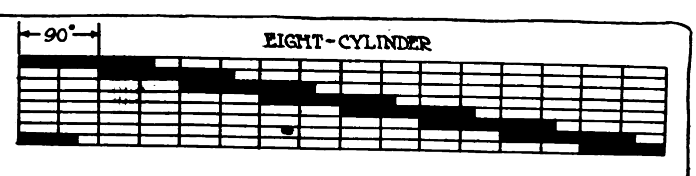


Fig. 17—Chart of overlapping power impulses for an eight drawn in the same way as Fig. 18

10,000 Chevrolets for 1915—The Chevrolet Motor Co., Flint, Mich., is planning to build at least 10,000 Chevrolet cars for the 1915 season in its Flint plants. The New York factory will take care of all of the New England States and the export business, and is expected to manufacture at least 3,000 cars. The working force will be greatly increased in both plants and within a short time the Flint plant will be turning out 50 cars a day.

Detroit Springs on Denby—The Denby Motor Truck Co., Detroit, Mich., will use springs manufactured by the Detroit Steel Products Co., Detroit.

Safety First Plant at Plainville—It is reported that the Safety First Motor Car Co. will locate its plant in Plainville, Mich., and will employ about twenty-five men to start with.

Fisher Body Adds—A two-story addition, 30 by 157 feet and to cost $10,000 will be started on the plant of the Fisher Body Co., Harper avenue and Hastings street, Detroit, Mich.

English Classes for Foreigners—The Ford Motor Co., Detroit, Mich., in co-operation with the Y. M. C. A., is establishing English classes for its foreign employees desiring to learn and to perfect themselves in that language.

Endurance Tire's New Factory—The Endurance Tire & Rubber Co. is having plans prepared for a factory to be 80 by 250 feet, one story, and of brick construction, to be erected at New Brunswick, N. J., at an estimated cost of $50,000.

Marathon Rubber Plant in St. Catharines—The ratepayers of St. Catharines, Ont., passed a by-law to grant a 5-acre site and fixed assessment of $10,000 for 10 years to the Marathon Rubber Co., Akron, O. In return the company agrees to erect buildings and a plant to cost at least $50,000 and to employ a minimum of 100 hands at the start.

Tire Plant for Buena Vista—A corporation to be known as the Williams I. X. L. Tire & Rubber Co., Buena Vista, Penn., capitalized at $300,000, has purchased a site and plans to build a plant there for the manufacture of automobile tires and commercial rubber articles.

Alpena Bids Too Low—Bids totaling only $4,500 were recorded at the sale of the property, tools, stock and outstanding accounts of the bankrupt Alpena Motor Car Co., although their total value is set at $30,000. The bids were not accepted and another sale probably will be ordered.

Elbert Co. Locates Plant—The Elbert Motor Car Co., a recent incorporation in Seattle, Wash., has located its plant at 2012 Fifteenth avenue, West, that city. In addition to manufacturing a cyclecar this company will also build a light delivery car with a carrying capacity of 500 pounds.

Auto-Rebuilding Co. Increases Output—The Auto-Rebuilding Co., Victoria, B. C., manufacturer of automobile bodies, wheels, springs, engines, etc., has been taken over by a syndicate in that city with increased powers and larger working capital. The output of the plant will be increased.

Ahlberg Bearing Co. Opens Plant—The Ahlberg Bearing Co., Chicago, Ill., has opened an office and factory in Los Angeles, Cal. This company specializes in regrinding annular ball bearings. Karl E. Ahlberg, president of the company, has taken charge of the company's interests in Los Angeles and is personally superintending the installation of the machinery.

Occupies Reliance Truck Co.—Recently the American Malleables Co., Lancaster, N. Y., secured the plant formerly occupied in Owosso, Mich., by the Reliance Motor Truck Co., and is now manufacturing all kinds of malleable iron castings, specializing in automobile work. The company contemplates operating another plant in Flint, Mich., within the next year.

Standard Welding's Third Addition—The Standard Welding Co., Cleveland, O., is building its third large addition of the year to its plant. The newest structure is of structural iron, with corrugated asbestos, metal reinforced roofing and siding. The dimensions are 60 by 240 by 30 feet high. The new building is to be devoted entirely to the storage of rims and will accommodate approximately 100,000 rims.

Chevrolet Dealers Visit Factory—About sixty Indiana dealers for the Chevrolet accompanied William J. Small, state distributor, on a visit to the factory at Flint, Mich., last week. Before going to the factory, 2 days were spent in Detroit, followed by 2 days at the factory, where there were a number of special entertainment features. The dealers drove home new cars, thus opening the 1915 season for the Chevrolet in Indiana.

Jeffrey's Cold Weather Tests in Summer—The Thomas B. Jeffery Co. has installed in the works at Kenosha, Wis., a refrigerating plant for the purpose of making cold weather tests on Jeffery carbureters, batteries and motors. In 1 hour after starting the refrigerating machinery it is possible to get a temperature of from 8 to 10 degrees below zero. The room in which this outfit is installed will accommodate one of the largest Jeffrey models and leaves plenty of room for men to work on the car. This device has been installed by the Jeffrey company so that summer experiments can be conducted under winter conditions.

The Automobile Calendar

Oct. 3-10........Cincinnati, O., Show.
Oct. 3...........Fresno, Cal., Track Meet, Fresno Co., Agricultural Assn.
Oct. 4...........St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 5-12.........St. Louis, Mo., Show, Forest Park Highlands.
Oct. 7-8-9-10.....Detroit, Mich., First Truck Convention of Motor Truck Manufacturers', Dealers' and Owners' Organization; promoter, Motor Truck Club of America.
Oct. 7-17........New York City Electric Vehicle Show, Grand Central Palace.
Oct. 10..........Medford, Mass., Track for Light Cars, Combination Park.
Oct. 10-17........Boston, Mass., New England Light Car and Cyclecar Show, Horticultural Hall.
Oct. 17..........Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-23........Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-24........Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1....Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21....Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26........Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28..........New York City, Commercial Tercentenary Celebration.
Oct. 28-31........Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.............El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 8-9.........El. Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11.........Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 26..........Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4.........New York City, Annual Meeting of the American Society of Mechanical Engineers.
Jan. 2-9.........New York City, Annual Automobile Show, Grand Central Palace
Jan. 3-10........Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16........Philadelphia Automobile Show.
Jan. 23-30.......Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb. 15-20.......Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22..........San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13........Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn. Boston Commercial Motor Veh. Assn.
Mar. 7...........San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 14..........San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

The Week in  the Industry

Motor Men in New Roles

NEW SCRIPPS-BOOTH APPOINTMENTS — R. H. La Porte, formerly with the H. H. Franklin Mfg. Co. as Eastern sales representative, has joined the selling force of the Scripps-Booth Co., Detroit, Mich., and will appoint agents in the Eastern and Southern States. A. D. Caldwell, formerly with the Hupp Motor Car Co., Detroit, as sales representative, has joined the selling organization of the Scripps-Booth Co., and will appoint agents in the Middle, Western and Pacific States.

Menzies Sales Manager—C. M. Menzies has joined the Northwest Auto Co., Portland, Ore., as sales manager for the Cole and Reo.

Sickles Hyatt Roller Bearing Engineer—E. C. Sickles has been engaged as works engineer for the Hyatt Roller Bearing Co., Newark, N. J.

Warren Portland Studebaker Manager—D. C. Warren is the newly appointed sales manager for the Oregon Motor Car Co., Studebaker distributor, at Portland, Ore.

Merz Quits Racing—Charles Merz has quit racing to join the Findeisen & Kropf Mfg. Co., Chicago, Ill. He will represent the firm in the engineering department.

Rhodes Abbott Sales Manager—D. M. Rhodes has been appointed sales manager of the local branch of the Abbott Motor Co., at 467 Woodward avenue, Detroit, Mich.

Lloyd Treasurer—C. W. Lloyd has been made treasurer and appointed retail sales manager of the E. C. Johnson Co., Philadelphia, Pa., distributor for the Reo and Premier cars.

Gilpin Heads Milwaukee Ford—Ford business in Milwaukee, Wis., is now in charge of a direct factory representative, A. W. L. Gilpin, who has headed the Chicago branch for some years.

Mitchell Joins Barger—T. H. Mitchell has bought half the interest of L. E. Barger in the Abbott Motor Sales Co., Toledo, O. Hereafter the business will be conducted as a partnership.

McDonald Chalmers Manager—H. R. McDonald has accepted the management of the Oakland (Cal.) branch for Chalmers cars, operated by the Western Motor Car Co., of San Francisco.

Miller N. Y. Winton Sales Manager—H. J. C. Miller is sales manager of the Winton Motor Car Co., New York City. He has been a member of the Winton sales force in that city since 1906.

Sommer Allen Superintendent—L. A. Sommer, president of the Sommer Motor Co., Bucyrus, O., has been elected general superintendent of the Allen Motor Co., Fostoria, O., maker of the Allen car.

Farrington Resigns from Power Wagon—S. A. Farrington has resigned his position as editor of *Power Wagon*, Chicago, Ill., to accept the position of publicity manager for the Thomas B. Jeffrey Co., Kenosha, Wis. He is succeeded by S. A. Phillips, formerly technical editor of *Power Wagon*.

Sowers Now Manager—J. L. Judd, who managed the Jackson branch in Boston for some years, resigned recently, and A. H. Sowers, for a long time sales manager of the firm, was appointed to fill the vacancy.

Gray J-M Manager—H. W. Gray, who has been in the automobile business in St. Louis for the past 6 years, has been appointed manager of the accessories department of the H. W. Johns-Manville Co. there.

Fred Merz in Repair Business—The Guarantee Auto Repair Co. has begun business in Indianapolis and will make a specialty of rebuilding and overhauling motor cars. The company is owned by Fred P. Merz.

Buckley Ford Retail Manager—H. M. Buckley, who started with the Ford Motor Co. in Detroit in 1909 as a machinist, has been appointed manager of the retail sales department of the Ford Chicago branch.

Gibson Takes on Further Work—B. S. Gibson, Jr., formerly assistant manager of the A. G. Spaulding Bros. agency for Stevens-Duryea cars in New York City, is now in charge of the Brooklyn and Long Island business.

Allen Promoter — C. Louis Allen, formerly automobile sales manager of the Pyrene Mfg. Co., New York City, maker of the Pyrene hand fire extinguisher, has been promoted to the position of general sales manager.

Jossman Joins Chevrolet—H. R. Jossman, who was formerly traveling representative in the State of Michigan for the Oakland Motor Car Co., Pontiac, Mich., has a similar position with the Chevrolet Motor Co., Flint, Mich.

Fuller Gets Nomination—Alvan T. Fuller, who handles the Packard in Eastern Massachusetts, was nominated for representative to the Bay State legislature on the Progressive ticket last week in Malden, Mass., where he lives.

Weise Joins Winton—John S. Weise, for several years manager of the United States Tire & Rubber Co.'s branch at Los Angeles, Cal., has been appointed sales manager of the Los Angeles factory branch of the Winton Motor Car Co.

Homan Resigns from Overland—C. C. Homan has resigned as purchasing agent of the Willys-Overland Co., Toledo, O. H. V. Hawk has been appointed general purchasing agent of that company, the Gramm Motor Truck Co. and the Garford Co.

Shutt Back in Boston—W. H. Shutt, formerly manager of the H. J. Koehler Co., Boston, Mass., who went to New York some months ago, has been sent back to assume charge in his old position to push the sale of Grant cars in New England.

Johnson Klaxon's Detroit Representative—A permanent office has been opened in room 1317-1319 Dime Bank Bldg., Detroit, Mich., by the Lovell-McConnell Mfg. Co., Newark, N. J. Charles Johnson, special representative from the home office, is in charge.

Trombley Sales Manager—D. M. Trombley has become general sales manager of the De Luxe Automobile Co., St. Louis, Mo. He was formerly with the Pathfinder Motor Car Co., also the Cole Motor Car Co., of Indianapolis, and the Cole Motor Car Co., of Missouri.

Holleyhead Federal District Sales Manager—A. F. Holleyhead has been appointed district sales manager of the Federal Motor Truck Co., with headquarters in Chicago, Ill. Mr. Holleyhead was formerly manager of the Detroit branch of the Gibney Tire Co.

Bond District Sales Manager—W. W. Bond has been appointed district sales manager for the states of Indiana and Kentucky, for the Detroit Electric Sales Co., Indianapolis, Ind., agent for the Detroit electrics. His headquarters will be at Meridian and Walnut streets, Indianapolis.

Kjeldsen with Holdbrook—S. J. Kjeldsen, who has been associated with the foreign car business in this country for some time, has joined the Holbrook Co., New York City, builder of automobile bodies.

Jackson Sole Owner—J. R. Jackson, during the last three years manager of the Stratton-Woodcock Automobile Co., Grand Rapids, Mich., is now sole owner of that concern, having bought out the interest of the other stockholders. A new salesroom is to be opened by him opposite the present agency and the Paige-Detroit will be handled from there.

Westcott Men Promoted—When H. G. Root of Springfield, O., succeeded H. L. Ashley as secretary-treasurer and general manager of the Westcott Motor Car Co., Richmond, Ind., G. F. McCurty, who had held the position of sales manager, became assistant general manager, while H. P. Mammon formerly district sales manager for the Cole Motor Car Co., in the central states, became sales manager of the Westcott company.

Chandler Change in Cal.—A change has taken place in the handling of the Chandler cars in California. The Peacock Motor Sales Co., Los Angeles, Cal., has been appointed distributor for Northern California, Nevada and the Hawaiian Islands, while the Pearson Motor Car Co. will handle the car in San Francisco. George A. Peacock is general sales manager there and Roy B. Alexander is manager in San Francisco. The other officers are: George Pearson, Jr., and E. L. Peacock.

Prominent Detroiters Are Bank Directors—Four of the best known men in the automobile business in Detroit, Mich., are members of the Board of Directors of the Merchants National Bank, which was recently organized here. These men are: Walter O. Briggs, president of the Briggs Mfg. Co.; Hugh Chalmers, president of the Chalmers Motor Co.; Horace E. Dodge, vice-president and general manager of Dodge Bros., and Eugene W. Lewis, secretary-treasurer of the Timken-Detroit Axle Co.

Automobile Agencies Recently Established

PASSENGER CARS

Alabama

Birmingham	Dodge	Saunders Motor Car Co.
Mobile	Haynes	Motor Machine Co.
Oakman	Moon	W. H. Utley

Arkansas

Little Rock	Cole	W. E. Bell Auto Co.

British Columbia

Vancouver	Franklin	Consolidated Motor Co.

California

Los Angeles	Dodge	Harold L. Arnold
Los Angeles	Haynes	Bekin-Speers Motor Co.
Los Banos	Haynes	N. Y. Hulen
Oakland	Premier	A. B. Cosby Motor Co.
Sacramento	Chalmers	Bert S. Bingham
Santa Cruz	Oldsmobile	Hubbs & Brisac
San Diego	Mercer	Pacific Auto Co.
San Diego	Simplex	Pacific Auto Co.
San Diego	Stutz	Pacific Auto Co.
San Francisco	Apperson	Myers Motor Car Co.
San Francisco	Dodge	H. O. Harrison Company
San Francisco	Premier	A. B. Cosby Motor Co.

Canada

Sherbrooke, Que.	Reo	R. A. Webster

Connecticut

Hartford	Empire	Keeney Garage
Hartford	Oakland	Auto Tire Co.
South Norwalk	Cole	Vaast Bros. Garage

District of Columbia

Washington	Briscoe	The Briscoe Sales Co.
Washington	Haynes	The Briscoe Sales Co.
Washington	Hupmobile	Crescent Motor Co.

Florida

Live Oak	Cole	E. F. Dougherty
Sanford	Apperson	C. F. Williams
St. Petersburg	Haynes	Cramer B. Potter

Georgia

Atlanta	Apperson	Southern Apperson Co.
Waynesboro	Apperson	J. O. Applewhite

Idaho

Boise	Franklin	Norman Gratz

Illinois

Altoona	Cole	Eleventh Ave. Garage
Argenta	Apperson	J. A. Eyman
Aurora	Haynes	Auto Accessories Co.
Bethany	Haynes	Hudson & Scott
Champaign	Cole	J. L. Wiese
Chatsworth	Herff-Brooks	T. C. Baldwin
Chenoa	Glide	F. E. Cunningham
Chestnut	Apperson	O. F. Downey
Chicago	Oakland	Schillo Motor Sales Co.
Cissna Park	Glide	Herman Cluver
Danville	Apperson	Barger Sales Co.
Decatur	Cole	W. L. Shellabarger & Sons
Effingham	Cole	Curry Motor Car Co.
Elliott	Herff-Brooks	Nels Sunnes
Gardner	Apperson	Knut Mathison
Gibson City	Apperson	Wm. A. Susdorf
Greenville	Cole	Auto Supply & Sales Co.
Hammond	Haynes	E. B. Leavitt
Hillsboro	Cole	Wiley & Williams Garage
Jerseyville	Apperson	W. F. Shephard
Joliet	Haynes	Joliet Motor Co.
Kilbourne	Haynes	A. E. Sauer
Lee	Apperson	S. Ostewig & Co.
Oregon	Apperson	R. O. Sayner
Owaneco	Glide	I. M. Luzader
Pleasant Plains	Apperson	John Lehman
Princeton	Apperson	Evans-Coppins Co.
Quincy	Apperson	Quincy Garage
Rockford	Studebaker	C. B. Williamson
Springfield	Haynes	J. Earl Bell
Stonington	Apperson	F. A. Gleason
Utica	Glide	W. W. Wylie

Indiana

Evansville	Cole	R. D. King
Indianapolis	Dodge	Steinhart-Eckler Auto Co.
Indianapolis	Krit	Krit-Auman Auto Sales Co.
Salem	Cole	C. M. Crim
Winchester	Haynes	H. K. Wright

Iowa

Bonaparte	Haynes	Blackford & Blackford
Boxolm	Apperson	Ecklund & Burkgren
Brooklyn	Apperson	B. W. Sloan
Clear Lake	Haynes	H. D. Mason
Cresco	Haynes	Woods & Milz
Deep River	Glide	C. M. Shaffer
Des Moines	Apperson	Apperson Iowa Co.
Des Moines	Wahl	Masebach Auto Co.
Dubuque	Dodge	Byrne Bros.
Eagle Grove	Haynes	Middletown Auto Co.
Eagle Grove	Herff-Brooks	Wm. Pletcher
Mason City	Apperson	Leaman Auto Co.
Northwood	Haynes	S. O. Thompson
Waterloo	Cole	Burd Auto & Supply Co.

Kansas

Chanute	Franklin	Chanute Auto Co.
Lawrence	Cole	C. E. Varnum
Liberal	Haynes	Liberal Auto Supply Co.
Salina	Mitchell	Ollinger Auto. Co.
Salina	Overland	Ollinger Auto. Co.

Kentucky

Glasgow	Haynes	G. R. Lewis
Greenville	Apperson	R. O. Pace
Louisville	Haynes	Van Patton Motor Car Co.
Louisville	King	Van Patton Motor Car Co.

Louisiana

New Orleans	Apperson	Bernin Auto Co., Inc.
New Orleans	Jeffery	Abbott Auto. Co. Inc.
New Orleans	R.C.H.	American Automobile Co.

Maryland

Aberdeen	Reo	Motor Sales Co.
Baltimore	Apperson	Model Automobile Co.
Salisbury	Haynes	Peninsular Motor Co.

Massachusetts

Boston	Dodge	Charles S. Henshaw
Boston	Lewis	E. A. Gilmore Co.
Springfield	Oakland	Dunbar Motor Co.
Watertown	Herff-Brooks	C. E. Mathews

Michigan

Bay City	Franklin	Oakland Auto Co.
Belding	Studebaker	Wise & Goodman
Brown City	Ford	H. C. Stimson
Detroit	Haynes	McKinney-Devlin Co.
Flint	Chevrolet	Garner Auto Sales Co.
Grand Rapids	Haynes	Adams & Hart
Grand Rapids	Haynes	Adams & Hart
Jackson	Cadillac	Ralph Lewis
Jackson	Ford	Ralph Lewis
Ludington	Oldsmobile	Donald McVichie
Plainwell	Herff-Brooks	G. H. Crawford
Port Huron	Overland	Mooney Motor Sales Co.
Saginaw	Krit	J. P. Beck
St. Joseph	Glide	E. Hofer
South Haven	Maxwell	C. A. Herriman
Woodbury	Apperson	W. R. Wells

Minnesota

Minneapolis	Apperson	Nicollet Ave. Auto Co.
Minneapolis	Briscoe	Minneapolis Briscoe Motor Sales Co.
Minneapolis	Marmon	Harry J. Mich
Minneapolis	Westcott	D. G. Hedderly & Son
Sottenwood	Haynes	A. O. Hovdesven & Son

Mississippi

Greenville	Cole	H. H. Berry

Missouri

Centertown	Maxwell	Stark & Vogel
Chillicothe	Cole	Adams & Sons Grocery Co.
Kansas City	Apperson	Bruening Bros. Auto. Co.
Kansas City	Maxwell	Acton-Parke Auto Co.
Kansas City	Paige-Detroit	Greenlease Motor Car Co.
Salisbury	Cole	Stamper & Stamper
Springfield	Studebaker	D. B. Asbury
St. Joseph	Cole	Grand Center Motor Car Co.

Montana

Lewiston	Apperson	Fergus County Machine Co.

Nebraska

Omaha	Apperson	Apperson Jack Rabbit Co.
Omaha	Hupmobile	Cadillac Co. of Omaha
Omaha	Paige-Detroit	W. L. Huffman Auto. Co.
Seward	Oldsmobile	J. F. Zimmerer

Nevada

Ely	Franklin	Ely Garage & Supply Co.

New Jersey

Newark	Cole	Wallace Motor Car Co.

New York

Brooklyn	Apperson	Farrell Auto Co.
Buffalo	Briscoe	Monroe Motor Co.
Buffalo	Dodge	J. A. Cramer
Buffalo	Haynes	A. L. Dixon
Buffalo	Herff-Brooks	Henry Brunn
Buffalo	King	Mutual Motor Car Co
Penn Yan	Haynes	Wagener Bros.

North Carolina

Asheboro	Paige	Asheboro Motor Car Co.
Durham	Paige	Snow Motor Car Co.
Franklinton	Paige	Franklinton Garage Co.
Gastonia	Cole	Gastonia Garage Co.
Henderson	Haynes	J. S. Paythress & Son
Hickory	Paige	T. F. Bogle
Mebane	Paige	Mebane Motor Co.
Winston-Salem	Paige	Crawford Mill Supply Co.
Yanceyville	Paige	J. A. Massey

North Dakota

Bismarck	Haynes	K. Shenkenberg
Hillsboro	Haynes	Helgo Bros.
Oakes	Franklin	E. W. Weston

Ohio

Bucyrus	Haynes	Harry O. Paxton
Circleville	Reo	Clifton Bros.
Cleveland	Apperson	Eiseman Auto Co.
Cleveland	Haynes	W. H. Barger Co.
Columbus	Abbott-Detroit	W. W. Muzzy
Columbus	Chevrolet	Daniels Motor Car Co.
Columbus	Cole	Brasher Motor Car Co.
Columbus	Davis	Renner Auto Sales Co.
Columbus	Detroiter	Frank P. Corbett
Columbus	Dodge	Ohio Auto Sales Co.
Columbus	Ford	Renner Auto Sales Co.
Columbus	Haynes	P. H. Rogers Motor Car Co.
Columbus	Hupmobile	The Kaiser Motor Car Co.
Columbus	King	Auto Inn & Exchange
Columbus	Lexington-Howard	F. Mayer
Columbus	Marion	Frank P. Corbett
Columbus	National	O. G. Roberts & Co.
Columbus	Overland	O. G. Roberts & Co.
Columbus	Pilot	F. E. Jolly
Columbus	Velie	Spring Street Garage Co.
Columbus	Vulcan	Miller-Main Garage
Columbus	Waverley	Brasher Motor Car Co.
Columbus	White	Brasher Motor Car Co.
Coshocton	Hupmobile	Geo. J. Bock & Son
Dayton	Apperson	H. H. Barton
Greenville	Buick	Dunham Auto Co.
Greenville	Westcott	John Ludy
Lancaster	Reo	Clyde Chidester
Lima	Dodge	Baxter Bros.
Lima	Oldsmobile	W. E. Rudy
Logan	Studebaker	Studebaker Garage & Sales Co.
McConnelsville	Ford	Morgan County Garage
Newark	Overland	Fred S. Simpson
New Berlin	Apperson	W. E. Schumacher
Thornville	Overland	Thornville Garage
Toledo	Apperson	R & M Motor Car Co.
Toledo	Cadillac	Toledo-Cadillac Co.
Toledo	Chandler	Lichtie Auto Co.
Toledo	Oldsmobile	Bunnell Auto Sales Co.
Wooster	Apperson	H. H. Ziegler
Youngstown	Haynes	Electric Auto Service Co.

Oklahoma

Bigheart	Haynes	Bryant & Truitt
Dewey	Cole	L. E. Chanks
Tulsa	Herff-Brooks	J. H. Snider

Oregon

Portland	Apperson	Apperson Motor Car Co.

Pennsylvania

Beaumont	Dodge	Crew Bros.
Beaver	Haynes	Fort McIntosh Auto Co.
Biglerville	Herff-Brooks	E. H. Trostle
California	Haynes	Duff Garage
Clearfield	Cole	Wallace Garage
Duquesne	Oldsmobile	Old City Hall Garage Co.
Erie	Haynes	Wolverine Motor Co.
Fayette City	Haynes	J. P. Sloterbeck & Son
Franklin	Haynes	Geo. K. Moffett
Greensburg	Haynes	F. M. Seanor Motor Co.
Greenville	Haynes	Gillespie & Holden
Houston	Apperson	Isaac C. Patsch
Indiana	Haynes	C. H. Moore
Johnstown	Dodge	Lincoln Automobil Co.
Lamberton	Haynes	Hill Bros.
Philadelphia	Stevens-Duryea	F. W. Eveland
Pittsburg	Apperson	Pittsburg Apperson Co.
Punxsutawney	Haynes	Edelblute & Olson
Reading	Haynes	L. H. Fisher
Scranton	Apperson	C. C. Conrad
Tarentum	Haynes	Valley Motor Co.
Tunkhannock	Apperson	C. P. McKown
Tyrone	Apperson	Penna Auto Co.

Rhode Island

Providence	Apperson	Apperson Sales Co.
Providence	Dodge	Cadillac Auto. Co. of R. I.
Providence	King	Charles L. Bebeau
Providence	Pathfinder	Robert L. Knight

South Carolina

Charleston	Haynes	Palmetto Garage Co.
Columbia	Franklin	Gibbes Machinery Co.

South Dakota

Sioux Falls	Dodge	C. W. Thomson
Sisseton	Cole	Staving Bros.

Tennessee

Bristol	Oldsmobile	L. C. King
Nashville	Hudson	Imperial Motor Car Co.

Texas

Amarillo	Dodge	W. E. Groendycke
Austin	Partin-Palmer	Deen's Garage
Brownsville	Haynes	Hinkley Auto Co.
Galveston	Cole	John Christensen & Co.
Galveston	Dodge	Galveston Motor Car Co.
Dallas	Paige-Detroit	Munger Automobile Co.

Utah

Ogden	Apperson	Becraft Auto Co.
Ogden	Buick	Wotherspoon & Jost
Salt Lake City	Apperson	Apperson Motor Car Co

Virginia

Norfolk	Apperson	Seay Bros.
North Tazewell	Herff-Brooks	W. A. Scott & Co.

Washington

Walla Walla	Dodge	Franklin Motor Car Co.

West Virginia

Parkersburg	Cole	O. D. Strader
Wheeling	Dodge	Engineering & Equipment Co.

Wisconsin

Beloit	Briscoe	James W. Nenhall Auto Co.
Bounduel	Briscoe	Adolf Ulmer
Coleman	Briscoe	Motor Car Co.
Dodgeville	Briscoe	E. C. Miller & Son
Grafton	Briscoe	Lansing Garage
Madison	Cole	R. A. Warner
Marinette	Cole	United Car Sales Co.
Milwaukee	Briscoe	Milwaukee Auto Sales Co.
Milwaukee	Haynes	W. H. Diener
Oshkosh	Briscoe	H. Hanley
Pardeeville	Briscoe	Royce Carpenter
Viroqua	Briscoe	Zityner & Fortney
Wausau	Cole	Wausau Garage

Accessories for the Automobilist

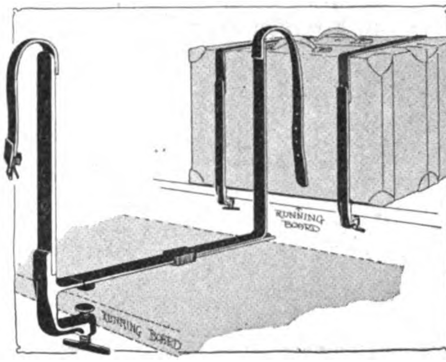


Fig. 5—Asch suitcase carrier

SPARTON Warning Signal—A hand-operated warning signal, Fig. 1, at the unusual price of $5 is now offered by the Sparks-Withington Co., Jackson, Mich. This represents a reduction of $3. A similar horn with a straight trumpet is also offered for $4.25. Both these horns are made so that they can be easily attached to the car, and they are well finished in black enamel and brass.

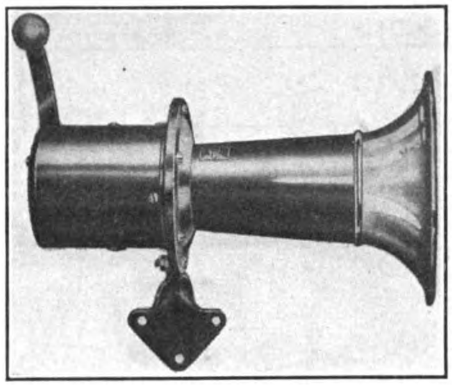


Fig. 1—Sparton hand-operated warning signal

Multiple Cone Clutch—A multiple cone clutch whose special features are ease of engagement and long life is shown in Figs. 2 and 3. In the former illustration, which is a part section, the construction is shown very clearly. The three cones are all on the one four-splined shaft. When the clutch collar, indicated, is pushed to the left, which is out, the smaller cone is disengaged. When this is moved about 3-16 inch further its hub comes into contact with the hub of the middle cone and this cone is then forced out. In like manner the third cone is disengaged by the further movement of the clutch collar. These cones are engaged by springs of different strengths, the largest cone having the strongest spring.

When the clutch is to be engaged, the largest cone goes in first and the others follow in order. In this way a smooth and gradual clutching action is obtained. The facing is plain metal and the clutch runs in oil. The taper is 4 degrees and the overall length is 11⅞ inches. The clutch is designed for 35 horsepower at 1600 revolutions per minute. It is manufactured by the Automatic Gas Motor Co., Indianapolis, Ind.

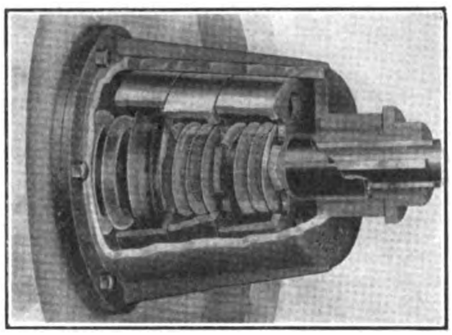


Fig. 2—Phanton view of Multiple cone clutch

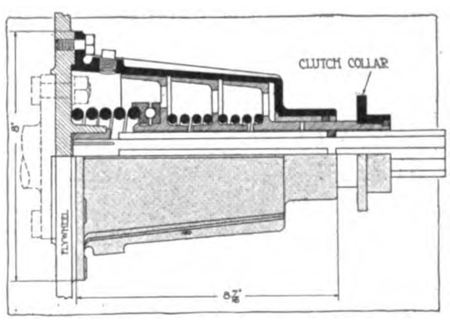


Fig. 3—Part section through Multiple cone clutch

Asch Hose Clamp—A simple and effective instrument for making hose clamps out of plain iron wire is offered by Asch & Co., 1779 Broadway, New York City. This device is shown in Fig. 4. The coupling is made by taking a piece of stout wire and bending it into a U shape and then slipping the free ends of the wire through the U as shown at the top, right. The tool is attached as shown, the ends of the wire being wound around the pins as indicated. The wire is then drawn tight by screwing up on the wing nut and when this is accomplished the tool is bent over to the right and the wire is cut off close to the hose leaving the hose clamp completed as shown at the left at the bottom. The price of this device is —

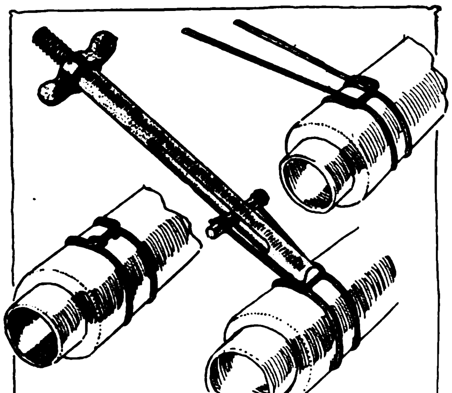


Fig. 4—Asch hose-clamping tool

Asch Suit Case Carrier—A handy device that should be appreciated by tourists is the suit case carrier shown in Fig. 5. It enables one or two suit cases or a small trunk to be solidly strapped to any running board. The carrier is adjustable so that it may be put in place instantly and changed from one car to the other as desired. The method of attachment is very simple. There is a screw clamp which can be tightened by hand as shown. The price per pair is $3. They are distributed by Asch & Co., 1779 Broadway, New York City.

Holden Easybak Cushion—To fill in the little space at the base of the seat back, the Holden Mfg. Co., of St. Paul, Minn., is advancing the Easybak Cushion, which it claims makes the driver's seat like a morris chair. It allows the driver to rest while stretching out his feet to control the brake and clutch pedals and obviates the possibility of backache.

Carleton Electric Generator—To furnish current for automobile lighting, the Carleton Co., Boston, Mass., has placed on the market the Carleton electric generator, which, at the rate of 1,800 revolutions per minute, can provide sufficient power to supply lamps of 48 candlepower. This requires a current of 6 volts and 8 amperes. This is more than sufficient to supply any automobile. The generator sells for $15.

Grant-Lees Gearset—For cars weighing not over 1,600 pounds, the Grant-Lees Co., of Cleveland, Ohio, will have ready for delivery in October a new gearset. The case is aluminum, the gears of 3½ and the shafts of 1 per cent. nickel steel. This is made for cars carrying a motor of bore and stroke 3¼ by 5, and capable of developing 25 horsepower at 1,600 revolutions per minute.

Sewell Cushion Wheels—For motor trucks having solid tires, and for many that now carry pneumatic tires, the Sewell Cushion Wheel, made by the Sewell Cushion Wheel Co., Detroit, Mich., is advanced as economically effective in taking away the jars and jolts, while reducing tire costs. The principle of the wheel, Fig. 6, is an outer and inner rim, between which is a rubber cushion. At the side is a rubber flange, which is held in place by two steel bands. This serves

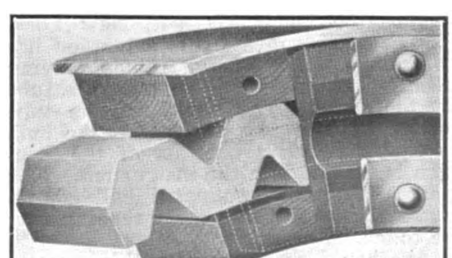


Fig. 6—Sewell cushion wheel for trucks

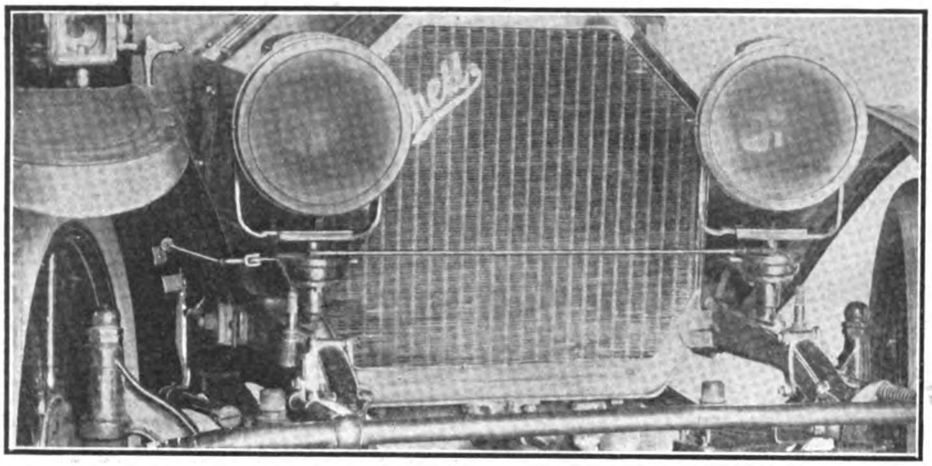


Fig. 7—Hughes turning headlights

to keep the rubber flange from bulging.

Hughes Turning Headlights—Fig. 7 shows a simple device invented by David Hughes, of Racine, Wis., for turning the headlights of the car automatically with the steering gear. Small movements do not make any difference in the straight, forward position of the lights, but further movement of the front wheels to the left or right points the headlights in the direction that the car is turning, so that the road is properly illuminated. The device can be installed on almost any make of car.

Davis Friction Drive—A friction transmission of unusual design has been brought out by the Davis Car Co., Seattle, Wash. It is illustrated, in Fig. 8, and it will be noted that the reduction is obtained by means of two pairs of cones. The drive cones have large faces over which the driven cones slide in and out to obtain the different reductions. It must be noted that, as the pair of driven cones move in to give high gear, the driving cones must move out. This is accomplished by means of the four arms pivoted at A. The pressure of the cones is adjusted by means of the two levers B. Since no provision is made for a differential, compensation is secured when rounding corners by the slippage of the pair of bevels that drive the inner wheels. The use of four cones instead of two also has the advantage that with a given permissible size of cones the wear is cut in half.

It is planned to assemble a light car weighing 1,200 pounds and equip it with this transmission.

Michelin Tire Poster—The Michelin Co. is sending out a poster which bears a humorous picture of the "Michelin Man" having removed from his anatomy a tire to aid a motorist who has evidently had a serious blow-out. The poster is 21 by 29 inches. It may be secured from the Michelin Co., Milltown, N. J., by sending 10 cents in stamps.

Weinhagen Hydrometer—H. Weinhagen, 160 Leonard street, New York, has brought out a hydrometer for use in battery work, this instrument having a bulb attachment at one end and a tube at the other. The mouth of the tube is immersed in the electrolyte, the bulb is squeezed and a quantity of the solution is carried into the instrument. This floats the small graduated bulb shown and in this way the gravity reading may be taken. It sells for $1.50.

Another accessory which this concern is marketing is a neat gradometer which

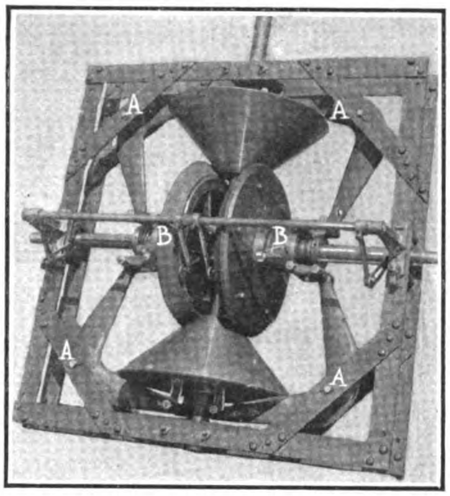


Fig. 8—Davis friction drive

is attached to some horizontal part in the front compartment, and which registers the steepness of a grade in per cent.

Pittsburgh Dirigible Searchlight—A searchlight, powerful enough to enable the occupant of a car to make out the numbers on houses, or to read small lettering on sign-posts, and which can be attached to the wind-shield in a moment, is being advanced by the Pittsburgh Electric Specialties Co., Pittsburgh, Pa. The searchlight can be attached to the battery or lighting system. It is operated on a universal and can be turned in any direction. With it one can look for trouble in the engine, at the same time having a more powerful light than is ordinarily obtained in a light made for this purpose.

Brazelton Headlights—An odd type of headlight has been introduced by G. T. Brazelton, Birmingham, Ala., which is built into the radiator and has shutters at the sides which permit the light to be thrown to the sides of the road. The shutters are operated from the driver's seat and the light coming through the shutters is thrown above the fenders owing to the high position of the lamps.

Hoosier Tandem Master Vibrator—The feature of the Hoosier master vibrator, shown in Fig. 9, is that two pairs of platinum contacts are employed instead of one, as ordinarily. These are connected so only one operates at a time, however. Should the operating pair stick the other pair will take up the work automatically.

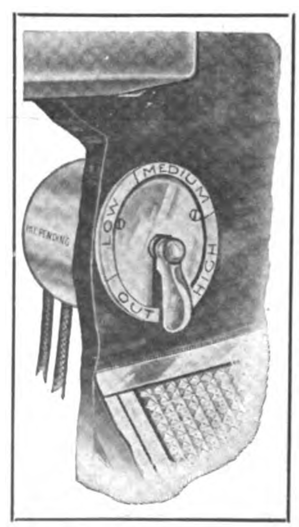
The Hoosier Tandem, as it is called, is housed in a neat mahogany box with a substantial switch. It is manufactured by the Hoosier Oil Co., South Bend, Ind., and sells for $15.

Chaney Dimmer—A dash switch, Fig. 10, that graduates the intensity of the light from high to low and can be worked either with the hand or the foot, is made by the L. F. Chaney Co., Springfield, O. In city driving the light is kept low with small current consumption. In emergencies, where full power is needed, a touch on the handle brings back the full search light efficiency. On dark country roads, in isolated territories, the full search light glare is essential to the safety of the driver and the occupants of the car.

Cozy Cab Top for Fords—A storm-proof top for 1913 and 1914 Ford runabouts has been brought out by the Fouts & Hunter Co., Terre Haute, Ind., under the name of the Cozy Cab top. This top is easily detachable and adjustable in a very short time. The Cozy Cab has a front window which is hinged at the top and swings up out of the way when not in use. The door curtains, made of rubber covered duck, roll up automatically around a metal spring roller concealed in a housing on each side of the front window. The front window takes the place of the ordinary windshield, but uses the holes employed for holding the latter. The side panels, one on each side of the seat, are held by the irons which secure the folding top. These panels fit around the edge of the seat. It sells for $50.

Fig. 9—Left—Hoosier Tandem Master Vibrator for Fords.

Fig. 10—Right—Chaney light dimmer. It may be operated by hand or foot



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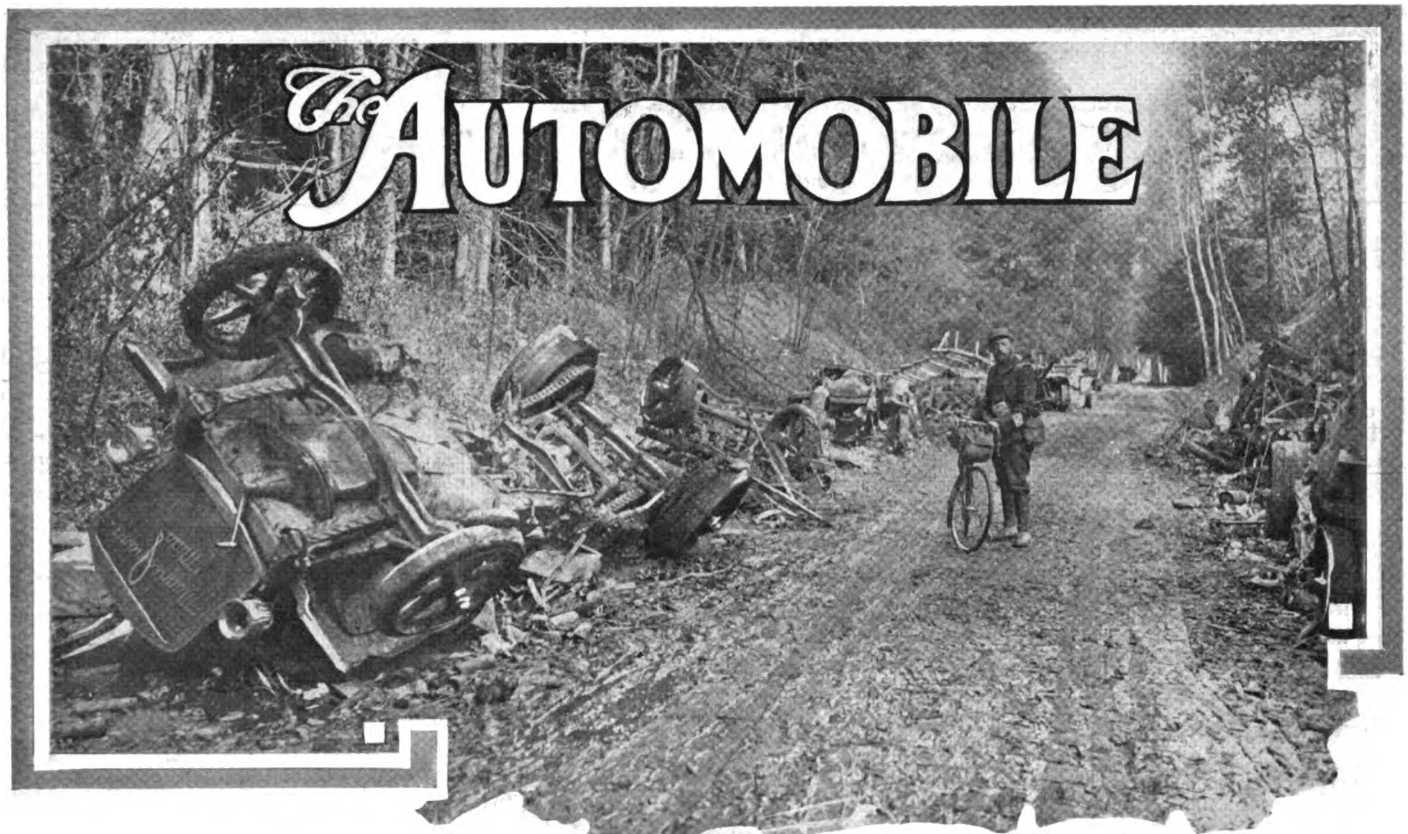


A German motor convoy attacked and destroyed by French troops in the forest of Villers-Cotteret. A rifle shot killed the driver of the first truck and it capsized and the rest of the vehicles were piled up behind it. Fire broke out and destroyed the entire fleet

With a Car at the Front

Tremendous Work Done by Cars and Motor Trucks in European War—Changing Tires Under Fire—A Night Dash Over Battlefields

By W. F. Bradley,
Special Correspondent of THE AUTOMOBILE *with the Allied Armies in France*

PARIS, Sept. 25—We speak and write of the importance of the role played by automobiles in this great war, but no man, who has not been on active service, can appreciate to the full the work done by mechanical transport. The opportunity presented itself to go on active service as a motor car driver, doing the same work as well-known race drivers and hundreds, indeed thousands of more humble motorists. I accepted this offer, and at the present moment am wearing the British uniform, driving officers from the base to army headquarters, from headquarters to the firing line—doing any kind of work which may be required. This is the story of a spell of service, a period in which days were lost count of, for the completion of the task and not the setting of the sun decided that rest should be taken.

Officers Use Cars Only

I was given orders to report at the depot 6 miles away within half an hour. The first work was to carry officers in the district of Paris and to the army base. Officers never make use of the railway—unless they are prisoners. The only rapid means of locomotion is the automobile. The trip from Paris to the nearest point of the firing line can be made in 3 to 4 hours with a fast car. The average time on the train is from 20 to 23 hours.

While military men are making the greatest possible use of cars, civilians are being restricted to the utmost. Within the zone of the armies it is absolutely impossible for a civilian automobile to penetrate. Newspaper men in particular have made wily and determined efforts to break through, but without success. The seizure of the car and the return of the occupants on foot, escorted by gendarmes, effectively puts a stop to any such schemes.

The freedom of the main roads from all other kinds of traffic and the right of way which the military man enjoys make it possible to maintain a very high average rate of speed. A pace of 30 or 40 miles an hour can be set and maintained for hour after hour, the only necessity for slackening being on turns or when army convoys are met.

Right—M. Michelat, chief engineer of the Delage company, now serving as an automobile driver with the French army. His duty is driving officers to and from headquarters and to the firing line

Upper left—English motor truck passing through one of the Marne towns while the battle of the Marne was in progress

Lower left—A Delage car on the firing line. Note the German caps which the French soldiers have put on for a prank. The men are always ready for a bit of fun .

After a full day's work in and around Paris, I was given the order to drive to the headquarters of the British army in the field. Paris is a fortified city, with gates closed and breastworks outside the gates. Civilians driving cars only get through with great difficulty; military cars have a right of way. Five miles from the city walls a deserted country is entered. All the troops are at the front and most of the civilians have fled. From time to time a wrecked automobile is seen by the roadside. When a machine breaks down under war conditions it has to be repaired on the spot or abandoned. There are no resources other than those possessed by the driver, and if he is unable to carry out the repair the best plan is to strip the chassis and leave it. It is almost painful to see high grade cars rotting and rusting by the roadside when a little unobtainable assistance could have saved them.

Most of the cars seen on the road are high-grade machines bearing all the evidences of hard and continuous work. In a little village where I was held up for a few seconds a handsome Rolls-Royce with a costly boat type body appeared. A German helmet was tied to the radiator cap, the body was thickly coated with mud and tied around the car were cans of gasoline and boxes with provisions.

Truck in Artillery Zone

The battle of the Marne had come to a close about a week before I ran through this district. But all the ravages of war were to be seen. At the town of Meaux the half of a rickety bridge spanned the Marne. This point had been under heavy fire, for the houses at the approach to the bridge were in ruins, and an English motor truck, which had somehow or other got into the line of fire, was in such a condition that it was not even worth the attention of the junk dealer.

All the barges in the river at this point had been sunk. Between Meaux and Chateau-Thierry, about 40 miles up the river, not a single bridge has been left intact. At one of these towns on the River Marne the bridge has been blown up by the French at 2 p. m. At 2 o'clock the following morning German officers approached this bridge in a Benz limousine. Not knowing that it had been demolished, they rushed across at high speed to fall to an instant death in the water.

After crossing the Marne at Meaux it was discovered that we could not get back to the north side without making a wide detour to Chateau-Thierry, a town famous years ago for its hill-climbing competitions. Consequently we swung round and recrossed the Meaux bridge, making a detour on the north bank to Chateau-Thierry. This brought us through a big portion of the Marne battlefield. All the dead and wounded men had been removed, but horses still lay in the fields and on the roadside.

But what most impressed one as a tourist was the utter untidiness of the whole countryside. One hill had been under heavy shell fire. Big trees had been cut through by shell, innumerable branches had been carried away, every telegraph pole was broken and telegraph wires hung stragglingly. In the fields, where there were not actual signs of fighting thousands of cans and bottles lay around. There were spent shells, also unspent shells mounted in wicker baskets. In one field a big heap of soldiers' equipment was rotting under sun and rain. Hay ricks were untidy; fodder was scattered about the roadside; there were wrecked wagons in ditches. In place of the trim, grassy banks on each side of a well kept highway there was a bank of soft mud trampled by thousands of hoofs and shoes.

The Wake of War

Between the Marne and the Aisne valleys is a 30 to 40-mile stretch of country through which the German armies made their retreat after the Marne battle. This was a deserted country, not destroyed, but scoured clean of food and fodder. Despite the heavy traffic the main roads had kept in a good condition, only the side banks, which are usually trim and neat, had been trampled into a bed of mud.

As the general headquarters were approached at Fere en Tardenois conditions changed. Third and fourth class roads had to be used. As heavy rain had fallen, these roads had suffered severely. In most cases there was nothing more than a central track with deep banks of mud on each side. The conditions reminded me particularly of those in the Middle West states in America. When another car was met we each went as little into the mud as possible. When a convoy was overtaken the lorries had to be passed one by one, each passage being carried out at the risk of ditching the car.

At British Headquarters

The full extent of the motor transport service in connection with the British army was realized in the village selected by Sir John French as his headquarters. About 2 miles before reaching this village hundreds of horse-drawn army transport wagons were passed in muddy fields. It was very rarely that I saw these vehicles in actual service other than bringing up provisions for themselves.

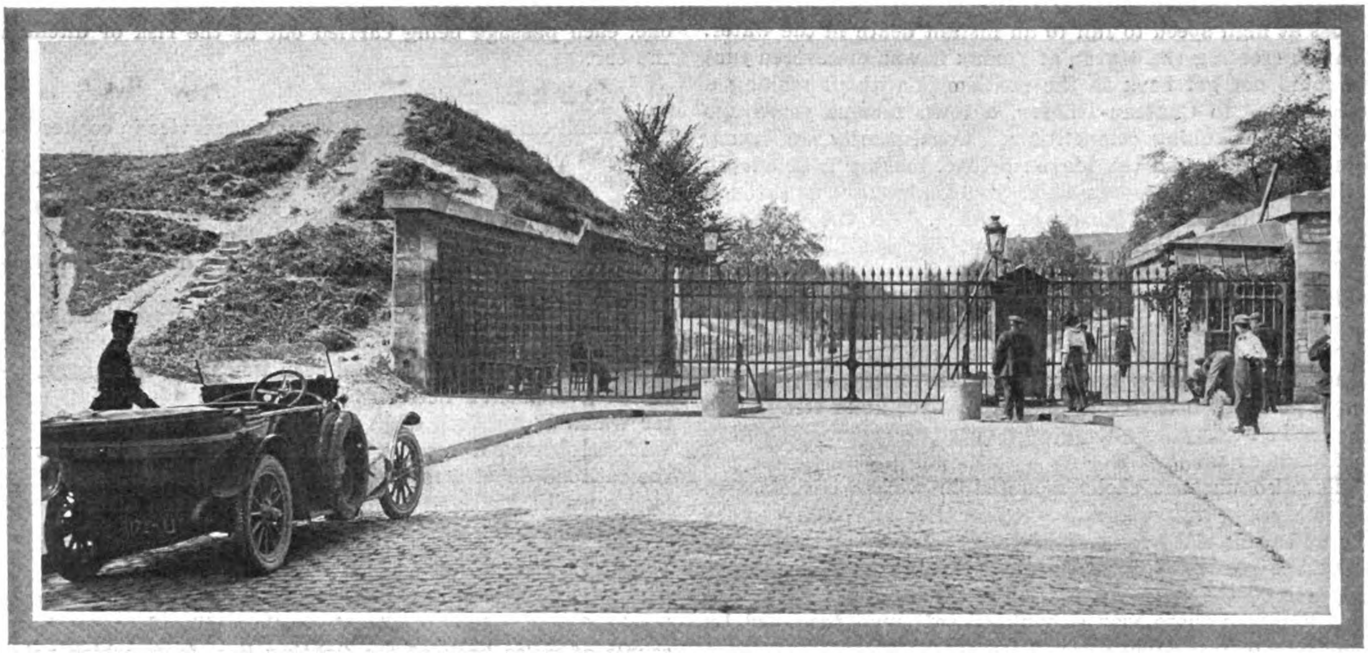
A mile outside of the town motor lorries were lined up in close formation for more than a mile. These were nearly all commercial vehicles which had been taken out of active service at a moment's notice and carried the advertising matter which forms such a distinctive note of this war. These vehicles formed a reserve called upon in rotation to go to the railroad depot a mile to the north of the town and there load up with food and ammunition to be taken direct to the firing line.

Trucks in Firing Line

Originally the military plan was to make use of motor trucks for carrying supplies from the railhead to a point a couple of miles back of the fighting line, from which point the final distribution was made to the men by horse wagons. This plan has been altered, the motor trucks now going right up to the firing line and delivering direct to the men in the trenches. This system exposes the truck to fire and has caused a few of them to be lost, but the time gained is sufficient justification for its continuance.

During the 6 or 7 weeks the war has been in progress the British motor transport service has settled down to business in a remarkable manner and is now giving results which in the opinion of all officers are amazing. The army generally is showing itself highly efficient, but the motor transport service is certainly the best of its many branches. Since the outbreak of hostilities the weaklings and unsuitable types which were pressed into service too hurriedly have been abandoned and have been replaced by new trucks supplied by English factories. Judicious classification has also been indulged in, so that 5-mile-an-hour lorries are no longer made to keep pace with 12-mile-an-hour machines.

All that remained of the German motor truck convoy destroyed in the forest of Villers-Cotteret by the French after the fire



The gates of the City of Paris are now closed and no one is allowed to pass in or out of the walls without undergoing close scrutiny and having all papers, etc., carefully inspected

No work is being done away from made roads. The absence of cross-country work is made possible by reason of the network of roads in this part of Europe. One of the chief defects of several of the English makes of lorries is the lack of clearance. I noticed several cases of rear axles designed with a view to rapid inspection and quick dismounting, but without any thought that the vehicles might have to operate on mud roads. If the war continues throughout the winter, which is likely, many of these trucks will be incapable of operating on the third and fourth class roads.

Very useful, if not indispensable, accessories are differential locks and towing hooks, front and rear. Despite careful driving a truck would sometimes get off the road into the mud. As all journeys are made in convoys, it is always possible to get the vehicle out if hooks, a rope and differential lock can be used at once. Without these accessories serious stoppages are to be feared.

Generally cooling and lubricating systems are proving satisfactory. Up to the present all the motor trucks have used gasoline only. The British army has brought its entire supply from England, either in 2-gallon cans or in big kegs, and has never had to make use of such alternative fuels as benzol and alcohol.

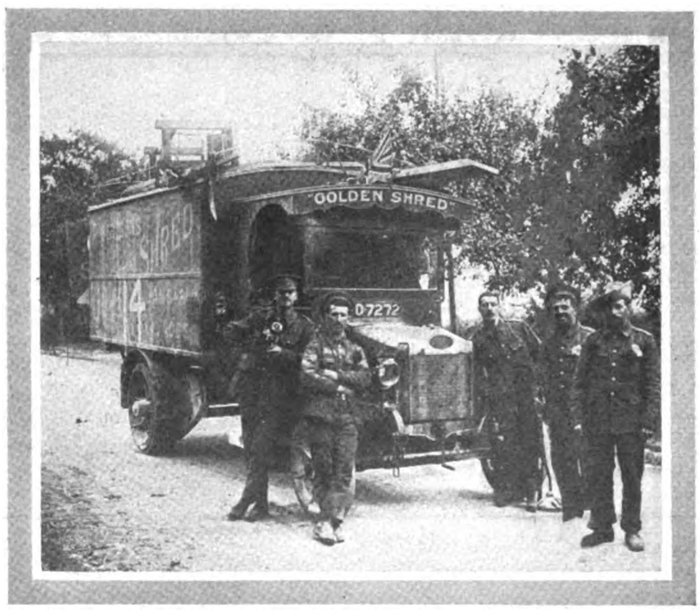
Army Headquarters Motorized

On the public square of the headquarters town there was an even greater scene of motor activity. Here were to be found 200 motor vehicles of every type. There were motorcycles, touring cars of all types, motor ambulances, trucks, omnibuses and a well-equipped motor workshop. A portion of a covered market at one end of the square formed a gasoline and oil depot. Close by was a van stocked with tires and accessories, while in the center of the square was the motor workshop. The equipment of this latter was simple but effective. The vehicle was an ordinary 4-ton chassis with a big platform body carrying a tarpaulin cover. Inside the body was a twin-cylinder Douglas motorbike motor generating current for electric lighting and for driving a lathe. Sixteen skilled mechanics were attached to this shop and at the time of my visit were working a day-and-night shift. A surprisingly extensive range of repair work was undertaken. While the equipment was sufficient to do almost any job, natural discretion was exercised; when the smash was of such a nature that it would unnecessarily tie up the resources of the shop the vehicle was abandoned rather than be repaired.

50 to 1 Officer Scheme

For every hour spent in the saddle, army officers in these days spend 50 hours in an automobile. Horses are maintained, but with the exception of cavalry officers it is a rare feature to see an officer on horseback. No particular type of touring car appears to be preferred, although English officers have a preference for a comfortable rather than a very fast car. The machine ought to be able to touch 45 miles an hour with ease and to keep up 40 miles an hour for long periods.

My own car is a Darracq of 16-horsepower rating, with no special features, but which does as good service as any other. The few special features for active service are absolute reliability, a very big range of action and adequate accommodation for tools and spares.



One of the Br'tish motor trucks at the front. Note that the advertising matter which it bore as a peaceful vehicle of commerce has not been removed. The British trucks are operated on gasoline brought from England with the troops

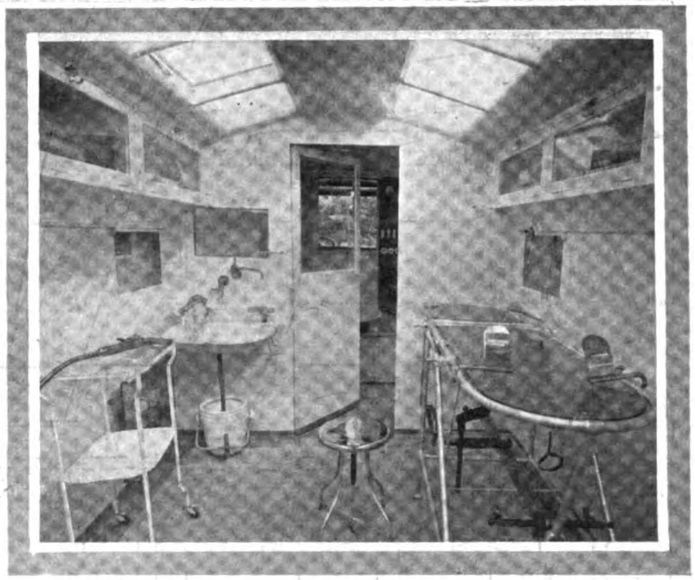
In most of the cars the gasoline tanks were too small, for in a war-devastated country it was often necessary to carry sufficient fuel for journeys of 400 to 500 miles.

An adequate oil supply was also necessary, and a car which could run very long distances without the bonnet being lifted for renewing the oil had an advantage over others.

Tires Changed Under Fire

Spares which are unnecessary in civil life are indispensable for active service, but not many cars had the necessary space for carrying these. Detachable wheels are a valuable acquisition. On one occasion when drawn up for a tire change we were fired on by German stragglers hiding in the woods behind the Allies' lines. The change was made while shots were flying. Under such circumstances there was a wonderful amount of satisfaction in knowing that the change would occupy but a few seconds, for my car was fitted with detachable wire wheels.

An efficient system of lighting is indispensable. Electric-lighting appeared to give the best results, but this system requires so little attention that here is a tendency among drivers to give it none at all, with the result that it failed them when needed.



Interior of the operating room in one of the automobile ambulances used by the French army. Note the completeness of the equipment and the immaculate cleanliness throughout

Ambulances at Fire Line

For ambulance work automobiles played just as important a role as in any other section of army activities. At this headquarters town there were a large number of 16-horse-power Wolseley fitted with light canvas bodies in which were four stretchers on rails. The stretchers were in two rows, with just sufficient room for the attendant to move between the two. These vehicles went close to the firing line, the wounded were picked off the ground by the stretcher men and the stretcher slipped into the van.

With its load of four wounded the ambulance returned to the headquarters town, which was never more than 10 miles behind the lines, and there discharged. In the town in which I am stationed the church was made use of as a hospital, the number of cases treated in this building being 2,000 on 2 successive days. After being given first attention in this temporary hospital, the officers and men were moved back to either permanent hospitals or nursing homes. A large amount of voluntary work was done in this connection.

While at the front I met R. N. Goode, of the Packard company, who was using a Packard car for carrying wounded officers from the front to the American hospital in Paris. The Paris branch of the Ford company gave important assistance in this work. Although these cars are small, they were fitted up according to a French system to carry six men in an inclined position. Light but strong hoops were fitted to the chassis, these hoops carried a waterproof cover, and the stretchers were attached in two rows of three to the hoops with a coil spring connection. Loading and unloading was not so rapid as with the British system, but there was the advantage of being able to carry two more men; further, the spring connections attenuated the road shocks.

Night Trip to Front

After spending most of the day coming from Paris to the headquarters town and in making journeys in and around the headquarters, I was ordered to be in readiness for a night trip to the firing line. At this time the battle of the Aisne was at its height; the Germans had heavily shelled the English position for 2 days and 2 nights in an endeavor to break through before the French could carry out their flanking movement. Thus, as we set out the heavy guns were booming from the heights dominating the Aisne valley, and on the banks of the river Maxims were at work. After traveling some distance under headlights, the order was given to extinguish all lights and we slipped along quietly and cautiously, descended the hill leading into the valley, crossed the pontoon bridge and finally got into touch with the troops for which we were searching. All this northern bank of the river was held by the Allies, but the Germans above were strongly opposing their advance and kept up a heavy fire on them. It was only after considerable loss that the enemy was driven out of his position on the crest of the hills.

When we returned to general headquarters it was 2 a. m. I was then allowed to go off duty. It was raining heavily, I had not been billeted, and the only place to sleep in was the rear of the car. A dozen other drivers were passing the night under similar conditions, our sleep being disturbed by the constant, steady rumble of motor trains taking ammunition to the front.

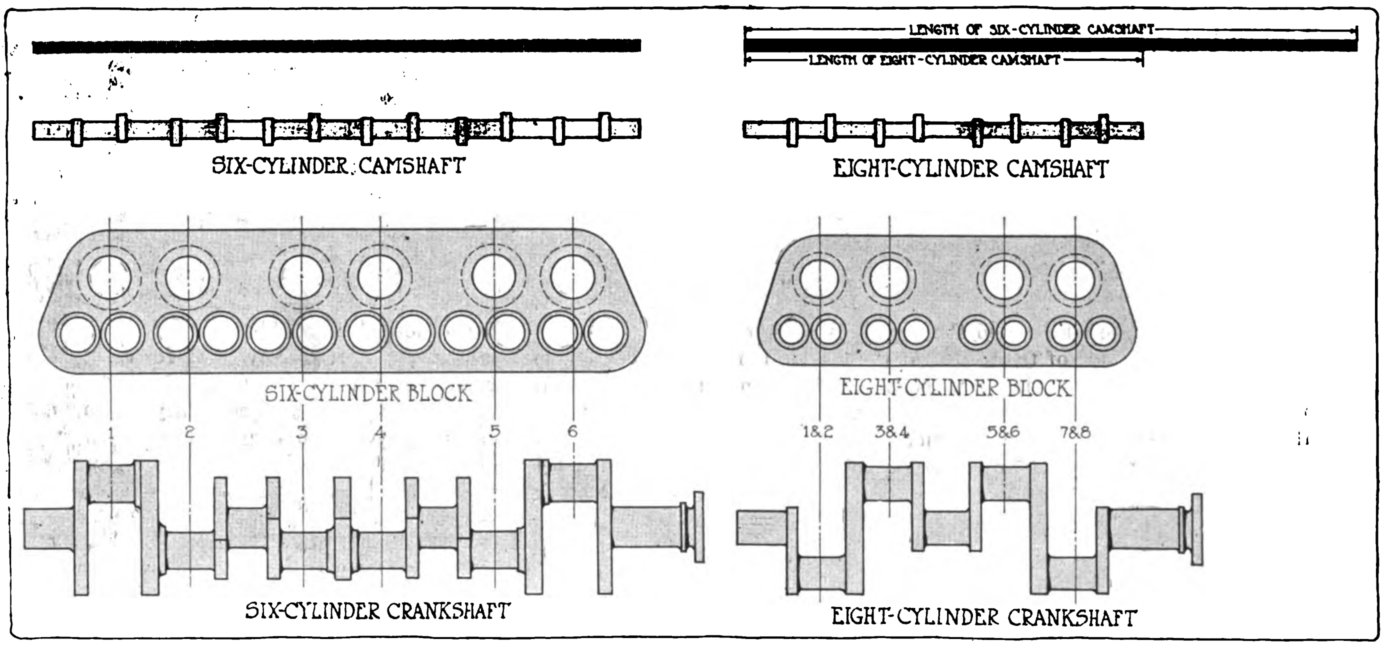
The following day was spent in carrying officers from point to point along the firing line. Passing down a straight stretch of road we were arrested by a group of peasants gesticulating wildly around a wrecked German motor van. As we pulled up they indicated that Germans were to be seen down a lane running through a wood on our left. The car was pulled up opposite the end of the lane, rapid orders were given for the motor to be kept running and the gear kept in engagement ready to slip away as quickly as possible, while rifles were got out. The men could be easily seen creeping along the hedge bottom, but as the officer was of the opinion that they were only stragglers, he fired a few shots and told me to move on. Their presence was reported to French scouts a mile down the road.

No Rest for Drivers

Most officers allow their drivers little rest. The order was given one morning to return to Paris, a 4-hour journey at high speed. After visiting military offices the order was given at 1 o'clock in the afternoon to drive to the army base 150 miles to the southwest of Paris. There was no time for a meal, and in place of the usual—or unusual—lunch, I ate sandwiches while driving. The trip was made in 4 hours.

After the business had been transacted, dinner eaten and gasoline taken aboard, a night run was made back to Paris. Only military automobiles are allowed on the roads after nightfall, and even these are stopped at the entrance to all important towns. By the aid of the headlights it was possible to maintain almost as high an average during the night as in the day. On the whole run of 150 miles only one other car was seen on the road, and naturally there were no horse vehicles.

(Continued on page 665)



Comparative dimensions of six and eight-cylinder engines designed to develop the same horsepower at the same r.p.m.

Eight-Cylinder Advantages

A Comparison With Four and Six-Cylinder Designs

D. McCall White

Late Chief Engineer Messrs. D. Napier & Son, Ltd., London, and formerly Works Manager of Messrs. Crossley Motors Ltd., Manchester, Eng., now associated with the Cadillac Motor Car Co., Detroit, Mich.

EVER since the first use of the multi-cylinder, internal-combustion engines, engineers generally have been searching for an engine which would approach the action of a turbine as nearly as possible. As evidence of this tendency one need only look at the various applications for patents in different countries, many of which embrace points relating to internal-combustion turbines.

In short, the tendency of later years has been to obtain an engine having high flexibility, freedom from vibration, combined with general sweetness and smoothness of action, with silence, and last but not least, continuous torque. These characteristics are all more or less combined in a practical manner in a carefully-designed eight-cylinder engine.

Engineering All Compromise

As every engineer knows and recognizes, all engineering designs are a matter of compromise and therefore, the careful and intelligent engineer selects and takes a line on all those prints which he hopes to obtain, not sacrificing any one point in its entirety, but molding the whole design into as successful a compromise as he is able to place before the public.

ONE CAN URGE, TECHNICALLY, MANY POINTS AGAINST EVERY TYPE OF ENGINE OR DESIGN WHICH WAS EVER PRODUCED, BUT THE ENGINEER WHO CAN DESIGN AN ARTICLE WHICH HAS THE TOTAL BEST COMBINATION OF GOOD THINGS, PRACTICALLY, HAS PRODUCED THE BEST ARTICLE FOR THE PUBLIC.

In the eight-cylinder proposition, therefore, which admittedly must be carefully designed and well manufactured, we have before us a prime mover which gives astonishing results in practically every direction one may look. The advantages are numerous and when one considers that we have practically continuous torque, owing to the fact that one cylinder fires every 90 degrees of the crank and that there are eight impulses extending over one cycle, each impulse lasting theoretically 75 per cent. of the stroke, one can easily appreciate what this means not only as regards smooth running of the motor, but as regards the wear and tear of the tires and parts of the chassis generally.

For a given power the eight-cylinder is lighter than the six-cylinder.

The crankcase is decidedly lighter in the eight, being 25 per cent. shorter than in the six.

The crankshaft of the eight is practically the same length as that of the four-cylinder engine.

The eight-cylinder has torque 33 per cent. more uniform than that of the six.

The eight-cylinder V-engine is very adaptable for the grouping of all its accessories.

The camshaft in the eight-cylinder has eight cams as compared with twelve cams in the six-cylinder.

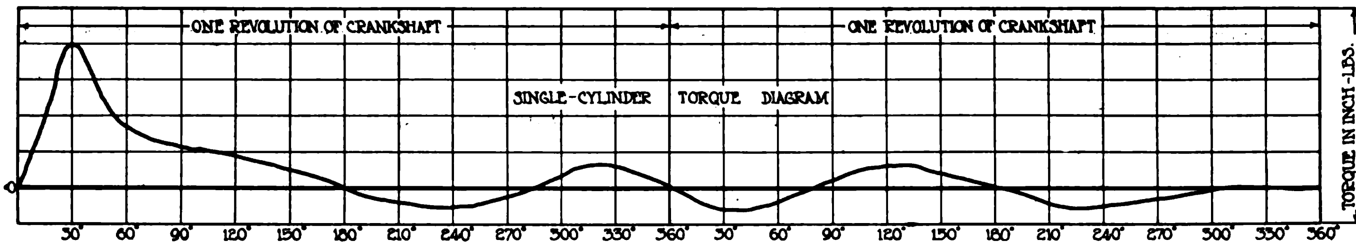
The cylinder blocks in the eight-cylinder motor weigh 15 per cent. more than those in the six.

Connecting-rods in the eight-cylinder are more expensive than in the six.

The six-cylinder motor is more expensive than the eight because of its extreme length, and the fact that it must be rigid throughout to take care of this length.

Because of the cylinders being much smaller, a higher compression can be used in the eight-cylinder than in the six.

Mechanical efficiency of eight is high, as frictional losses are not great, as the quantity of rotating bearings are no greater than they would be in a four.



Torque diagram of single-cylinder motor, showing the torque in inch-pounds on crankshaft

For a given power developed the engine is lighter than the six-cylinder by reason of the fact that the engine is no longer than a four-cylinder engine, the bore of the cylinders can be made smaller because there are more cylinders, thereby allowing the reciprocating parts such as pistons, connecting-rods and valve gear, to be made to the minimum as regards lightness.

The crankcase also is decidedly smaller and so far as length is concerned, is roughly 25 per cent. shorter than a six-cylinder engine crankcase, and is hardly, if any, longer than that of a four-cylinder engine.

Again the crankshaft is to all intents and purposes, practically the same length as that of a four-cylinder engine, which advantage is enormous not only from a weight point of view, but for reasons to be discussed later. We have also a very light flywheel on the eight-cylinder engine as compared with engines having fewer number of cylinders.

It is generally accepted that whilst there are several more values, the fact that they are smaller enables them to be well silenced and the continuous rhythm of the motor and the action of the tappets on the cams makes the turning moment practically continuous on the camshaft. In fact, this point has been generally recognized in Europe by engineers who have endeavored to steady up the uneven turning moment on the camshaft on engines by placing dummy loaded tappets at various angles on the camshaft.

Others again have a form of brake upon the camshaft to minimize this defect.

Again, the eight-cylinder engine has a crankshaft very little longer than the ordinary four-cylinder engine as previously mentioned, which in itself is a point on which great stress can be placed as one of the most serious defects which can be laid to engines which have long crankshafts is the disturbance which occurs at certain periods of engine speed. This can be overcome in a measure, by fitting a crankshaft of enormous dimensions which interferes with the mechanical efficiency of the engine as a prime mover and accounts, in common, with other points, for the difficulty many engineers have in obtaining equal power, cylinder for cylinder, from the six-cylinder engine against the four. Naturally, of course, this does not always apply, but certainly has a whole lot to do with this seeming inefficiency, when the six-cylinder is exceptionally smooth in action as regards periodic tremor. Many designers fit a damper on the front end of the six-cylinder crankshaft thus tending to absorb the periodicity. The crankshaft is undoubtedly simpler in construction and certainly is a cheaper manufacturing proposition than that of the six-cylinder engine and need only be supported upon main bearings similar to that generally employed on a good four-cylinder engine.

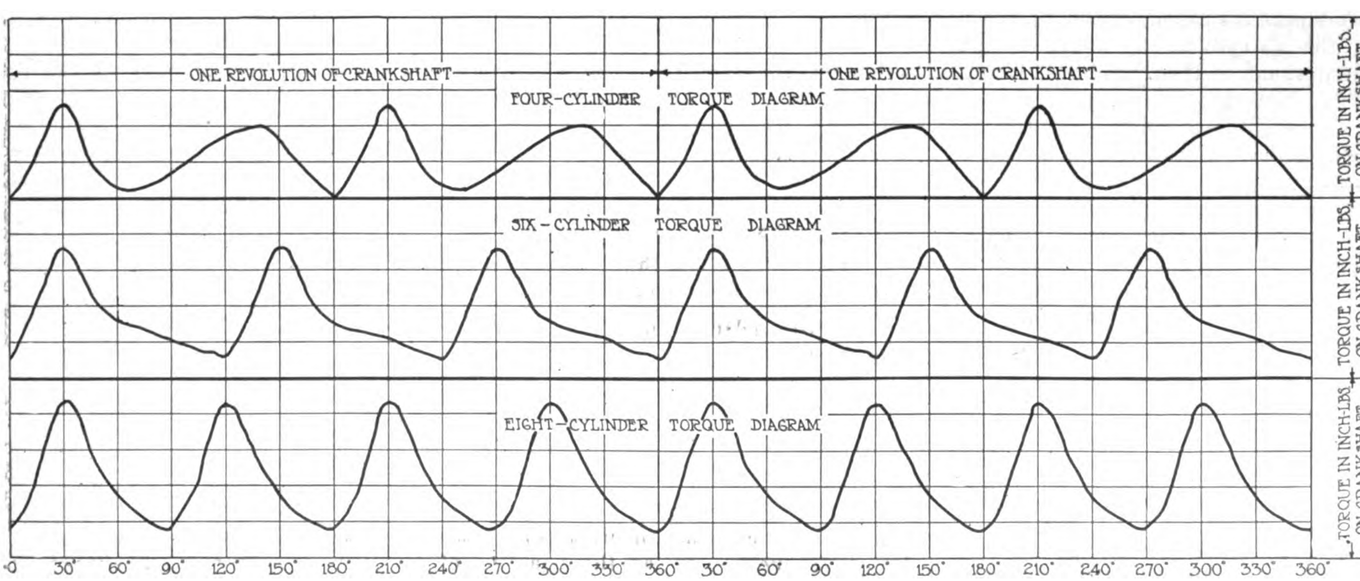
Torque 33 Per Cent. More Uniform

We have also the question of the camshaft, which should be in every engine as rigid and as free from torsional disturbance as possible. In order to demonstrate this point a comparison is made in the accompanying figure of a six and eight-cylinder camshaft, suitable for developing the same horsepower at the same speed.

Owing to the practically continuous torque of the eight-cylinder engine, the variation of the turning moment is very small, the torque being about 33 per cent. more uniform than that of the six-cylinder engine and for this reason the designer can dispense with a considerable amount of weight in the flywheel rim, as previously mentioned, which every engine must have to steady up the torque variation, storing the maximum load and giving it forth again when the load given forth becomes low, thus allowing as little speed fluctuation as possible, so that, therefore, the less the torque variation and the more frequent the impulses, the less kinetic energy required to be stored up by the flywheel.

The carburetion, which is one of the most serious and vital points in multi-cylinder engines, generally becomes a proposition as simple as the carburetion in a four-cylinder engine.

The eight, designed for high efficiency, with its magnificent



Comparative torque diagrams of four, six and eight-cylinder motors, showing increase in uniformity with added cylinders torque at low speeds, makes the necessity of changing gear practically non-existent and where one considers that flexibility and a range of speeds can be obtained from 75 revolutions per minute to from 2,800 to 3,000 revolutions per minute or more, it can be appreciated what delights are before the prospective driver when such variation can be obtained with perfect smoothness all along the scale. So smooth indeed can these engines be made, that, when the air is stationary, a pencil can be placed on end on the mudguard and the engine raced up to a high number of revolutions without any movement whatever on the part of the pencil.

The cooling also is all that could be desired as the water naturally rises to the highest and hottest parts of the cylinders, viz: the water jacket around the valves.

The engine being short, the bonnet naturally becomes so, with the result that space which would otherwise be used for an engine having cylinders all in a line, can be used for body space.

In such countries as the United States, wherever torque at low speeds is much to be desired, owing to road conditions, such an engine pulls smoothly and evenly and with great power in heavy and on direct gear and can climb and accelerate from very low speeds indeed on heavy hills.

V Design Very Adaptable

The disposition of an eight-cylinder engine when designed on the V principle leads itself nicely to the placing of the various units so necessary to the present day automobile, such as starting or lighting outfits, as well as tire pump, etc.

To illustrate comparisons clearly, the accompanying illustrations show parts of two engines, a six and an eight-cylinder, designed to develop the same horsepower at the same revolutions per minute. It will be observed that the six-cylinder engine gains as far as cylinder weight is concerned, but on the other hand, the gain is lost when one considers the weight and cost of the six-cylinder crankshaft and crankcase against the eight-cylinder crankshaft and crankcase. The same naturally applies to the camshaft.

It would be easy to go into the details and carefully analyze each point for and against these two known types of multi-cylinder engines, chief amongst these being the easy manufacturing possibilities of the eight-cylinder camshaft which has eight cams and fewer supporting bearings against the twelve cams on the six-cylinder; four throws on the crankshaft instead of six, all of which former are on one plane, while those of the latter are at 120 degrees to one another, requiring at least one more main bearing journal to support the shaft.

Regarding the matter of the cylinders, although there are two blocks the combined weight of which is greater than that of the six-cylinder by about 15 per cent., they certainly counterbalance their combined increased weight by the ease with which they can be handled in the factory.

The eight connecting-rods are more expensive than the six-cylinder owing to the fact that two more rods are used although this fact is, to some extent, balanced by there being two less crankpin end bearings.

The six-cylinder crankcase is an enormously expensive part against that of the eight-cylinder, chiefly, owing to its extreme length and the fact that it must be made so rigid to take care of this length as well as the added main bearings and camshaft bearings.

Higher Compression in Eight

Regarding the question of comparative economy, the writer is of opinion, not only theoretically, but from practical observation, that the eight-cylinder is just as economical as a four-cylinder of equal power, chiefly due to the fact that the cylinders being much smaller much higher compression can be used without distress and also to the splendid distribution of the gases.

In addition to this point it is much easier to keep the eight-cylinder engine running along without the throttle being very far open owing to its better torque, thus adding to its economy.

WITH REFERENCE TO MECHANICAL EFFICIENCY, THE V-TYPE EIGHT SHOWS UP VERY WELL INDEED AS THE FRICTIONAL LOSSES ARE NOT GREAT OWING TO THE QUANTITY OF ROTATING BEARINGS BEING NO GREATER THAN THERE WOULD BE ON A GOOD FOUR-CYLINDER ENGINE.

One large company in France has already adopted the V-type of eight-cylinder engine as standard and while they may be the first people to produce in large quantities, they are not, so far as the writer is aware, the first people to produce this type of engine.

We have the famous French eight-cylinder, V-type racing Darracq engine which put up some splendid speed tests several years ago on the Florida beach, as well as the Rolls-Royce Co., Derby, England, which produced and manufactured an eight-cylinder V-engined automobile known as the Legalimit car.

As far back as the year 1907-1908, the Daimler Motor Co, (1904) Ltd., Coventry, England, with which the writer was at that time associated, produced eight-cylinder V-type engines, the bore being 154 millimeters and the stroke 150 millimeters.

There has also been the well known eight-cylinder aviation motor known as the Antoinette as well as one or two others.

Torque Diagrams for Comparison

In the matter of torque between various engines some graphic diagrams are shown and afford an interesting comparison between single-cylinder, four-cylinder, six-cylinder and eight-cylinder engines of the same size cylinders.

The horizontal line has been divided into degrees of crank movement—each 360 degree representing one revolution, whilst, naturally, 180 degrees represents one stroke, the total length of the diagram being one complete cycle or two complete revolutions.

The vertical lines represent the torque in inch-pounds on the crankshaft.

For a single-cylinder engine, all the forces tending to twist the shaft in the positive direction are about the zero line, and all those which are negative are below the line.

It is therefore, not difficult to understand how these diagrams have been laid out, for the torque of engines, having various numbers of cylinders, is simply the torque of a single-cylinder superimposed at the correct intervals on the same crankshaft. One of the most interesting points to be noted is the positive increase of torque which occurs in a four-cylinder engine during the second third of each stroke.

Naturally, after an explosion, the torque falls off rapidly, and owing to the effect of the other pistons, it becomes very low after the crank has passed 65 degrees of a revolution. Suddenly, however, around this point the torque is increased again and actually attains a large proportion of its maximum value.

This is not due to another explosion, however, but to the curious effect of the other pistons. Thus, instead of the torque being further reduced throughout the exhaust stroke, it actually changes direction merely because of the momentum of the piston.

The same applies to the suction-stroke and compression-stroke which latter hardly shows negative torque at all.

It is these particular points which explain to a great extent the splendid results obtained from the four-cylinder engine. The six-cylinder engine undoubtedly has many points to recommend it, chief amongst which is the more or less smooth torque in comparison with engines with fewer cylinders, and has also many points in common with the eight-cylinder engine.

Counterbalancing the Crankshaft

Engineers Add Weights to Neutralize Pressure on Bearings Caused by Centrifugal Force of Masses That Are in Rotary Balance but Not in Centrifugal Balance —Mathematics Needed in Determining Size of Counterweights

By L. J. Petre
Consulting Engineer

THE idea of counterbalancing a crankshaft is usually associated with single-cylinder engines wherein the aim is elimination, or partial elimination, of vibration.

IN THE DEVELOPMENT OF THE HIGH-SPEED AUTOMOBILE ENGINE, IT HAS BEEN FOUND ADVANTAGEOUS TO COUNTERBALANCE THE CRANKSHAFT FOR THE PURPOSE OF RELIEVING THE BEARINGS OF EXCESSIVE PRESSURE DUE TO CENTRIFUGAL FORCE.

Center Bearing Suffers

The pressure on the center bearing of a three-bearing, four-throw crank may in some cases be sufficient to break down the lubricant before excessively high speed is reached. The fact that the center bearing in engines of this type do not wear as well as the end bearings has been observed by repair men.

That this difference may be largely due to the centrifugal force caused by the rapid revolution of the two intermediate crankpins together with their connecting rod big ends, would hardly be suspected. In fact, if asked, off-hand, whether there be any pressure on the main bearings of a crank of this type due to centrifugal force, the average engineer would probably answer that, inasmuch as the shaft is symmetrical and may be shown to be in running balance by means of a running balance machine, there can be no pressure of this nature. HOWEVER, WHEN THE ACTUAL PRESSURE ON EACH BEARING, DUE TO THIS CAUSE, HAS BEEN ONCE DETERMINED FOR SPEEDS BETWEEN 2,000 R.P.M. AND 3,000 R.P.M. THE SUSPICION IS READILY JUSTIFIED.

Determining Centrifugal Pressure

The process of determining this pressure consists of ascertaining:

First: Either by weighing or by calculation, the weights of each of the unbalanced* masses.

The big ends of the connecting-rods, the crankpins and usually some adjacent portions of the crankcheeks, Fig. 1 at W, X, Y and Z, are examples of unbalanced masses since they are balanced by similar parts located in other planes of revolution.

Second: The location of the center of gravity of each of these unbalanced masses.

Getting the Center of Gravity

To find the center of gravity of a flat piece of this kind, suspend it from one corner by means of a string, Fig. 2; drop a plumb line through or close to the point of support and draw across the face of the piece a line showing the position of the plumb line. Now suspend it from another corner, drop the plumb line through the point of support and the intersection of the two lines will show the location of the center of gravity.

Third: The centrifugal force due to each of these masses.

Fourth: Distribtion of these forces to each bearing.

The Necessary Calculations

The calculations necessary for determining these are as follows: Suppose that we find the weight of the big end of the connecting-rod, Fig. 4, is 3.75 pounds, and for simplicity we assume (as in this case is practically correct) that the center of gravity coincides with the center of gravity of the crankpin (see Fig. 4), that the weights of crankpin and weight W, Fig. 1, are 3.5 pounds and 3.75 pounds, also that the locations of their centers of gravity are as shown

*An *unbalanced mass* here means any weight or portion of the crank whose counterpart or counterweight does not revolve in the same plane.

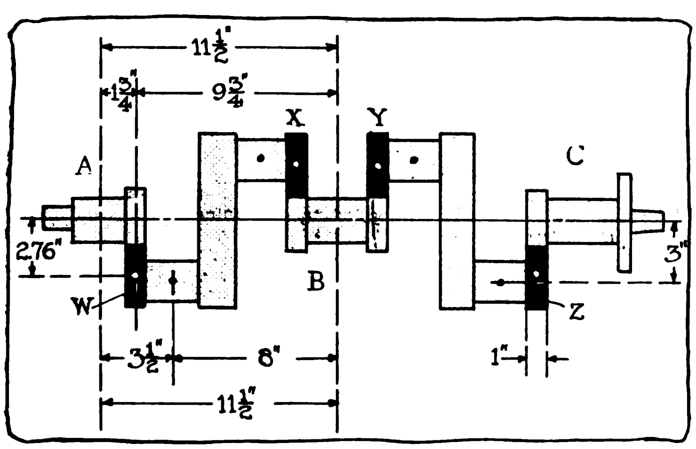


Fig. 1—Big ends of the connecting-rods, the crankpins and usually some adjacent portions of the crankcheeks at W, X, Y and Z, are examples of unbalanced masses since they are balanced by similar parts located in other planes of revolution. For instance, X and Y balance W and Z

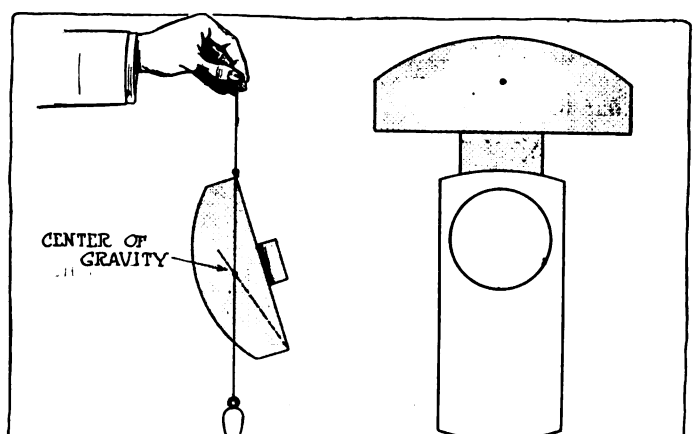


Fig. 2—To find the center of gravity of a flat piece suspend it from one corner by a string, drop a plumb line through point of support and draw a line showing the position of the plumb line. Suspend it from another corner and repeat, the intersection indicates center of gravity

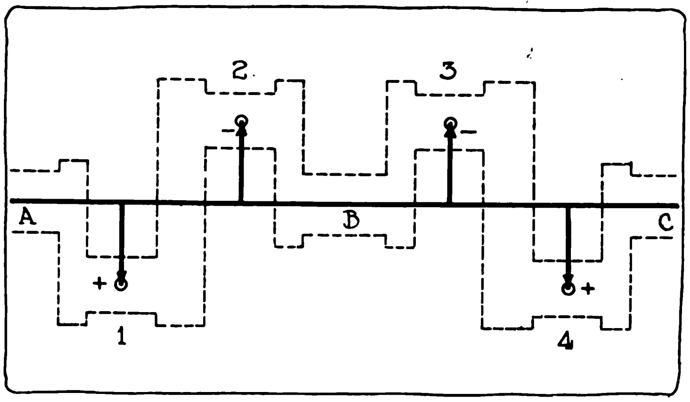


Fig. 3—Diagram showing the points of application of the forces on the crankpins as projected in the horizontal plane

by dimensions, Fig. 1, and that we assume a speed of 2,400 revolutions per minute.

The centrifugal force, F, equals:

$$F = 1.2276\ WRN^2.$$

Where F = centrifugal pull in pounds.
W = weight in pounds.
R = radius in feet.
N = revolution per second.

For big end of rod

$$F = 1.2276 \times 3.75 \times .25 \times 1{,}600 = 1{,}841 \text{ pounds.}$$

For crankpin

$$F = 1.2276 \times 3.5 \times .25 \times 1{,}600 = 1{,}718 \text{ pounds.}$$

For W

$$F = 1.2276 \times 3.75 \times .23 \times 1{,}600 = 1{,}694 \text{ pounds.}$$

Since the center of gravity of the rod big end and that of the crankpin coincide we have a total force of 1,841 + 1,718 = 3,559 pounds acting in a plane 1 1-4 + 1 + 1 1-4 = 3 1-2 inches from the middle of bearing (*a*) and 8 inches from bearing (*b*).

Similarly we have a force of 3,559 pounds acting in a plane 3 1-2 inches from bearing (*b*) and 8 inches from bearing (*a*), but the force due to crankpin No. 1 is in one direction which we shall call positive (+), while the force due to crankpin No. 2 is in the opposite direction which we shall call negative (—). The directions and relative locations of these forces are illustrated diagrammatically in Fig. 3.

The total resultant forces acting upon each of the three bearings due to each of the four crankpins and rod big ends is as follows:

$$\text{On A due to} \left(\begin{array}{l} \text{No. } 1 = +3{,}559 \times \dfrac{8}{11\frac{1}{2}} \\ \text{No. } 2 = -3{,}559 \times \dfrac{3\frac{1}{2}}{11\frac{1}{2}} \end{array} \right)$$

$$= +3{,}559 \times \frac{4\frac{1}{2}}{11\frac{1}{2}} = +1{,}392 \text{ lbs.}$$

$$\text{On B due to} \left[\begin{array}{l} \text{No. } 4 = +3{,}559 \times \dfrac{3\frac{1}{2}}{11\frac{1}{2}} \\ \text{No. } 2 = -3{,}559 \times \dfrac{8}{11\frac{1}{2}} \\ \text{No. } 3 = -3{,}559 \times \dfrac{8}{11\frac{1}{2}} \\ \text{No. } 4 = -3{,}559 \times \dfrac{3\frac{1}{2}}{11\frac{1}{2}} \end{array} \right]$$

$$= -3{,}559 \times \frac{9}{11\frac{1}{2}} = -2{,}784 \text{ lbs.}$$

$$\text{On C due to} \left(\begin{array}{l} \text{No. } 3 = -3{,}559 \times \dfrac{3\frac{1}{2}}{11\frac{1}{2}} \\ \text{No. } 4 = +3{,}559 \times \dfrac{8}{11\frac{1}{2}} \end{array} \right)$$

$$= +3{,}559 \times \frac{4\frac{1}{2}}{11\frac{1}{2}} = +1{,}392 \text{ lbs.}$$

In the same manner the weights W, X, Y and Z distribute their pressure as follows:

$$\text{On A due to} \left(\begin{array}{l} W = +1{,}694 \times \dfrac{9\frac{3}{4}}{11\frac{1}{2}} \\ X = -1{,}694 \times \dfrac{1\frac{3}{4}}{11\frac{1}{2}} \end{array} \right)$$

$$= +1{,}694 \times \frac{8}{11\frac{1}{2}} = +1{,}178 \text{ lbs.}$$

$$\text{On B due to} \left[\begin{array}{l} W = +1{,}694 \times \dfrac{1\frac{3}{4}}{11\frac{1}{2}} \\ X = -1{,}694 \times \dfrac{9\frac{3}{4}}{11\frac{1}{2}} \\ Y = -1{,}694 \times \dfrac{9\frac{3}{4}}{11\frac{1}{2}} \\ Z = +1{,}694 \times \dfrac{1\frac{3}{4}}{11\frac{1}{2}} \end{array} \right]$$

$$= -1{,}694 \times \frac{16}{11\frac{1}{2}} = -2{,}356 \text{ lbs.}$$

$$\text{On C due to} \left(\begin{array}{l} Y = -1{,}694 \times \dfrac{1\frac{3}{4}}{11\frac{1}{2}} \\ Z = +1{,}694 \times \dfrac{9\frac{3}{4}}{11\frac{1}{2}} \end{array} \right)$$

$$= +1{,}694 \times \frac{8}{11\frac{1}{2}} = +1{,}178 \text{ lbs.}$$

The total pressure on the center bearing due to centrifugal force = — 2,784 — 2,356 = — 5,140 pounds.

On end bearings = + 1.394 + 1.178 = + 2,570 pounds.

On connecting-rod bearings = 1,841 pounds.

The pressure on the main bearings may be eliminated by the use of counterweights located opposite the crank cheeks W, X, Y and Z.

The pressure on the connecting-rod bearing may be only slightly reduced since it is controlled by the weight of the big end of the rod, the strength of which must not be sacrificed.

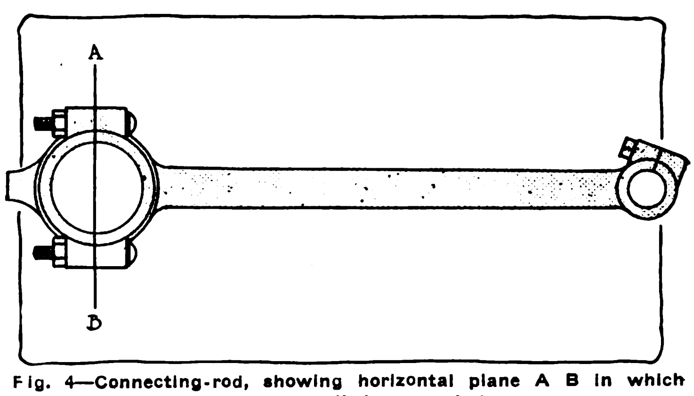


Fig. 4—Connecting-rod, showing horizontal plane A B in which forces are applied to crankpins

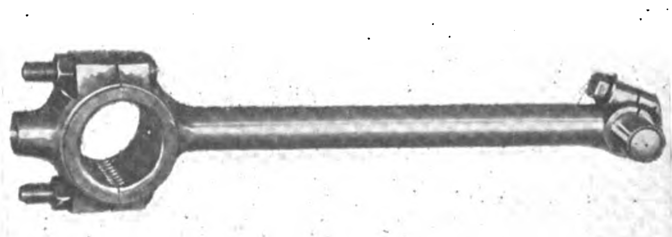


Fig. 5—Tubular form of connecting-rod, showing extension at lower end for balancing

However, at the time of the explosion the pressure on the rod bearing is reversed, thus permitting a renewal of the oil film.

THE SHAPE AND SIZE OF COUNTERWEIGHTS REQUIRED TO ELMINATE PRESSURE ON MAIN BEARINGS IS DETERMINED PARTLY BY THE CLEARANCE SPACE ALLOWED IN THE CRANKCASE.

THE CLOSER (LONGITUDINALLY) THE COUNTERWEIGHT IS TO THE BEARING TO BE PROTECTED AND THE GREATER THE RADIAL DISTANCE FROM ITS CENTER OF GRAVITY TO THE AXIS OF THE SHAFT THE LESS WILL BE THE WEIGHT REQUIRED.

As a rule, it will be found necessary to make the counterweight nearly as large as the space will permit. Fig. 4 shows in section a convenient form of counterweight, the weight of which may be regulated by the thickness. The center of gravity may be found mathematically or experimentally as may also the weight. Suppose it is found possible to locate the center of gravity of the counterweight 3 1-2 inches from the axis of the crank and that the maximum weight possible is 7 pounds and thickness = 1 inch.

$$F = 1.2276 \times 7 \times \frac{3.5}{12} \times 1{,}600 = 4{,}010 \text{ lbs.}$$

The pressure on bearing (*a*) will be:

due to counterweight 1 $= -4{,}010 \times \frac{9\frac{3}{4}}{11\frac{1}{2}}$

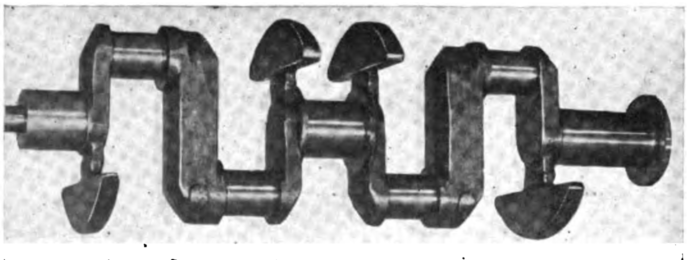


Fig. 6—Counterbalanced crankshaft which is designed to eliminate whipping at peripheral speeds

due to counterweight 2 $= + 4{,}010 \times \frac{1\frac{3}{4}}{11\frac{1}{2}}$

$$= -4{,}010 \times \frac{8}{11\frac{1}{2}} = -2{,}789 \text{ lbs.}$$

This being slightly more than necessary, the thickness may be reduced from 1 inch to:

$$2{,}570 \div 2{,}789 = .921 \text{ or practically } \frac{59}{64} \text{ inch.}$$

—L. J. PETRE, 13,242 Forest Hill road, Cleveland, O.

With a Car at the Front in France

(*Continued from page* 659)

As we approached Paris the control became particularly severe. Down the road the glitter of a bayonet would be seen and the word "Halte" would ring out. It was necessary to pull up sharply, for the sentinels in this part of France are territorials whose guns go off easily. Climbing a winding hill at a rapid clip, I had just made an unsuccessful attempt to avoid running down a cat when I became conscious of a figure dancing a jig in the center of the road ahead of me and pointing a bayonet at the car. It was an inexperienced territorial looking for the most vulnerable part of a car to attack with a bayonet. I relieved him from his embarrassment by pulling up a couple of inches from the end of his steel. Very cautiously he came round to the side of the car and demanded our papers, which were presented and examined in silence.

Barricades on Roads

On the outskirts of Versailles barricades had been put across the road. They consisted of two walls, each one-half the width of the road, placed on opposite halves and about 10 yards apart. It is possible to zigzag through them, but utterly impossible to go by at speed. As no lights are employed, it is necessary to keep a sharp lookout to avoid running into the barricades.

Two days before a group of German spies dressed as English officers had attempted to get into Paris with an automobile at night. They had actually got inside Versailles before their daring attempt was discovered. In consequence of this we were submitted to a searching examination at each post. To add to the difficulties it was discovered that we had been given the wrong password for that night. We were held up at the point of the bayonet while the guard was turned out and officers were brought. Fortunately among the officers there was a personal friend, who understood the mistake, and gave us the correct password, with which we could enter deserted Paris at 2 a. m.

At 8 a. m. that morning a start had to be made for the firing line. The trip was made through the forest of Villers-Cotteret, where a day before the French had destroyed a German motor train of sixteen vehicles. The train was entirely loaded with gasoline and was surprised by a body of French dragoons reconnoitering in the forest. By a well-directed shot the driver of the first truck was brought down. Deprived of its guiding hand, the vehicle zigzagged wildly about the road, causing the followers to collide with it. In the confusion of the attack fire broke out and in a few seconds those sixteen trucks were a mass of twisted iron.

Germans Wreck Cars

Automobile captures are rather rare. Whenever the Germans are hard pressed and have to leave their vehicles they generally find time to wreck them. The method usually adopted is to take off the radiator and throw it in the river if there is one near, or carry it away. The Allies are almost equally careful not to allow their cars to fall into the hands of the enemy; the result is that the country-side is strewn with wrecked cars. When this war is over the work of replacement will be enormous. Such a killing pace has to be maintained and the time allowed for adjustments is so short that even the best of cars must have a shortened life.

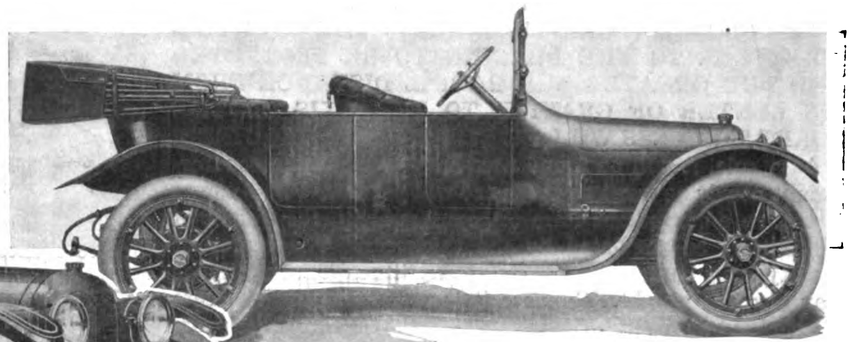
From what I have been able to observe, the Germans are making a greater use of motor guns than are the Allied forces. When the war broke out the English and French had very few armored cars. The Germans, on the other hand, had large numbers in readiness and certainly have used them with effect. With guns mounted on automobiles the Germans are able to keep up a steady fire until the enemy is almost on them and then get away in safety with the guns.

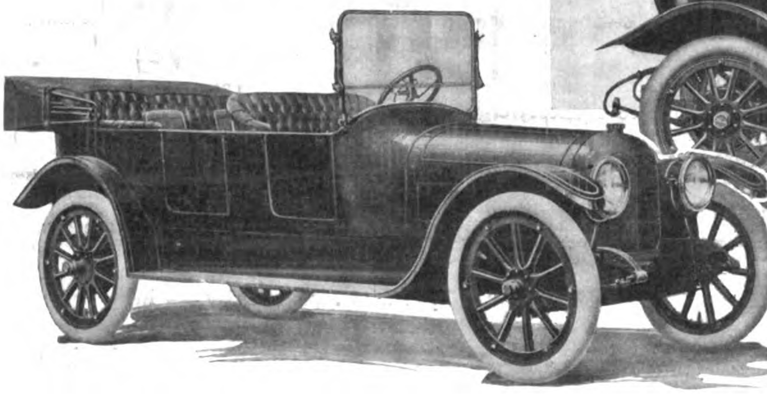
In a certain measure this inferiority of the Allies in the matter of automobile guns has been removed since the war broke out. The French army has obtained from the De Dion Bouton and Schneider factories a special chassis capable of carrying really heavy guns and with such provision that the guns can be fired from the chassis. When the gun goes into action the chassis is stiffened by a series of struts.

Coming through a certain town at midnight I was able to appreciate the important role played by automobiles in moving troops rapidly from place to place. In the wide avenues and public square of this town fully 1,000 touring cars and about 200 motor buses and observation cars were drawn up in orderly lines ready to move a mass of infantry. There was provision for moving 8,000 men at 25 miles an hour.

Apperson Adds New Four and Six

Line Now Comprises Two Fours and Two Sixes





Left—New Apperson 6-45 seven-passenger touring car selling for $1,785. Above—Apperson new 4-40 five-passenger touring car for $1,480

TWO entirely new cars, one a four and the other a six, have been added to the Apperson line for the 1915 season. This brings the number of models marketed by this concern, which is now in its twenty-third year, to four —two fours and two sixes.

The two new cars are similar in design, although the dimensions of the motors and the wheelbases are different. The new four, which is known as model 4-40, is built on a 116-inch wheelbase and has a 4 by 5-inch power plant with L-head block cylinders. The new six is known as model 6-45 and has a 3.5 by 5.125 motor, and also has the cylinders of L-shape in a single casting.

Both these cars incorporate many features of design which have hitherto been unknown to Apperson practice. In the motor castings the core work has been so arranged that the air before reaching the carbureter is drawn through a passage cast in the exhaust manifold, and passes along the heated metal. In the six this heated air scheme has been carried out even more thoroughly than in the four, as in this motor there is no exterior air pipe to the carbureter. In the four the air enters the passage in the exhaust manifold casting and is led through to the other side of the motor, and then by means of a flexible tube, to the carbureter.

Another unique feature that will be seen in the new Apperson is the method of carrying the spark and throttle linkage. As the carbureter is on one side of the engine and the magneto on the other, it is necessary to carry a transverse control rod. This has been neatly taken care of by a tube which passes straight through the motor casting acting as a bearing for this transverse shaft.

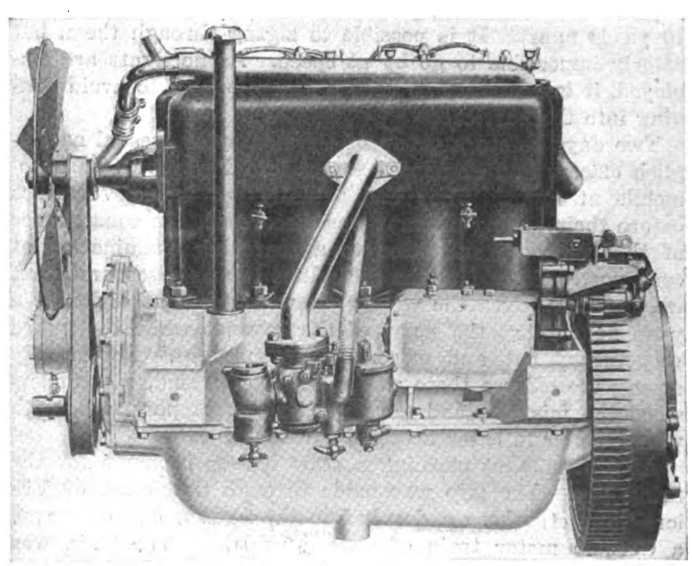
Narrower Turning Radius

While the suspension of the motor is the same as that of previous Appersons in that it is carried rigidly at four points, an alteration has been effected in the narrowing of the main frame, which not only provides a strong motor support with all the advantages of a sub-frame, but also permits of a narrower turning radius in steering the car.

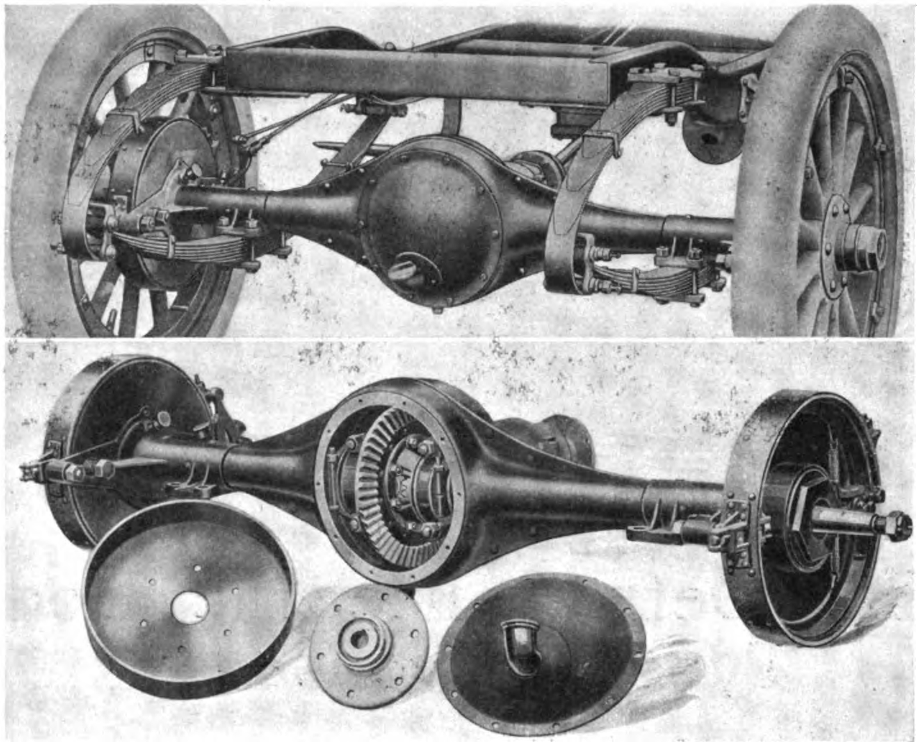
Force-feed lubrication to the main and crank bearings is continued in both the new four and six, but it has been improved in that independent force feed leads are also carried to the bearings of the camshaft.

The water-cooling system on these new Appersons is different from that employed on any other American car. The water is pump-circulated by centrifugal impeller mounted in in a casing forward of the timing gears. It is carried to the top of the water-jacketing instead of to the bottom as is the general practice. The casting which acts as the water outlet on the top of the cylinders is a double one, serving also the purpose of a water feeder. Baffle plates and partitions are so arranged in the cylinder casting that the water passes down on one side of the cylinder, and up on the other, forming a complete circulation. The baffling arrangement in the four differs from that used in the six. In the former the water enters the jacketing space on the left side, and flows downward to the bottom of the jacket and then up on the right side back to the radiator. On the six, the water is led along a space at the tops of the cylinders until it reaches the rear end of the motor, and then passing a horizontal partition, it flows back to the forward end, and then out to the radiator.

Some slight detail changes in the actual construction of the chassis will also be noticed. These are all in the line of lightening and simplifying the car without in any way detracting from its structural strength. The transverse shaft which carries the brake and clutch covers is an example of this. This shaft formerly extended all the way across the frame construction. It is now only one-half its former length, and is supported from the transverse angle bar that



Left side of four-cylinder motor used in Apperson 4-40, showing mounting of Rayfield carbureter and Bijur cranking motor



Upper—Rear construction of new Apperson cars showing small differential housing and underslung rear spring. Lower—Rear axle partially disassembled, showing brake construction

acts as the support for the forward end of the gearbox.

Another factor in the production of the very simple chassis is in the mounting and arrangement of the brake and clutch control members. Practically all of these are assembled directly in the gearbox cover plate. In fact, when the latter is removed, it carries with it the gearshifter lever, emergency brake lever, their bearings and supports and the shifter forks. There is now a flexible coupling between the clutch and gearbox which takes care of any misalignment between these two units. The fulcrum of the emergency brake lever is on a direct level with the floorboards. By this arrangement it is not necessary to cut any slot in the floorboards for the passage of the lever, but merely to have a large enough opening for the insertion of the pivot point.

Drive Taken Through Springs

The rear support of the gearbox is the same as in the past and the drive members from that point back are much the same. Double universal joints, floating axle, and double brakes, one metal-to-metal, and the other fabric, still remain features of Apperson practice. A feature that is an innovation on the new cars is that the drive is taken through the springs. The spring hangers are new, being in the case of the rear support integral with the frame gusset plates, and of strong ribbed section. The front brackets for the rear springs are also new, being of cast steel, and having a double T-section.

This season the Bijur lighting and starting system will be standard equipment. This is a 6-volt double-wire outfit capable, according to the Apperson engineers, of spinning the new four, under ordinary conditions, at a speed of from 90 to 150 revolutions per minute.

The bodies supplied with the new cars have been brought up to date in every particular. On both the 4-40 and 6-45, only the five-passenger touring style is at present supplied. These are painted a special grade of dark blue which the Apperson company has named Elgar blue. They are of modified streamline design with a rounded radiator, having a shield-like dome top, which moulds into the contour of the bonnet. All the control members and the instruments are mounted on a cowl board, which is slightly in-set so as not to interfere with the knee room of the driver. The price of the four with this body, including electric lighting, starting and full equipment, is $1,485, that of the six $1,785.

Power Plants of Similar Design

The power plants on these two new cars are similar in design, although the dimensions are different and there are many other differences in the actual construction. For instance, the piston rings on the four-cylinder model are three in number for each piston, while on the six there are but two. Both pistons, however, are fitted with oil rings. The length of the piston on the four-cylinder is 5.25 inches, while on the six it is 5 inches. The dimensions of the bearings of the crankshafts are also different. On the four-cylinder model, there are three main bearings, the crankshaft is 1.875 inches in diameter for all three bearings, and the lengths of these bearings are respectively 2.5, 3 1-16 and 4 inches for the center, front and rear. On the six, the crankshaft is 2 inches in diameter and is supported on four bearings, the lengths of these being respectively 2 13-16, 2, 2 and 3.25 inches for the front, two centers and rear. Connecting-rod bearings on the six are 2 inches in diameter and 2 inches in length.

The valve action on both models is inclosed by cover plates and is on the right side. The Rayfield carbureter is on the left, and the air intake is led from the opposite side of the motor as previously described. Carbureters are of different sizes, that on the four being a 1 inch, and on the six a 1.25 inch.

An Eisemann magneto forms the sole source of ignition current on both the four and six.

No change has been made in the contracting band clutch which has formed a part of Apperson construction for several years. The component parts of this clutch comprise principally a band and flanged drum. The band is contracted upon the surface of the drum by linkage somewhat similar to that used in operating a contracting brake. Directly behind the drum there is the flexible coupling and then the three-speed gearset which also has been unaltered for this season.

Small Differential Housing

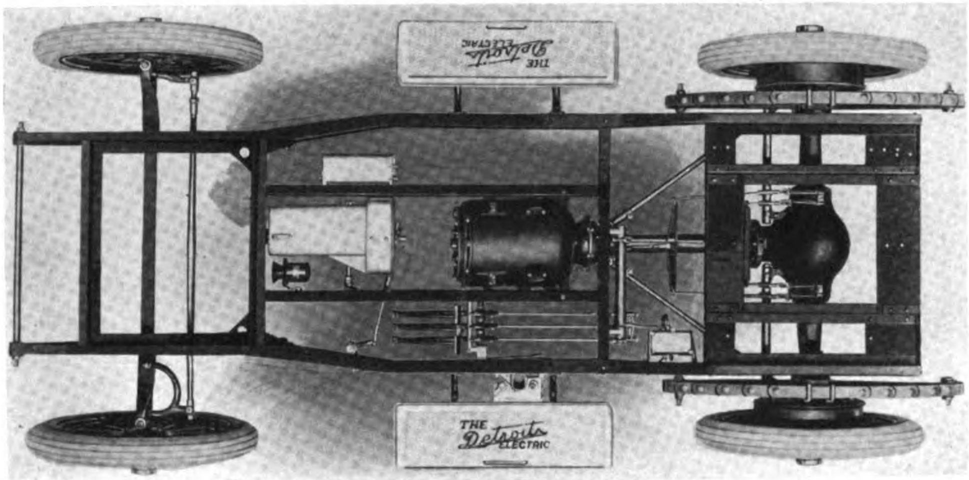
There are two universal joints in the drive and the torque is taken through the rear spring which is underslung on the two new models. The construction of the rear axle is worthy of attention in that the differential and drive pinion have been kept in an exceedingly small housing 6-16-inch thick.

The bearing equipment on both new cars is similar. Timken rollers are used for the pinion shaft and outer end of the axle, while Hyatt's are used for the differential in connection with a ball thrust.

Pressed steel has been used to advantage in many of the small fittings about the car, for instance, in the step hangers, rear tire carriers, and so forth, besides the axle housing and drums. Sheet metal stampings are used to support the muffler instead of the malleable brackets employed in former models. Wood wheels are used as standard on both the new cars, the tire sizes on each being 34 by 4 inches.

Left drive and center control is used on all Apperson cars.

(*Continued on page* 679)



Plan view of chassis used in new Detroit electric. Note controller in housing ahead of motor

Six Detroit Electric Body Types—Two Chassis

All Models Worm Driven Except One

WITH the manufacturing department of the Anderson Electric Car Co., Detroit, maker of the Detroit electrics, so situated that it will be possible to begin shipment of the 1915 models several months earlier than ever before, the concern is enabled to make an announcement of the details of these new cars at this time. No radical changes are made in the principles involved in the construction of 1915 cars as compared with the 1914 output, indicating that the Anderson company feels that it has arrived at a standard construction of approved excellence.

Five Worm-Drive Models

The 1915 Detroit electric offering will be six body types, five of which are mounted on a chassis of 100-inch wheelbase, while only one of them, a four-passenger rear drive brougham, is fitted to a chassis with 94-inch wheelbase. All of the models on the longer wheelbase have worm drive with the worm underneath the wheel and their battery is slightly larger capacity than that of the other model, which is fitted with a bevel gear rear axle. Wood wheels, with either Goodrich Silvertown cord or Motz cushion tires, or wire wheels, with Silvertown cord tires, are optional.

Prices are practically the same as they were, although due to greater refinement and finish they are in some cases slightly higher. Model 50 cabriolet is priced at $2,650 with lead battery and $3,530 with Edison battery; model 51, four-passenger brougham, at $2,850 with lead and $3,730 with Edison; Model 52, duplex-drive, five-passenger brougham, at $3,000 witih lead and $3,880 with Edison; model 53, forward drive, five-passenger brougham, at $2,950 with lead and $3,830 with Edison; model 54, rear drive five-passenger brougham, at $2,950 with lead and $3,830 with Edison; and model 55, rear drive four-passenger brougham with lead battery at $2,600. The last-named, model 55, is the 94-inch wheelbase car and corresponds to last season's model 43 selling at $2,550. Model 53 corresponds to the $2,850 car of 1914, while the duplex drive model 52 is the same in price as the one it succeeds of 1914, and so on.

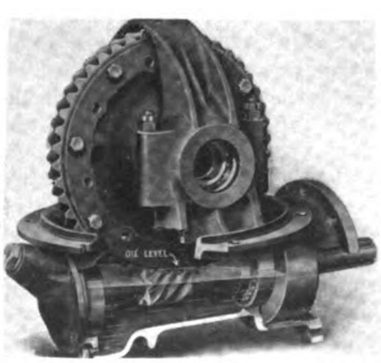
Battery Capacity Increased

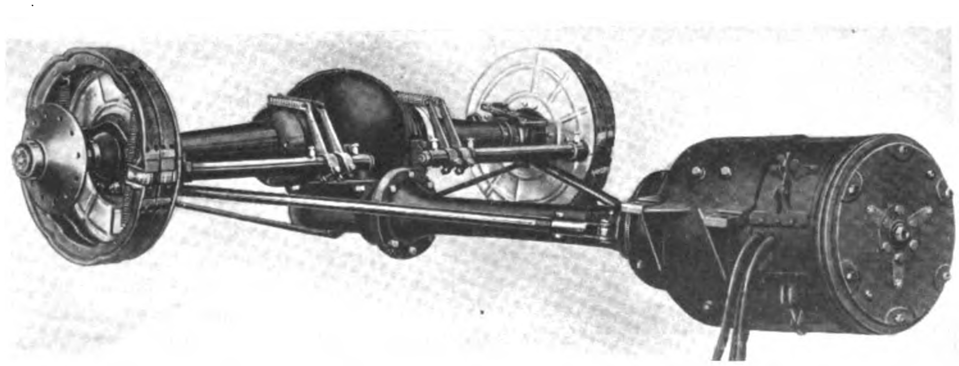
Battery capacity has been somewhat increased, and though the number of cells is the same as last year, the number of plates per cell has been increased from 13 to 15, this referring to the lead batteries. That is, the 100-inch wheelbase cars have 42 cells of 15 plate type instead of 13 plate, while the 94-inch has 40 cells, also 15 instead of 13 plate.

A new feature of importance is the metal compartment ahead of the motor and accessible through a trap door in the floor, in which is mounted the controller mechanism, brake on the head of the motor, the Klaxet horn, which replaces a bell as a warning signal, the ammeter shunt and the throw-over switch used to change the lighting connections from one-half of the battery to the other. The trap door is fastened in and prevented from rattling by rubber rollers. For additional protection, the controller has an extra cover of its own which can be removed by loosening two clips. To remove the controller from the car it is only necessary to disconnect the cables and remove three screws, when the controller can be lifted bodily through the trap door.

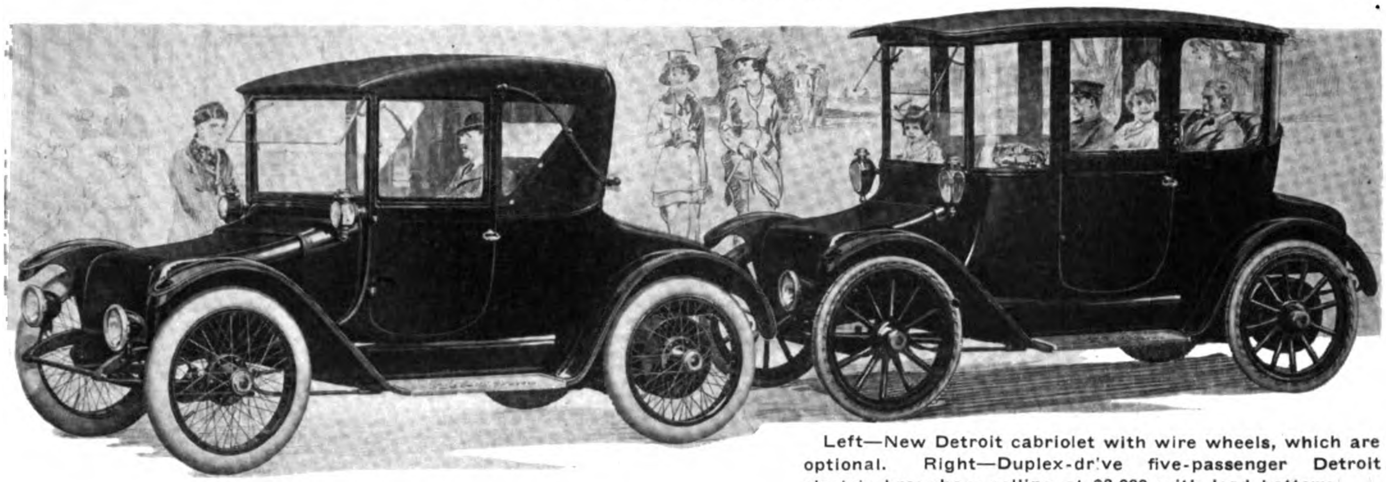
Due to this new controller location and also to a new scheme of wiring whereby all wires are led to a terminal board provided under the left end of the rear seat and all wires leading up from the chassis and down from the body are connected to numbered positions on this terminal board, it is a very easy matter to take the body from the chassis without in any way disturbing the wiring.

Detroit electric bodies, which are constructed entirely in the





Left—Lanchester-type worm gear used in the Detroit electric. The worm runs in a bath of oil. Right—Drive unit, showing underneath worm and inclosed propeller shaft



Left—New Detroit cabriolet with wire wheels, which are optional. Right—Duplex-dr've five-passenger Detroit electric brougham selling at $3,000 with lead battery

company's shops, are examples of the highest art in coach work and are even more refined than in the past. The door windows are sashless and fitted with a new type of window lift to replace the hand lifting by means of straps. It is merely necessary to turn a small nickel-plated handle to raise or lower the glass the desired amount.

As an illustration of the refinement to which the body construction has been carried, aluminum drip moldings have been placed over the doors to prevent water from dripping upon those entering or leaving the car on a wet day. Door panels are of solid sheet aluminum with moldings pressed in, thus entirely eliminating the separate moldings formerly used. The window sashes are all metal covered, eliminating the possibility of checking or warping.

Steering continues to be by means of a horizontal lever mounted parallel with the control lever, the latter being operated by the left hand and when advanced accomplishes the forward or reverse movement of the car. In reversing, the control lever is first brought to neutral position, raised slightly until it comes in contact with a stop, and then advanced in the usual way. When brought back to neutral again after reversing, it automatically drops into normal position for running forward, making it impossible to start the car backward when it is desired to go ahead after having reversed the car.

Interlocking Emergency Cut-Out

There are two brake pedals, each of which operates independently a pair of internal expanding brakes on the rear hubs. Between the brake pedals is a third small pedal which operates the emergency cutout switch and sets the brake ratchet. A pressure of the foot on the three pedals at once cuts off the power, regardless of the position of the control lever and locks both hub brakes. It is then impossible to release the brakes until the control lever is returned to its extreme backward position. A Yale locking device is also provided.

In the duplex control models, the interlocking cut-out feature also prevents starting the car from either driving position unless the pedals are in position to operate from that seat. In these models providing drive from either seat, there are two sets of steering and control levers and two sets of brakes. The operation of shifting pedals from one driving position to the other has been simplified. This is accomplished by pushing forward the small lever at the side of the front steering mast head, which releases the brake pedals so that they can be pushed with the foot flush with the toeboard. This automatically locks the pedals which have been pushed down and raises the other set of pedals to the operating position.

As heretofore the battery is carried in front and rear compartments and the jars are of the high ribbed type, making it unnecessary to wash the plates. Mileages of from 50 to 85 miles per charge are obtained. There are in the 100-inch wheelbase models eight trays placed lengthwise of the car, four under the front hood and four under the rear.

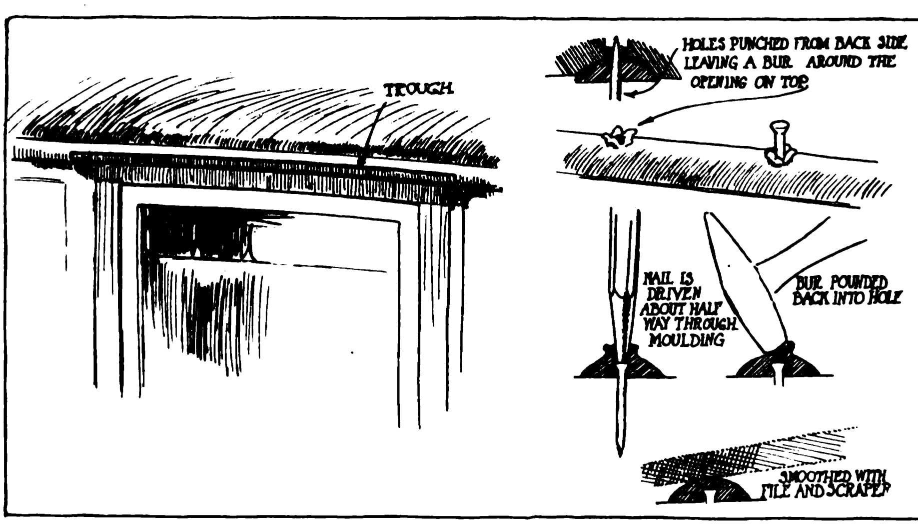
The drive system is practically the same as it was, the motor, torsion tube and rear axle being in unit. The motor is series wound and is said to have high torque characteristics and very low internal resistance. It is held on the under side of the supporting rails by large steel bolts so that it may be released and easily lowered to the ground.

Lanchester Type Worm Used

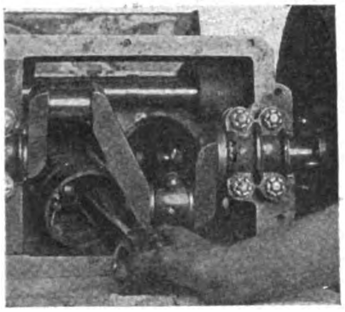
The Lanchester type of worm gear which is used on all the models excepting the one mentioned is of the type in which the worm is below the wheel and runs continually in a bath of oil. Axles are floating, while the housings have been somewhat re-designed in order to give them greater strength while reducing the weight.

The brakes used have been improved by the addition to the drums of stiffening flanges. Both brakes are internal expanding and measure 16 inches in diameter by 1 1-4 inch width.

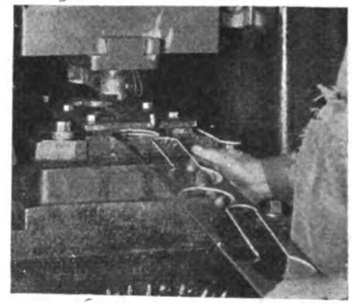
(*Continued on page* 679)



Left—Aluminum drip moulding placed over the doors of Detroit electrics to insure dry entrance and exit on a rainy day. Right—How the nails are concealed in applying mouldings to Detroit Electrics



The Rostrum



Advocates Engines Running Over 1,500 R.P.M.

EDITOR THE AUTOMOBILE:—*I have just read the article by a British writer, on the slow and high-speed engine, published in your September* 10 *number, page* 490, *but cannot agree with his views.*

It is true, of course, that the measure of efficiency in an engine which has to propel itself, as is the case with an automobile or aeroplane engine, is the ratio of its power to weight, but it hardly seems credible that the author can believe that the highest results can be obtained with an engine running 1,500 *revolutions per minute; for if he but look at any of our recent high-speed engines he will receive a surprise. Take for example the Deltal engine described some time ago in your columns. This engine develops about* 90 *horsepower at* 3,000 *revolutions per minute and weighs* 570 *pounds with carbureter and magneto. This is* 1 *horsepower for every* 6 1-3 *pounds.*

I would like very much to see an engine of any piston displacement whatever which can produce this ratio of power to weight at 1,500 *revolutions per minute.*

Nor is the above engine of the double-valve, over-head type which has shown even better results in racing. It is merely a large-valve, L-head type of good design.

As to aeroplane engines running at about 1,500 *revolutions per minute, this is because these engines are run most of the time at nearly their maximum power and it is not advisable to run an engine where such extreme reliability is required at* 3,000 *revolutions per minute even though modern engines are very reliable at that speed. In an automobile, however, it is desirable to have an engine capable of extreme speed and power when such may be needed, even though the engine is not regularly run at such extreme speeds. Also, the modern, high-speed engine, which gains its power by large valves and not by extreme valve timing, will not show much if any difference in power compared with the low speed type at* 1,000 *revolutions per minute.*

Southport, Conn. EDWARD G. INGRAM.

Reader Gives Views on Modern Gas Engine Design

EDITOR THE AUTOMOBILE:—This subject should interest those contemplating a change in their power plant and will aid those who attempt to solve the problem of making a purchase by a study of numerous designs as displayed in the many trade papers.

I note that there are something like 200 different motor designs with no two alike. There is also a total lack of similarity in power rating for a given bore and stroke. There are high-speed, medium-speed, and low-speed, sometimes called high-duty or heavy duty for a given horsepower. The price is generally high and the weight is generally heavy. The term is a very vague and misleading one and any prospective buyer to insist on such an installation for a speed boat would be considered joking. High whether used in connection with speed or power means the same. Consider an engine with, say, three cylinders 5 by 5, at 800 revolutions per minute. It develops 25 horsepower and weighs 500 pounds. It may be a heavy engine compared with another of the same power or where three cylinders 4 by 4 at 1,200 to 1,300 revolutions per minute develops 28 horsepower. In the latter case we have high power with light weight and this is a most desirable power plant for a boat outside of a heavy fishing boat with full lines and where weight is not a detriment.

There is also another perplexing consideration and the more the average novice studies catalogues and sectional cuts the more confused he gets and the more convinced is he that there are no fixed laws governing engine design as applied to the two-cycle marine engine at least. The most amusing part of it is how one concern will claim a decided advantage for a feature another will condemn. The detachable cylinder head feature is one so amusing to me that I fail to see how some concerns can muster sufficient nerve to blow about a feature others avoid and in doing so resort to all kinds of intricate castings besides adding to the cost of machining the bore with a closed end. This is true in the highly developed standard automobile designs. There are, however, some exceptions. For structural reasons a solid head would be impracticable, as in the silent Knight or engines with valves in the head; and some of those prefer to use valve cages rather than add a needless joint at a point where the jacket is most essential, when otherwise surplus metal to retain studs would restrict the circulation besides tending to distort the bore by unequal expansion.

Personally I prefer to increase the volume of water space at the head and reduce it to the practical limit at the lower end, this reduces the tendency to form a rib where the jacket stops on the bore and aids circulation by convection.

Carburetion is getting to be a problem due to low-grade gasoline and while the automobile engineer has ideal conditions due to an inclosed engine kept warm by its own heat no car is considered up to date that does not make provision to heat the charge leaving the carbureter by some means and all modern carbureters are provided with an attachment to heat the primary air by means of a sleeve fastened to the exhaust pipe connected by a tube or flexible pipe and yet there is a painful absence of any marine engine so fitted, to combine the inlet and exhaust pipe does seem the logical method of retaining a mixture after it leaves the carbureter were it not for the fact that the exhaust pipe is not the same temperature at any point compared with that of some other. If we take a three-cylinder, the charge entering the cylinder at the end (outlet) of the exhaust pipe comes in contact with the total heat of three cylinders, the charge entering at the middle cylinder comes in contact with that of two units, while that entering the other has a heat contact of the cylinder it enters only. This is a condition tending to graduate the density of the mixture into lean, medium and rich, which in turn causes no two cylinders to be of the same power and may account for backfiring in one or the other according to the adjustments used, or if a change is made to eliminate backfiring the over-rich cylinder will four-cycle, which is equally bad and wasteful. I would recommend that sufficient heat be absorbed by air entering the carbureter to make and retain a uniform charge of such a nature that condensation is prevented.

The dangers arising from the backfiring bug-a-boo while real are simply due to a lack of sufficient fuel rather than a defect in design. If we trace the cause of the backfiring we will find regulation will stop it. This may be done by enriching the charge or by the more logical method of air scavenging the cylinder.

Cleveland, O. JAMES MCINTOSH.

Description of Delco Circuit-Breaker

Editor THE AUTOMOBILE:—Will you please explain what the circuit breaker on the Delco system is for and how it operates?

Chicago, Ill. H. M. W.

—The circuit breaker used in the Delco system is for the purpose of interrupting the circuit between the source of current supply and the lamps, etc., when a wire becomes grounded. The source is the storage battery or the generator, depending on which happens to be furnishing the current.

It consists of an electro magnet with a single winding and it opens and closes the circuit leading to the lamps, horn and ignition through contacts A, Fig. 1.

When there is a ground or short circuit in one of the wires, it causes an excessive flow of current which goes through the winding of the circuit-breaking relay. The increased current produces a magnetic pull between the pole piece B and the armature C, which in turn causes the extension D of the armature to give a hammer blow effect on the point E and cuts off the current supply. The opening of the contact kills the magnetic pull between the pole piece B and the armature C and the contacts close again, but are opened as soon as contact is made. The relay will continue to vibrate until the ground or short circuit is removed. The spring F is for the purpose of holding the armature away from the pole piece.

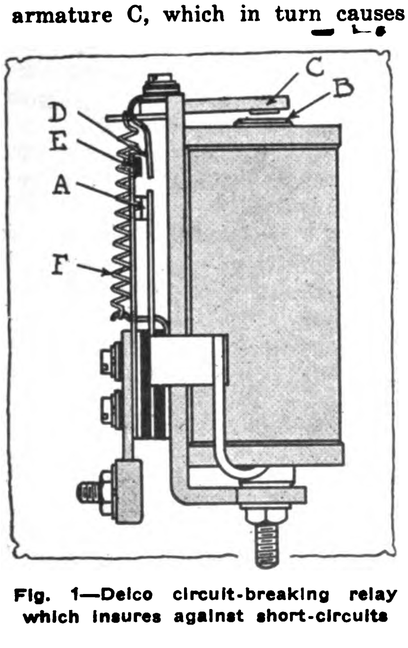


Fig. 1—Delco circuit-breaking relay which insures against short-circuits

A current of approximately 25 amperes is required to trip the circuit-breaking relay, but after it is in operation a current of approximately 5 amperes will cause it to continue vibrating until the ground or short circuit is removed.

The function of the relay is the same as that of a fuse except that it eliminates the necessity of replacing fuses or fuse blocks.

How to Wire Master Vibrator

Editor THE AUTOMOBILE:—Will you please give me an illustration showing how to connect a master vibrator to a four-way coil on a 1914 Ford?

Ilion, N. Y. R. B. FISK.

—A typical wiring diagram is that of the K-W Master

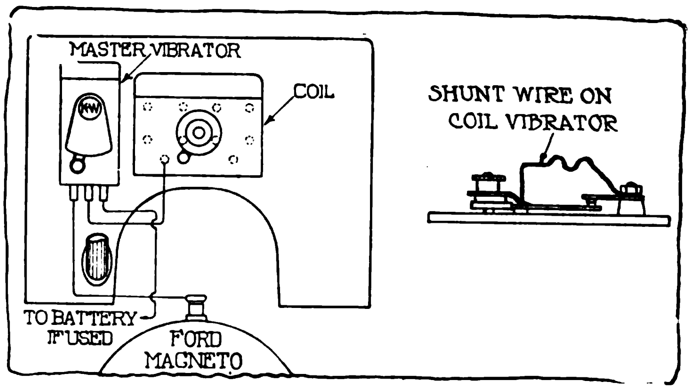


Fig. 2—Left—Diagram showing master vibrator attached to Ford. Right—Shunt wire for short-circuiting individual vibrators

vibrator shown in Fig. 2. The wiring diagram is easily understood. The master vibrator is mounted in a convenient place on the dash, either at one side of the coil or directly on it. The usual place is just above the steering post on the left side of the dash, as shown in the diagram. The switch of the vibrator is used to start and stop the motor, and the switch on the coil is thrown over on the lead that connects to the master vibrator. None of the timer leads or spark plug wires are disturbed.

It is important that the vibrators on the coil be short-circuited, either by screwing them down tight or by bridging them with copper wires, the latter method is better. This is done by attaching a small copper wire, as shown in the corner of the illustration.

How Rotary Valve Is Timed

Editor THE AUTOMOBILE:—In your issue of September 24, page 581, Mr. Furst asks about timing a rotary valve engine. Your reply does not coincide with my experience with those engines, so I take the liberty to reply. A rotary valve which turns at half crank speed is a very fast valve and so opens quicker than the usual poppet valve, and on this account does not need to be opened so early. Of course, much may depend on the design of the valve, but such engines as I have built with rotary valves had this advantage. One of them was exhibited at the New York show in 1907. A recent table published in the *Motor Age* gives the timing of sixty engines and the average, as I remember it, is about as follows: Exhaust opens 45 degrees before center and closes 8 after, followed at once by the inlet opening. The time of closing of the inlet is not a matter of valve but of pipe. If the inlet pipe is long, the valve should remain open long, because the gases once started in the pipe will continue to ram in for an appreciable time. With the above timings Mr. Furst will get good results and high speeds if his valve is properly proportioned. The rotary valve gives not only

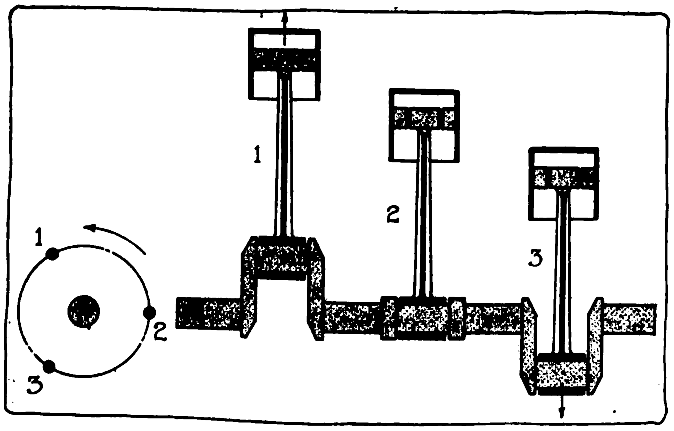


Fig. 3—Diagram showing inertia forces tending to rock a three-cylinder motor

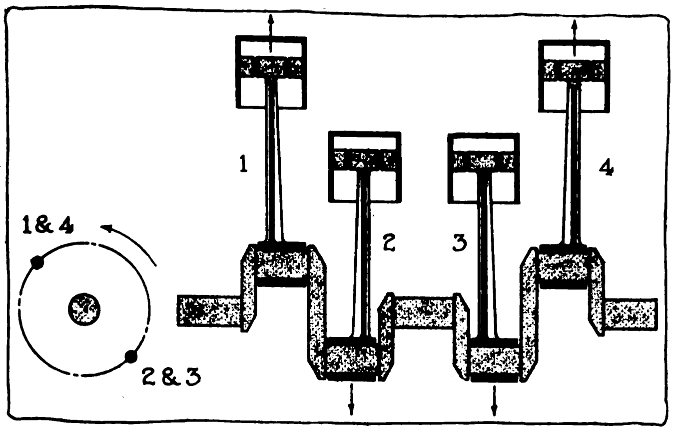


Fig. 4—Diagram showing that in the four-cylinder motor the inertia forces are balanced and there is no tendency to rock the motor

a quick opening but the passage is nearly straight and this lets the gases pass freely and fast.

Philadelphia, Pa. CHAS. E. DURYEA.

Why Not a V Six-Cylinder Motor?

Editor THE AUTOMOBILE:—1—Why was a three-cylinder, four-cycle engine never marketed in an automobile?

2—Would it be practicable to build a six-cylinder engine V shape such as the new Cadillac, but with a three throw crankshaft? If not, what would be the disadvantages?

3—What is the object of automobile manufacturers putting out their new models in Midsummer and Fall instead of Spring?

The farmer is a big factor in buying automobiles today and he would rather buy in the Spring than Fall because he gets little use of a machine in Winter. A new machine bought in the Fall would stand unused nearly all Winter and when Spring comes he hesitates on buying because he knows that there will be new models out in a few months. The early Spring is the time most people get the automobile fever worst.

E. St. Louis, Ill. A SUBSCRIBER.

—1—The objection to the three-cylinder motor is that it is subject to rocking in a longitudinal direction due to the unbalanced moments produced by the inertia forces incident to the reciprocation of the pistons and connecting-rods. Also, while the power impulses may be evenly spaced, they do not occur with sufficient frequency. It has generally been conceded that four cylinders is the minimum.

In understanding the lack of balance in the three, consider first of all the inertia force produced by a single piston and connecting-rod. When these masses are increasing speed, there is a reaction on the motor in the opposite direction to the motion and when they are decreasing speed, there is a reaction in the same direction.

For example when the piston is starting from top dead center its acceleration produces an upward pull, while when it is slowing down, as it nears lower dead center, a downward pressure is exerted. On the up-stroke, the acceleration of the piston causes a downward reaction on the motor and when it slows down near the end of the stroke an upward force is created.

Therefore when the piston is above mid-position the pull is upward and when below, downward. With number two piston and connecting-rod half through the stroke, number one is just beginning and number three is ending the down stroke. There is an upward pull on number one, zero pull on number two and a downward pull on number three, as shown in Fig. 3. One-half revolution later these forces are reversed and the tendency is to rock the motor in the opposite direction.

In the four, all-in-line six and V-type eight this tendency to rock is not present because the moments are balanced. This is shown by Fig. 4. In this motor, which is typical of all four-cylinder designs, the reciprocating parts are symmetrically arranged. When the piston in number one cylinder moves down, so does that of number four. Likewise, when number three piston goes up, number two does also. Therefore, if there is an upward inertia force due to number one there is an equal upward force due to number four. Also, the downward force of two is matched by that of three. The result is that no rocking can take place.

2—The same lack of balance in the three is also present in the six-cylinder V-type, which is merely two sets of three with a 90-degree interval between them. The six also has the disadvantage that the explosions are unequally spaced. With the crank throws 120 degrees apart and two connecting-rods attached to each throw, the explosion will occur alternately at 90-degree and 150-degree intervals.

One advantage of this type of motor, however, would be a shorter overall length and a shorter crankshaft, and camshaft, but the cam followers would be more complicated.

3—There are several good reasons for this practice. Manufacturers from year to year have brought their models out earlier in order to be the first in the field and get the lion's share of the business. Also, when Midsummer comes a man that is in the market for a car hesitates to buy one of this season's models because the year is half over; he would rather wait and get a machine built for next year's trade. If some of these new models are available in the Fall he will buy, but if not, he will wait until Spring. Thus, the Fall is converted into a good selling season. In addition, closed cars are now used more than ever, with the result that there are a great many sold in the Fall. People buying these cars, however, would probably defer purchase in a great many cases, if they could not obtain new models.

Thus it is seen that instead of the selling season being confined to the Spring months it is now spread fairly well throughout the year, by this policy. This facilitates production and allows the manufacturer to operate at a more nearly constant rate, instead of rushing manufacture in the Winter and Spring and closing down in the Summer, as used to be the case.

Circulation Stopped—Motor Heats

Editor THE AUTOMOBILE:—1—I have a model 10 Buick and am experiencing quite a little trouble with the cooling system. After running for a few minutes the water boils away rapidly. The radiator inlet pipe becomes very hot as does the extreme top of the radiator. The rest of the radiator remains cold and the outlet to the pump, as well as the pump remains cold. I have had the pump apart and it seems in good order. The radiator drains out all right.

2—When running on high the car occasionally indulges in back jumping and I suspect the clutch or the planetary transmission. It seems to occur most frequently when the throttle has just been opened a slight amount. It has a Schebler carbureter, well-adjusted and the newly fitted Bosch, independent magneto gives perfect ignition.

Hollis, L. I. R. M. DE VIGNIA.

—1—Either your pump is not working or the cooling system is stopped up. The fact that the pipe running to the radiator is hot and the lower part of the radiator and the piping to the pump is cold, shows that there is no circulation. Look for loose pieces of hose or dirt in the piping; see that the radiator is clean and examine the pump once more.

2—Due to wear in the bushings in the interior of the mechanism, the three fingers that engage the clutch are now too long and should be shortened by 1-8 inch by bending them that amount. Then adjust the clutch by the turnbuckle under the floor boards. First pull the hand lever back until it clicks, there being a notch with which it registers at this point. Then tighten the turnbuckle until the clutch just begins to take hold.

Increase of Tire Pressure with Heat

Editor THE AUTOMOBILE:—1—Kindly forward to me figures regarding the increase of tire pressure per degree of heat.

San Diego, Cal. H. F. WHITE.

—The increase in pressure for a given rise in temperature can be calculated by the formula:

$$P = \frac{P_1\,(459 + T)}{459 + T_1}$$

Where P_1 = the initial pressure
T_1 = the initial temperature
P = the final pressure
T = the final temperature

P and P_1 refer to the absolute pressure—which is merely the sum of the gauge pressure plus atmosphere, or 14.7 pounds.

If the pressure to which the tire is inflated is 60 pounds and the temperature is 60 degrees then if the temperature should rise to 100 degrees, the new pressure may be calculated by substituting in this formula.

$$P = \frac{60\,(459 + 100)}{459 + 60} = 64.7$$

This represents an increase of 4.7 pounds..

Why Advance Spark Means Economy

Editor THE AUTOMOBILE:—1—Please publish in your paper where the Rayfield cyclecar is made?

2—Why does a car run on less gasoline with the spark advanced.

3—What is the advantage of a spark lever?

Marathon, Iowa. O. A. SMITH.

—1—Rayfield Motor Co., Fisher Building, Chicago, Ill.

2—This is only partly true. There is a limit to the amount the spark can be advanced to improve the economy of the motor. The spark lever should be set so that the greatest power is obtained from the charge. This means that it should merely be advanced to this point. Further movement will cause a decrease in economy. Under a given set of operating conditions the economy is greatest when the motor is operating most efficiently.

Figs. 5, 6 and 7 show three indicator cards, the one at the top showing the effect of very early ignition, the middle one, point of best ignition, and the lower one too late position of the spark. The horizontal distance represents the piston stroke to a certain scale and the vertical distances the pressures in the cylinder at various piston positions. The cross indicates the position of the spark in each case.

It will be noted that the center diagram has the largest area and, as the area is proportional to the power developed, it will be seen that this diagram indicates the greatest power development, or, under a given set of conditions, this position of the spark is the best for economy.

The spark occurs just before the piston reaches the top of the stroke, combustion takes place almost immediately and the pressure rise is indicated by a line that is almost vertical. About the time the pressure has become a maximum, the piston has started out on the power stroke and expansion begins.

With the spark advanced too far, as shown in the upper diagram, the area is reduced. The spark in this case occurs considerably before the piston has reached the top of the stroke, with the result that the explosion line is farther to the left. Nor is it quite straight because the piston is moving fast enough at this point so that it moves an appreciable distance while combustion takes place. Since the pressure rise is probably completed before the piston gets to top dead center. the gas is slightly compressed during the completion of the up-stroke. This may form a slight loop at the apex, as shown.

When the spark is retarded, the piston has already started on the expansion stroke before the ignition takes place. This causes the compression line to double back on itself until the point of ignition is reached when there is a rapid rise of pressure. The top of the card is rounded off, however, due to the acceleration of the piston.

3—The spark lever is for the purpose of enabling the operator to set the time of ignition at will to give best economy and power.

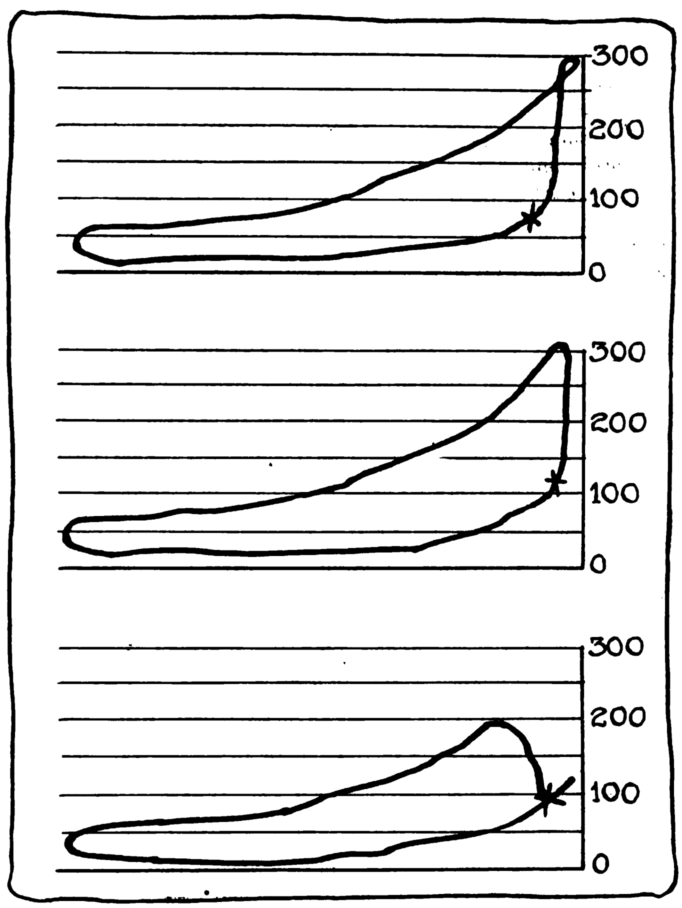
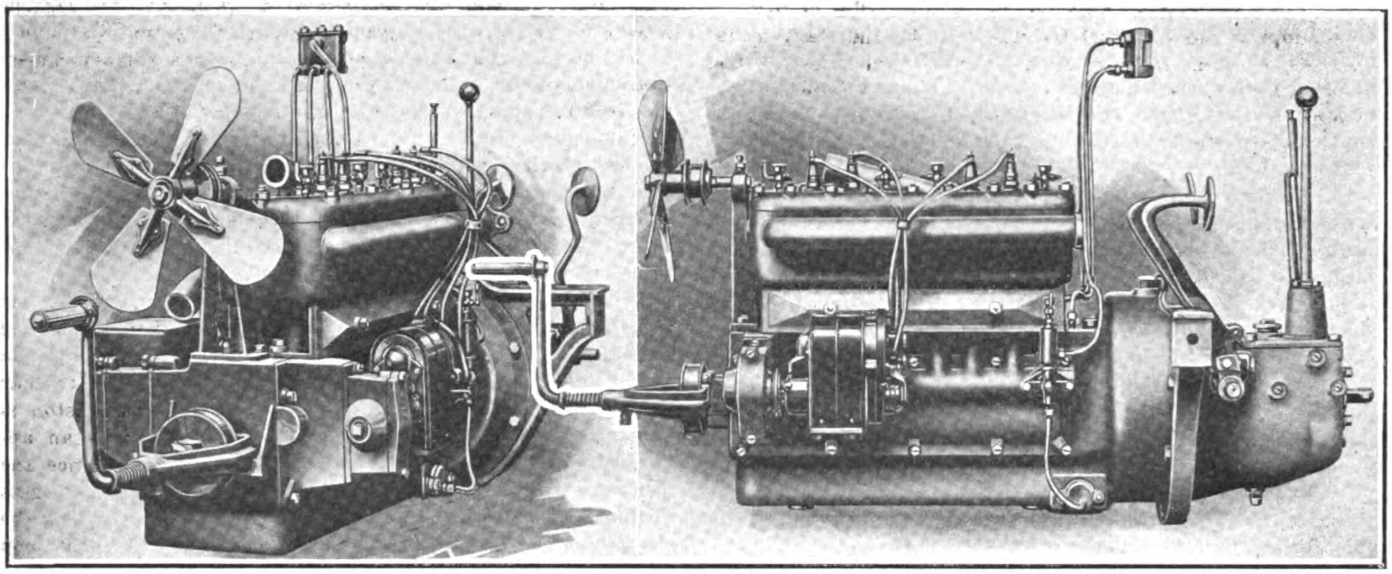


Fig. 5—Upper—Indicator card showing spark advanced too far and consequent reduction in card area

Fig. 6—Middle—Spark properly timed and occurring slightly before dead center. This position gives a maximum area

Fig. 7—Lower—Spark very late. Showing the reduced area and consequent loss of power



Left—New small-car motor showing the general construction. Note the method of supporting the crank handle by means of a yoke. Right—Left side of new power plant illustrating the mounting of the magneto, and the oiling system

G. B. & S. Small Car Unit Power Plant

Weighs 392 Pounds—Easily Installed—Bore 3¼, Stroke 4¼—Detachable Cylinder Heads

ON October 1 the Golden, Belknap & Swartz Co., Detroit, starts production of a new powerplant adaptable to small-car installations. This is called model D and its total weight with gearset, clutch, magneto, motor-generator and carbureter is 392 pounds.

Like previous designs of this make, model D is a unit power plant type arranged for three-point suspension. The gearset bolts to the flywheel housing. The rear motor support with an arm extending for attachment to each side member of the frame is interposed between the flywheel and gearset housings as in former G. B. & S. practice. A special point is made of the simplicity of the application of the motor to any small chassis. It requires only the drilling of one hole through each side of the rear motor support and the insertion of two bolts when the motor is swung in the car frame ready to attach the drive shaft, the front end of the motor fastening with two bolts to a front cross-member of the frame.

The motor, 3 1-4 by 4 1-4 inches, has the cylinders cast in block with valves on the left. The horsepower rating is 17 at 1,000 r.p.m. with 141 cubic inches piston displacement.

Detachable Cylinder Heads New

New to G. B. & S. construction is the detachable cylinder head which is in the form of a single plate securely held in place by steel bolts and exposing all valve pockets, valves, piston heads and cylinders when removed.

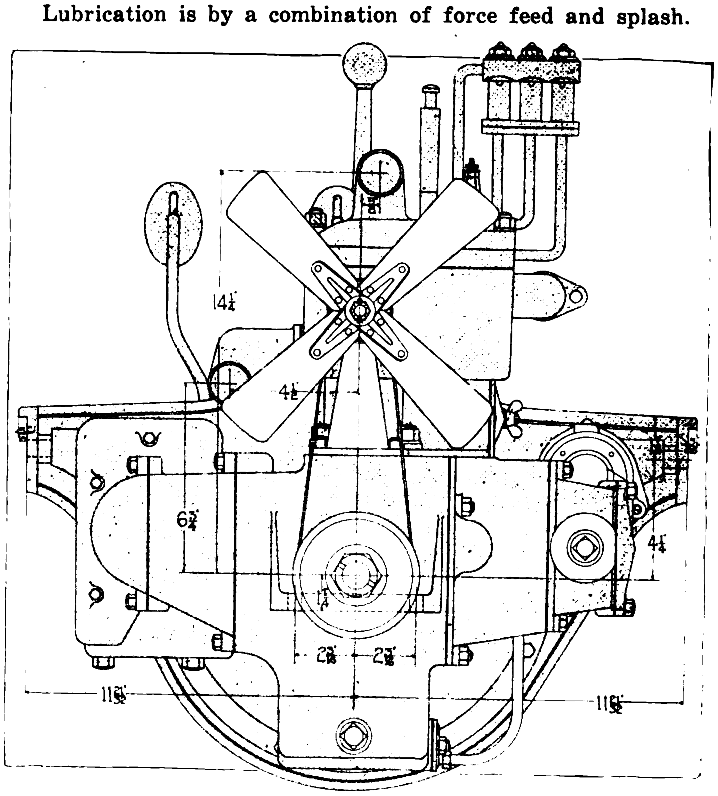
Valves are completely inclosed by a plate readily removed by unscrewing two wing nuts. The valves have cast-iron heads with steel stems. The crankshaft has three large main bearings of nickel motor babbitt.

Silent-Chain Drive

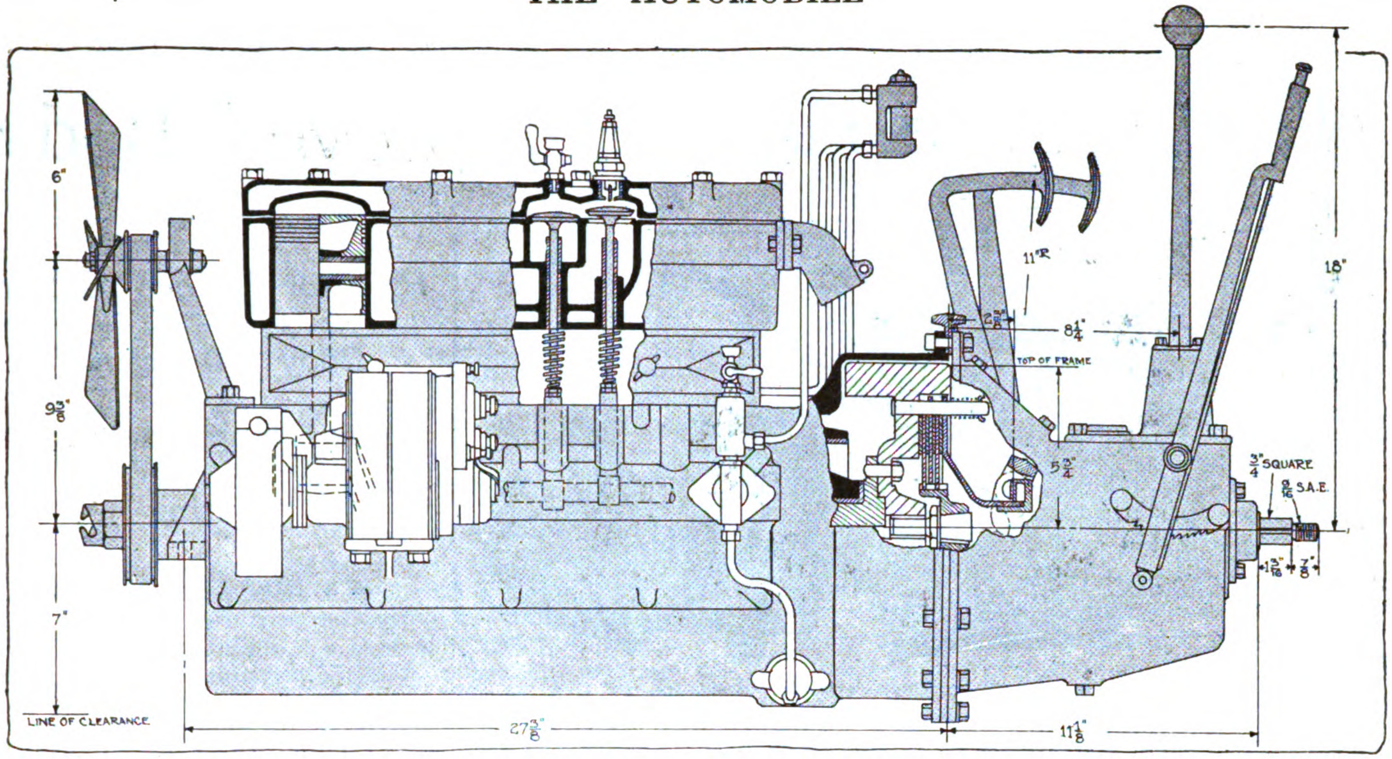
A noteworthy feature is the use of silent-chain drive for the camshaft, magneto shaft and generator shaft. These run in a bath of oil, being completely housed at the front of the motor, and may be adjusted by the insertion of shims of varying thicknesses between that portion of the housing carrying the magneto or generator shaft sprocket and the main housing, this serving to slightly increase or diminish the distance between chain centers. These special shims are furnished by the manufacturer.

The motor is arranged for thermo-syphon cooling with large water connections.

Lubrication is by a combination of force feed and splash.



Front view of motor with the principal dimensions given



Left side of motor partly sectioned and with the principal dimensions given. The overall length is about 44 inches

The motor is equipped with a force-feed oiler, operating from No. 4 exhaust cam. The oil is forced from the oil reservoir at the bottom of the crankcase to the three-feed dash dial, and thence through three pipes leading to the three main bearings. An oil level is maintained in the crankcase from which connecting-rod bearings and pistons are lubricated by the splash from the dipping of the connecting-rod ends.

Motor-Generator System Used

The magneto is carried on the left and symmetry and balance of accessories are obtained by placing the generator and starter on the right. The motor-generator which has been used extensively on this motor is of Apple make, but any one of the well-known makes may be fitted equally well in which the combination of motor and generator is made applicable. The ratio between generator and crankshaft is 2.5 to 1, so that either when cranking or when being driven for generation of current the unit travels 2.5 times as fast as the motor.

Fitted to the motor is a three-speed selective gearset. The power comes to it through a four-plate disk clutch, two of the plates steel and two faced with asbestos woven wire. Pedals and center control levers are a part of the assembly as furnished.

The principal dimensions of the power plant are:

Crankshaft front bearing—1 1-2 by 3 1-2 inches.

Crankshaft center bearing—1 5-8 by 2 1-4 inches.

Crankshaft rear bearing—1 5-8 by 4 inches.

Connecting-rod bearings—1 1-2 by 2 inches.

Flywheel diameter—11 3-4 inches.

Flywheel width—3 13-16 inches.

Crankcase bell housing diameter—12 by 14 inches.

Overall length of power plant from face of fan to end of drive shaft—44 inches.

Distance from center of holes of front support to center of holes in rear support—37 3-8 inches.

Distance from center of holes of rear support to rear of gearcase—11 1-8 inches.

Distance from rear of gearcase to end of drive shaft—2 1-16 inches.

Width of rear support—23 15-16 inches.

Crankshaft center to top of water connection—14 1-4 inches.

Crankshaft center line to top of fan—16 3-8 inches.

Crankshaft center line to extreme bottom of motor—7 1-2 inches.

Extreme width of motor exclusive of rear support—20 inches.

Weight without gearset, clutch, magneto, motor-generator and carbureter but with crankcase and oil base—285 pounds.

Weight magneto, motor-generator and carbureter—67 pounds.

Weight gearset and case, pedals and clutch—40 pounds.

Total weight power plant complete—392 pounds.

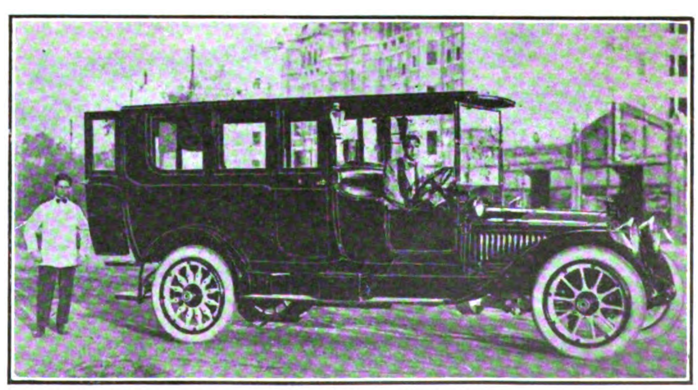
Valve diameter outside—1 13-16 inches.

Valve diameter clear opening—1 5-8 inches.

Valve lift—7-32 inch.

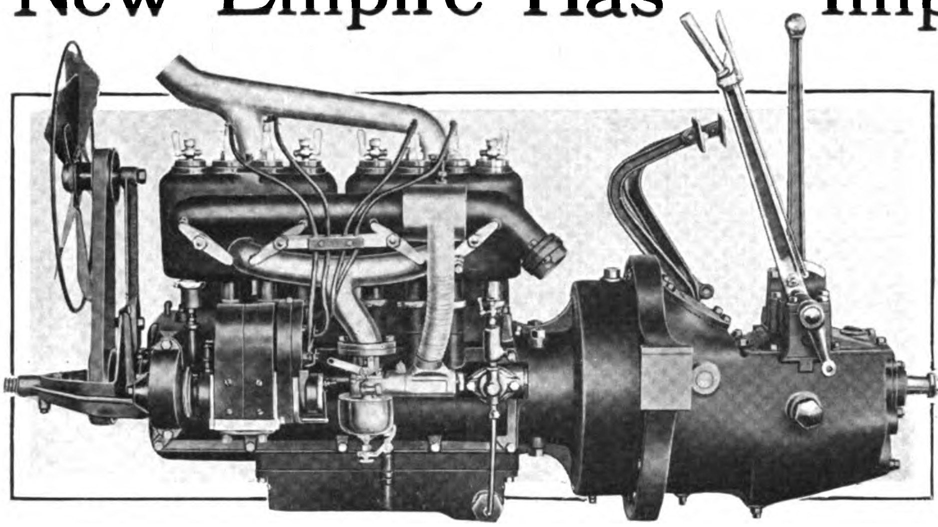
Big Packard Ambulance for Newton, Mass.

A luxurious ambulance has recently been delivered to a hospital in Newton, Mass., by the Packard Motor Car Co., Detroit, Mich. The ambulance is made up with a roomy closed body, electrically lighted, having ample windows for light and air, with doors on the side and rear and mounted on a 2-38 chassis. It has a gong, powerful searchlights, will climb almost any hill encountered on high gear, and is capable of great speed, with perfect comfort over rough going, a feature which doctors and nurses alike consider of prime importance.



Packard ambulance with roomy inclosed body

New Empire Has Improved Body



Unit power plant employed on Empire standard chassis for 1915

Price of Former Touring Body $50 Less—Line Comprises Two Touring Cars and a Roadster

WITH but few modifications the chassis made by the Empire Automobile Co., of Indianapolis, Ind., is the same as that employed for the past 3 years. The same body as that introduced for the 1914 season at $900 can now be purchased for $850. But, in addition to this, model 31-40, an improved streamline five-passenger touring car, is listed at $975. The streamline roadster, which corresponds to the latter in the two-passenger capacity, is sold at $875. In other words, the price has been cut $50 on the last year's design and a new five-passenger car added at $75 more than the car of 1914.

Remy Electric System

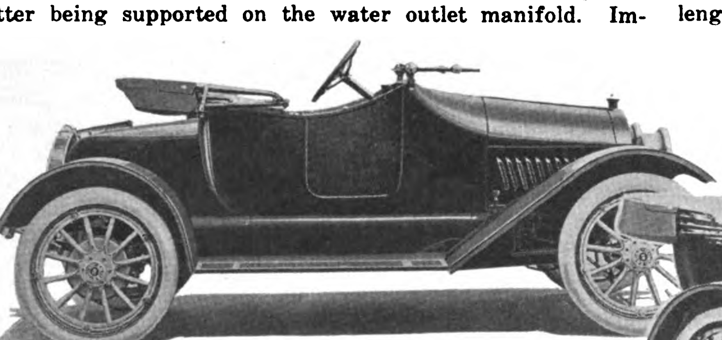
In bringing out this new design outside of the improved body work the most important change is the adoption of the Remy lighting, starting and ignition system. The mounting of this has of course caused minor changes to be made in the motor. But other detail changes have also been effected for this season. For instance, the oiling pump is now a horizontal instead of a vertical design and an oil pressure chamber is integral with the pump in order to maintain a steady flow to each of the leads. A priming cup is mounted on the oil pressure chamber so that in case the car has not been used for a considerable length of time, the pump can be primed to insure the delivery of oil as soon as the motor starts to run.

This season the fan post has been braced to increase its rigidity. A neater job has been made of the wiring, the latter being supported on the water outlet manifold. Improvement has been made in the clutch. Formerly the clutch adjustment was held by a number of steel plungers which fitted into holes in the clutch adjustment plate. These plungers were held in the holes by means of coil springs placed behind them. Now instead of the plungers, there are bolts, and when the adjustment has been made, the bolts are screwed down into the adjustment holes. This gives a much more positive adjustment lock than that provided by the plungers. Other than these minor details the chassis remains as it was.

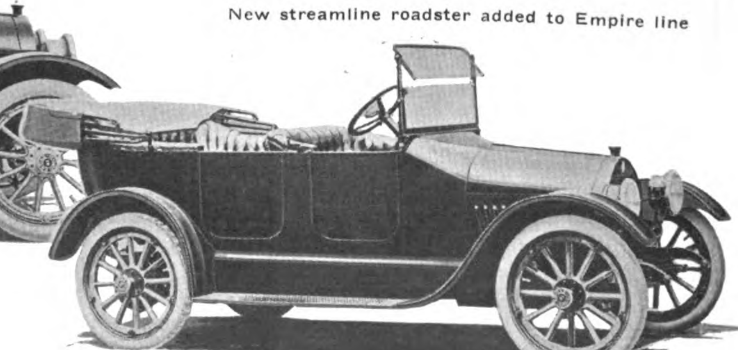
Right Steering Is Retained

A unit power plant suspended at three points including motor, clutch and gearbox is employed. The motor is a four-cylinder, L-head 3.75 by 4.5 unit, having a piston displacement of 198.8 cubic inches and stroke-bore ratio of 1.2. The cylinders are cast in pairs with separate manifolds, the water-jacketing space being large to take care of the needs of the thermosyphon cooling system. Unlike most of the motors for this season, the Empire has its valves all on the left side and this is accounted for by the fact that right steering has been retained.

Three rings and one oil groove underneath the lowest ring are used on the pistons. In the oil ring six holes are drilled to permit the oil sucked up by the pistons to return to the crankcase without being burned in the combustion chamber. These oil holes are .125 inch in diameter and are spaced equally around the circumference of the piston. The length of the piston is 3 9-16 inches. The diameter of the



New streamline roadster added to Empire line



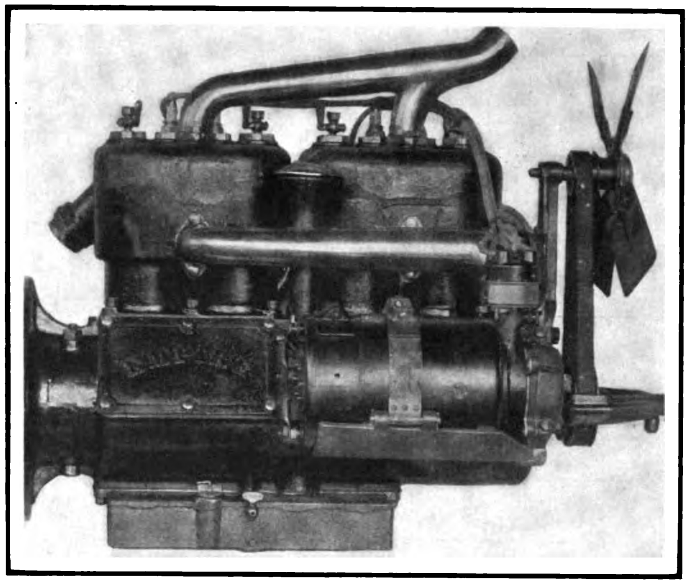
Model 31-40 touring car fitted with the new Remy electric equipment pin is .875 inch and the connecting-rod is an I-beam type.

Drop-forged crankshafts of high-carbon steel are used in all Empire cars. The diameter of the shaft is 1.75 inches and the shaft is finish ground to this size. It is carried on three bearings which are respectively 3.3, 3.3 and 4 inches in length from front to rear. These bearings are lined with white brass and have diameters of respectively 1.5, 1.5 and 1.625 inches.

Telescopic sleeves inclose what would be the exterior portion of the valve action. These sleeves can be raised, should it become necessary to adjust a tappet, by a single motion of the hand. In order to keep the tappets silent they are provided with fiber inserts. The valve action is driven from spur-type timing gears and the camshaft is a high-carbon steel drop-forging carried on four bearings. The valve diameters are 1.625 inches and the lift .3125. Nickel steel is used for the stems and cast iron for the heads.

Combination Pressure and Splash Oiling

A combination force-feed and splash oiling system is used. One and a half gallons of oil are contained in the lower part of the crankcase and from the reservoir the oil pump delivers the supply of lubricant to a three-unit sight feed mounted on the dash. At this point the oil is divided into three independent leads and flows to the three main bearings. After overflowing from the main bearings the lubricant drains into the splash troughs where it is picked up by the connecting-rods and thrown to the interior parts of the motor. It is a constant level system, the oil overflowing from the troughs as soon as it has reached the desired height. By using the oil drain holes in the pistons a copious supply of lubricant can be splashed into the cylinders without fear of smoking caused by the burning of the oil in excessive amounts during the explosion stroke.



Side view of motor showing the installation of the new Remy single unit system for lighting, starting and ignition

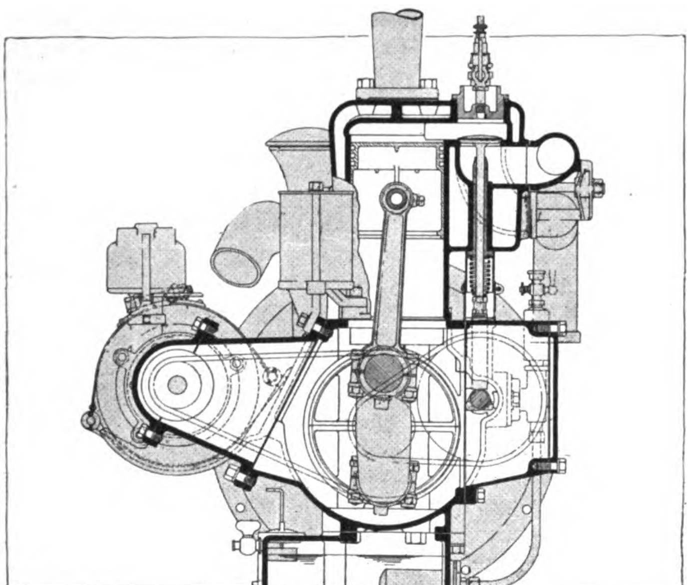
Special interest centers about the new lighting, starting and ignition system adopted by the Empire cars because it is a new product of the Remy factory. Known as model 129, it is a motor-generator outfit with battery ignition. The motor-generator is cylindrical in shape and is carried on the forward end of the motor, on the right side. A single armature with a compound winding operating at 12 volts performs the functions of a cranking motor and lighting generator.

When the starting switch is closed this unit operates as a compound-wound motor and turns the engine over at a speed of approximately 100 revolutions per minute until the engine fires. As soon as the engine starts running the unit becomes a shunt generator and at an engine speed of 350 revolutions per minute commences to charge the battery. At any speed above this the output curve of the generator remains flat at 6 amperes. The regulation is effected by means of a vibrator device which automatically increases and decreases the field strength of the generator. Both the relay and regulator are built upon an insulating block of bakelite and covered with a housing of the same material mounted on the engine side of the dash.

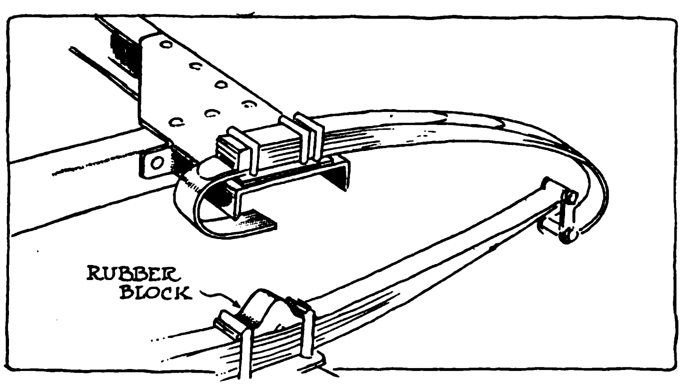
Generator Fuse a Safety Measure

Protection is afforded by a generator fuse which is also fitted to the insulating block of the relay regulator for the purpose of protecting the generator should the battery become disconnected from the charging circuit. If the battery should become disconnected the fuse will burn out, thereby opening the field circuit, rendering the generator inoperative. The entire system is wired by the single-wire method and each lighting circuit is protected by an independent fuse. The operator may determine from his seat whether or not the tail light is burning because the dash lamp is wired in series with it.

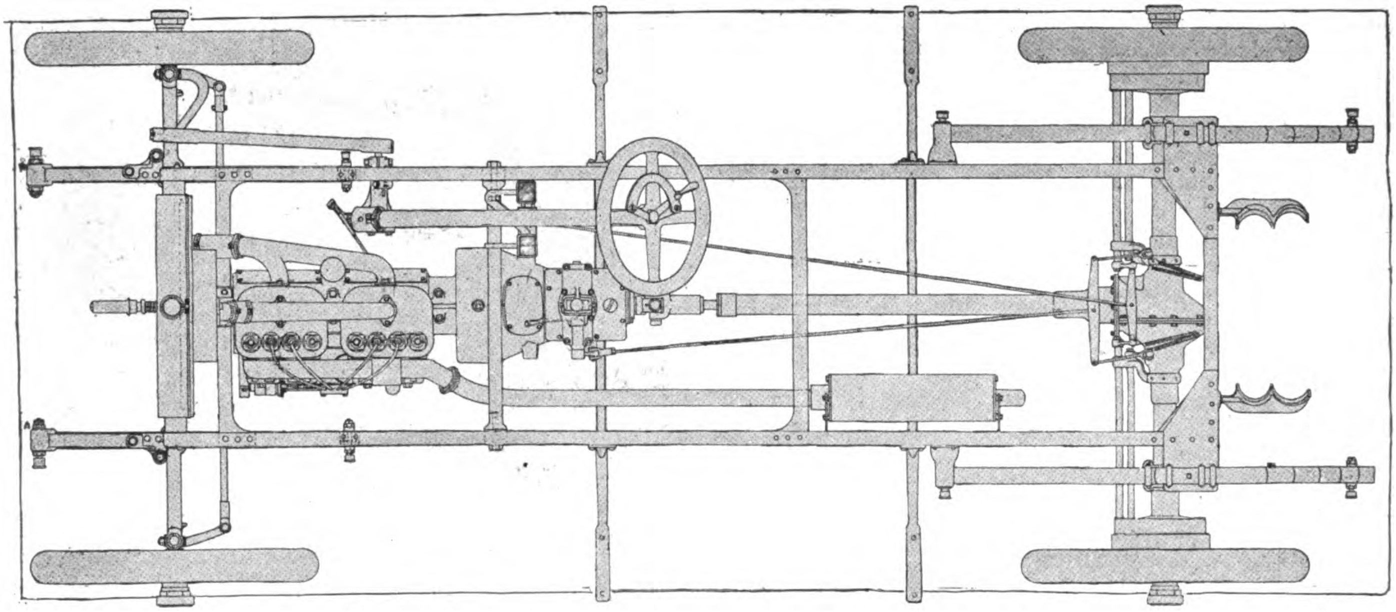
Ignition is by battery. Bakelite has also been used to good effect in the manufacture of the distributer. The construction of this system is such that the advance and retard motion does not move or oscillate the distributer and the wires attached thereto, thereby eliminating much of the chance of chafing and breaking the cable insulation. This system also operates at 12 volts and is designed throughout for that e.m.f. The coil is a special design for this voltage



Transverse section through the Golden, Belknap & Swartz motor used on Empire cars



Unique rear spring suspension a feature of the Empire

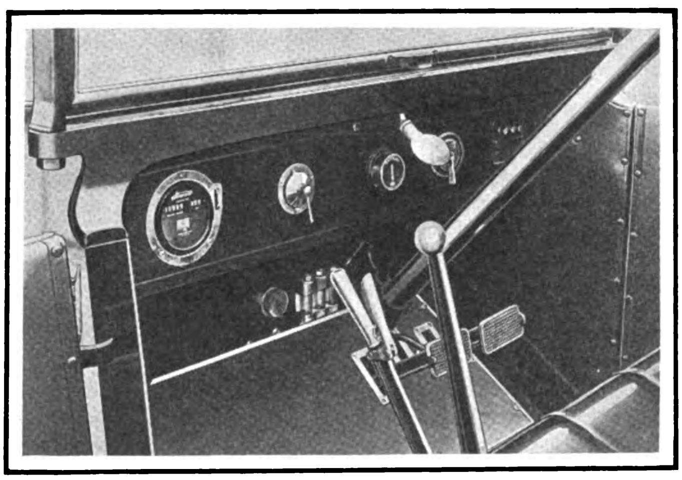


Plan view of chassis—Note three-point suspension of power plant and long straight brake linkage

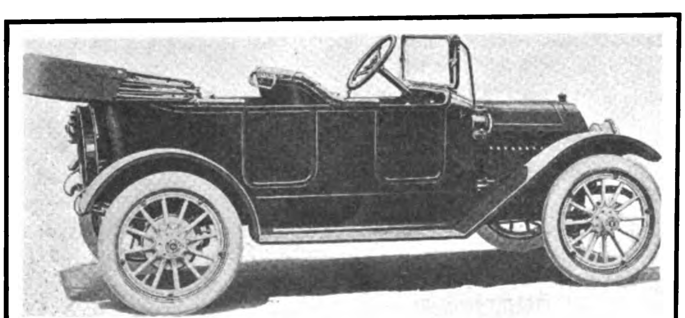
and has the advantageous feature of operating satisfactorily on a lower voltage should the output of the battery become low. The coil windings are heavily insulated and protected by bakelite.

The distributer segment arm, which is also made of the bakelite material, carries a safety spark gap to protect the distributer coil and high-tension cable. The circuit breaker is so designed that lag will be a minimum. In fact the makers declare that this has been altogether eliminated and that there is no time factor in the installation. A 12-volt, 50-ampere-hour, Willard battery acts as the current reservoir.

On the touring cars a 14.5-gallon gasoline tank is mounted under the front seat, giving a gravity feed to the Holly model-H carbureter. On the roadster bodies the tank is in the cowl and is of 12-gallon capacity, also providing a gravity feed. A 1.5-gallon reserve feature is incorporated in the touring car tanks. The carbureter is provided with hot-air intake and an air adjustment on the dash.



Dash showing mounting of control devices and instruments



Side view of model 31 tour'ng car which has been continued with a $50 reduction in price

A disk and ring clutch is used. It has three 9-inch disks, two of which are faced with Raybestos fabric and the third, that running between the other two, is of steel. The entire clutch is housed within the unit plant and runs in oil. It may be reached however, very easily by removing a large hand-hole cover which is accessible by lifting the floorboard in the driver's compartment.

Three-Speed Gearset

Three speeds are provided by the gearset. This is also accessible by a cover plate. The width of the gears across the teeth is .875 inch and on direct a final reduction between the motor and rear wheels of 4 to 1 is provided.

Only one universal joint is employed in the drive. This is mounted just behind the gearbox and is of the cross type. From this point the drive is taken through the steel shaft which is inclosed in a tube that is so constructed as to form a unit housing for the shaft and differential. The shaft is squared at the universal end and it may be quickly removed together with the rest of the entire rear system by removing the rear axle spring clips and detaching the brake rods.

The rear axle is a Weston-Mott semi-floating. The axle shafts are heat treated steel carried on heavy-duty Hyatt rollers. A noticeable feature in the axle housing is the utilization of a 3.5-inch sleeve bearing member which is hardened and ground. The axle carries a companion sleeve and the rollers bear upon these two members.

There are two sets of brakes. One expanding and the other contracting, acting on 12-inch drums on the rear wheels. The equalizers are mounted just forward of the rear axle. The brake linkage is distinctive in the employment of long, unjointed rods. The wheelbase is 110 inches, the tires 32 by 3.5 and the wheels twelve-spoke wood artillery.

The equipment on model 31, which is the held-over car, is practically the same as that on the model 31-40 except that acetylene lighting and magneto ignition are supplied instead of the new Remy outfit. Both cars have mohair tops, rain vision windshields, with a ventilating feature on the model 31-40, Stewart speedometer, etc. On the new car non-skid tires are provided on the rear.

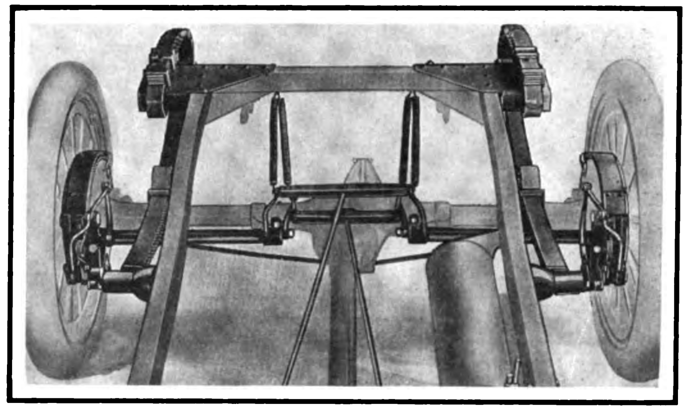
Apperson Adds New Four and Six

(*Continued from page* 667)

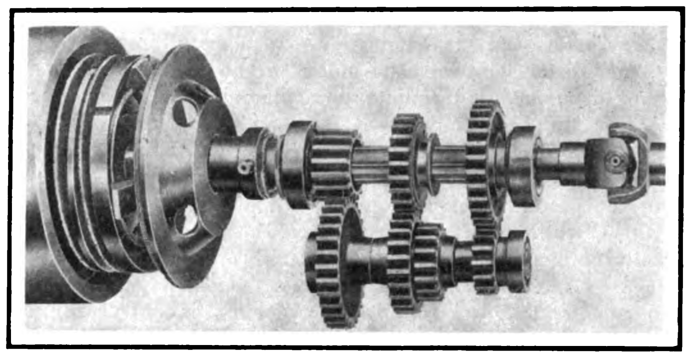
Equipment is full including a one-man top with dust cover and quick-adjustable curtains, rain-vision type of windshield, and full line of tools, lamps, license holder and so forth.

The two models which are carried over are known respectively as the 6-60 and the 4-45, the former being a six and the latter a four-cylinder design. These two cars are also similar in design but vary throughout in their dimensions. On the 6-60 chassis there are three lengths of wheelbase, 134 inches for the seven-passenger touring, 128 inches for the five-passenger and 122 inches for the roadster. These three cars sell at respectively $2,350, $2,200, and $2,200.

On the 4-45 there are two wheelbases, the touring car 120 inches and the roadster and coupé 116 inches. The prices on this are $1,685 for the touring car and roadster, and $2,350 for the coupé. Both cars have T-head block power plants, the dimensions of the six motor being 4.125 by 5 inches and those of the four, 4.5 by 5. In general chassis features they are the same as the two new cars which have been described. Both are equipped with the Bijur lighting and starting system, and have the single high-tension magneto ignition. They have the contracting band clutches, three-speed gearboxes, gravity gasoline feed, left drive and center control, and are fitted with bodies of streamline design. They are sold fully equipped.



Rear construction and equalizing mechanism on Empire



Assembly of clutch and gearset with universal joint

Six Detroit Electric Body Types—Two Chassis

(*Continued from page* 669)

As regards the controller, this has been re-designed to give easier action and more perfect automatic lubrication, the drum segments being lubricated by felt wicks dipping into a reservoir of oil in the controller casing.

The controller affords five forward speeds, which are 5, 8, 13, 17 and 20 miles per hour. The control is of the double voltage system, the battery connection being changed by the operation of the controller so that a low voltage is applied to the motor for the first three speeds and a high voltage for the two high speeds.

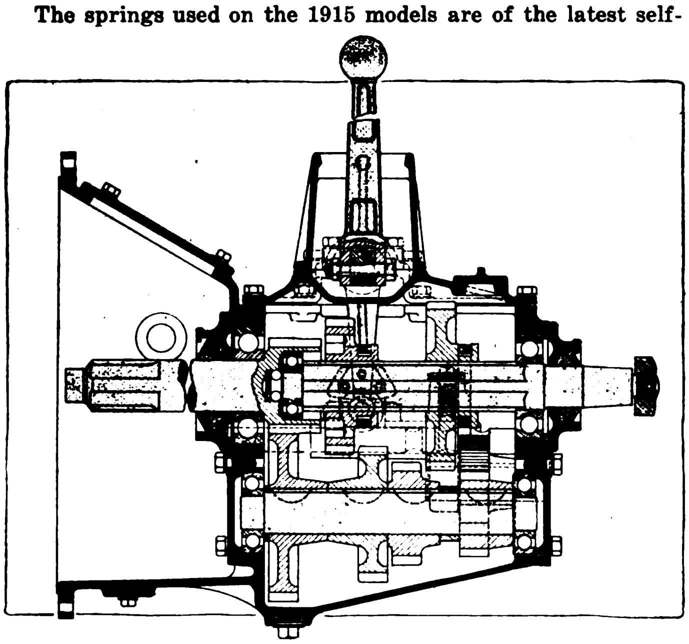
The springs used on the 1915 models are of the latest self-lubricating type in the leaves of which small indentations or cups have been made, these containing lubricant which serves to prevent squeaking between the leaves.

Another refinement is the use of battery hood props of a new design. Steel forgings which automatically drop into position and securely hold the hood raised, are used.

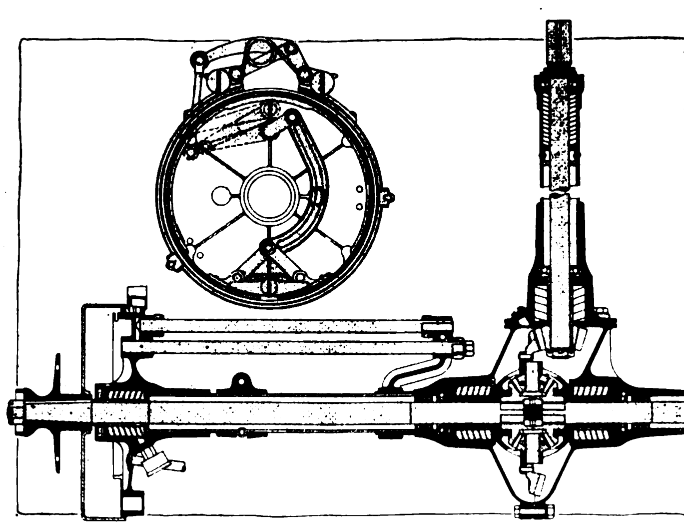
Gusset Plates Integral

The frame has been widened at the rear so as to better support the body and to give more battery space under the hood. An entirely new feature in frame design has been adopted in making gusset plates integral with the side rails, reducing the number of parts and adding to the strength.

Lamps are of the same design as previously used. However, a new style of bracket has been adopted permitting of making permanent soldered connections, while at the same time the lamps are adjustable. A dimming switch is provided for the front lamps.



Sectional view of gearbox showing full ball-bearing support



Sectional view through rear axle. V'ew of brake assembly

The Engineering Digest

Methods for Brake-Testing the Power of Motors Without Dismounting Them from Car or Boat

SUGGESTING AN EQUIPMENT FOR REPAIR SHOPS

OCCASIONS frequently arise when it is desirable to ascertain the exact horsepower of a motor in an automobile or boat without going to the trouble and expense of dismounting the motor and placing it on a regular brake test stand. To diagnose shortcomings or make sure of the effects of a repair and for almost all experiments with carbureters and ignition devices, a convenient method for telling the power developed under each of the experimental conditions, while also keeping tests on the road available, is in reality indispensable, but the testing is usually foregone for lack of facilities or for lack of confidence in makeshift arrangements, and the repairs or the experimental results are permitted to end in something less than certainty as to what has been accomplished.

Th. Lehmbeck, authorized automobile engineer of Berlin-Friedenau, Germany, writes of the methods which he has found useful in such cases; substantially as follows:

The motor in a car is usually mounted so closely that the flywheel almost touches the drip pan, and in boats the distance from the flooring is also as a rule very small. It is therefore nearly always a bandbrake which must be used, and while it is not ordinarily recommendable to brake on the flywheel, an exception can very well be made for tests of mounted motors if the proper precautions are taken and the tests do not last more than an hour.

Even in some of the best automobile factories in conservative England the cable brake is still freely used for power determinations, and the method employed there suggests the simplest manner of proceeding, but it can of course only be used if there is clearance enough for the cable. The arrangement, as used in a factory, consists of a cast-iron stand with two bearings, mounted in these bearings a shaft with a broad belt sheave with side flanges, a rope about 30 millimeters in diameter wound upon the sheave with the two free ends reaching upward and attached to two spring scales. The shaft is connected by a clutch with the motorshaft, the motor is started and when it has been warmed up the spring scale on the side where the sheave pulls downward is tightened. The motor then draws the rope around till it begins to rub on the drum on that side while the other end of the rope loosens. The other spring scale is now tightened till it shows a few kilograms of load, by which action the load of the first scale will be increased consderably. After a few minutes a condition of equilibrim is reached, which can be recognized by a reduction of the motor speed taking place when the second scale is tightened further. By now deducting the load of the second scale from that of the first, there is obtained the real load under which the motor has been running. The motor speed being registered by means of a revolution-counter, the horsepower is now figured from the formula: HP. $= P\,N\,L \times 0.001396$, in which P is the effective load, N the number of revolutions and L the effective lever arm with which the load is working, or one half of the distance from center to center of the rope strands.

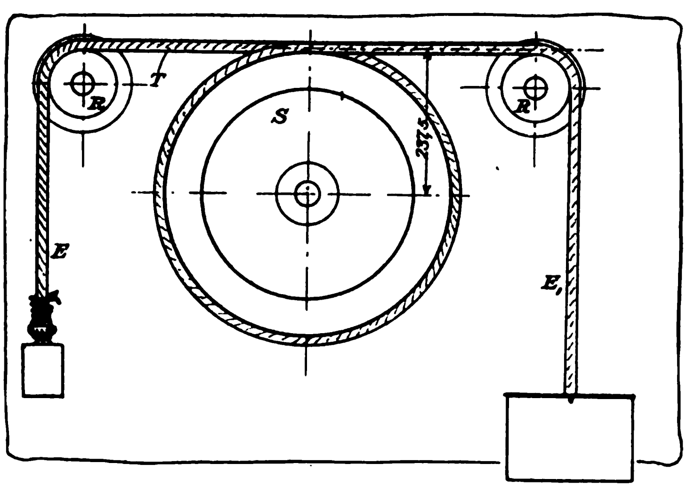


Fig. 1—Arrangement for testing by cable brake

The Makeshift Plan

In applying this method to mounted motors, the modifications indicated in Fig. 1 are introduced. The rope T is laid around the flywheel S and the free ends are led right and left over the two rollers R. Assuming that the flywheel turns in the anti-clockwise direction, customary in the case of automobile motors, a weight of 3 kilograms, for example, is attached to the end E, and at the other end E, there is hung a scale for the reception of the loads. Supposing the weight at this end is 12 kilograms, the effective brake load will thus be 9 kilograms. To prevent the rope from slipping from the flywheel, guide boards must be secured at both sides without touching it, and the friction in the journals of rollers R must of course be a minimum. Assuming the diameter of the flywheel is 450 millimeters and that of the rope 25 millimeters, the effective radius of the load becomes 237.5 millimeters, or, when expressed in meters, as required for use in the above-mentioned formula, 0.2375 meter.

The supposed data, with 1,150 revolutions registered by the counter, would give HP. $= 9 \times 1.150 \times 0.2375 \times 0.001396 = 3.43$.

Motors of up to 25 horsepowers can be tested in this simple manner without fear of burning the rope if from time to time a little soapwater is sprinkled upon the rope or the flywheel.

If there is not room for laying a rope around the flywheel, a bandbrake can be used on the plan shown in Fig. 2. To the two iron brake shoes A and B there is secured a leather belt of the width of the flywheel rim, and a strap of steel skelp, of the same width and 1 millimeter thick, is laid around the belt and made fast to the brake shoes as at 1 and 2. At its middle lower portion this strap is riveted to the leather belt, with the very flat rivet heads counter sunk in the leather so as not to project. Side guards of U shape, 40 millimeters broad and 3 millimeters thick, are also secured to the steel straps as shown in Fig. 2 at 3, 4 and 5.

The flywheel is here supposed to be 400 millimeter in diameter. To the upper end of the brake shoe A there is hinged the suitably shaped end of a ⅝-inch screwbolt which is about 200 millimeters long and is passed through an oval hole in brake shoe B. A spring washer, a valve spring of 100 millimeters length, 35 millimeters diameter and 3.5 millimeters wide, another spring washer and, finally, a handwheed H are mounted as shown, the handwheel being threaded upon the bolt, of course, and this leaves a free, smooth end of the bolt about 50 millimeters long with a hole for the attachment of a wire cable or the hook of a spring scale. In the case of a wire cable, which may be 3 to 4 millimeters strong, it is carried over a pulley and attached, as before, to a scale for the reception of weights.

The brake is first mounted loosely around the flywheel with the brakeshoes A and B about 50 millimeters apart, and the motor is run warm. A rope L is laid around B, as shown, and attached at the other end to something fixed, to prevent the brake from being carried around with the flywheel if it should happen to seize. When all is ready, the handwheel H is cautiously turned on till equilibrium is brought about, as before, the spring at the handwheel serving only to regulate the brake action. Oil is dropped on the flywheel occasionally during the progress of the test, so that the belt shall not burn on to it.

A belt of 5 millimeters thickness lasts at least for one test and cannot break during the test on account of the protecting steel strap.

For convenience in calculations the distance from center of flywheel to center axis of the screwbolt should be made 358.1 millimeters, as this simplifies the formula HP = P N L $\times$ 0.001396 to HP. = P N $\times$ 0.002.

The figuring can in this manner be done mentally. For example, the motor makes 1,300 turns per minute with a brake load of 22 kilograms, and this gives a power of 11 $\times$ 1.3 = 14.3 horsepowers.

When a bandbrake is used, the lever arm cannot be made longer than the 358.1 millimeters referred to, unless one can work with a securely fixed rigging, but the arrangement suffices for most cases and gives results which are accurate enough in practice.

It goes almost without saying that for tests of a motor in a car the vehicle clutch should be out of action.

With regard to tests of motors in boats it need only be said that they should be made with the boat in the water, as the air and carbureter conditions here differ from those obtained in a closed room. Also, any test should be made once with the propeller shaft disengaged and again with this shaft turning in its bearings, as the water pressure upon the structure of the boat may affect the friction in this element very considerably.—From *Auto-Technik*, May 23.

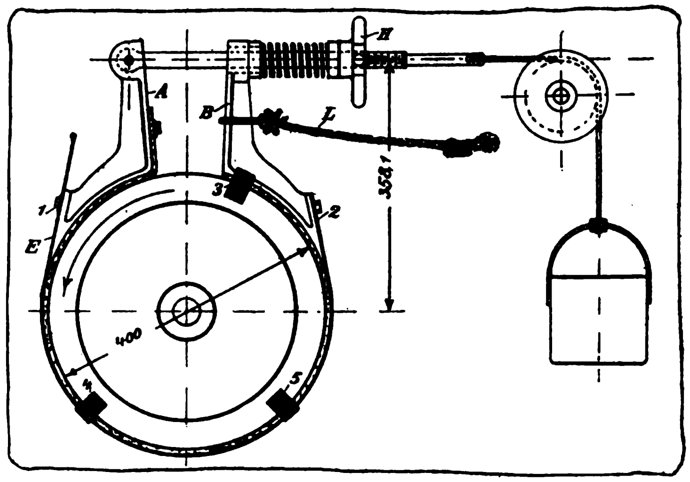


Fig. 2—Band brake test for mounted motor

Pointer from British Practice on the Chances for Disk Wheels

VAUXHALL Motors, Ltd., a British manufacturing firm, points out that the recently introduced aluminum disks appear to have increased the popularity of wire wheels, especially among drivers who have so far been unfriendly to them on account of the difficulty of cleaning. The disks are conical, to cover and inclose the whole axle end, and light is reflected from them along two radial lines, with the slant of the cone in them, producing an effect more pleasing than any which can be obtained from flat disk wheels. If it is a true fact, as stated, that objections to the disk type of wheel can be so easily overcome, so far as appearances are concerned, as to make it advisable to transform a wire wheel into a disk wheel by means of a conical aluminum cover plate, those who hesitate to employ steel disk wheels for trucks and other commercial vehicles merely because they are afraid of popular objections to the type may now find encouragement for developing the steel disk wheel to what it should be in the matters of strength, light weight, sightliness and freedom from resonance or other noise. In the French war trucks equipped with this class of wheels no objections have been publicly recorded with regard to their reliability, though in these cases they are equipped with solid rubber tires, but it is not to be denied as yet that the air tires—which of course are the only kind used in connection with the Rudge-Whitworth wire wheels with aluminum disks for pleasure cars—obviate resonance and noise much better than solid tires could do, and, by the same token, protect rivets against working loose. The conical form should have a certain influence to reduce noises, as well, but a relatively soft cushioned seating for a solid rubber tire, such as is already used in some delivery wagons and trucks, would perhaps be the most effective expedient to adopt in this respect, where heavy commercial vehicles are concerned.

Malleable Nickel Coating for Aluminum by the Canac Process

THE difficulties experienced in providing aluminum with an adherent coat of nickel are well known. Usually, when it is desired to make the deposit by the electrolytic process, an intermediary metallic coating is required, and copper, zinc or iron is generally the metal first precipitated. Naturally the pickling of the aluminum which must precede the process plays an important part but despite all care taken in this operation the nickel coating produced is far from presenting the guarantees of permanent adhesion which would be desirable.

Among methods recently developed, however, one devised by J. Canac circumvents the need of a first coating with another metal and results in a nickel coating so firmly adherent that aluminum sheets provided with such a coating have been placed in the market under the name of aluminum-nickel, although there is no question of an alloy. And these sheets can be used as a raw material to be worked into new forms and articles.

The preliminary pickling of the aluminum is elaborate, however, and comprises the following operations:

(1) Immersion in a boiling bath of potash, (2) brushing with milk of lime, (3) dipping for a few minutes in a 2 per cent. solution of cyanide of potash, (4) exposure to the action of a bath composed of 500 grams of hydrochloric acid, 500 grams of water and 1 gram of iron, until the aluminum takes on the appearance of damascened metal.

After each operation the aluminum is washed in water.

With regard to the composition of the nickeling bath, the following ingredients give good results: Water 1,000 cubic centimeters, chloride of nickel 50 grams, boric acid 20 grams.

The aluminum-nickel will bear hammering; the sheets can be curved or spun without cracking and it is only by fracture that the aluminum can become exposed. It can be heated up to the fusion point of aluminum without deformation.

In *Revue de Métallurgie* for June Mr. Tasilly examines the nature of the adhesion between the two metals caused by the Canac process. He finds that a light deposit of iron is formed upon the aluminum sheet when it comes out of the iron-containing bath, and it seems that this iron by forming a network on the surface of the aluminum sets up a multitude of terminals which favor the attack by the hydrochloric acid at certain points. The result is a peculiar appearance of the aluminum surface involving a new capacity for holding the electrolytic deposits.

The nickel which is deposited under these conditions takes root, so to say, in the aluminum and forms one body with it so perfectly that it is impossible to detach the nickel without tearing off at the same time particles of aluminum. The metal so treated does not change in moist air, resists chemical actions very well, is nowise affected by wine or alcohol and does not sweat gasoline or kerosene contained in a vessel made of it.

Aluminum-nickel made by this process can thus be employed in all cases where there is use for a light, resistant and unchangeable metal; as for railway appliances, canoes, automobiles, aeroplanes, physical instruments, photographic apparatus, household and travelling utensils.—From *Génie Civil*, September 12.

New Light Built-Up Steel Wheel Received with Acclaim

A STEEL wheel, built along the lines of present artillery wooden wheels, has been invented by W. Starley, an Englishman, and its manufacture has been taken up by The Jointless Rim Co., Ltd., Birmingham, Eng.

The Autocar, which hails this new wheel as something of great importance to motordom, states that "the essential difference between the new wheel and other steel wheels is that it is built up with separate hollow spokes, which are attached to an ordinary steel tire rim at their outward extremity and wedged together at the nave as in a wooden artillery wheel.

"The ten spokes have a U-section and are pressed from flat steel plates, the rounded portions of the spokes being on the outside. The open or inner side of each spoke has a flat plate, welded to it, completely closing it, the welding being done by the oxy-acetylene process. The nave end of the spoke is tapered just like a wooden spoke. When the ten spokes are assembled, the taper leaves a slight space between adjacent spokes, the opening being the widest toward the center. These taper spaces are, in the process of assembling, filled with steel wedges. The outer ends of the spokes fit over small lugs, which are let into the tire rim from the under side and afterwards riveted over. No welding or brazing is required at the rim, as the hollow spokes fit over the lugs and remain firm.

"When the wheel has been roughly assembled, the tire rim is placed in a large vise which grips it at three points, which the wedges already referred to are driven into. This produces a tendency in the spokes to spread, but, being prevented from doing so by the rim, and interlocking with one another at the nave, the wedging action results in the spokes becoming firmly locked together. After the spokes are wedged the center is bored out to a circle, and inside a groove is turned into which is spun a steel liner. This, in turn, is bushed with brass, to prevent rusting.

"A steel flange is fitted on each side, being held in place by spinning over the ends of the steel and brass liners. The lateral strength of the wheel, does not, however, depend on these flanges, which are only fitted to give the wheel a finished appearance. The outer flange is fitted with a brass hub cap so that car makers are not even called upon to provide this; they have nothing to do except to fit the wheels to their hub-shells.

"The methods of attachment is that known as the stud system, each alternate spoke being drilled for the studs or bolts and a cross liner of brass fitted into each hole to prevent rusting and to act as a driving support for the stud.

"Before assembling and after completion the wheel is treated by the Fermangan anti-rusting process inside and out. The total saving in weight in a set of five 26 by 3-inch wheels is about 13 pounds.

"This wheel would seem to not only have the stability and strength of the wooden artillery wheel, but the heat radiating, and resilient qualities of the wire wheel." On the other side it is not to be forgotten that a very high factor of safety is required in a wheel depending for its strength on oxy-acetylene welding of small steel parts and on wedge action of other steel parts, both these elements calling for highly skilled workmanship to secure uniform results.

Sensible Methods of Suppressing Reckless Driving

IN the early summer numerous automobile accidents occurred on the Boston Post Road within the town of Greenwich, some of which resulted fatally. As this part of the road extends from the city of Stamford to the New York State line, a number of drivers would "open up" their cars, feeling that they could cross into New York State before being caught. Saturday and Sunday evenings when the tourists were returning to New York and New Jersey were the times when the most flagrant cases of speeding were observed.

The authorities of the town of Greenwich decided to put a stop to this reckless driving and put the matter in the hands of four constables headed by Alden McMurtry of Sound Beach, Conn., a prominent member of the Society of Automobile Engineers. Various traps were measured and a system of signals was arranged for timing.

The state law provides that any speed greater than 25 miles per hour shall be *prima facie* evidence of recklessness. However, if the driver could prove to the satisfaction of the court that at the time of arrest his car was under absolute control, that the highway was clear and that there were no intersecting roads or dangerous turns, it would be doubtful if the charge against him could be sustained, as *prima facie* evidence merely places the burden of disproof on the accused.

A form of schedule was agreed upon after making a number of tests with a large five-passenger touring car, as follows:

Trap A. Speed limit, 35 miles per hour. With muffler cut-out open (unlawful), 30 miles per hour. Passing car going in same direction with car approaching in opposite direction, 30 miles per hour. With cut-out open, 25 miles per hour.

Trap B, located on turn. Limit, 25 miles per hour; cut-out open, 22 miles per hour. Driving turn on wrong side of road although clear, 20 miles per hour.

While an absolute schedule was established, nevertheless a great amount of discretion was used. In the majority of cases a gentlemanly warning regarding the consideration of other users of the highway, etc., had more effect than a troublesome arrest and fine. However, the speed-mad drivers were given no consideration, and heavy fines were imposed. This form of crusade against recklessness has resulted in less than twenty-five arrests during the period from May 17 to September 1. The considerate drivers may run along at 30 miles per hour, provided they use discretion on certain parts of the highway and in congested sections.

Bank Accounts of Ford Employees Gain 30% in 6½ Months

Records of the Company Show That Individual Efficiency of Employees Is Increased, While Living Conditions and Health are Greatly Improved by Operation of the Profit Sharing Plan Adopted Last January

DETROIT, MICH., Oct. 2—The working out of the Ford profit-sharing plan was the subject of a talk by John R. Lee in charge of the sociological work of the Ford company recently in this city. Mr. Lee analyzed every phase of the system, showing how the Ford company has taken up every department of the work and how each workman is individually investigated in order to make certain that he is eligible for participation in the plan. Mr. Lee showed that within the first month 60 per cent. of the workmen were participating, this notwithstanding the fact that the working force of the company approximated 20,000 and represented forty-nine different nationalities.

In order to facilitate the work of investigating the different employees it was necessary to start a school in which the English language was taught, there being upwards of 1,000 enrolled in this at the present time.

The economics of the profit-sharing scheme was proven by the fact that after it had been in operation for 7 weeks it was possible to build more cars with fewer men and working fewer hours per day.

Men's Health Improved

As to how the profit-sharing plan is actually working out for the benefit of the worker, the report shows that after 6 1-2 months' work the bank accounts of the employees had increased 30 per cent. Of still greater importance was the fact that punctuality and regularity had increased to a remarkable extent and the general health of the employees was improved.

Mr. Lee said in part:

"The Ford Motor Co. was first incorporated under the laws of the State of Michigan, January 16, 1903. It was originally capitalized at $100,000, which was subsequently increased by a stock dividend of a very large surplus to $2,000,000. The company started its incorporation with $28,000 in cash, and this has taken care of the corporation since it started, that is to say, nothing outside of this $28,000 was ever taken by the company in the way of money.

"The plant in Detroit, together with its various branches in different parts of the world, covers approximately 150 acres, and represents some 7,000,000 square feet of floor-space.

"For the year ending October 31, 1913, the gross business was $90,000,000, or it represented 165,000 cars, and the profit thereon was in the neighborhood of $20,000,000.

"From September 30, 1913, to the present time, the gross sales have been $110,000,000, representing 226,000 cars, and the rate of earnings the same, showing an increase over preceding periods, notwithstanding the fact that the price of the finished product has been materially lessened and our profit-sharing plan has been in operation since January, 1914.

Forty-Nine Varieties Work

"The working force of the company is about 20,000 altogether, and at present represents forty-nine different nations or countries of the earth. I give you these facts, and the following names of countries our men represent, in order that you may a little better understand our problem.

"The men we have working for us represent the following nationalities: American, Polish, Hungarian, Italian, Spanish, English, Irish, Welsh, Scotch, Russian, Greek, Turk, Bulgarian, Dutch, Belgian, Swiss, Norwegian, Swede, Dane, Finnish, Japanese, Chinese, Australian, Macedonian, Persian, Negroes, Indians, Canadian, French, German, Servian, Austrian, Mexican, all the South American countries and Central America, forty-nine in all.

An 8-Hour Day

Sixty per cent. of our employees speak English and 33 per cent. are citizens of the United States. The ages of our employees are from 16 to 75. We are operating a so-called open shop. Our work is all done on per diem basis, that is to say, at an hourly rate. We have no piece work, or bonus system. We work 8 hours out of the 24. We have some departments requiring two shifts, some three.

"Our profit-sharing plan differs from all the other profit-sharing plans of which we have any knowledge in all its features. Let me state here that it was not inaugurated or planned, or put into operation, as a business expedient in any way whatsoever.

The aim of the Ford Motor Co. in arranging for the gigantic step was to better the financial and moral condition of each employee and those dependent upon them.

"The money that is paid employees under the profit-sharing plan comes to them regularly in their pay envelope, to be used, and by use thereof they are acquiring American ways, methods of business, strength of manhood, loyalty, and improvement in their conduct of self as citizens of the United States.

"There is no stipulation or proviso, whatever, in the plan which deprives an employee of anything given him under it, should he see fit to sever his connections fairly and honorably with the company at any time. It is required, and is the object of this plan, that the employee shall use the money given him as his part of the profits in ways which will not harm or be a detriment to himself, or to society at large.

"There are three groups of eligibles:

"First: All married men, living with and caring well for their families.

"Second: All single men past 22 of good habits.

"Third: All women or single men under 22 years, living with and sole support of some next of kin.

The Sharing of Profits

"The statement ordinarily made that the minimum wage is $5 a day is not correct. We pay for 8 hours' work approximately 5 per cent. more than they would receive at any other shop for 10 hours. Then they add to that enough to make up the $5. Those men in the factory who are getting up to and including 38 cents an hour come under the $5 class. Those getting from 38 cents and up to and including 48 cents, receive $6 per day; those receiving 48 cents an hour or over, receive $7 a day.

"On this basis, for example, if a man's wages amount to $2.75, add to that $2.25 as his share of the profits, which is paid

Classification of Employees Wage Schedule Made Effective October 1, 1913

KEY

A—Mechanics and Sub-Foremen
B—Skilled Operators
C—Operators
D—Helpers
E—Laborers

Service—Employees in Service Continuously for Two Years and Over
1—First Class Workmen
2—Men of Average Ability
3—Beginners

Skill Rate	Former Hiring Rate	Present per Hour Rate	Rates Ranging	59-60	52-58	46-50	42-45	38-41	34-37	29-33	26-28	23-25	20-22
			Condensed To	65	60	54	48	43	38	34	30	26	23
A—X X				2	7								
A—X													
A—1		54				2							
A—2		48					45						
A—3		43						273					
B—Service		43						51					
B—1		38							606				
B—2		34								1457			
B—3	23	30									1317		
C—Service		38							19				
C—1		34								348			
C—2		30									2071		
C—3	23	26										4311	
D—1		34								31			
D—2		30									137		
D—3	23	26										416	
E	23	26										2003	
Special	20	23											208
	Compi	led Augu	st 4, 1913								Total		13,304

to him on his regular pay day in cash.

"We make a sharp distinction between amount of wages and profits, in order that the benefits of the plan may be safely, sanely, and positively appreciated in each individual case.

Profits Sometimes Withheld

In the operation of the plan, we are finding many cases where it is necessary for the general good to withhold profits from some of the men, and in many cases to take away from them all of the profits already granted until they can fully realize the advantage of same.

"In order that the facts above stated can be fully understood, would say that up to date we have recovered the sum of $7,000 paid employes who obtained their profits under false conditions, or were using them in some way detrimental to themselves and others.

"The true foundation of this plan was conceived a little prior to January, 1914.

"The Ford company began to recognize the human element in the three-fold phase of manufacturing, men, material and money.

"We are working today instead of 9 hours a day, 50 hours a week, and have increased the wages 15 per cent.

"We have a systematized rating according to skill or ability, and indemnify each employe against petty discrimination by the foreman, and have arranged a clear cut simplified scale of wages.

"When a man fails to get along in one department, he is sent to our employment department, and there questioned closely to make sure of the fact that he is not undesirable and an unworthy individual. At this place, he is given another trial in some other part of the factory.

Investigating the Worker

"Each employe has been at some time investigated, at the time of employment or some time subsequently, and a record taken as to his financial condition, his place and method of living, his occupation, those dependent upon him, kind of recreation indulged in, his habits, age, religion, home conditions, neighborhood, ambitions, what he intends to make of himself, if anything. These data are gotten by men from all sources, from himself, his wife, his pastor, church records, etc.

Teaching English Language

"The working out of all this has presented very many problems. The fact that so large a percentage of the men have no knowledge of the English language made it necessary for the company to establish a school for enlightening them. We have now enrolled about 1,000 men, who are being taught English by the Roberts system, teach him the ways of American citizens, even to purchasing and handling of property, etc.

"To gather information from employes, we organized first a band of about 200 men. We have sifted this band of men now down to twenty men, and after examination all stand high in gentlemanly qualities, tact and diplomacy, human interest, conception of the profit-sharing plan.

"Each man is kindly and thoroughly brought to see, if possible, the benefits of better manhood and better standard of living, if he be unable to appreciate them for himself. We try to teach them self-respect and care for home and children.

Many Interesting Cases

"We have found many interesting cases since beginning in this work, and I will tell one of them here. A great big chap weighing 250 pounds walked into the office one day. I asked him what he wanted. He said, 'I am so and so, and I want to know why I don't get $6 a day.' We sent for his time sheet, and found he was one of our foremen. We asked him a few questions. He said he thought he had a mother, but he didn't know where she was; there was no one dependent upon him. We asked him if it wasn't true that he paid his board 2 weeks in advance, put the rest of his change in his pocket, and just let it seep out, etc. 'Well,' he said, 'what of it, what ought I to do with it?' 'Well,' I said, 'You have got to prove to us that you have some of the elements of thrift before we give you this money.' He said, 'What have I got to do? I don't know how to start.'

"We suggested that he look up his mother, etc., and that he had to be thrifty.

"He got to the door and turned around. He says, 'I was a bum once and I may as well be again—you don't appreciate me around here.'

"We found he was a very responsible employe, and told him to go out and see if he couldn't find himself. He came back in 6 weeks, and handed me a letter from his mother full of gratitude and delight to think that he had come to her again, and acknowledging receipt of $25. She said she never had anything do her so much good, said she didn't know whether he was dead or alive, and was so glad to hear from him, particularly as she needed the $25, as she had been living around among her friends without any money. He showed me a receipt from a tailor, showing that he had paid $8 on a bill about 8 years old; then a receipt from some lodge he belonged to, and last of all, he showed me a bank book with $40 in it.

"We immediately approved him for his share of the profits, and it is the most gratifying thing in the world to see him living here in Detroit with his mother, with his bank account growing every day, and a man altogether satisfactory to us in the shop, improving in his work, and he now wants to be enrolled as an instructor in English in our school, and we are going to enroll him.

60 Per Cent. in First Month

"The figures showed after the first investigation taken about Feb. 1, 60 per cent. of the men were receiving profits, because they seemed from the records to embody the necessary qualities to receive and use the money under the plan according to the purposes of it.

"We have just completed Sept. 1 investigation, and this percentage has grown from 60 per cent. to 82 1-2 per cent. of the total force. The other 17 1-2 per cent. represents the ineligibles, or men whom we are still working upon, but up to the present time are not qualified to receive the money.

Fewer Men, More Cars

"In the month of February, 1913, with 16,000 men working 10 hours a day, we built and shipped 16,000 cars. In the succeeding February, after the profit-sharing plan had been in operation 7 weeks, with 200 men less, working 2 hours a day less, we built and shipped 26,000 automobiles. It is true that the giving of a portion of the profits to each individual qualified is not entirely responsible for this tremendous increase. Much is attributed to improved methods. Of the 44 per cent. increase, 25 per cent. is the proper amount to credit to the men.

Bank Accounts Up 30 Per Cent.

"On August 1, or about 6 1-2 months after the plan was inaugurated, a gain is shown in the bank accounts of our employees of 30 per cent.; in the amount of life insurance, 86 per cent.; homes bought and paid for, 87 per cent.; lots bought and paid for, 86 per cent.; homes bought on contract, 75 per cent.; lots bought on contract, 135 per cent.; and payments made on contracts for lots, 145 per cent.; amount of rent per month, 12 per cent.; amount of board per month, 11 per cent.

"These last two figures are interesting, inasmuch as they show that the men have moved out of squalid quarters into neighborhoods where conditions were better.

"We have a directory, somewhat on the plan of our city directory, and have made a map, showing districts inhabited by our employes. Each section is marked according to the character of the residents.

"Punctuality and regularity of attendance is present to a surprising degree, and this has solved many, many problems that were more or less vexatious in our various departments. Spoiled work has greatly decreased, and our medical department tells us that our men, as a whole, have gained in health since January.

"It is perfectly natural for men to wonder about the permanency of this plan, and we can only say concerning it that it is the outcome of a business which for 11 years has been built by perseverance and with all the conservative judgment that the human mind is capable of. The Ford company has laid plans so that the profit-sharing plans, or rather toward men-making plans, shall endure, and also plans have been started which will bring about a still better condition for these men, firmly convinced of the wisdom of the saying, 'Whatsoever a man soweth, so shall he reap.'

Study Men in Factory

"We watch the individual man in the shop just as much as we watch the product and each individual machine; in fact, we watch our men three times as much as anything else.

Six Grades of Men

We have six grades. We have also some forty-eight different rates of pay that we apply to different skill throughout the shop, and we boiled them all down to eight. A man starting with us here as a skilled operator in the B class goes in as a B-3 operator at 30 cents. We watch him and as soon as he improves he is placed in the B-2 class. He doesn't have to wait upon the tender mercies of his sub-foreman, but is watched from the time department, to see that he is advanced when he deserves it, and his wages will be raised from 30 to 34 cents.

"The table herewith represents a survey of 13,304 men, not quite all of the force here at this time. The majority of the men fall into the C and B groups, these are machine shop operators and average men throughout shop. These groups, A, B, C, are producers, D are helpers, plumbers, steamfitters, etc., E is the common laborer. We pay the laborer, unproductive, one rate. We have a special grade for messengers and some women in our employ. This whole scheme has given splendid results.

Investigate Each Man

"We take his name, his residence, married or single, speaks English or not, religion, recreation indulged in, birthday, lived in Detroit, how long, number of children, names and ages of children, names of persons dependent, how much they earn a week, number at school. This information we do not use at all in the consideration of the fitness of the man, but you can imagine that in going among all this foreign element to get the truth, we had to have something or other to throw light on the man, to be sure that the data he gave us about his family and people dependent upon him was right. For instance, we ask a man if he is a Catholic, and what church he goes to. We go and consult the priest. We find many who say they are married are liars.

Ford Motor Co. Employees

	Dec., 1912	Oct., 1913
Five-day men	3,594	322
Men discharged	776	137
Men quitting	386	326
Men laid off	4,822	844
Total hired	5,678	1,789
Gain for month	856	945

How Banking Grows

"The Ford company has been charged with influencing its employes to deposit their savings in Highland Park State Bank, stock of which is owned largely by members of the company. Only 28 per cent. of the savings of employes since the profit-sharing plan was inaugurated were shown as having been deposited in Highland Park State Bank. The other 72 per cent. were in other banks throughout the city.

"Bank deposits have increased 80 per cent. since the profit-sharing plan was started. Of the American employes, 609 have no accounts, 2,280 have bank accounts, aggregating $462,411, an average of $202.81.

"The Irish come in pretty strong, with an average of $291; the French and Hollanders with $304, and the prize deposit is held by a Hindu and is $575.

"Out of 2,889 Americans, 1,631 have life insurance. Several nationalities, Greek included, do not believe in life insurance, as not one man out of whole numbers of those nationalities employed carries any insurance.

Making Citizens

"Bank accounts were shown by religions. Out of 9,501 men 6,175 speak English, 3,076 do not and 3,640 out of this number are naturalized citizens. We are trying to prepare thirty men weekly for citizenship.

"The Americans predominate in owning homes and lots, although they do not always predominate in average value, as we look through the columns of our investigation records.

"The percentage of good homes at the first investigation was 47, and on the second, 69 1-2. The fair homes at first were 39 per cent. and on the second investigation, 29 1-2 per cent. Poor homes at first showed 23 per cent., but on the second investigation had declined to 1 1-2 per cent.

"Neighborhood conditions have improved from 41 to 57 per cent., the fair jumping from 40 to 40 1-2 per cent., while the bad declined from 19 to 2 1-2 per cent.

THE AUTOMOBILE

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Our Opportunity

BEING prepared when the opportunity comes is a great secret of success. In business the young man, filling satisfactorily his $25-per-week job, will only be assured of the job higher up, if when the vacancy occurs he has prepared himself and is equipped and ready for the higher duties. In proportion as he has prepared himself for such will his efforts meet with the highest success.

So in our industrial worlds, conquests were never made by looking around, whining and wringing the hands. This is a world of activity, one in which "art is long and time is fleeting." A world in which favorable business conditions are not made specially for the individual concern, but in which the condition is open to all and only those profit who are ready when the opportunity comes.

The Opportunity

Such a business opportunity has presented itself to the American motor truck industry. Foreign powers are buying trucks and the demand came in the twinkling of an eye. There was no herald 6 months ago announcing from New York to Chicago that in September and October Europe would buy trucks in quantities that would keep many factories working on night-and-day forces, rather the chapter of opportunity was penned in a single week, and the final decision arrived at in one short day. Yesterday there was scarcely a symptom of need for American trucks in Europe, yet today the demand is here.

A few concerns are going to profit well by this opportunity, they are going to profit because they are ready for the opportunity. During the past months they have been cutting their cloth to meet requirements, doing business by going out in the highways and compelling it to come in; whereas others have talked depression, have looked on the great expense of American industry through the wrong end of the telescope and have allowed themselves to feed their own discontent. Such firms are today in a poor condition to meet the opportunity, which it is not necessary to cross the Atlantic to get in touch with but which has come to our very doors.

As Others See Us

Europe has examined our motor trucks during the past 3 weeks, and is today telling us our shortcomings as seen in the light of their experience. With Europe our trucks are too heavy, fully 20 per cent. heavier than those of France, Germany or England. This added weight is a direct handicap. We are today, and have been for 2 or 3 years, working for lighter-weight passenger cars, cars in which a great percentage of the motor power is not consumed in transporting the needless excess weight of the vehicle. We have acknowledged this situation, and have begun an era of higher efficiency in motors and the chassis in general.

The Springs

Spring suspension plays a much greater part in truck life than it is generally given credit for. Europe views spring suspension as a most important factor. If the spring system is not correct, you wear your tires too rapidly. The road wheels must hold the road. They must not bounce off the surface. Every time they bounce off the surface, the wheel spins or lags and there is tire wear. Hence, spring suspension becomes a vital factor in reducing tire wear, which is one of the most considerable factors in the expense of truck upkeep.

Wear

Ability to wear is the criterion that many foreigners use in the selection of a motor truck. Will it wear? This is the question they endeavor to solve. Parts must wear, and have they provision for adjustment? Can you adjust the bushings of the steering gear when they wear? It is cheaper to adjust than to replace. It is much quicker and in either war or industry the economy of time is a vital factor in truck operation.

So adjustment and accessibility become real factors in truck work. So Europe considers it, and as Europe is the big buyer today, it is quite necessary that these matters be conspicuous. But adjustability and accessibility are not important solely because Europe thinks so. Our own conditions demand them. Our industries demand such; and should our nation make large purchases of trucks for war purposes or determine on some form of truck subsidy system these factors would be equally important.

Horsepower and Gasoline War Tax Defeated by Senate Caucus

After Repeated Amendments to the Original House Measure Had Been Killed, Both Provisions Were Voted Down in Stormy Midnight Session—Victory May Be Only Temporary

WASHINGTON, D. C., Oct. 7—There will be no American war tax on automobiles and gasoline. At least, the provisions of the House of Representatives that would have collected 1 cent from the sale of each gallon of gasoline and 50 cents per horsepower for every automobile sold, were defeated late last night in a Democratic Senate caucus.

Long Fight Is Expected

It is expected that, in spite of the automobile and gasoline taxes having been thrown out by the Democratic Caucus, the House of Representatives will try to put them back on the bill. A long fight on the war revenue measure is expected to prolong the session of Congress. It is expected that the increased tax on beer, and 5 cents a gallon on rectified spirits will offset the loss on automobile and gasoline taxes.

The vigorous resistance of the automobile industry to the measures, in which it was shown that a necessity and not a luxury would be made to suffer heavily by the two taxes, probably influenced the senators and representatives.

The session was a tempestuous one and the discussion of the automobile tax caused the greatest trouble.

The vote of the caucus was 20 to 17 against the 1 cent per gallon tax on gasoline, the Senate committee having reduced the House assessment of 2 cents a gallon.

Among other changes in the original bill are:

The tax on chewing gum is 4 cents for each dollar box sold.

The committee added a tax on sparkling wines, not otherwise provided for in the bill, of 1 cent on pint bottles and 2 cents for bottles containing more than a pint.

It was decided to exempt from the tax all theatres and entertainments, chatauquas, lectures, lyceums, agricultural and industrial fairs and religious and charitable entertainments.

The committee estimated that several millions of revenue would be derived from the added taxes.

The first action of the caucus was to vote an increase in the proposed extra tax on beer from 50 cents to 75 cents a barrel, to make the total tax $1.75 a barrel, with a drawback of 5 per cent. for purchase of revenue stamps in advance. The amendment, urged by Senator Williams of Mississippi, was carried by a large majority after Senator Stone had made a vigorous speech against it. A special revenue tax on rectifiers of distilled spirits of 5 cents a gallon also was adopted. Together the proposed taxes on liquors would yield an annual revenue of more than $50,000,000.

Democrats of the Finance Committee had agreed to the House tax of $1.50 a barrel on beer, which would yield, at 50 cents over the normal tax, an added revenue of $32,500,000 annually. The further addition of 25 cents a barrel by the Senate Democrats would yield another $16,000,000. With the 5 per cent. discount for prompt payment figured, the least to be derived from beer would be approximately $46,000,000.

The proposed tax of 5 cents a gallon on rectified spirits, Treasury experts estimate, would yield $5,000,000. Thus the total to be derived from liquors would be more than half the anticipated Treasury deficit caused by the European war.

The caucus retained the stamp tax of 2 cents on Pullman car tickets. There will be no stamp tax on checks or other negotiable paper in this bill as approved by the Democratic caucus.

The caucus also revised the tax on banking capital. As framed by the Senate Committee, the bill would have levied $2 for every thousand dollars of banking capital and surplus. This rate was reduced to $1 per thousand by a vote of twenty-six to eleven.

Injustice of Bill Strenuously Argued by Industry

WASHINGTON, D. C., Oct. 6—The last draft of the proposed war tax revenue measure, as drafted by the three Southern Senators, places a tax of 1 cent a gallon on gasoline and 50 cents per horsepower on passenger, gasoline cars, this horsepower tax to be paid by the manufacturer or dealer, the tax to be paid by the manufacturer excepting under conditions where he has already contracted for the sale of his cars with his dealers, in which case it is expected that the dealer will have to meet the bill.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, was in this city today representing his organization, and hoping to make a date for a public hearing on the measure. A public hearing was denied and he was granted a conference with two of the Senate committee, Senator Simmons of North Carolina and Senator Williams of Mississippi. Senator Gore of Oklahoma, the third member of the committee, was not present.

The committee acknowledged to Manager Reeves that more pressure was being brought to bear against the gasoline tax than had been brought against any similar measure in Washington. Practically all automobile manufacturers, all accessory manufacturers, all automobile dealers' assns., and a great many of the large automobile and supply dealers have forwarded telegrams to the committee. Scores of other organizations have forwarded their resolutions and from all sections protests have arrived against the measure.

Governor of Michigan Protests

Governor Woodbridge N. Ferris, of Michigan, sent the following telegram today to U. S. Congressman Underwood:

"Proposed motor car tax will in my opinion, strike a deadly blow at Michigan's greatest manufacturing industry. Michigan is loyal and patriotic, and ever willing to bear her share of the nation's burden. This industry is a Godsend to tens of thousands of laborers. Give us a tax that is not centralized —a tax that approximates a uniform distribution for those who have and to spare."

The reduction of the gasoline tax from 2 cents a gallon to 1 cent was brought about largely by the general protests not only from motor car manufacturers, but also from the thousands of farmers using stationary engines and gasoline engines used in power plants and other places. The sentiment is general that the present compromise of 1 cent a gallon on fuel will not be seriously disputed, but the horsepower tax of 50 cents per horsepower will be combated from the start.

What 50 cents per horsepower on gasoline passenger cars means to the automobile industry does not seem to be comprehended by the committee, which considers the gasoline pleasure vehicle solely a luxury and not a business necessity. The committee seems to be unanimous in the belief that there are scores of large automobile concerns making fabulous fortunes each year, and entirely neglects the hundreds of small companies that would practically be forced out of business by the horsepower tax.

Already the automobile dealer is taxed in many different ways, and the additional tax proposed by the Senate Committee would place an unreasonable hardship on many motor interests. For example, a dealer in automobiles in North Carolina, it is reported has at present to pay $500 per year for the privilege of doing business. To this we must add the various registrations that are required. Each state registers the cars and in many states personal property taxes on automobiles are paid; chauffeurs are registered in excess of horse drivers, and several states that have wheel taxes which are particularly burdensome. In the State of Iowa, with its 100,000 automobiles, it is estimated that the gasoline consumption is 75,000,000 gallons annually, which gives a revenue from this state alone of $750,000. It is not surprising that a general protest from all owners and dealers in vehicles should come from this state as well as others.

Many Send Objections by Wire

During the course of a speech in the Senate, Senator Smith read telegrams from many manufacturers protesting against the proposed tax. Herewith are presented some of these telegrams:

Nordyke & Marmon: "Proposed tax is the greatest menace to the industry in its history, owing to the contracts existing with dealers. Tax can not be passed on to consumers and will fall as an unjustifiable burden principally upon the states of Michigan and Indiana. Automobile manufacturing is one of the few industries that has kept the spark of industrialism alive in the United States during the long depression the country has been passing through. The automobile manufacturing industry as a whole is in no condition to stand this discriminatory tax."

Indiana Companies Protest

The Indiana Automobile Manufacturing Assn., the Hoosier Motor Club and affiliated clubs and workmen employed in the automobile factories of Indiana have also protested against the proposed tax on automobiles and on the capital stock of automobile manufacturing companies. Representatives of thirty-two motor car makers sent a telegram to Lincoln Dixon, member of the Ways and Means Committee, urging that he use his influence against such a tax.

Owners of cars and workmen joined the manufacturers in sending telegrams of protest to President Wilson, the Congress and members of the Indiana delegation in Congress. The messages state that practically all the motor cars built in the United States are manufactured in Indiana, Michigan and Ohio, and that hence the tax would be discriminating:

C. W. Nash, president Buick Motor Co.: "Senate committee's recommendation taxing owners and manufacturers of automobiles is the most serious blow that could be dealt this industry. We appeal to you to use all honorable means to save Michigan's greatest industry. Also request hearing of manufacturers before senate committee."

Hupp Motor Car Co.: "This seems to be vicious class legislation. No other industry has been singled out for such drastic and confiscatory action. The automobile must be recognized as a public necessity and convenience instead of a mere luxury. The hundreds of thousands of users of automobiles in the United States are entitled to the same fair and just treatment that should be applied to all other owners of property."

Chalmers Motor Co.: "We have already been forced to make a reduction in the price of our cars, due to conditions existing abroad and a tax of $40 per car would reduce the profit to a point where the successful operation of our company would be seriously impaired."

Studebaker Corporation: "The proposed special tax is intensely disturbing to the entire automobile industry. It immediately threatens the existence of numerous companies and the consequent elimination of income to many thousands of employes. Such an overwhelming blow to the automobile industry at this critical time would positively introduce wide disaster. There are approximately 1,548,350 automobiles owned in the United States, whose owners already pay property and state taxes. The majority of these cars are owned by persons in moderate circumstances and the use of these cars largely for business purposes makes them practically a necessity. The imposition of a third tax on motor cars and automobile owners is a positive burden amounting to discrimination. It is confiscation. The gravity of this proposed step and its far-reaching influences, which, in our opinion, can not have been adequately and thoroughly reviewed, makes a hearing in conference on this subject of vital importance and we respectfully request an early opportunity to lay before you important facts in connection with the proposed plan."

Cadillac Motor Car Co.: "Congress surely does not appreciate what would be the effect upon the entire automobile industry if proposed impost were forced. Michigan, in particular, would suffer a staggering blow. The automobile has become a commercial necessity for the whole country and its manufacture should be encouraged and not crushed. Michigan now depends largely upon the automobile industry for employment and thousands of Michigan workmen would become injured by such an unjust tax."

Federal Motor Truck Co.: "New proposed tax for motor truck manufacturers means suicide. Truck manufacturers in America to date have not made a dollar. Trucks are not a luxury; are sold on cost of installation and operation. Any additional tax will have lead effect on truck industry."

Henry B. Joy, president Packard Motor Car Co.: "Proposed additional tax is unfair and inequitable in the extreme. We now pay in taxes $35 on every vehicle we ship. Proposed tax would increase taxation to $75 each, an impossible, burdensome taxation."

Charles Thaddeus Terry, general counsel National Automobile Chamber of Commerce: "Automobile manufacturers throughout country protest against tax. Automobiles now pay three taxes. More taxes will destroy industry."

Imperial Automobile Co.: "If the proposed tax becomes a law you will ruin every automobile manufacturer in America."

In addition to the above, telegrams of protest have been received by Senator Smith and Senator Townsend from Stutz Motor Car Co., Briscoe Motor Co., Jackson Automobile Co., Abbott Motor Car Co., Anderson Electric Car Co., Briggs Detroiter Co., Commerce Motor Car Co., Cricket Cycle Car Co., Day Automobile Co., Dodge Bros., Ford Motor Co., Hudson Motor Car Co., Krit Motor Car Co., Regal Motor Car Co., Saxon Motor Co., Signal Motor Truck Co., Wagenhals Motor Co., Wahl Motor Co., Republic Motor Truck Co., Cartercar Co., Durant Dort Carriage Co., General Motors Truck Co., Havers Motor Car Co., National Motor Truck Co., Oakland Motor Car Co., Olds Motor Works, Reo Motor Car Co., and Detroit Auto Dealers Association.

Armored Cars for U. S. Army, Congressman Urges

WASHINGTON, D. C., Oct. 5—Some time this week Congressman Anthony, of Kansas, member of the House Committee on Military Affairs, will introduce a bill to have the United States army adopt and purchase armored motor cars as a regular arm of the military service. Several other members of the committee on military affairs have kept a close watch on the war efficiency of armored cars as described in the European dispatches and the sentiment at the Capitol is that the present war has demonstrated that this government can no longer afford to be without this equipment.

"To my mind," said Congressman Anthony to THE AUTOMOBILE correspondent, "there can be no doubt that any up-to-date army must be equipped with armored automobiles. The things that have been accomplished through their use by both Germans and the Allies have demonstrated that, as engines of modern warfare, they are indispensable.

"There was a time when people laughed at the idea of the automobile being a business asset, but only one glance at the country roads and wheat fields of my state, Kansas, is necessary to show that mistaken idea. And, since those nations which are recognized as having the most perfect military organizations in the world have demonstrated not only the efficiency but the necessity of armored cars, it seems to me high time for the United States Government to correct a defect which at any time might have the most serious consequences for our army.

"The time may easily come soon when much of the military work done by the horse will be accomplished through the instrumentality of the armored car. When this time does arrive it would be a great mistake to have this country behind all others in such valuable and essential equipment."

N. Y. Separator Repeal Law Defeated

NEW YORK, N. Y., Oct. 6—The New York City dealers and garagemen who have been fighting against the gasoline separator, the installation of which is required by an ordinance, were unsuccessful this afternoon in having the repeal of the separator law passed by the Board of Aldermen over the Mayor's veto. The vote was thirty-three to twenty-one in favor of retaining the old ordinance on the books; fifty-three votes, or two-thirds were necessary to override the veto. The board voted to repeal early in the summer.

This, however, does not mark the end of the fight. In pleading with the Board of Aldermen not to override the veto of Mayor Mitchel and repeal the ordinance, the Fire Prevention Bureau stipulated that it was perfecting a satisfactory separator than can be installed for less than $100 and would take no further action until this device was ready for the market; all present devices are declared by the garagemen to be expensive and not satisfactory after installed. As a further move, the appeal may be reattempted or a substitute ordinance may be introduced.

JACKSON, MICH., Oct. 5—The Argo Motor Co. has been incorporated. Capital stock $750,000. Benjamin Briscoe, president; Jas. R. Findlater, vice-president; F. D. Dornam, secretary; L. E. Latta, treasurer.

Not More Than 27,000 Cars in America South of U. S.

European Consignment Methods Described by Hupp Export Representative—Governments Selling Cars "Abandoned" in Customs

DETROIT, MICH., Oct. 5—"In all the countries south of the United States, that is Mexico, Central and South America, there are not over 27,000 automobiles, according to the most recent statistics which I have secured, and of that number about 15,000 are in Brazil and Argentina," said Peter Severin Steenstrup, export representative of the Hupp Motor Car Co. in South America, who is now visiting in Detroit.

"The automobile business in South America has really been overdone, and this is especially true concerning high-priced cars. The business is done mostly on a consignment basis with most of the European automobile manufacturers. Through their banks in the different South American countries they are able to investigate very quickly the financial standing of their agents or of the importers handling motor cars, and thus sometimes grant more than 90 days for the settlement of their accounts.

"However, in many cities the customs are now crowded with high-priced cars which have not been taken out by the consignees. As the storage charges amount to 1 per cent. of the invoice for the first month, 2 per cent. the second month, 4 per cent. the third month, and thus keep on an ascending scale the price to be paid for the cars when the consignee is finally in a position to take them out is generally so high that the cars are left with the customs and thus annually a large number of high-priced automobiles have to be sold by the government, or rather by the customs, and generally the prices obtained are not higher than what a medium-priced new car costs.

Government Sold Cars

"Last May there were 300 such imported cars in the customs house at Buenos Ayres, Argentine, and I know of two instances where $5,000 cars were offered for $2,000 and it was not at all an easy matter to find purchasers, notwithstanding their real value.

"The majority of automobiles owned in South America are bought by the wealthy city people who are able to afford a chauffeur. The number of owner-drivers is very small, but with the advent of the moderate-priced American cars it is very likely that the number will be increasing more rapidly. The owner-drivers are especially to be found in certain sections of Brazil.

Farmers Will Buy

"The number of farmers owning automobiles is still relatively small, but during the last 18 months the number has increased and is certain to go on increasing, as the dealers are directing their efforts much more than heretofore to the agricultural sections of the country, such as the provinces in Brazil where coffee is grown.

"The greatest drawback for the more rapid progress of the automobile business in most all of the South American countries is the entire lack of good roads, for outside of the highways and roads near the big cities there are hardly any roadways at all. Even in Africa one will find better highways than in South American countries. As an example of this, I will cite the case of a party of motorists which made a trip from Rio de Janeiro to Sao Paulo, a distance of about 400 miles—about as far as from New York to Buffalo—and it required 13 days to make the trip.

Argentina Needs Stone Roads

"In Argentina there is now a big movement afoot for having good roads built, as the recent extraordinary season of rain—it rained practically continually during the months of March, April and May—made the highways and roads absolutely impassable. As a consequence 30 per cent. of the corn crop was absolutely lost as it was impossible to haul it to the railroads. This could not have happened if stone or macadam roads had existed.

"Under ordinary weather conditions it requires about 10 hours to drive from Valparaiso to Santiago, in Chili, the distance being some 100 miles, but part of the year, during the rainy season, the roads are impassable and motor car traffic impossible.

"In some of the South American countries the application or the levying of duty by the customs is somewhat of an unpleasant joke, as there is a great difference when the duty is levied in gold or when it is in paper; for instance, in Brazil there is, according to the tariff, a 7 per cent. preferential tariff on American motor cars, but as a matter of fact when it comes down to actually settling the bill the duty amounts to 18 per cent.

"One of the principal reasons why the American manufacturers have always been at a disadvantage in doing business in South America is the lack of American banks in those countries. By being compelled to send their bills of lading and other shipping documents and invoices through the foreign banks in South America, our foreign competitors are naturally able to learn, not only our prices, but also who our customers are. This is a condition which I understand is now in a fair way being relieved."

British and Italian Cars Being Imported

NEW YORK CITY, Oct. 5—Agents in this city for French, German and Belgian makes of automobiles are receiving no shipments from the other side. Dealers in English makes are able to obtain a few cars and have not been as yet seriously injured by the war. The firms dealing in Italian cars, however, are in an enviable position, as the Italian government has given permission for the exportation of pleasure cars of 30 horsepower and less.

The Fiat Motor Sales Co., in particular is enjoying the benefits of Italy's neutrality. E. R. Hollander, president of the company, states:

"Our factory has shipped us more than 180 cars since war was declared. Some of these we have received, some are in the Custom House and some are afloat. There are available for our use forty-five more automobiles which the factory had made up at the time war was declared.

"As automobiles are contraband of war, our factory was unable to sell any of the stock on hand to any of the warring nations after hostilities opened, and so the automobiles were shipped to America. The government, which seems to be expecting war, has placed an embargo against the exportation of commercial motor vehicles."

E. L. Dugas of Lancia & Co., stated that several Lancia machines are in the Custom House and that another shipment is expected from Italy on October 6. He states:

"The only restriction that the Italian government has placed on our factory is that it export cars only to neutral countries."

The Peugeot Auto Import Co. is relying for its future supply upon the factory branch in London. It has several models on its salesroom floor at present.

R. W. Schuette, American agent of the Rolls-Royce, states that he expects in the next few months to handle about fifty cars, or one-sixth of the entire annual output of the British factory. He has received about a dozen chassis and there are a number now on the way.

Tire Prices at Before-War Level

NEW YORK CITY, Oct. 5—Not only have tire prices reached the level from which they ascended at the outbreak of the European war but one reduction has been made. The United States Tire Co. has made reductions in its chain tread casings ranging from about 4 to 15 per cent. This is a reduction from the before-the-war list, and the cut is larger on the smaller sizes. The 32 x 3 1-2 is dropped from $27.40 to $20.10 and the 36 x 4 1-2 from $49.35 to $42.

These prices went into effect and at the same time the United States returned in all other cases to its before-the-war list. When tires started downward, following their rapid ascent, United States, Goodrich and Diamond, Republic and Fisk went back to their old dealers' discounts, but kept the higher list. But inasmuch as the list is seldom adhered to by dealers anyway the maintenance of the list was considered largely theoretical.

October 1, when the United States returned to the old list, Goodrich and Diamond did likewise, and the day following, October 2, the Fisk Rubber Co. also went back to the old list. The Republic Rubber Co. is still at the higher list, but its dealers' prices are normal.

Crude Rubber Still Cheaper

Prices of rubber continue to decline, owing to lack of buyers. It is also suggested by the *India Rubber World* that an expected loss of interest in high-class rubber goods is affecting the market.

Para was selling up to 63-65 cents a pound on September 30, which compares with 75-80 a month ago and 80-82 a year ago. The best grade plantation was quoted at 63-64 on September 30, 75-80 on September 1 and 60-61 on October 1.

N. Y. Gets $1,462,968.86 in License Fees

NEW YORK CITY, Oct. 4—Mitchell May, Secretary of State, reports up to September 2, motorists have paid in to the state in fees for the registration of motor vehicles and chauffeurs' licenses a total of $1,462,968.86, which is nearly $200,000 in excess of the amount contributed for the same purpose during the whole of last year. So far there have been registered 161,353 motor vehicles. This is an increase of 36,090 over the corresponding period of last year. The number of chauffeurs licensed is 61,398. During all of last year there was registered only 132,450 motor vehicles and 56,702 chauffeurs.

The New York City bureau continues to hold a big lead both in the number of licenses and registrations issued. To September 8 this year the cars registered in this city were 71,407, as against 59,667 in the same period of 1913. The increase in the number of chauffeurs was more than 4,000.

The Buffalo bureau stands second, considerably ahead of Albany. To September 8, Buffalo shows 49,879 cars registered, increase over the same period of last year of more than 12,000. The Albany registrations total 38,353, an increase of a little more than 10,000.

Minneapolis Industry Employs 1,437

MINNEAPOLIS, MINN., Oct. 5—Industrial survey by a division of the Minneapolis Civic and Commerce Assn. shows there are six automobile manufacturing plants in Minneapolis 88 distinct motor car repair shops, 11 distinct accessory manufacturers; also, 24 gasoline filling stations outside of Bowser tanks at garages and drug stores. The employee list is a total of 1,437, of which 384 are in the factories, 863 in the repair shops, and 119 in the accessory plants. In the filling station work 71 men are employed. In addition six plants build electric batteries, employing 57 men.

The manufacturers of cars are the H. E. Wilcox Motor Co., trucks; Ford Motor Co., general; Nott Fire Engine Co., motor-propelled fire apparatus and motor pumping engines; Dispatch Motor Car Co., pleasure cars; Robinson Motor Truck Co., trucks; Braise Motor Car Co., trucks and cyclecars.

Market Reports for the Week

Market prices this week were a little unsettled. All changes but one were lower. Tin experienced a fluctuating week. Opening at $30.90 and rising to $31.13 on Thursday, it closed with no change for the week. There was small response from copper customers, though both electrolytic and Lake were offered at reduced prices. Antimony rose to $0.10 at a gain of $0.01 1-2. There was an inquiry for 300 tons for Europe on Tuesday, causing sharp buying by the dealers here. Little buying for foreign account, however, was done for these prices are above those at London. Rubber prices were steady, especially Up-River Para, which was quoted at $0.65. Cottonseed oil saw a gradual decrease from $5.85 a barrel to $5.53, with trading a little more active at the end of the week. The petroleum market was steady with no changes. Linseed oil dropped to $0.53 on Friday at a loss of $0.03. Lard oil dropped to $0.92, or 1 cent lower than the opening price. Cyanide potash dropped from $0.32 to $0.28.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.08½	.08½	.08½	.08	.08	.10	+.01½
Beams & Channels, 100 lb.	1.31	1.31	1.31	1.31	1.26	1.26	......
Bessemer Steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	......
Copper, Elec., lb.	.11¼	.11	.11	.11	.11⅝	.11⅖	—.00 7/20
Copper, Lake, lb.	.12	.11⅞	.11⅞	.11⅞	.11⅞	.11 11/20	—.00 9/20
Cottonseed Oil, bbl.	5.85	5.61	5.60	5.59	5.54	5.53	—.32
Cyanide Potash, lb.	.32	.32	.28	.28	.28	.28	—.04
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.93	.93	.93	.93	.93	.92	—.01
Lead, 100 lb.	3.70	3.70	3.70	3.70	3.70	3.60	—.10
Linseed Oil	.56	.56	.53	.53	.53	.53	—.03
Open-Hearth Steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	.65	.66	.66	.65	.65	.65	......
Silk, raw, Ital.	..	..	..	..	4.45	..	......
Silk, raw, Japan	..	..	..	..	3.60	..	......
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	30.90	31.00	31.125	31.125	31.00	30.90	......
Tire Scrap	.05	.05	.05	.05	.05	:05	......

C. of C. Has Record Show Applications

NEW YORK CITY, Oct. 7—Feeling that in the elimination of the proposed tax on automobiles against manufacturers and dealers, the Finance Committee of the Senate at Washington has properly recognized the position of the motor car industry, there was a general sentiment of appreciation at the meeting of the Directors of the National Automobile Chamber of Commerce held today at the New York headquarters.

Representatives of the Chamber visited Washington and supplied facts regarding the making and marketing of automobiles and those facts, coupled with protests from thousands of dealers and manufacturers of automobiles, parts and accessories throughout the country, it is believed, showed clearly to the lawmakers at Washington how unfair it would have been to require the automobile industry to carry such a heavy burden as the tax would involve.

While it is true that a number of the larger concerns have been very successful in the marketing of cars, it was felt that the industry should not be judged solely by the great successes of eight or ten makers, when there are 450 listed manufacturers of automobiles in the country and more than 15,500 dealers, besides 13,630 garages and the hundreds of factories making parts and accessories.

At to-day's meeting the component vehicle warranty clause was adopted and there were reports from committees on patents, traffic, commercial vehicle, good roads and shows.

While the automobile industry has suffered with other lines by the depression in trade and by the practical elimination of its export business, which last year amounted to $34,500,000, further proof that the automobile is a necessity in various lines of business and for doctors, contractors, salesmen and other business men, was furnished by the traffic department reports which showed that shipments in substantial quantities were made by practically all factories during August and September.

The Show Committee reported a record number of applications of space at the National Automobile Shows at New York and Chicago, the drawings for which will take place tomorrow in connection with the semi-annual meeting of members.

President Charles Clifton presided and the others in attendance included: S. T. Davis, Jr. (Locomobile); Roy D. Chapin and Howard E. Coffin (Hudson); C. C. Hanch (Marmon); H. H. Rice (Waverley); S. D. Waldon (Packard); Wilfred C. Leland (Cadillac); John N. Willys (Overland); H. O. Smith (Premier); E. R. Benson and A. R. Erskine (Studebaker); Wm. E. Metzger (American Electric) and Alfred Reeves, General Manager.

Studebaker's September Sales, $4,277,797

DETROIT, MICH., Oct. 3—The total value of the Studebaker cars sold by the thirteen Studebaker branches in the United States during the month of September was $4,277,797.92, which is the best September business the Studebaker Corp. has ever had.

The totals for each branch in dollars are not given but the percentage of increase over the corresponding month in 1913 and the showing is rather exceptionally good for several cities, while the total average gain for the thirteen branches is 232 per cent.

Gain in sales for each branch in September, 1914, according to percentage over September, 1913:

Omaha, Neb.	520 per cent.	Boston, Mass.	222 per cent.
Kansas City, Mo.	508 " "	Detroit, Mich.	114 " "
Chicago, Ill.	322 " "	San Francisco, Cal.	107 " "
Minneapolis, Minn.	270 " "	New York, N. Y.	77 " "
Dallas, Tex.	268 " "	Los Angeles, Cal.	71 " "
Philadelphia, Pa.	251 " "	St. Louis, Mo.	49 " "
Atlanta, Ga.	245 " "		

$50,000 of Michigan Buggy Claims Cancelled

KALAMAZOO, MICH., Oct. 5—In the matter of the Michigan Buggy Co., bankrupt, contested claims amounting to approximately $50,000 have been disallowed by Referee in Bankruptcy Banyon of Benton Harbor. The decision was made at a hearing held here.

The claims disallowed were presented by William R. Beebe, A. H. Vayo Co., Lewis Spring & Axle Co., Herbert Mfg. Co., Ernest F. Briggs, Michigan Motor Car Co., Journal Co., George F. Thompson

& Sons Buggy Co., Lewis Engelhausen, R. Kloeppel, E. F. Gerber, Owenhouse Hardware Co., H. Jacoby, F. F. Taylor & Son, C. J. Stone, J. T. Coleman, Hubbard & Hubbard, M. D. Harris, John L. Bridges & Son, A. P. Spell, Scott & Tiffany, E. Vander-Carr and Carr Auto Co. Claims allowed at the same hearing were as follows: Mayo Radiator Co., $308; F. G. Wood, $136.02; G. S. Patterson, $790.18; Reed Foundry & Machine Co., $2,500; Cecil White, $1,900; John Hamilton, $436; R. L. Carmell, $1.01; Slater & Co., $36.70; LaCross Motor Co., $8.80; B. H. Adams, $1.50; G. E. Meyers, $1.16; J. M. Nash, $74.31; H. B. Shirk, $66.63.

Walpole Tire Co. Earned $30,000 in August

BOSTON, MASS., Oct. 3—There were sixty present at the meeting of the Walpole Tire & Rubber stockholders. Judge Harris, one of the receivers, in the course of outlining general conditions with the company stated that there are about 800 stockholders, of whom 241 are women. He stated that the Walpole company earned $30,000 in August and for no month less than $20,000 since the receiver took charge. In 6 months $160,000 was paid off to creditors.

Auditor Keith stated that from January 31 to June 30 of this year the company earned $125,000 and that with one exception all the departments were now on good-paying basis. The good-will item has been marked down from $800,000 to $250,000. $422,000 has been paid out since the receivership, including $60,000 to the Traders Bank. Counsel Metzler stated that including the subsidiary company profits, average earnings had been $30,000 a month. The indebtedness of $1,100,000 has been reduced to $250,000. The company has about $750,000 quick assets.

Swinehart Co. Has $137,000 Surplus

AKRON, O., Oct. 3—The directors of the Swinehart Tire & Rubber Co. met September 30 and declared the usual dividend of 6 per cent. on the common stock of the corporation. The report to the stockholders showed a very prosperous year ending August 30. After paying all charges and dividends and charging off a large sum for depreciation, there remains a surplus of $137,000. The plants of the company are running at almost 80 per cent. of capacity and the future outlook is excellent.

Missouri Fair Crowds Inspect 18 Cars

SEDALIA, MO., Oct. 3—Eighteen different makers of cars were shown in the motor show at the Missouri State Fair, which closed here Saturday. The exhibits were mostly by Kansas City dealers and reports are that the fair business was exceptionally good.

The car salesmen here explained that Missouri is unusually prosperous this year. A huge corn crop is in the making and the wheat yield was one of the best in the history of the state. With the exception of a few districts in central eastern Missouri, the recent dry weather caused little harm to the growing crops.

That Missouri is rapidly becoming a motor state was shown by the attendance. On big Thursday of the fair more than 2,000 cars were parked in the grounds. Practically all of these toured to Sedalia from points as far distant as 100 miles.

U. S. Rubber Co. Has $8,000,000 Cash

NEW YORK CITY, Oct. 6—President Colt, in commenting upon the action of the United States Rubber Co. directors in declaring the regular quarterly dividends on the preferred and common stocks, said: "Dividends having been amply earned and the finances of the company being in an easy condition, with $8,000,000 cash on hand, I think the action of the board is not only conservative, but one that is entitled to commendation in these times. The division of $1,700,000 at this time among 15,000 stockholders will, I am satisfied, do much good."

PITTSBURGH, PA., Oct. 3—A dividend of 1 3-4 per cent. on the preferred stock and 1 per cent. on the common stock has been declared by the Westinghouse Electric Co., payable October 15 on the preferred and October 30 on the common.

Motion for U. S. L. Sale Denied

BUFFALO, N. Y., October 7—Judge Hazel, in the Federal Court, denied the application of Alfred Stickney, representing the Central Trust Co., for an order authorizing the sale of the United States Light & Heating Co. The Stockholders and Protective Committee and merchandise creditors were authorized to intervene. James O'Moore, one of the receivers, and Louis Posner, attorney for the company, opposed the motion, claiming that the company would soon be in good financial standing.

WASHINGTON, D. C., Oct. 1—A drawback allowance was today granted by the Treasury Dept. on the exportation of automobile tops manufactured by the American Top Co., Jackson, Mich., for the use of imported mohair cloth, imitation mohair cloth, jute webbing, buckram and celluloid sheets.

An allowance was also given on aluminum automobile hoods manufactured by the Michigan Stamping Co., Detroit, Mich., with the use of imported sheet aluminum, for the account of the Ford Motor Co., that city.

NEW YORK CITY, Oct. 4—The United States Rubber Co. declared the regular quarterly dividends of 1 1-2 per cent. on the common, 2 per cent. on the first preferred and 1 1-2 per cent. on the second preferred stock, payable October 31, to stock of record October 15.

Defunct Hoosier Bus Line Pays Stock Dividend

INDIANAPOLIS, IND., Oct. 3—J. I. Gardner, receiver for the Rapid Transit Motor Co., has been authorized by the court to pay a dividend of 2 1-2 per cent. to stockholders and it is understood another dividend may be paid later. All creditors have been paid in full. The company formerly conducted a motor bus service in Indianapolis, but the venture did not prove successful.

NEW YORK CITY, Oct. 7—C. Arthur Benjamin, has been made sales manager for the George W. Houk Co., Buffalo, N. Y. He was formerly general manager of the Fiat company at Poughkeepsie, N. Y.

August Exports Feel War Shock—Drop to $762,422

WASHINGTON, D. C., Oct. 6—Automobile exports from this country for the month of August have fallen off $1,676,208, compared with the same period in 1913, or from $2,438,630 to $762,422. This amounts to about 60 per cent. Tire exports dropped from $377,031 to $188,002, or about 50 per cent.

For the 8 months ending August exports dropped $2,218,-278, or from $23,710,140 last year to $21,491,862 this year.

Figures issued by the Bureau of Statistics show the exportation during August, 1914, of 66 commercial cars valued at $124,016, 385 pleasure cars valued at $441,879 and parts valued at $196,527. In the same month last year these exports were as follows: Commercial cars, 68, valued at $109,-437; pleasure cars, 1,936, valued at $1,874,312, and parts valued at $454,881.

During the eight months ending August exports of commercial cars amounted to 509, valued at $772,257, while the pleasure cars numbered at 18,884, valued at $16,612,060, and the parts $4,107,545. During the same period in 1913 the figures were as follows: Commercial cars, 730, valued at $1,260,-086; pleasure cars, 18,464, valued at $18,484,396, and parts $3,985,658.

EXPORTS—	August, 1914 NO.	August, 1914 VALUE.	August, 1913 NO.	August, 1913 VALUE.
Automobiles	385	$441,879	1,936	$1,874,312
Commercial	66	124.016	68	109.437
Parts		196,527		454,881
Tires		188,002		377,031
Total		$950,424		$2,815,661

EXPORTS—	8 Months Ending August, 1914 NO.	8 Months Ending August, 1914 VALUE.	1913 NO.	1913 VALUE.
Automobiles	18,884	$16,612,060	18,464	$18,484,396
Commercial	509	772,257	730	1,260,086
Parts		4,107,545		3,985,658
Total		$21,491,862		$23,730,140

Detroit May Have Most Perfect Traffic System

DETROIT, MICH., Oct. 3—Working in co-operation, the Detroit Board of Commerce, the Wolverine Automobile Club, the Detroit Police department and many prominent citizens have started a movement, a campaign which is to result in providing this city with the most perfect traffic system.

Frederick H. Elliott, secretary of the Safety First Society of New York was the principal speaker at a meeting held at the Board of Commerce and he told of what had been accomplished in New York. He urged the formation here of a similar society and this was decided upon, by president C. B. Warren of the chamber who will appoint a special committee to prepare a plan of action.

Among the various suggestions offered by the different speakers these are the most interesting: Licensing of all drivers of automobiles; authorization given to the city and state officials for the revocation of the drivers' licenses in case of carelessness and negligence having caused accidents; severe penalties for drivers having caused accidents while under the influence of liquor; more rigid examination of applicants for a driver's license as to their body fitness, that is to say good health; the passing of an ordinance prohibiting pedestrians to cross streets in the congested districts except within the specially marked "cross" sections reserved to pedestrians; all vehicles to be compelled to have tail-lights; prohibition of glaring head-lights; prohibition for fire engines, ambulances and other vehicles not required to observe the speed regulations when going to a fire or hospital to observe them when returning from such calls; teaching to the school children how to walk and cross the streets; display of accidents at moving picture shows and theaters, showing how accidents happen, how they can be avoided.

The suggestion of Alderman Lodge, who will introduce an ordinance at the next meeting of the common council to provide for the construction of elevated safety zones at street car stopping places, is meeting with great favor. It is contended that such elevated stopping places located at the places where at present the white safety zone lines are marked on the level street, will improve conditions to a great extent. It is suggested that these raised platforms be constructed of concrete and that they be provided with lights at both ends.

Trego Is Assistant Manager of Knox

DETROIT, MICH., Oct. 3—Frank H. Trego, who since September 1912 has been connected with the research engineering department of the Packard Motor Car Co., has become assistant general manager of the Knox Motors Co., Springfield, Mass., assuming this post on October 1. Mr. Trego has had a long connection with the automobile industry, his factory experience dating from 1909 when he was one of the engineers with the Hudson company when its Model 20 was placed on the market. After this Mr. Trego became chief engineer of the Thomas Motor Car Co., Buffalo, and 2 years ago installed the department of research in the engineering department of the Packard company. During the last 2 years his efforts have been spent in the development of the present Packard motors.

Mr. Trego has approached the engineering problem from somewhat a different angle than many engineers, his efforts combining much practical work with theoretical and research endeavor. His policy has been one of working cars out at great length on the road and subjecting them to all kinds of hardships rather than spending all his time in the drafting room and the laboratory. It is not surprising that, because of following out this program, he has been successful in giving cars of special performance and free from many of the annoying difficulties that often follow cars developed entirely in the laboratory.

The Packard company tendered Mr. Trego a complimentary dinner before leaving.

Asks Receivership to Prevent Marion Sale

INDIANAPOLIS, IND., Oct. 6—Suit asking $4,000 judgment, the appointment of a receiver and an order restraining the company from turning its assets over to J. I. Handley, has been filed in the Superior Court in Indianapolis against the Marion Motor Car Co. by the Standard Brass Foundry. A hearing will be held October 12, pending which time the company has agreed to not dispose of its assets. It is alleged the company has accepted a bid of $71,375 from Handley for the assets and that last December the company made an agreement with its creditors under which indebtedness was to be extended, payments to be made in installments. In October, 1913, James E. Kepperley was appointed receiver for the Marion Motor Car Co. and was discharged January 24, 1914.

$2,700 for Hudson Landau-Limousine

DETROIT, MICH., Oct. 5—A landau-limousine is the latest addition to the line of Hudson cars made by the Hudson Motor Car Co. This new style body is built on a Hudson six-40 chassis and sells at $2,700. It combines luxury and the very latest improvements to make traveling in closed cars as comfortable as possible. This landaulet presents all the comforts of a standard limousine and the movable top may be dropped to give practically all the advantages of an open car. The top is of solid aluminum with perfect fitting waterproof joints to prevent the possibility of a leak. Leather is only used in a portion of the back quarter.

A Delaware Gasoline-Electric Truck

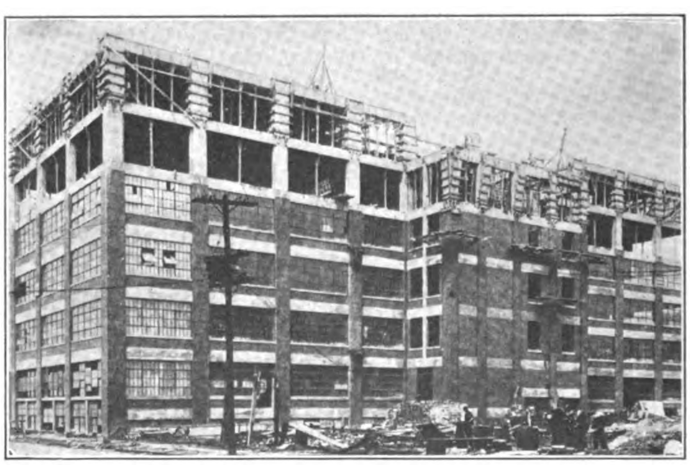
WILMINGTON, DEL., Oct. 5—The Standard Arms Mfg. Co., which is located here, has begun the manufacture of motor vehicles, and under sub-contract with the Field Omnibus Co., has just delivered a twenty-eight-passenger motor bus to the Springfield Transit Co., of Springfield, Mass. Power is furnished by a gasoline engine, with electric generator set, electric motors driving the wheels. This is the second machine the company has turned out.

Detroiter Now $985—Rebate to Buyers

DETROIT, MICH., Oct. 5—Since the first day of this month the price of the Detroiter cars has been reduced from $1,050 to $985. All purchasers of 1915 cars since August 1 are requested to call at the dealer or distributer from whom they purchased their car and they will be given a cash rebate of $65. This price reduction was expected by the dealers, inasmuch as at the annual convention held in July President C. S. Briggs of the Briggs Detroiter Co. stated that the price of the 1915 model would be reduced as soon as the production had reached twice the rate of cars made during a specified number of months in 1913.

No Separate Truck Show in Boston

BOSTON, MASS., Oct. 3—There will be no separate motor truck show in Boston next March, but a combined passenger car and commercial vehicle exhibition at the one time in Mechanic's building. This was the result of the annual fall meeting of the Boston Automobile Dealers' Assn. and the Boston Commercial Vehicle Dealers' Assn. held this week. The matter was given careful consideration and the members of the latter organization felt that a separate show would be unwise, and they agreed to accept space in the basement of Mechanic's building for their trucks and delivery wagons. Much of the space for passenger cars has already been spoken for by the Boston dealers, and there are new applicants



New factory of Hyatt Roller Bearing Co., Newark, N. J., to provide for the increased demands for its product. The new structure is 75 by 200 feet and will comprise six stories and a basement. The building is of cement and steel construction, conforming with the general plan of the others in the group. The work now has reached the top story and the machinery already is being placed on the lower floors coming in every day. Manager Chester I. Campbell of the show states that he will be able to combine the truck and passenger car shows without any great trouble. It will not be possible to have such a big truck show as formerly, but it will be big enough to make it a feature. E. A. Gilmore resigned as a director of the commercial association and Frank Crockett of the Knox was elected to fill the vacancy.

Mitchell Averages 15.5 M.P.G. for 1,946 Miles

NEW YORK CITY, Oct. 6—The Mitchell 35-horsepower light four car, which left Chicago September 23, in an effort to cover 250 miles a day with its bonnet sealed, arrived in this city on September 30, after covering 1,946 miles in 170 hours and 5 minutes. The car averaged 15.5 miles to the gallon of gasoline and 300 miles to the quart of oil.

The car left for Philadelphia, Baltimore, Washington, Wheeling and then back to Pittsburgh, the purpose being to drive the car with sealed bonnet 7,500 miles, the average mileage made in a year by an owner.

National to Continue Four-Cylinder

INDIANAPOLIS, IND., Oct. 5—To meet the demands of those desiring a four-cylinder car, the National Motor Vehicle Co., Indianapolis, Ind., will continue their series V-3 during the coming season. It was stated in THE AUTOMOBILE for September 24 that a six only would be marketed. The motor dimensions of the six are 3.75 by 5.5 and it sells for $2,375 and $150 extra with wire wheels.

Klaxon Reorganizes Sales Organization

NEWARK, N. J., Oct. 6—The selling organization of the Lovell-McConnell Mfg. Co. has been reorganized and enlarged. The sales and advertising departments have been merged into one. Additional territorial managers have been appointed.

The new selling organization will direct both sales and advertising and will be in charge of a committee composed of W. O. Turner, secretary of the company; C. L. Mead, Advertising Manager, and C. F. Brown. F. M. Hayes, who formerly represented the Klaxon in the West and in New England, will continue in charge of the New England territory. R. G. Coghlan has been transferred from the Mississippi territory to take charge of the Eastern territory, which includes New York, New Jersey, Pennsylvania, Delaware, Maryland and the District of Columbia.

W. J. Whaley, who formerly had charge of the sales for the Atlanta branch of the Western Electric Co., has been given the Southeastern territory. This includes Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Tennessee.

Charles Johnson, who for the last 3 years has acted as outside representative of the president, is now manager of the newly established Detroit office in the Dime Bank Building of that city. Mr. Johnson has charge of the factory business in Detroit, Toledo and Michigan cities, and of the sales in Michigan and eastern Canada. He will also supervise the work of the new permanent service station which has been established in Detroit at 108-114 Jefferson avenue and which is in charge of W. G. Packard.

R. L. Wilkinson continues in charge of the Middle Western territory with headquarters in Chicago. This territory includes the states of Wisconsin, Illinois, Indiana, Ohio, West Virginia and Kentucky.

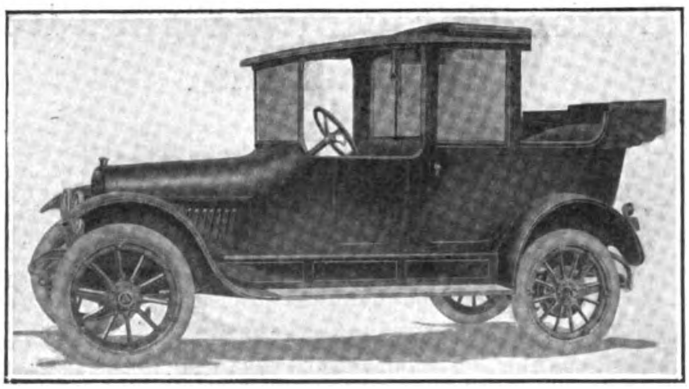
The Mississippi territory has been divided. W. P. Coghlan, late sales manager of the Moon Motor Car Co. of New York, has been placed in charge of the northern division, which will henceforward be known as the Northwestern territory. This includes the states of Minnesota, Iowa, North Dakota, South Dakota, Nebraska, Wyoming, Montana and Missouri, except Kansas City.

Arthur E. Francis, formerly of the Champion Spark Plug Co., Toledo, has been assigned to the Southwestern territory. This includes the city of Kansas City, Mo., and the states of Arkansas, Kansas, Oklahoma, Texas, New Mexico, Colorado and Utah.

The Pacific Coast territory, including western Canada, will be in charge of W. R. Johnston, formerly assistant general manager of the Stromberg Motor Devices Co. of Chicago, and for the past 3 years Pacific coast manager for the Stewart-Warner Speedometer Corp.

New Rayfield Averages 24.2 M.P.G.

CHICAGO, ILL., Oct. 3—Under the supervision of F. E. Edwards, chairman of the technical committee of the Chicago Automobile Club, the Findeisen & Kropf Mfg. Co., of this city, manufacturer of the Rayfield carbureter, held a test last Thursday that brought out officially the merits of the model G Rayfield carbureter in the way of economy, accelera-



New Hudson landau-limousine which sells for $2,700 mounted on the six-40 chassis

tion, low throttling, speed and hill-climbing without any change in adjustment.

The car used was a 1915 model 80 Overland, four-cylinder, 4 1-8 by 4 1-2, and weighing 3,620 pounds, carrying four persons. Charles Merz, former race driver, was the pilot, and besides Mr. Edwards the car carried S. D. Hirschl, chairman of the technical committee of the Chicago Motor Club, and E. A. Rossow, manager of the Chicago Rayfield branch.

On 1 gallon of 58 Standard Oil gasoline the car ran 24.2 miles. In the way of acceleration a speed of 30 miles an hour from a standing start was attained in 12 1-5 seconds. Then the Overland throttled to 3 miles an hour on high and quickly accelerated to 42 miles per hour. On Hubbard's hill, about the only grade about Chicago suitable for such tests, the Overland went from a standing start to a speed of 18 miles per hour on high at the top. The next hill trial was from a flying start and the speed of 12 miles per hour at the bottom was increased to 18 at the top.

Findlay Men Rehabilitate Adams Truck Co.

FINDLAY, O., Oct. 5—Through the efforts of the Findlay Business Men's Assn. the Adams Bros. Truck Co., of this city, will be reorganized and remain in Findlay. W. D. McCaughey is the receiver now. The business men's association raised $12,500 in new subscriptions, and Murry Irwin, of the Louis Spring & Axle Co., Jackson, Mich., will take a like amount of stock and probably become the general manager. It is the plan to settle with creditors at 20 cents on the dollar, or 40 cents in stock, rather than have the company go through an expensive receivership. The entire matter will probably be closed up this week.

Receiver Named for Crescent Motor Co.

CINCINNATI, O., Oct. 2—L. J. Howe of this city has been appointed receiver of the Crescent Motor Car Co. in the United States District Court as the result of the filing of an involuntary bankruptcy petition against the company by its creditors. This company is successor to the Ohio Motor Car Co.

NEW YORK CITY, Oct. 6—The Motor Contest Dealers' Assn. will hold its first dinner at Healey's restaurant on the evening of October 17.

Howland Addresses Electric Vehicle Assn.

NEW YORK CITY, Sept. 30—Ellis L. Howland, secretary of the Motor Truck Club of America, spoke to-night on the subject of "Practical Ideals in Electric Vehicle Promotion" before the Electric Vehicle Association of America at its monthly meeting.

Mr. Howland claimed that the criterion for judging motor trucks should be efficiency first and economy of operation second, rather than judging on a dollar cost basis in which it is often impossible to get actual horse costs.

DETROIT, MICH., Oct. 5—F. R. Bump, who has been connected with the bicycle business and later with the automobile business from the time the first automobiles were made in the United States, has joined the Studebaker Corp. and will shortly have charge of an important department of the firm.

CHICOPEE FALLS, MASS., Oct. 5—G. W. Kerr, for a number of years body engineer of the Stevens-Duryea Co., Chicopee Falls, Mass., has announced his resignation from that concern.

Boston Garagemen Fight Fire Restrictions

BOSTON, MASS., Oct. 3—When the new garage law went into effect last Thursday it was found that there were some defects in it, and at once an effort was started to secure modifications of the law. This may be done by the Fire Hazard Commissioner who has the power to make or suspend rules and regulations. John O'Keefe of Lynn, Mass., has just been appointed to the position and the representatives of the electric vehicle associations got busy and asked for a hearing on the regulation that prohibited the use of electricity in garages to some extent. It seemed at first as if there could be no storing of electric and gasoline vehicles in any garage, and this was pointed out as a hardship to the owners of garages and the electric vehicle industry as well.

The hitch in the law came over the regulations governing electricity which would exclude charging stations in garages where gasoline vehicles were cared for. So an application was made to Commissioner O'Keefe, on behalf of the Electric Vehicle Assn. and the Electric Motor Car Club. He gave a hearing on the matter at the State House during the week which was attended by F. A. Barron, of the insurance department of the General Electric Co., Schenectady, N. Y.; W. H. Blood, Jr., of Stone & Webster Engineering Corporation, Boston; J. A. Hunnewell, Lowell Electric Light Corporation, and chairman of the New England section of the Electric Vehicle Association of America; W. E. Russell, C. M. Greene, A. H. Abbott, of the General Electric Co.; T. J. Pace, Westinghouse Electric Co. of Pittsburgh; C. H. Miles, Boston Edison Co.; I. Osgood, Boston Board of Fire Underwriters; C. S. Lawler, of the Factory Mutual Insurance Co. and President Day Baker, of the Electric Motor Car Club of Boston.

Mr. Baker and his electric colleagues showed that so far as had been learned no garage fire ever originated from electric charging apparatus, and that with the improved new methods of installation fires would be practically impossible.

Abbott to Build Sixes Only for 1915

DETROIT, MICH., Oct. 6—The Abbott Motor Co., will manufacture only six-cylinder cars for 1915. At the present time a big six having a Continental motor 3 3-4 by 5 1-2 and a wheelbase of 130 inches is being delivered with a five- and also a seven-passenger body, the former costing $2,090 and the latter $2,190. A light six to weigh about 2,100 pounds with a 116-inch wheelbase and a motor probably 3 by 5, will be marketed early next year and the Abbott company is endeavoring to show this car for the first time at the New York show. The company contemplates manufacturing 2,500 cars for the 1915 season.

Weed Co. Granted Perpetual Injunction

NEW YORK CITY, Oct. 5—The Parsons Non-Skid Co., Ltd., and the Weed Chain Tire Grip Co. have been granted a perpetual injunction in their suit against the Leather Tire Goods Co., Inc., in which they alleged infringement of patent No. 723,299. Judge Hough handed down the final decree in the U. S. District Court for the Southern District of New York, ruling that the Leather Tire Goods Co. had infringed patent No. 723,299, covering the well-known Weed tire chain construction. The injunction prohibits the manufacture or sale of any infringing devices and in particular the Side Chain Kant Skids made by the Leather Tire Goods Co.

The decree states that the Parsons and Weed companies are to recover from the defendant all gain and profits from the manufacture and sale of infringing devices. Karl S. Dietz is made special master to determine the amount of such damages and report to the court. The defendant is ordered to submit to the court an account of its business in such infringing devices and to report from time to time to the special master. The Weed and Parsons companies are to recover costs of the suit from the defendant.

Indiana to Quash Invalid Ordinances

INDIANAPOLIS, IND., Oct. 5—Attorneys who have been conducting a quiet investigation, have found that in many municipalities throughout the state, ordinances have been enacted that conflict with the state motor law. It is expected that a series of test cases will be brought, with a view to having declared invalid many ordinances that are obnoxious.

There is a specific provision in the state law that no municipality shall enact an ordinance that conflicts with the state law. In spite of this fact numerous traffic measures have been adopted and ordinances have been passed attempting to fix speed limits lower than those permitted by the state.

The question also probably will be raised that it is unlawful to tax automobiles as personal property. The state motor law provides that aside from the annual state license, no motor car shall be subject to any other tax or license. Every city and county, however, has continued to require that motor cars be returned for taxation as personal property.

Boston Dealers Cut Employees' Insurance Rate

BOSTON, MASS., Oct. 3—The committee comprising J. H. Johnson of the Buick, J. W. Bowman of the Stevens-Duryea and Joseph Donovan of the Studebaker, representing the Boston Automobile Dealers' Assn. who were asked to try to secure a reduction in the insurance rate under the employers liability law, have been successful. The committee secured a new rate for all automobile dealers in New England at a substantial reduction from the old rate that the automobile men were paying to the insurance companies.

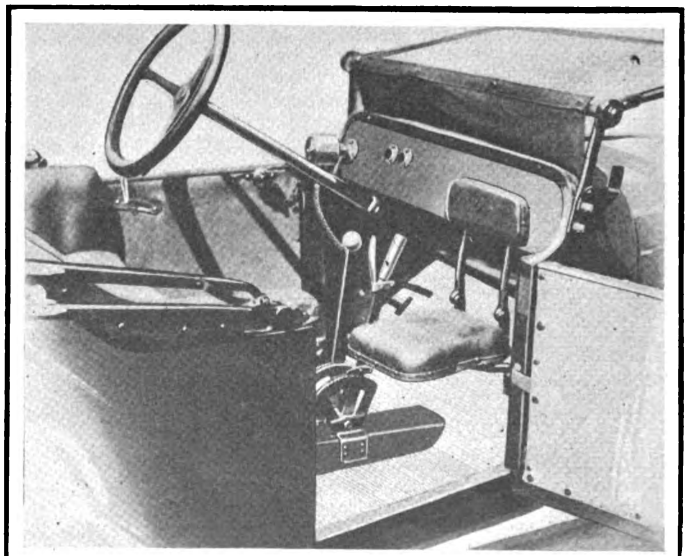
Senate to Probe Truck Purchase

WASHINGTON, D. C., Oct. 5—That the action of the Postmaster General in awarding to the White Co., of Cleveland, the contract for furnishing the Washington city post office with seven motor trucks will be the subject of a Congressional inquiry is indicated by a resolution introduced in the Senate by Senator Townsend of Michigan. Several bidders who submitted propositions have made protests against the awarding of the contract to the White Co. and have brought Congressional influence to bear to ascertain certain facts from the Postmaster General regarding the awarding of this contract. It is understood Senator Townsend is going to press his resolution and to that end is likely to deliver a strong speech in the Senate on the subject in order to force the Democrats to pass the resolution. The text of the resolution follows:

"Resolved, That the Postmaster General be, and hereby is, directed to send to the Senate at the earliest possible date all information in his possession or in the possession of the Post Office Department in any manner bearing upon the action of the department inviting the manufacturers of motor trucks, some time prior to September 8, 1914, to submit bids for supplying such trucks for the use of said department. Such information to include the department's invitation to bidders; copies or originals of the respective bids received; the action of the department in forming a committee to pass upon the bids; how, by whom appointed and under what instructions the committee acted; the full report of the committee and the reasons for its award of contract or contracts to other than the lowest responsible bidder, if such contracts were made, and all correspondence or facts that will tend to give the fullest possible information regarding this transaction."

Motor Products Co. Absorbs Cricket

DETROIT, MICH., Oct. 7—*Special Telegram*—The Motor Products Co. has absorbed the Cricket Cycle Car Co. and will continue to make the Cricket cars in two models, a pleasure and a commercial vehicle, the price to be around $300.



Saxon with folding seat for extra passenger

De Palma Thrills 40,000 at Trenton

TRENTON, N. J., Oct. 2—Ralph DePalma in his Mercedes, J. Lecain in a Chevrolet and W. D. Morton in a Mercer special were prize winners at to-day's races at the Fair Grounds here where over 40,000 people watched a program of good racing on the half-mile track. DePalma won three events and doubtless would have captured some others had the water pump on his Mercedes not gone out of commission. Lecain also was unfortunate in that when driving in the 25-mile race the axle of the Chevrolet cracked, a wheel came off, and the car struck a bale of straw which was used as a protection on the turn. Nobody was injured. C. Bergdoll, driving a Bergdoll special, was put out of the winning due to his car catching fire from the carbureter.

The summaries follow:

5 Miles, Class C, 161 to 230 Cu. In.

CAR	DRIVER	TIME
Chevrolet	J. Lecain	6:32¾
Roberts	M. Roberts	6:37
Chevrolet	G. C. Jessup	

10 Miles, Class C, 300 Cu. In. and Under

CAR	DRIVER	TIME
Mercedes	Ralph DePalma	13:05½
Chevrolet	J. Lecain	13:24
Chevrolet	G. C. Jessup	13:31

5 Miles, Class E, 450 Cu. In. and Under

CAR	DRIVER	TIME
Mercedes	Ralph DePalma	6:35
Erwin	G. C. Bergdoll	6:36
Roberts	M. Roberts	6:37

10 Miles, Class D, Free-for-all

CAR	DRIVER	TIME
Mercedes	Ralph DePalma	12:39½
Erwin	G. C. Bergdoll	12:42
Isotta	R. N. Brown	12:54
Roberts	M. Roberts	

10 Miles, Class E, Free-for-all Handicap

CAR	DRIVER	TIME
Chevrolet	J. Lecain (10s)	13:00½
Erwin	G. C. Bergdoll (30s)	13:22¼
Roberts	M. Roberts (30s)	13:23

25 Miles, Class E, Free-for-all

CAR	DRIVER	TIME
Mercer	W. D. Morton	30:50½
Erwin	G. C. Bergdoll	withdrew accidents.
Chevrolet	J. Lecain	

An Election Day Meet at Brighton

NEW YORK CITY, Oct. 6—There will be an automobile race meet on election day, November 3, at Brighton Beach. This is being promoted by O. V. Matthews.

Tetzlaff Breaks Grand Rapids Track Record

GRAND RAPIDS, MICH., Oct. 6—Teddy Tetzlaff broke the mile record for the Comstock park track here Sunday, making the mile in his Blitzen Benz in 50 seconds flat, the former record being 52 2-5 seconds. About 6,000 persons witnessed the program offered by Tetzlaff and others in the competition promoted by E. A. Moross of Indianapolis.

The summary:

3-Mile—For Local Drivers

CAR	DRIVER	TIME
Packard	White	3:29 3-5
Buick	Calrow	
Mercedes	Vandenberg	

Free-for-All—Three 3-Mile Heat

FIRST HEAT

CAR	DRIVER	TIME
Maxwell	Carlson	2:59 1-5
Maxwell	Tetzlaff	
Burman	Kennedy	

SECOND HEAT

CAR	DRIVER	TIME
Keeton	Callaghan	2:50 1-5
Burman	Kennedy	
Maxwell	Tetzlaff	

THIRD HEAT

CAR	DRIVER	TIME
Maxwell	Carlson	2:44 2-5
Burman	Kennedy	

3-Mile—450 Cu. In. and Under

CAR	DRIVER	TIME
Maxwell	Tetzlaff	3:09
Burman	Kennedy	
Keeton	Callaghan	

3-Mile—Non-Stock—450 Cu. In.

CAR	DRIVER	TIME
Maxwell	Tetzlaff	3:08 1-2
Burman	Kennedy	
Keeton	Callaghan	

To Lower Track Record

CAR	DRIVER	TIME
Benz	Tetzlaff	50 sec.

50-Mile Free-for-All

CAR	DRIVER	TIME
Maxwell	Tetzlaff	52:36
Great Western	Tidmarsh	

New Track Records at Oklahoma Fair

OKLAHOMA CITY, OKLA., Oct. 5—Louis Disbrow, Heine Ulbricht, Johnny Raimey, T. Milton, J. Cleary and Eddie Hearne closed the entertainment features of the Oklahoma State Fair here Friday and Saturday before crowds conservatively estimated at 20,000 each day. Disbrow drove his Simplex Zip; Raimey, the Case Comet; Cleary, the Scat; Milton, the Mercer; Ulbricht, the 120-horsepower Special, and Hearne, the Case.

Two new automobile half-mile dirt track records were made Saturday. Eddie Hearne lowered Burman's record of 5:55 1-5 for 5 miles, going the distance in 5:47, and John Raimey lowered Burman's record for 3 miles from 3:32 3-5 to 3:25 2-5.

On Friday, Louis Disbrow established a new half-mile dirt track record when he drove 2 miles in 2:13 3-5 or three-fifths of a second better than the record made by him at Toledo, Ohio, last June.

One of the best exhibits at the Oklahoma State Fair this year was the automobile exhibit. The show was under the auspices of the Oklahoma City Automobile Assn. One large building, formerly used for agricultural purposes, containing 22,080 square feet, was given over to the automobile enthusiasts and more than seventy different makes of 1915 cars were exhibited.

Denver Club Back in A. A. A. Fold

DENVER, COLO., Oct. 1—After remaining out nearly a year, the Denver Motor Club has renewed its affiliation with the American Automobile Assn. The reuniting of Colorado's leading motor and good roads organization with the national body was brought about largely through the efforts of Ralph W. Smith, Colorado vice-president of the A. A. A. The club withdrew on account of dissatisfaction with the administration of the A. A. A. and the belief that this section of the country was not receiving sufficient benefits in return for the dues paid into the national organization's treasury by motorists living this far west. This action adds about 1,000 to the A. A. A. membership.

Transcontinental Run for Electric Vehicles

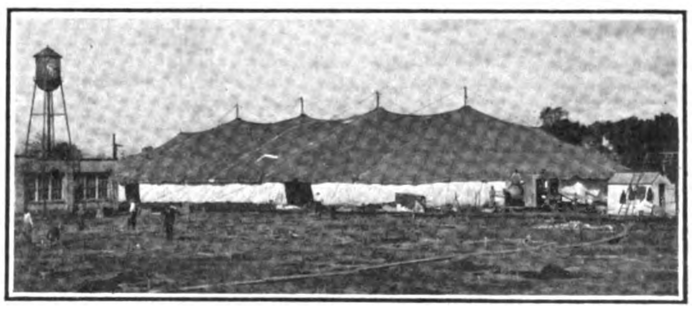
NEW YORK CITY, Oct. 7—Plans are being made by the Electric Vehicle Assn. of America for a transcontinental run over the Lincoln Highway next summer, in which both passenger and commercial electric vehicles will participate. The series of mileage tests to be held on the indoor track at Grand Central Palace, New York, during the Electrical Exposition and Motor Show which opened today have been arranged largely to furnish the mileage data needed for preparing a schedule.

The principal mileage test at the Electrical Exposition and Motor Show will be made by the General Vehicle Co., which will operate one of its 1,000-pound delivery wagons continuously during the 10-day period of the show. Two batteries will be provided and while one is in use the other will be recharged. This plan is in use by a number of companies working under high pressure.

Among the companies who will exhibit are the following concerns: Ward, General Vehicle, Anderson, Baker, Commercial Truck, Electric vehicle companies and the Gould, Edison, Philadelphia and the National Carbon storage battery companies.

Now Kalamazoo Is to Have a Speedway

KALAMAZOO, MICH., Oct. 3—It is reported that with the success of the automobile races at Kalamazoo recently, exceeding the hopes of the directors, plans are already being made for the building of a 2-mile automobile speedway together with a grandstand and bleachers that will accommodate 50,000 people. The Kalamazoo County recreation park committee met recently and decided to take up immediately the proposition. The cost of the improvements will probably exceed $200,000. It was also decided to hold the races for 2 days next year. Labor Day is to be included in the dates and a 100 mile race for a large purse with a series of other races will be scheduled.



With the constant increase in demand for its product, the Maxwell Motor Company has been forced to utilize every available building for the manufacture of its cars. The tent in the photograph was purchased by the Maxwell company for a temporary paint shop, and will be used as such until a new building can be constructed. Under this immense canvas may be seen row after row of freshly painted axle housings, six or seven hundred of them ready to be placed in the finished cars. No other part of the car is painted in the tent, other buildings being used for the purpose. In the foreground can be seen workmen making the cement bases for a spacious building which, when finished, will take the place of the tent and will be the finishing room for the factory. Enameling and painting will be done in this new building

War Golden for the German Industry

All Private Motor Vehicles Bought for Cash by Government—Factories Working Full Tilt and Overtime—Enormous Impetus for Whole Trade Confidently Expected After War Is Over

This is the translation of a letter just received—October 7—from a German subscriber for THE AUTOMOBILE who is anxious that Americans should know the exact conditions existing in the Fatherland; that is, as they existed at the date of his letter, September 2.

By Kurt Goldstein

BERLIN-CHARLOTTENBURG, Sept. 2—In receipt of your bill of July 30 I beg to inform you most cordially that it unfortunately is impossible for me at the present time to forward you the amount of $5 in payment of my subscription for the coming year, as all money remittances to America have been prohibited. I must ask you to continue nevertheless to mail me your journal as before, and you will then receive the amount of the subscription promptly as soon as the ordinary traffic is again established. I do not wish to inclose the amount in this letter, as the letter post is too unsafe and, indeed, I do not know whether it will reach you.

On this occasion I would like, however, to let you know something about the general situation here, as this certainly will interest you and possibly also your readers, especially as so much distorted information is going abroad.

Before this reaches you, the daily press will have informed you of the victories of our German army in France and in Russia. I only repeat briefly: The French are defeated over the whole line and our troops stand within 80 kilometers of the gates of Paris. The Russians were defeated by the Austrians in the battle of Krasnik, and by the German troops in the battle of Tannenberg, where alone 70,000 prisoners were taken and the entire artillery of three army corps was captured. These communications are official and therefore completely reliable. The reports of victories have stimulated all business, and I do not exaggerate when I state that here in Berlin, the capital, apart from the enormous enthusiasm for the war, no other effects of the war condition are noticeable.

From the first day of mobilization, everything was in perfect order, and there were no counter-currents against the war. The information spread abroad about socialistic mutterings and of battles lost by our German troops is purely fictitious. Further details on these points you will of course get through the daily press, as already mentioned. But I would like to let you have some facts about the automobile industry.

At the declaration of war the army administration at once requisitioned about 30,000 automobiles; even the figure of 40,000 is mentioned. Especially, every commercial vehicle, this including all the omnibuses of the local General Omnibus Co., was at once turned to military uses. They are employed by the commissariat for the transportation of food; also as ammunition wagons and in the fresh-meat service for the firing line, etc.

Over the entire country so-called Immobile Motor Vehicle Commandoes have been distributed, which have charge of the equipping of these vehicles in accordance with the rules and specifications of the army authorities. Pleasure cars were ordered to be placed at the disposal of the army on the very first day of the mobilization and most of the cars in good condition were bought. The purchase price is paid at once in cash—as in fact everything bought by the army is settled for in two to four weeks' time.

The automobile factories, especially those making trucks, work for the army administration with all the forces they can command, and these factories as well as those making parts and accessories are therefore tremendously busy. My own firm, for example, reached during the month of August the highest monthly volume of trade ever experienced. And, although a great deal of material is used, the army authorities do not by any means order anything promiscuously.

The many members of the automobile commerce who have been called to arms are also employed in the army according to their capabilities, and one finds therefore today in the motor vehicle batallion the same gentlemen who during their civilian days were most busy with automobile affairs. It is thus evident that the automobile industry will derive great benefits from this war; not only for being kept busy during the hostilities but also because most of the automobile owners whose vehicles have been bought for the army will be compelled to buy new vehicles later. On the unofficial exchange there is therefore also great demand at present for stock in the automobile manufacturing companies.

After the first reports of victories many private persons even went so far as to place orders for new vehicles at once, and those factories which at first had cancelled orders for parts have now revoked this precautionary measure.

I am quite willing, if you wish it, to send you further information, as I consider it my duty as a German to see that some veracious statements reach the press of foreign countries.

The moment Germany once again gets into regular communication with the United States you will learn the true condition of many things which are now under cover, and there will certainly then be great wonderment over the manner in which Germany went to war.

Second Used Car Report Out

CHICAGO, ILL., Oct. 6—The second issue of the Used Car Central Market Report published by the Chicago Automobile Trade Assn. has been issued. This is a 46-page issue of the report which was described in THE AUTOMOBILE, September 3, page 438, and is a comprehensive market report to tell the dealer the amount to allow in taking a used car of any year and make in trade for any machine. The information contained on the pages of this issue is strictly up-to-date, being compiled from prices obtained for used cars during the months of April, May and June. One hundred gasoline vehicles and fourteen electrics were listed in the first issue and the second has 125 gasoline and fourteen electrics. The number of sales upon which the information is based is 825 ending June 30 and the field of used cars covered is 25 per cent. larger.

Appraisal Shows $181,000 for Voiturette Co.

DETROIT, MICH., Oct. 7—*Special Telegram*—An inventory taken by the Detroit Trust Co., shows an appraised value of $181,000 for the American Voiturette Co. assets, against the company's book inventory of $444,000. The direct liabilities total $295,000 and the indirect liabilities, $213,000.

Clubs to Tour to New York Parade

NEW YORK CITY, Oct. 5—Invitations were sent yesterday to all of the automobile clubs within 400 miles of New York City to tour to New York as bodies and compete for club prizes in the Tercentenary Automobile Pageant on the night of October 28.

In addition to the list of clubs, letters have been sent by A. G. Batchelder, chairman of the executive committee of the American Automobile Association, to more than 2,600 car owners in the Metropolitan district who are members of the A. A. A.

BUFFALO, N. Y., Oct. 1—*Special Telegram*—With liabilities of $8,557.46 and assets of $2,316.41 up-to-date Auto Body and Specialty Co., Inc., of Buffalo, filed late today voluntary petition of bankruptcy here in Federal court.

CONTINENTAL Motor's Large Additions—Large additions are being made to the Detroit plant of the Continental Motor Manufacturing Co. Several new buildings have just been completed; others are under construction, and ground is just being broken for still others. Over 50,000 square feet of ground will be covered by these structures when all are finished. A new garage and steel stamping addition are already nearly ready. A wing to the heat-treating department has progressed as far as the completion of the structural steel work. This building will double this department's capacity. The largest unit of the new buildings is a continuation of the machine shop—already one of the largest structures of its kind in the world. This addition increases the floor space by thousands of square feet, wherein almost a quarter million dollars' worth of special Continental machines will be installed. The great extension to the experimental laboratories completes the additions. At the present time work on this has just begun, the foundation alone being finished. This enlarged experimental department, adding as it does over 7,000 square feet of ground space to the existing laboratories, will give the Continental company unequaled facilities for research work.

Hupp's Daily Schedule 75 Cars—Since September 28 the Hupp Motor Car Co., Detroit, Mich., has been operated on an output schedule of 75 cars daily.

Gabrielson Co. Will Build—The Gabrielson Car Parts Mfg. Co., Jamestown, N. Y., recently incorporated with a capital of $35,000, will erect a factory for the manufacture of automobile radiators.

Hyatt Acquires New Detroit Site—The Hyatt Roller Bearing Co., Detroit, Mich., has purchased a lot 165 by 161 feet on Grand boulevard and Cass avenue, where its new office building will be erected.

McQuay-Norris Opens Plant—The McQuay-Norris Mfg. Co., St. Louis, Mo., maker of the Leak Proof piston ring, opened its new factory on Locust street, in Automobile Row this week. New machinery has been installed at a cost of $25,000. The offices will take up a greater portion of the second floor together with the wholesale and out-of-town stock. The factory is on the ground floor.

White's Seattle Branch Plant—The White Co., Cleveland, O., has established a factory branch in Seattle, Wash., opening salesrooms at 1514 Third avenue, in the heart of the business district. The branch is in charge of E. W. Hill, who is in charge of the White factory interests in the Pacific Northwest, and R. G. Hubner, auditor for the White factory in this district. The Seattle branch will serve the entire States of Washington and Idaho.

Ford's New Cleveland Plant—The announcement is made by the Ford Motor Co., Detroit, Mich., to the effect that the new Cleveland, O., assembling branch, which will be erected on East 117th street, will cost in the neighborhood of $500,000. Railroad tracks will be run into the second floor of the structure and the roof will be used for testing purposes. According to H. N. Dunbar, the branch manager, the plant will be ready for occupancy early next summer.

Marathon Electric Starts Operations—The Marathon Electric Mfg. Co., Wausau, Wis., has started initial operations and is turning out a large line of electrical goods, including motors, dynamos, generators, etc., of the small type. The plant is being enlarged and a new power house erected. The company's quarters consist of the former forest products laboratory built by the Government 3 years ago and abandoned last fall at the conclusion of its pulp wood research work.

Sta-Rite Carbureter Co. in Utica—E. W. Mason, who purchased the patterns, good will, etc., of the defunct Watt Carbureter Co., Holly, Mich., is organizing a new company, which is to be located in Utica, Mich., and will manufacture the Sta-Rite carbureter. Mr. Mason is asking local stockholders of the bankrupt Watt company to take the same amount of stock they held in the old company in the new one in settlement of their claims, and it is said that most of them have accepted the proposition.

Bukolt Co. Building.—The Bukolt Mfg. Co., Stevens Point, Wis., which brought out a new device known as the Highway tire strap, is planning to erect a large factory addition late this fall or early next spring. A site 74 by 150 feet in size has been purchased and tentative plans call for a three-story structure covering nearly all of the new acreage. The concern intends to increase its capital by $50,000. Practically all of the issue has already been spoken for by Stevens Point capital.

Wants Tire Plant in Canton—Leslie Dunn, president of the York Co-operative Tire & Rubber Co., of New Orleans, wants to establish a factory in Canton, O., capable of turning out 2,000 finished tires a day. He wants to bring his shops as well as a cotton factory, where tire fabric can be made. He asks the Chamber of Commerce to give him 10 acres of land on which to erect the buildings. He also wants aid in disposing of remaining stock in the firm. His plan is unique. He would have the company include automobile owners only, each stockholder to be limited according to the number of tires he consumes.

The Automobile Calendar

Oct. 3-10	Cincinnati, O., Show.
Oct. 5-12	St. Louis, Mo., Show, Forest Park Highlands.
Oct. 7-8-9-10	Detroit, Mich., First Truck Convention of Motor Truck Manufacturers', Dealers' and Owners' Organization; promoter, Motor Truck Club of America.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 10	Medford, Mass., Track for Light Cars, Combination Park.
Oct. 10-17	Boston, Mass., New England Light Car and Cyclecar Show, Horticultural Hall.
Oct. 17	New York City, Motor Contest Dealers' Assn., First Dinner, Healy's Restaurant.
Oct. 17	Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-23	Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1	Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 23-24	Peoria, Ill., Illinois State Assn. of Garage Owners; Semi-Annual Convention.
Oct. 28	New York City, Commercial Tercentenary Celebration.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 8-9	El. Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 26	Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4	New York City, Annual Meeting of the American Society of Mechanical Engineers.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Automobile Show.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb. 15-20	Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13	Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn. Boston Commercial Motor Veh. Assn.
Mar. 7	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

The Week in  the Industry

Motor Men in New Roles

BIRDSALL Heads Grossman Detroit Office—E. T. Birdsall, the well-known mechanical engineer, has been appointed manager of the Detroit office of the Emil Grossman Mfg. Co., Inc., 708 Ford Bldg., to succeed G. E. Shaw. Associated with him are F. G. Walker, M.E., and A. A. Greenburg. They will cover the manufacturing trade. A. L. Glick, who was assistant manager of the Grossman company's Detroit factory before its consolidation with the Brooklyn headquarters at the Bush Terminal, has been appointed sales representative in Michigan, Indiana and Ohio.

Martin Signal Truck Sales Manager—The Signal Motor Truck Co., Detroit, Mich., has appointed Joseph J. Martin Western sales manager.

Merritt King District Manager—R. P. Merritt has been appointed district sales manager in northwestern Ohio for the King Motor Car Co., Detroit, Mich.

Darrah Manager—W. R. Darrah has been appointed sales manager of the E. C. Johnson Co., Philadelphia, Pa., distributer of the Reo and Premier cars.

Beidler in Charge of Maxwell—H. Beidler, formerly associated with Don Lee in San Francisco, Cal., will hereafter have charge of the Maxwell interests in the Northwest, with headquarters in Seattle.

Clement Joins Bock Bearing—C. H. Clement, until recently chief engineer and sales manager of the Metal Products Co., Detroit, has resigned, and is on the road as sales engineer for the Bock Bearing Co., Toledo, O.

Castle Representing Flanders Electric—F. E. Castle has been appointed Michigan representative of the Flanders Electric Co., Inc., Detroit, Mich., and will have his headquarters and salesrooms at 872 Woodward avenue.

O'Neill Made Secretary—The Stromberg Motor Devices Co. has transferred W. L. O'Neill from the managership of its Detroit branch to the office of secretary and sales manager of the company, with headquarters at Chicago.

Van Patten in Advertising Co.—L. A. Van Patten, who recently gave up the Saxon agency, has gone into the advertising business. He has joined the Cheltenham Advertising Service, 150 Fifth avenue, New York City.

Seymour Goes to Worcester—Robert Seymour has been appointed manager of the branch of the White Motor Co., Worcester, Mass., where he will handle cars and trucks under the direction of the New England branch at Boston, Mass.

Now With the Regal—Joseph E. Burns, formerly manager of the Lee Motor Car and Supply Co., of New Bedford, Mass., and afterward with the Jackson car in Boston, has joined the Davis Automobile Co. at Providence, R. I., to sell Regal cars.

White Goes to Chicago—R. W. White, who has been manager of the Columbus, O., branch of the Goodyear Tire & Rubber Co., has been assigned to manage the Chicago branch. The new Columbus manager is W. W. Magill. The branch is located at 87 North Fourth street.

Maxwell Sales Manager to Return Home—C. F. Redden, who has been abroad for several months, has advised the Maxwell Motor Co., Detroit, Mich., that he will sail for America on the steamship "Minnehaha" October 10, arriving in New York about October 19.

Maurer Studebaker Service Engineer—E. R. Maurer, M. E., has been appointed service engineer of the Studebaker Corp., Detroit, Mich. He will have charge of all service, parts, orders and claims at the Detroit plants, and also at the various Studebaker branches throughout the country.

Hogle in Accessory Business—The Detroit Accesory Co., Detroit, Mich., has started business at 870 Woodward avenue and will handle especially Ford specialties. This is a new company organized recently by W. M. Hogle, who was formerly sales manager of the Republic Motor Truck Co.

Moore's New G. M. Appointment—President C. W. Nash, of the General Motors Co., Detroit, Mich., has appointed D. K. Moore, who is sales manager of the Weston-Mott Co., Flint, to be also sales manager of the Northway Motor Mfg. Co., Detroit, and of the Jackson-Church-Wilcox Co., Saginaw, Mich.

Griffith Promoted—H. A. Griffith, who for the past 2 years has been assistant manager of the Los Angeles branch of the United States Rubber Co., has been appointed manager of the Spokane branch, to succeed H. A. Thompson, who has been promoted to the management of the Seattle and Tacoma branches.

Judd Joins Gilmore—J. L. Judd, until recently sales manager of the Jackson Motor Car Co., Boston, has joined the E. A. Gilmore Co., representing the Lewis VI. The Gilmore company now has practically all the Eastern New England territory for the car, and Mr. Judd will tour New England, establishing new subagents.

Cappeller North East Electric Manager—Edward Cappeller has been appointed Detroit, Mich., manager of the service department of the North East Electric Co., Rochester, N. Y., which makes starting and lighting systems. The local headquarters have been opened with the Foster Motor Sales Co., 1751 Woodward avenue.

de Causse Heads Locomobile Dept.—The Locomobile Co. of America, New York City, has opened a special department for the planning and ordering of specially designed bodies. J. Frank de Causse will manage this department. He has been connected for the last 10 years with the French automobile body manufacturers, Kellner & ses Fils, as assistant manager.

Moore's New Hupp Appointment—Laurence Moore, who has devoted most of his time in promoting the foreign trade end of the business of the Saxon Motor Co., Detroit, Mich., has been appointed director of both domestic and foreign sales. Mr. Moore recently returned from an extensive business trip to Europe. C. F. Jamison, who has been sales manager, will continue in that capacity.

Poole to Return to Europe—John L. Poole, export manager of the Hupp Motor Car Co., Detroit, Mich., with headquarters in Paris, will return to Europe from Detroit in the near future for the purpose of looking into Hupmobile business. Mrs. Poole will accompany him. Mr. Poole believes that there will be business for American automobile manufacturers in Europe this autumn.

New Marmon Branch Managers—W. F. Siegmund, until recently vice-president of the Electric Garage & Service Co., St. Louis, Mo., has been appointed manager of the Kansas City, Mo., branch of the Nordyke & Marmon Co. A. B. Wagner has been appointed manager of the Indianapolis sales branch of the Nordyke & Marmon Co. He has been employed by the company for the past 6 years.

Whitehead Norwalk Tire Sales Manager—J. W. Whitehead, general sales manager of the Diamond Rubber Co., San Francisco, has resigned to join the Norwalk Tire & Rubber Co., which was recently organized in Norwalk, Conn. During eight years Whitehead was assistant to C. E. Mathewson, Pacific representative of the Diamond company, and is now general sales manager and secretary of the Norwalk company.

Bond Succeeds Root—G. A. Root, president and general manager of the Crescent Motor Car Co., St. Louis, Mo., has resigned and is succeeded by M. W. Bond of the Bond Automobile Co., retail automobile dealer in St. Louis, Mo. Mr. Bond has also acquired Mr. Root's stock in the Crescent Co. J. B. Howard has been appointed sales manager and the company is arranging to put out a small four-cylinder car listing at $985, fully equipped, including electric starter, etc.

Petre Consulting Engineer—L. J. Petre, during many years in charge of the experimental and research departments of the F. B. Stearns Co., Cleveland, O., has gone into business for himself as an expert consulting engineer, and will also organize what might be called a club, consisting of some 300 automobile owners, whose motor cars he will personally inspect at regular intervals. Mr. Petre is temporarily located with the Auto Repair, Storage & Supply Co., Euclid avenue.

Recent Champion Plug Appointments—J. T. Moultrup, well known on the Pacific Coast, and lately with John Millen & Sons, Vancouver, B. C., is now representing the Champion Spark Plug Co., Toledo, O., in the Middle West. Charles Corwin, well known to the New York trade, formerly with the Ely company and the Donnelly Motor Equipment Co., is covering the New York territory for the Champion company. E. S. Torrance, for a number of years with Post & Lester and Bi-Motor Equipment Co., Boston, Mass., is covering the Eastern territory for the company.

Accessories for the Automobilist

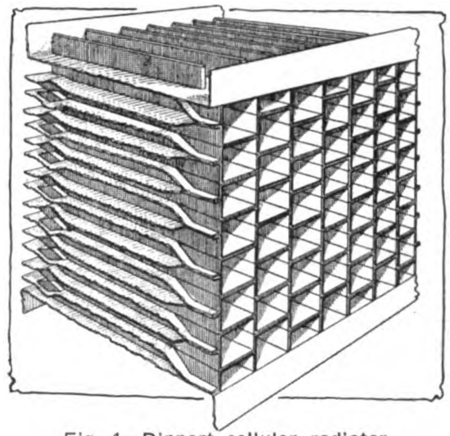


Fig. 1—Dippert cellular radiator

PULL-U-OUT Tackle — For stalled motorists, for lifting heavy loads, for all purposes where power against weight is needed, the tackle made by the Pull-U-Out Mfg. Co., 909 Pine street, St. Louis, Miss., is specially fitted, multiplying as it does the amount of force placed upon it by seventy. The mechanism of Pull-U-Out consists of a winding drum 6 inches in diameter, carrying 30 feet of quarter-inch steel tiller rope and capable of withstanding a ton pull. Internal gearing in the drum engages a bronze pinion on a long ratchet crank. A steel frame carries the drum and gearing and is provided with hook bolts and a sheave or block.

Two strong chains and three stakes of peculiar manufacture complete the outfit, which retails for $15.

Dippert Motor Radiator—A radiator of the Mercedes type is the Dippert, Fig. 1, made by the Motor Radiator Corp., Buffalo, N. Y. It is of the fin and tube type of construction but so made as to be free from the tendency of this type to leaking where the tubes enter the bottom and top headers.

Oakes Pressed Steel Pulley—To reduce weight and to make a saving in the cost of manufacture, the Oakes Pressed Steel Co. is placing for sale the Oakes pressed steel belt pulley. In the past it has been impossible to use pressed steel pulleys as there was not stock sufficient to cut a keyway. This has been overcome by brazing in a piece of tubing and cutting the keyway in the tubing. By substituting pressed steel, the weight has not only been greatly reduced, but a saving varying from 6 to 10 cents on each pulley has been made, as no machining is necessary. Being ready to assemble, a saving in time and equipment is also effected.

Halladay Automobile Bumper—Made of channel steel and designed for all styles of cars having drop front spring hangers, the L. P. Halladay Co., Streator, Ill., is advancing the Halladay bumper, (Fig. 2) as a money saver in that it reduces the chances of accident to the front of a car, thereby saving its price, $12.00, many times over by protecting lamps, fenders and radiators. In case of a severe shock the channel bar, the only bendable part, may be straightened. The other parts are practically unbreakable.

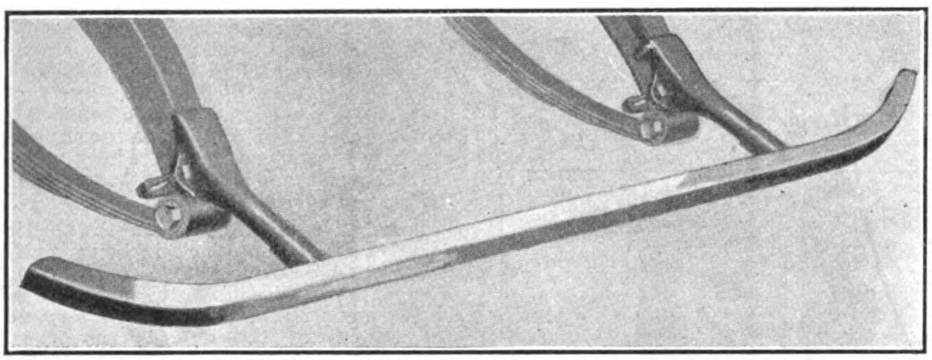


Fig. 2—Halladay steel automobile bumper

Sturges Shock Absorbers for Fords—A semi-hydraulic shock absorber, particularly adapted to Ford cars is being advanced by the Pacific Leather Works, of Oakland, Cal. It consists of a cylinder containing a spring, which is covered with oil. The springs of the car are suspended from these inner springs of the smoother, the outer arm being rigidly attached to the axle. This Sturges smoother, it is claimed, eliminates all shock and vibration.

Racine Electric Brass Polisher—To facilitate the polishing of brass-work on automobiles, the Racine Electric Co., Racine, Wis., is selling the Racine High Speed Auto Brass Polisher. This has a special high speed motor for giving the buffer the proper surface speed. The type G outfit is equipped with a 3½ by ½ grinding wheel, a steel brush wheel for cleaning tires before vulcanizing and two buffs for polishing brass or nickel plate, and has a threaded tapered spindle for attaching the various wheels. All the motors of this company are universal, operating on either alternating or direct current 25-60 cycle, 110-130 volts, with other voltages to order.

Walz Auto Signal—The improved Walz Auto Signal, Fig. 3, for indicating to other motorists which way a car will turn, or if it will stop, is simple in construction. The signal consists of two brackets, each containing two signal disks. One is situated over the number plate and the other on the left front fender. If the driver intends turing to the left, an arrow flashes in the left disks and vice versa. On stopping both appear.

Sterling Custom-made Tires—Made to order tires, with the name of the consignee stamped upon them if desired, is the offer of the Rutherford Rubber Co., Rutherford, N. J., makers of the Sterling Tires. These tires run from $8.25 for a 28 by 2½ to $53 for a 37 by 5. They are made in straight-wall and clincher quick detachable types. The Rutherford Rubber Co. is also making the Sterling Realrubber spring bumpers.

Perkins Anti-Glare Shade—Preventing the glare from the headlights of an oncoming vehicle from blinding the driver is accomplished in a simple device brought out by Perkins & Co., Grand

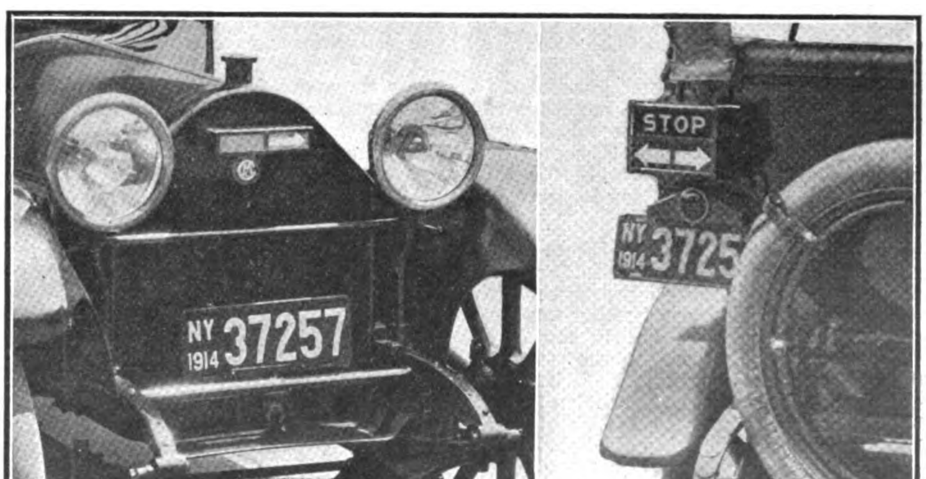


Fig. 3—Walz Auto Signal. It is attached to both front and rear

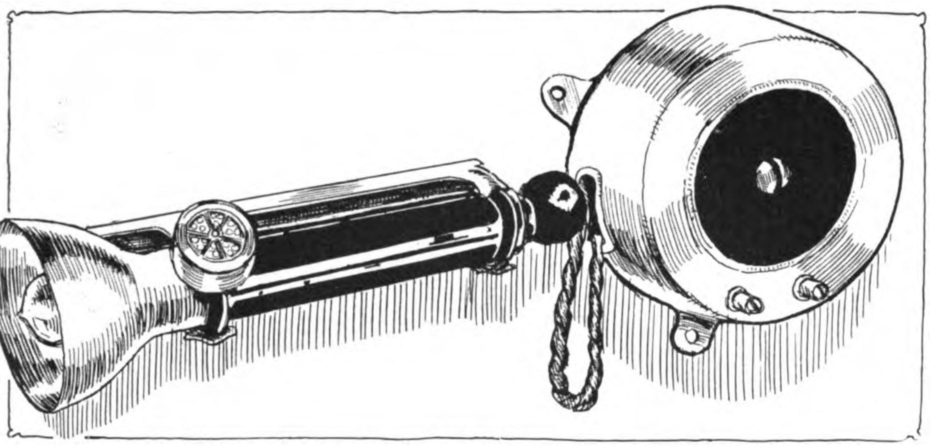


Fig. 4—Automatic cord winder attached to a combination cigar lighter and trouble lamp

Rapids, Mich., and called an anti-glare shade. It consists of a rectangular piece of amber-colored glass, properly supported on a bracket and so positioned that the driver can, by merely moving his head, cause the line of vision to go through the glass. When not needed the driver may look ahead as ordinarily but when glaring headlights appear before him he need do no more than turn his head and look through the amber glass. It is said the shade does not interfere with driving, as one may have unobstructed vision on all sides of the shade and through it without the slightest inconvenience.

Automatic Cord Winder—Fig. 4 shows the automatic cord winder manufactured by the Metal Specialties Mfg. Co., 736 W. Monroe street, Chicago, Ill., attached to a combination lamp and cigar lighter. This device holds the flexible cord running to the lamp and whenever the lamp or cigar lighter are to be used, the cord is automatically unwound, but the moment the tension is released the cord is rolled up again. The lamp fits into a simple case that may be attached to any part of the car.

The price of the automatic cord winder alone is $2.50, while combined with the cigar lighter and lamp it sells for $6. The eastern agent is Asch & Company, 1779 Broadway, New York City.

Allan's Self-Adjusting Wrench—The harder the pull the tighter the nut is held in the new wrench shown in Fig. 5 and which is manufactured by A. C. Allan, 420 West 63d street, Chicago, Ill. The operation of the wrench is simple in principle. One jaw is slotted and fitted with suitable guides, as shown, to allow the other jaw to slide in it. The handle is pivoted in the larger jaw and when force is applied moves the smaller jaw and thus grasps the nut firmly. The handle is reversible, so that it has the advantages of an ordinary S wrench. The pin that holds the handle is removable for this purpose, being held in place by a cotter pin and a washer.

New Oil-Pouring Device—When lubricating oil is poured into the motor compartments there usually is waste through sloppage over the sides of either the funnel or the can used, and it also is a difficult matter in some motors to get just the required amount of oil into the chamber. To obviate this difficulty the No-Shammy Products Co., Cleveland, O., has brought out what is called the Half-and-Half, a rectangular oil container with a spout at the bottom, the flow of oil through the spout being controllable by a thumb lever. This container, which

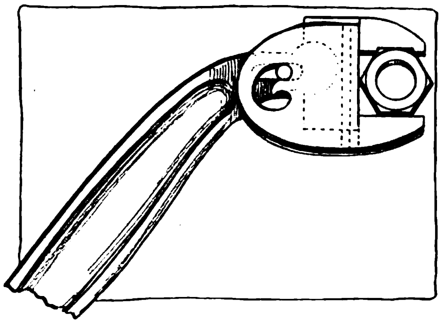


Fig. 5—Allan's self-adjusting wrench

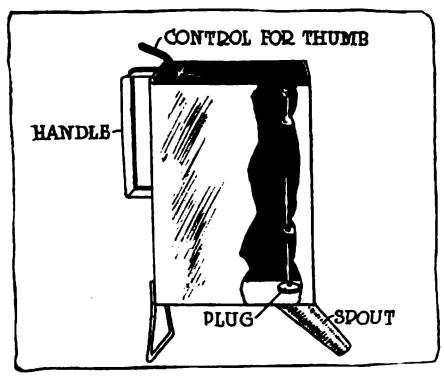


Fig. 6—No-Shammy oil-pouring can

is shown in Fig. 6, has a convenient handle, and the inside opening of the spout is covered with a small cap, which cap is connected by two rods to a thumb lever. Pressure on this lever raises the cap and thus permits oil to flow through the spout. Releasing the thumb pressure plugs the spout and stops the flow of oil. The Half-and-Half is made in two sizes, a quart size which sells for $1 and a two-quart measure which lists at $1.50.

No-Shammy Waste Can—A new idea in garage equipment, the providing of a waste can for the placing of old waste, together with a compartment for the holding of clean waste, is being sold by the No-Shammy Products Co., Cleveland, Ohio. The can is manufactured from heavy galvanized iron, and is fitted with a hinged lid at the top. It can be quickly fastened to the garage wall with wood screws. On the front is attached a sponge cup, and beneath is a swinging-rod for the drying of chamois skins. The 5-pound size sells for $3.00 and the 2-pound for $2.00.

Ogden Ratchet Swivel Joints—Claiming that breakage and distortion of speedometer shafts, gears, etc., is due largely to strains imposed upon them when the car reverses, the Ogden Fiber Gear & Tire Co., Columbus, O., has brought out a device for eliminating these faults. It is called the Ogden ratchet swivel joint, is illustrated in Fig. 7, and sells for $5. This joint is attached to the end of the speedometer flexible tubing, taking the place of the present joint, and may be used for either the left or the right side. It is fitted with gears giving the desired ratio for new or old Stewart speedometers, but the maker does not state whether it can be used with speedometers other than the Stewart. The gears used in this joint are of the spiral type.

Dahl Crescent Tube Guard—To obviate punctures, the Dahl Co., of Philadelphia, Pa., is advancing the Crescent Tube Guard, Fig. 8, a solid band made of the same material as an automobile tread, and which is tucked into the shoe, between the tread and inner tube. Great resiliency is claimed for this cushion, besides its protective qualities. Chafing and pinching are also done away with. It may be attached by anyone in a few minutes and lasts indefinitely.

Knickerbocker Luncheon Outfit—For those motorists who enjoy preparing their own meals while on a tour, the Knickerbocker Case Co., Chicago, offers a very compact case which holds sufficient food and utensils for six persons and can be carried in the tonneau back of the front seat.

It can be used as a table when extended, and then the utensil compartments are easily accessible. Many styles of this outfit are marketed, ranging in price from $15 to $75.

Beard Tire-Saving Jacks—A simple form of tire-saving jack is being marketed by the Beard Auto Lift Mfg. Co., Pleasant Lake, Ind. It is featured by a metal hook which slips around the bottom of the hub of the wheel and then by pushing down on the control the wheel is raised from the ground. When not required for use it folds up. A set of four sells for $5.

National Telescope Cylinder Pump—A tire pressure of 60 pounds may be reached in two minutes with the National Telescope Pump, which is worked by screwing it into the spark plug hole in one of the cylinders, according to the claim of the manufacturers, the National Motor Supply Co., Cleveland, Ohio. Suction from the piston of the cylinder used operates the pump, causing it to suck in and force out air as the engine revolves. This pump sells for $5.50; with a gauge for $6.50.

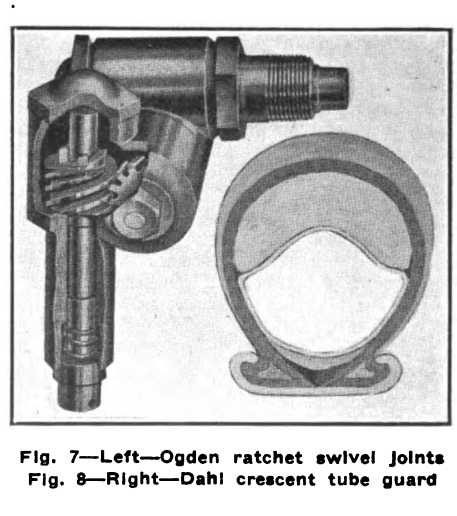


Fig. 7—Left—Ogden ratchet swivel joints
Fig. 8—Right—Dahl crescent tube guard

Paris motor buses in active service. From a photograph taken near the firing line during the battle of the Aisne between the Germans and the Allied Armies in France

French Industry Is Under War Régime

Factories Moved from Paris Brought Back Again—Skilled Workmen in Demand—Look to America for Magnetos—No 1915 French Models

By W. F. Bradley
Special Representative of THE AUTOMOBILE with the Allied Armies in France

PARIS, Oct. 1—French automobile manufacturers are still limited to one customer—the Government. The factories having commercial vehicle sections and those making aeroplane motors are working at high pressure under military control. Such remarkably good service has been obtained from the automobile lorries connected with the Army Service Corps that the authorities are doing everything possible to increase the number of vehicles. It is attempted to make up the wastage of horses by more trucks instead of by more horses.

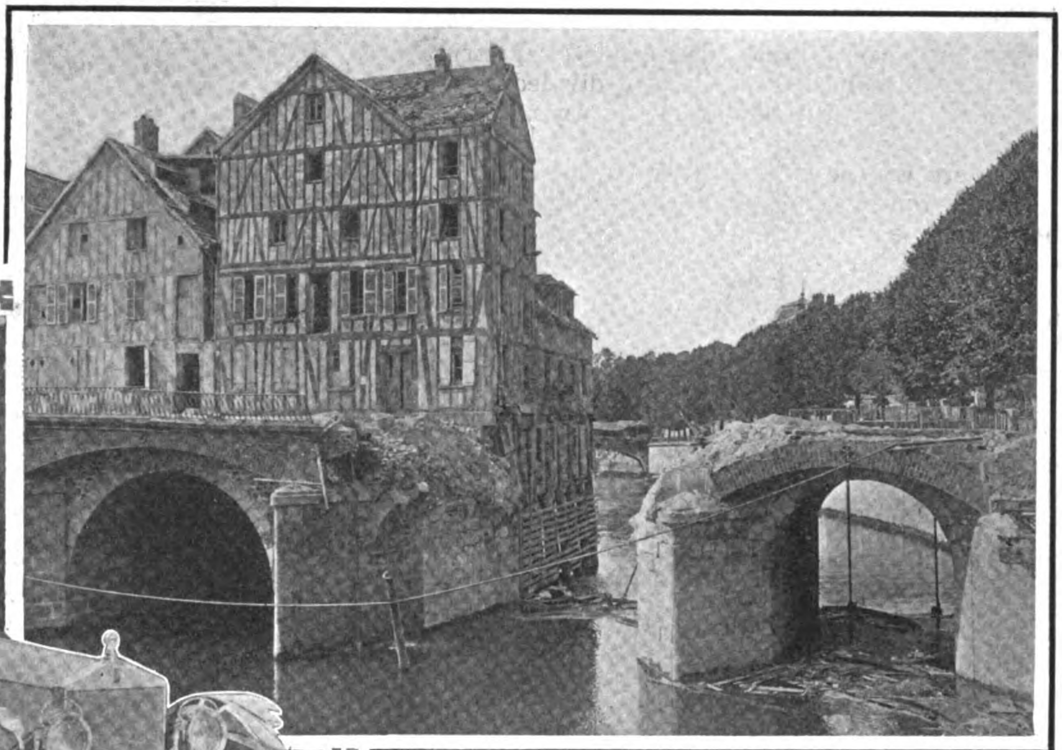
Making War Supplies

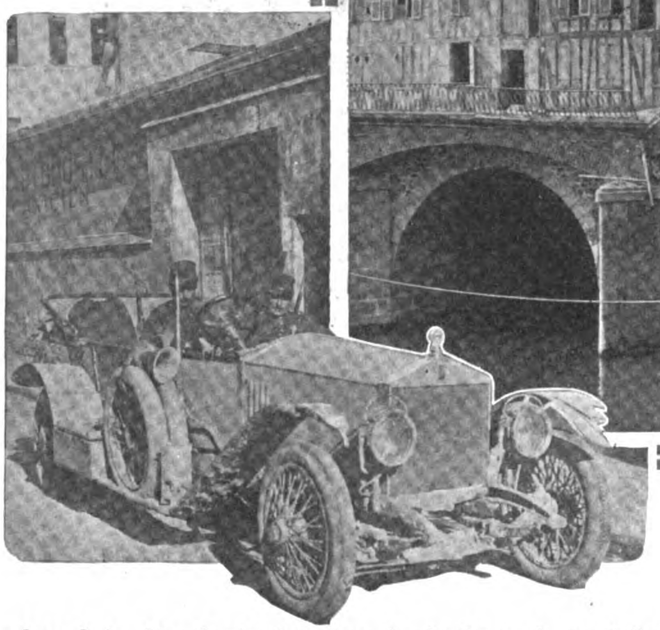
Most of the firms making touring cars only are undertaking work for the commercial motor manufacturers or are machining parts for the government arsenals. Shells, bombs, aeroplane darts, guns and gun fittings are being turned out in big quantities in some of the leading factories.

To Paris for Repairs

The repair departments of all factories are having a busy time. No conditions are more strenuous than those pertaining in war, and as the scene of the fighting is still very near Paris, cars are frequently sent into the capital to be repaired instead of being turned over to the traveling workshops. This work is not very satisfactory from the manufacturers' standpoint, for it is spasmodic and has to be got through in the shortest possible time. It has the advantage, however, of enabling staffs to be kept together. The skilled mechanics who have not been called up for war service have very little difficulty in finding work. In addition to those em-

Right — Wrecked bridge over the river Marne at Meaux, a scene of the recent hostilities between the Germans and the Allied armies. This is an important touring center for automobilists





Left—The brothers Georges and Maurice Sizaire on their Sizaire-Berwick car just returned from the front in France. Note the tattered condition of the wooden fenders, which is typical of the indifference to appearance of automobiles in army service

ployed in the factories, hundreds have been taken on at the various government arsenals.

Hard to Keep Staffs

Unskilled laborers are in a much less favorable condition. As it is believed, even by optimists, that this war will continue until the spring, workers are settling down to new conditions, taking up whatever work they can find, rather than wait for a resumption in the factories where they were formerly employed. This means that men will become scattered and it will be harder to get staffs together than was originally imagined.

No Cars for Public

There has been no repeal of the law against the exportation of automobiles, but the authorities are now willing to give permits in individual cases for cars to be sent out of the country. This is enabling factories with stocks to get their machines into England for the English or Colonial market. The volume of business done in this way, however, is small, for only cars which were completed or very near completion when the war broke out can be sent abroad. No factory in France has sufficient staffs to enable it to produce touring cars. Needless to say, the demand for touring cars at home is nil. It may be stated with certainty that not a dozen cars have been delivered to private customers in France since the war broke out.

Most Factories Near Paris

When Paris was in danger of being invested by the Germans, several of the automobile factories doing Government work were removed to the provinces. The Renault aviation motor section was taken to Lyons; Gnome went to Bordeaux; Clerget to Tours; Hotchkiss to Toulouse, etc. The entry of the enemy into Paris—we who live in the city have only just realized how closely we escaped this entry—would have had more than a moral effect. Nine-tenths of French automobiles are produced around Paris, and to have isolated this enormous source of supply from the army would have had a most disastrous effect. Now that the danger of an advance on Paris appears to be at an end, arrangements are being made for the removed branches to be returned to the city.

No French 1915 Models

Automobile manufacturers have not yet been able to size up how the industry will stand when the war is over. Although there is a firm conviction that the Allies will triumph, men of knowledge do not look for an easy victory. Many are of the opinion that the war will last throughout the winter and may come to an end in the spring. It can be accepted as certain that there will be no 1915 models. Supposing work is resumed in the early months of 1915, manufacturers will continue to produce the cars they were offering during 1914. The new types which should have been presented in the Grand Palais this month will be put forth as 1916 models. It is hardly necessary to state that there will be no automobile show in Paris before the end of 1915. Even England, which is much better placed than France, owing to the absence of conscription, has decided to drop its automobile show at Olympia this year.

Already 1915 is looked upon as a dead year, or a go-between year. Trade may spring up briskly after the war—business men are divided on this point—but there will be so much reorganization to do, there will be so much time lost in getting supplies, there will be so much delay in settling down to the old routine, that 1915 cannot under any circumstances be a brilliant year. Most men in the industry are of the opinion that there will be a period of retrenchment which will last fully a year after the declaration of peace.

State Owns 70 Per Cent. of Cars

One complicated phase of the situation is that the Government has become the owner of probably more than half the automobiles in France. No figures are available on this point, but from the opportunities I have had of noting the number of automobiles with the French armies and in army garages in various parts of the country, I am of the opinion that the State has purchased fully 70 per cent. of all machines above 12 horsepower. The army does not need all these machines on a peace footing—indeed there are thousands at the present time kept in reserve owing to the inability to use them with the troops—and when hostilities come to a close they must be disposed of. There will be a considerable wastage, for war is almost as great a destroyer of automobiles as of men.

Already the countryside is dotted with wrecked automobiles. Further there will be hundreds of cars which cannot go into private service until they have received a complete overhaul. Whether the damaged machines will be scrapped and the good ones kept, whether the army will keep them all, or whether it will sell them back to the original owners at a reduced price, is not known. The probabilities are that the last mentioned plan will be adopted. It remains to be seen whether the recuperating powers of the French nation are sufficient for it to replace its shortened supply of automobiles immediately or not.

To Refuse German Cars

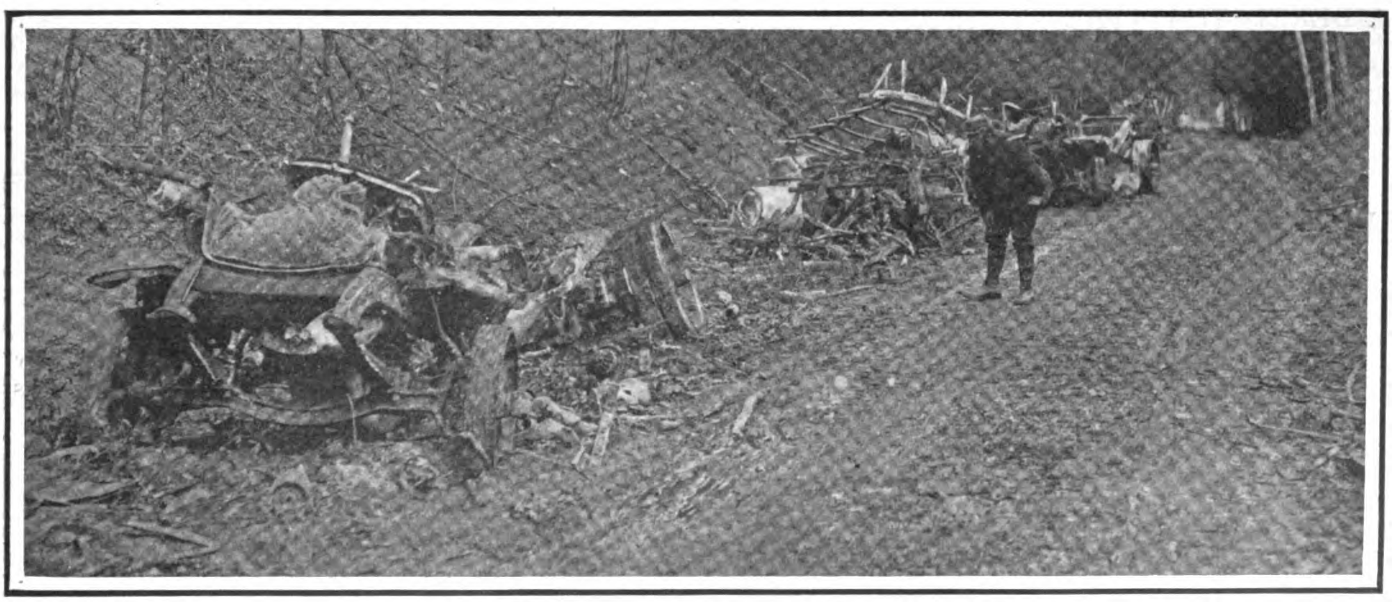
It may be taken that there will be an absolute refusal on the part of both France and England to accept any German automobile products for a long time after this war. This is already felt in England; it is not felt in France for the moment because France is not a buyer. No Frenchman or Englishman will want to own a German automobile, to use German tires, or to have on his car any German part if it can be produced elsewhere. At the present time there are no German companies in France. The Government stepped in and requisitioned all the Continental tires; it has taken possession of the Bosch factory in Paris; it has seized all German cars, and if there is any German business man in France at this time he must be in some position inaccessible to the police.

Germany Trade Not Wanted

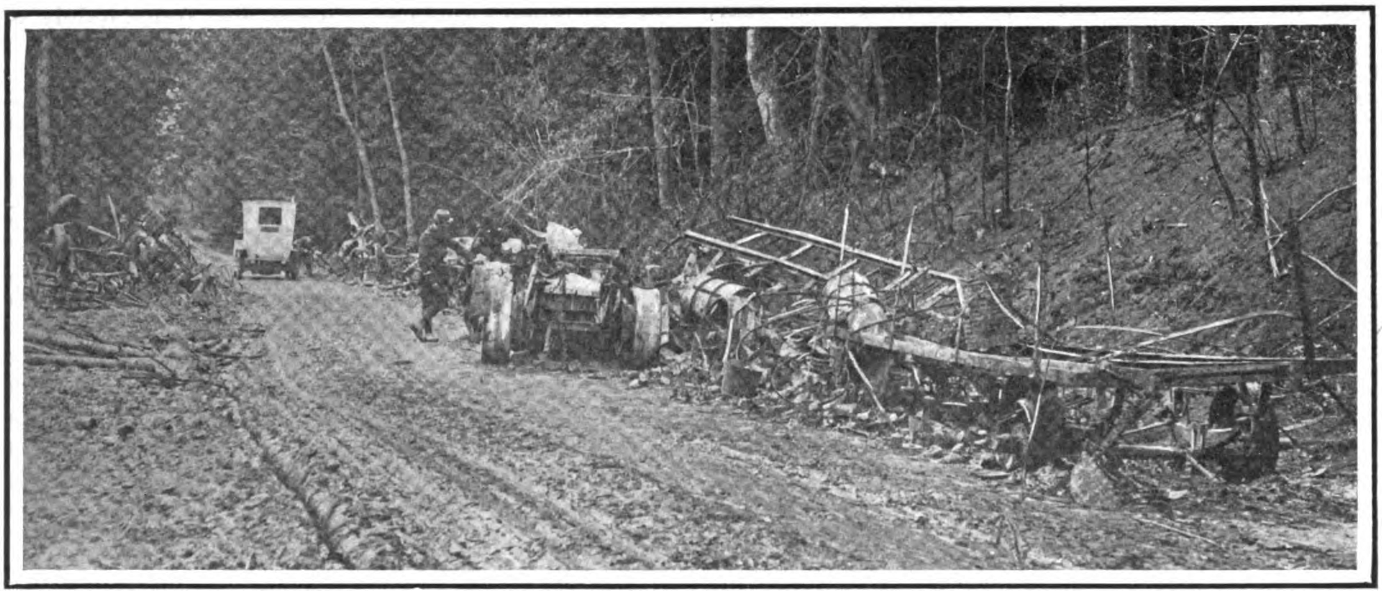
In England conditions are different; but even there the feeling is so strong that owners of German names are making frantic efforts to have them changed at the shortest possible notice and firms with German connections and German capital are trying to purify themselves in the eyes of John Bull. German trade does not need capturing: it is being thrown into the hands of British and French manufacturers.

Germany Has Magneto Supply

The most important feature of this business war is the magneto supply. Germany has made such advances in this connection that she has captured 90 per cent. of the magneto business in France and England. It is unanimously conceded that the two countries ought to get this business back. France is too busy driving the enemy out of her territory to trouble about this matter; but even England does



Another view of the German motor truck convoy which was surprised and destroyed by the French in the forest of Villers-Cotteret. The driver of the first truck was killed by a well-directed rifle shot and his vehicle zigzagged across the road so that the trucks following collided with it. Several of these vehicles capsized and a number of them took fire. In a very short time the entire convoy was reduced to a twisted mass of iron and wreckage hardly recognizable as the remains of efficient, powerful motor vehicles



The German motor convoy destroyed by the French troops in the forest of Villers-Cotteret during the fighting between the Allied Armies and Germans in France. Note the manner in which the ruined motor trucks have been thrown off the road

not appear to be handling the matter in as broad a manner as it justifies. The British Thomson-Houston Co. has decided to go into the magneto business, Vandervelt and a few others are doing the same, but the efforts are timid ones.

Want American Magnetos

It has been admitted in the trade here that a Bosch magneto helped to sell a car; now that the public for the first time is willing to accept other makes of magnetos, it is surprising that British manufacturers are not showing more faith. THERE APPEARS TO BE AN OPENING HERE FOR AMERICAN MANUFACTURERS. FRENCH AND ENGLISH ENGINEERS WITH WHOM I HAVE SPOKEN ADMIT THAT THERE ARE AMERICAN MAGNETOS EQUAL TO ANY PRODUCED IN EUROPE. IN ENGLAND IT IS CONSIDERED THAT THE AMERICAN MAGNETO COMPANIES WILL MEET THE SHORTAGE OF GERMAN-MADE MAGNETOS.

Gasoline Is Plentiful

France and England are experiencing no shortage of gasoline. The average retail price in Paris is only about 1 cent per gallon higher than it was before the outbreak of war. This slight increase is due in all cases to the extra cost of cartage or to the lessened demand. Retailers get a bonus on quantities; private sales not being as brisk as formerly, they are not buying to the same advantage and consequently have to sell at a higher price.

In England the price of gasoline has gone back to normal rates, and there, as in France, there is no possibility of a shortage. The British army on the Continent is importing from England the whole of its gasoline supply and has never experienced the least shortage.

Boillot in Accident—Other Drivers in Service

PARIS, Oct. 1—According to reports from the front, Georges Boillot has been involved in a serious accident while on active service. The French race driver was traveling at high speed, with three staff officers in his car, when he ran off the road at a bend in an attempt to avoid a car coming in the opposite direction. All the occupants of the car were thrown out, two of the officers being rendered unconscious, but their injuries were not of a serious nature. Boillot was uninjured, although his car was so completely wrecked that it had to be abandoned. He resumed service with another car. Although Boillot is attached to the headquarters staff, he is not driving General Joffre. The head of the French army moves about comparatively little; when he does travel it is by automobile with one of his staff officers at the wheel.

Goux Driving Officers

Jules Goux, who went into one of the forts at Belfort on the outbreak of war, has been transferred to the automobile section, and is now driving officers in a Peugeot. Louis Wagner, who finished second for Mercedes in the last French Grand Prix, has not been allowed to enter either the automobile or the aviation section of the French army. He is serving as an artilleryman on the Eastern frontier. The refusal to allow Wagner to serve in the branches in which he has so distinguished himself, is doubtless due to his recent connection with the German firm. Wagner is purely of French origin, and does not even speak a word of German. But in such times as the present the army will not take any risks, and all men who have had recent connections with German firms are put into unimportant posts.

No Names Given

News of motorists at the front is very scarce, no names are mentioned in dispatches, and when men are killed or wounded only their nearest relatives are privately informed. No lists are published in the newspapers or elsewhere. Men writing home are not allowed to state where they are stationed or where they are going to.

Truck Convention Success—300 Delegates Discuss Pertinent Subjects

Service Dealers Should Give Is Leading Subject Considered—Dealers Must Carry Adequate Supply of Parts—Room for Small Vehicles—Tires Ruined by Overspeeding and Overloading—Controlling the Drivers

Get Together

Almost all of the advantages which man possesses above the inferior animals arises from his power of acting in combination with his fellows, and of accomplishing by the united efforts of numbers what could not be accomplished by the detached efforts of individuals.—John Stuart Mill, the Convention Watchword.

DETROIT, MICH., Oct. 10—The 4-day convention of motor truck manufacturers, dealers and owners conducted by the Motor Truck Club of America came to a successful conclusion in this city today, the 300 registered delegates from the truck and accessory industries uniting in declaring the convention a success and hoping for a similar one next year.

The idea of a motor truck convention was started early in the spring, the dominant thought of "get together" being to bring the makers, dealers and owners in this new industry face to face, to get them acquainted and to unite in eliminating the abuses of the industry and solving its problems.

Upwards of fifty different truck makers were represented, the tire makers producing truck tires were on hand, dealers were present from many cities in goodly numbers, there were some owners present and the United States Government sent its official representative to assist in the work and invite the Motor Truck Club to hold its 1915 convention at San Francisco during the exposition.

The Thirty-four Varieties

Extending a program on matters relating to truck operation, manufacture and maintenance over 4 days was a herculean task and not fewer than thirty-four papers were presented covering the gamut entirely. These papers began with the omnipresent topic of service to truck owners, which was handled by both dealers and manufacturers. Tire problems were handled by three representatives of the tire industry who analyzed the evils of overloading and overspeeding, etc.

Two papers were presented on the question of time payments for trucks. Charges for demonstrations in making truck sales; traffic engineering; parts to be carried in stock by dealers; the use of trucks on farms, and a score of other papers pertinent to truckdom were on the calendar and all were discussed at length—in fact there was not time enough to tell the whole story of the truck field, and what are its sins of omission and commission.

All of the sessions at which addresses were made or papers read, and there were six of them, were well attended with the exception of the last one held this morning, the attendance averaging close to the 100 mark. The sentiment was general throughout that there was much to be learned and the time was short. The makers and dealers were intent on the varied subjects from start to finish.

Want to Organize

Many of the makers had made up their minds that if they attended a truck convention they must immediately form some sort of organization for their mutual benefit, and with this object in mind a caucus was held Thursday afternoon which was attended by over a score of truck makers who are not members of any organization. Many favored a national truck organization rather than joining with the present national organization, the National Automobile Chamber of Commerce, which counts in its membership thirty-three truck makers and which has a special committee for commercial vehicle work. A committee was formed to report on the subject. It is not known as yet what course of action this committee will recommend, but it is expected to report back to the different makers represented at the convention within 2 months.

The sentiment was apparent that there has not been enough of the "get together" spirit in the truck field, and that the National Automobile Chamber of Commerce has been devoting more attention to the passenger car industry than to the truck field. Many of the truck makers present expressed a desire that this national body attack the existing evils in the truck field more vigorously and that it take immediate steps to largely increase its membership, receiving into its ranks perhaps thirty or forty truck makers who are at present not counted in its membership. Action of this nature would bring its representation in the truck field up to seventy-five, and the feeling is quite general that there are 100 makers of trucks in America whose names should appear on its roster.

Successful Discussions

It is rarely in the first convention of its kind that such open-hearted discussion followed the reading of many papers; in fact, the truck makers, who had never before met in convention, talked right out from the shoulder with as much parliamentary atmosphere as do the members of the Society of Automobile Engineers, who have been educating themselves in such discussions for several years. Many of the makers had real problems to solve and they came prepared to tell their own secrets, to come direct to the point rather than beat around the bush and return home without getting results.

Invitations were read from the Mayor

of Buffalo and the Chamber of Commerce inviting the truck makers to the Bison City for 1915. Detroit also advanced its claims and special representative J. M. Hill, of San Francisco, advanced the claims of the Pacific Coast for next year. The selection of a place has been left with the Motor Truck Club of America.

The framers of the program for the convention had aimed at featuring those topics that had to do with the merchandising and maintenance of motor trucks rather than matters relating to the manufacture of them and the engineering problems entering into their makeup, and it was this practical aspect of merchandising as well as the bugaboo of service that called for the longest discussions in the convention which has just come to a close.

Service, Spare Parts, Demonstration, Tires, Drivers

Some Topics Discussed at the Motor Truck Convention

Day Defines Service As Stock of Parts and Speed

FAVORS PRESENT 90-DAY WARRANTY

It remained for W. L. Day of the General Motors Truck Co. to fire the opening bomb on service as the truck maker sees it. "We are all wrong in this matter of service," began Mr. Day. "Service should consist in a policy of no free repairs or replacements except under the strict letter of the manufacturer's warranty, no free demonstrations in making sales, no free-service trucks to be loaned to owners when they are having their own trucks repaired or overhauled, yet having ample stocks of repair parts together with adequate facilities for handling them; periodic inspection of the trucks, reports of these inspections to owners and adequate instructions to drivers before the trucks are turned over to their care."

Mr. Day was in favor of the present 90-day warranty of the National Automobile Chamber of Commerce and believed that it should be extended to cover a period of 1 year. In tracing the history of the service problem from its inception down to the present Mr. Day blames competition for the present evils and predicted that a continuation of such competition would lead to eventual failure and bankruptcy.

The Dealers' Viewpoint

J. H. Thompson, a Detroit truck dealer, championed the side of the dealers in this service argument, and began by assailing the present 90-day warranty of the makers as a meaningless document, the only certainty about it being that the buyer could secure perfect parts for imperfect ones, if the imperfections exhibited themselves within the 90-day period. "But," continued Mr. Thompson, "the owner must send the imperfect part back to the factory at his own expense, while his truck stands idle at the expense of business efficiency. Once the part arrives at the factory it remains with the factory to determine whether the part is really defective or not, and if the factory decides to send a new part it is done at the expense of the owner and he must also install it at his own expense, if the dealer will not do so.

"The truck maker should provide in his warranty for the cost of fitting free parts covered by the warranty, because at present the dealer is generally called upon to do this work and he must do it at his own expense. The dealer can only do this providing the discount on the trucks he sells is liberal enough for such a policy. Very often it is necessary for the dealer to provide spare trucks for the use of owners when theirs are being repaired.

"In service the dominant question is not how much should be free but how prompt and effective the service should be. If prompt and efficient service at reasonable charge is given, the purchaser is generally willing to pay the bill."

W. G. Cronkright, president of the Duquesne Motor Truck Co., in speaking of the problem on service to truck owners advocated the establishment of clearing houses for repair parts in different parts of the country, these clearing houses to carry spare parts for perhaps a hundred or more different makes of trucks, and to be conducted in some manner that would be satisfactory to all owners. Such a series of clearing houses would take off the dealer the burden of a heavy stock of repair parts which he must carry, and would simultaneously assure to any truck owner the ability to quickly secure spare parts irrespective of the section of the country in which he lives.

B. A. Gramm, a truck maker, drew a parallel between the motor truck industry and the machine tool industry in so far as service by the manufacturer applies. When machine tools are purchased and installed in your factory the machine-tool maker does not loan you an additional machine that you can use when the one you purchased is being repaired; rather it is up to the manufacturer of trucks to utilize other machines in his factory to do the same work while the other machine is being repaired. In the truck field many owners and dealers also think it necessary to loan a spare truck to the owner while he is having a repair made on his. This

Thompson Analyzes Service From Dealers' Viewpoint

GRAMM OPPOSES FREE SERVICE

is not businesslike, and its parallel cannot be found in the old-established industrial lines. The sooner the truck dealer stops it the sooner will he begin making a legitimate profit out of his business and the sooner will the buyer have reinvigorated confidence in him.

Mr. Pratt, one of the owners present, stated that, as an operator of a small fleet, he had found that the greatest trouble with service was that most users did not apply the same business principles to the use of trucks as they did to their own lines of business. His company started the use of trucks with a $15-a-week shipping clerk in exclusive charge of the vehicles, and the usual failure was encountered. Since that time, however, owing to his own studies into the matter of truck efficiency, the trucks, like all the rest of the machinery of the plant, had been put in the charge of the master mechanic, the drivers being required only to drive, the shipping clerk only to ship, and all being subservient to the master mechanic in respect to the physical aspects of the operation of the rolling stock. He applied the analogy of the railroad roundhouse system to this, pointing out that railroad locomotives were in the care of the master mechanic, and that they were rigidly inspected by special round-house men after each trip, the train dispatcher being required to govern their movements only, and the engineers only to drive them.

W. A. Conant of the Gould Storage Battery Co., was another who stated that the matter of service revolves largely around the question of speed. If the dealer is equipped to offer service and has the necessary parts, he said, the purchaser of the truck is willing to pay for the service. He offered as his opinion that it is prompt attention to the little problems that beset the truck user rather than slower solution of the large ones that brings the greatest satisfaction.

Spare Parts for Dealer—Eliminating the Demonstration

All Dealers Should Carry Adequate Supply of Spare Parts

FACTORY CONSIGNS TO DEALER

M. L. Pulcher of the Federal company discussed the very imporant subject of the amount of spare parts that a motor truck dealer should carry in stock, taking the viewpoint that the quantity of parts carried depended on the size of territory and also the distance of this territory from the factory. Further, the truck factory should cooperate with the dealer to the extent of consigning him parts on a 50-50 basis, that is, the dealer would be required to pay for one-half his stock of parts when same were received, and to pay the factory for the other half when they had been sold, the dealer to give an accounting to the factory each month.

In speaking on the question of list prices of trucks, as published by different makers, Mr. Pulcher said: "There is no standard of lists at the present time. A high list on a certain truck allows your dealer too much margin, and permits him to cut prices, which means that practically all purchasers buy your trucks at a different list. One Chicago purchaser reports that out of 275 trucks not more than three had been purchased at the list price. In view of this we are all wrong as manufacturers in deviating from our list. In nearly every town you will find two or three good truck dealers with up-to-date, clean, business-like salesrooms, and invariably these are the dealers who maintain their lists and secure legitimate profits.

"Every sale a dealer makes at a cut price under loss is a detriment to the maker of that truck. Next to the railroad, the motor truck business should be the largest industry in the country.

"Buyers do not like purchasing at cut prices, and personally I have never entered a store where they cut prices, but I have left feeling that I did not get the goods as low as some other buyer.

"Truck manufacturers can assist dealers in maintaining prices. There is a certain company in the motor truck field which audits the books of its dealers regularly, and by this procedure has brought the truck business up to a higher plane. I have tried to buy a passenger car of this company at a discount, but have not been able. Their policy of sticking to their price is a strong argument in convincing you that their vehicles are worth the price asked for."

In speaking of discounts to be allowed for quantity business in trucks, Mr. Pulcher drew attention to the great differences in the policy of companies at the present time in this work. One maker gives a 50 per cent. discount on large quantities, and another gives 7 to 10 per cent. discount on lots of 100 trucks. Single orders are not quantity business and should not carry discounts. The desirable discounts for quantity business are as follows:

	Discount
Order of 5 trucks.......	5.0 per cent.
Order of 25 trucks......	7.5 " "
Order of 50 and up.....	10.0 " "

The motor truck maker must remember that quantity business means trucks being delivered to many parts of the country, and the maker must realize that his dealers in these different cities will have to give more or less service on such orders. Because of this the manufacturers must retain a certain amount of money out of quantity business for the dealers into whose territory these trucks are delivered.

In selling spare parts they should be listed so that the total parts entering into a truck should not exceed the list price of a truck; in other words, there should not be any effort to get a higher price on spare parts than is legitimate. The dealer should get the same discount on these parts that he receives on the trucks, and an additional discount of 5 per cent. for cash on the 10th of the month. Mr. Pulcher believes that this additional discount is a good method of getting a correct estimate on the dealer and his business methods by the manufacturer.

In speaking of the stock of parts which the dealer should carry on hand, Mr. Pulcher said: "The stock of parts carried by a dealer depends on the number of trucks sold in the district and the distance of this district from the factory. All dealers should carry a good stock of parts, but generally they do not carry enough. The policy of our company is to insist on a dealer carrying a certain value of parts, and we check up his stock periodically to see that this is done. We have divided the entire country into zones, not unlike that of the parcel post service. In general, all parts carried by a dealer should pe purchased outright, but frequently this is impossible because of the amount of money so tied up. To make this possible, we share the burden on a 50-50 basis with the dealer, requiring him to pay the additional 50 per cent. value when the parts are sold. In this connection we will not allow the obligations of the dealer to the factory to exceed $5,000, and for all parts above this he must pay when received."

Free Demonstrations Fail To Sell Trucks in Detroit

DEMONSTRATIONS ARE UNNECESSARY

J. C. Ayres, a Detroit motor truck dealer, in speaking on the subject of demonstrations, and whether they should be free, charged for or made at all, told how after 3 years of experience he had found his business as great at the end of a year in which he had not made any demonstrations, as at the end of a similar period when he had charged for demonstrations. With free demonstrations he only made one sale out of eighty-one demonstrations; when charging for demonstrations he sold to 87 per cent. of those he demonstrated for, and with no demonstrations his sales showed a steady increase.

In analyzing the question of demonstrations Mr. Ayres said: "During 12 months we made free demonstrations and our records show that out of eighty-one free demonstrations we made but one actual sale, in other words eighty of the firms we demonstrated for did not buy from us. Of these eighty concerns only four bought trucks from other makers during the 12 months, so that there were seventy-six concerns that were getting free haulage from the motor truck dealers without even having to make a purchase.

"We next tried a period when we charged for demonstrations on a scale ranging from $8 to $25 per day, according to truck capacity and whether the work was done on city streets or over country roads. At the end of the 14 months we had sold to 87 per cent. of the concerns we made demonstrations for.

"Following this period of charged demonstrations we instituted a regime of no demonstrations and at the end of 10 months the percentage of total business was higher than in any similar period under the regime of either free or charged demonstrations.

Demonstrating Rates

"The usual schedule which should be followed in charging for demonstrations is:

$8.00 per day for a 1,500-pound truck
10.00 per day for a 2,000-pound truck
12.50 per day for a 2-ton truck
15.00 per day for a 3-ton truck
20.00 per day for a 5-ton truck
25.00 per day for a special lumber job or a job with a dump body.

"An increase of $5 per day should be charged whenever the trucks are operated in the country or over unusually hilly roads. There should be an extra charge of 10 per cent for overtime, the above rates of charge being based on a 10-hour day.

"If the concern or individual for whom you demonstrate buys a truck the question is frequently asked, should the dealer rebate to him the cost of the demonstration? He certainly should not. You are delivering the buyer a service, you are delivering his goods, the cost of which is a recognized item in any business. You are showing him the application of motor delivery to his business and he should be willing to pay for it. The demonstration charges should not be rebated; the dealer has already rendered a service, the buyer would have to pay to have these goods delivered if he had not his own teams or the dealer had not done it."

Time payments for motor trucks is a subject that has agitated the truck industry for many moons and two representatives, one of the industry and another from the outside, presented their views on this subject. The consensus of opinion on this pertinent topic is that the periods of payments should be under a year and that there should be a deposit of from 25 to 30 per cent. at the time of purchase.

Too Few Makers Build Small-Motor Vehicles

BIG FIELD FOR UNDER-TON TYPES

"There are 60,000 to 80,000 Ford passenger cars fitted out yearly to perform delivery functions," according to E. S. Foljambe, in his paper on "The Field for Medium Size and Small Trucks." By medium size and small trucks Mr. Foljambe referred to vehicles of 1200 to 2000 pounds capacity.

In further showing the enormous field of possibilities for small trucks, which field he considers neglected by the makers, Mr. Foljambe showed that between 1900 and 1910 the government statistics show an increase of 1,566,000 in the number of horses in use on our farms, or 8.6 per cent. At this rate of increase, and with 19,833,113 horses in 1910, there should now be in use approximately 20,000,000 horses. Mules, burros, and other draft animals have increased during the same period, 11.7 per cent., making the total number now in use 4,247,800, or a total of over 24,000,000. This does not take into consideration the 2,000,000 or more horses in cities. At the same time the average price of the horse has increased from $53 in 1900, to $112 in 1910, and of mules from $64 to $131.

A realization of how little inroad the truck has already made is borne in upon us when we consider the following figures: From 1908 until the present time inclusive, there have been produced in the United States, approximately 180,000 commercial cars; 100,000 to 125,000 of these are probably now in use. On an average, counting all sized vehicles, these do not displace more than three horses each, or a total number of horses displaced of not over 375,000. When this number is compared to the total number of horses and draft animals in use, it is found that commercial cars have in reality displaced less than 1.5 per cent., and even taking into consideration the motor driven farm tractor, the possible field still not covered is fully 98 per cent.

In regard to the weight of average loads in the "delivery" field, there is much ignorance even on the part of the users. Reference again to Interstate Commerce figures may be enlightening. These show that 95 per cent. of all parcel delivery packages handled in this country come under 50 lbs. in weight. Investigation by a New York firm making a specialty of analyzing delivery methods showed the average of all loads for retail distribution to reach the astonishingly low figure of 550 lbs.

The following figures are from a study of the weight of loads made by a large department store of Philadelphia during a rush period. For package delivery this company, and it is not alone, employs a vehicle weighing 4,000 lbs., with a rated capacity of 3,000 lbs. A careful analysis showed the loads to range from 800 lbs. to a maximum of 1,195 lbs., with the vehicle body piled just as full as it could be packed. This body was 9 ft. long, 56 in. wide, and 78 in. high. The total load moved by the motor with the maximum payload on the vehicle was 5,195 lbs., the payload representing but 23 per cent. of this total weight, while the dead load moved is represented by 77 per cent.

A study of one of the largest candy companies of New York City showed the following results, motor driven trucks during the normal period carried as follows: 22.3 per cent. payload, and 77.7 non-paying load; another truck but 18.8 payload, and 81.2 non-paying load; another 24.7 payload, and 75.3 non-paying load, while the horse vehicles showed a payload capacity of 41.8 and 58.2 non-paying load. During a rush period the same cars showed 22.7 per cent., 23.5 per cent., and 29.8 per cent., or an average non-paying load of 74.7 per cent. THE PAYLOAD IS A CONSTANTLY DIMINISHING ONE, WHILE THE NON-PAYING LOAD MUST BE MOVED OVER THE ENTIRE ROUTE. CONCLUSION, IT COSTS TOO MUCH TO DELIVER THE VEHICLE.

The analysis of the ratio of payload to dead load shows that the remedy lies in a reduction in the size and weight of vehicle, more in conformity with the average loads carried and that more frequent trips with these more nearly capacity loads must be made.

The bodies play an important part in the use of the vehicle in its proper field. The Philadelphia firm's experience showed that a body 9 ft. by 56 by 78 in. would not carry more than 1,100 to 1,200 lbs. of the class of goods being handled, and that a smaller capacity vehicle fitted with such a body would be more economical.

Overspeeding and Overloading Cause Tire Turmoil

TIRE COMPANIES SHOW ABUSES

Nearly an entire afternoon was given over to the question of truck tires, and the evils arising from overspeeding and overloading trucks. Representatives of Goodrich, Firestone and Goodyear presented papers on different aspects of the tire situation and a general discussion followed the presentation of these papers.

Trucks Under-tired

Roy Harris, of the Firestone Tire & Rubber Co., presented a paper on "Proper Load Rating of Truck Tires," He traced the development of the movement for oversized tires on passenger vehicles, and its transmission to the truck tire field, and pointed out that it was short-sighted of the maker to under-tire his vehicles, for the owner soon learns that it is poor economy, and has to go to the expense of having his wheels made over in order to fit larger tires. On reordering he remembers this and is apt to avoid a second purchase of an under-tired truck. Large and experienced users appreciate from bitter experience the importance of adequate tiring, and look with disfavor upon the man who tries to sell a truck with skimped tire equipment.

He discussed load distribution, center of gravity, and crowned roads, in their effect upon tire wear, advocating careful loading, a low center of gravity, and running in the center of the road. There is a wide diversity of speed limitations on different makes of trucks of the same capacity, showing that for higher speeds larger tires are needed, and that standardization of speeds for different capacities is needed.

He produced a table of tire capacities, showing two standards of capacity ratings, one of which varied with the diameter of the tire, and the other of which did not. He also pointed out that usually a greater capacity was given to a dual combination than to a single tire of equal cross-section. He stated that truck makers all allowed for overloads in every part but the tires, looking to the tire maker to be the goat. He appealed to truck makers to allow an equal percentage of overload capacity for the tires.

In discussing the question of the relative merit of the dual tire as compared with a wider single-section tire, Mr. Harris stated that he had found the single tire preferable to the dual tire, up to 7 inches, the largest size which it has so far been practicable to make.

Standard Tire Sizes

J. E. Hale, of the Goodyear Tire & Rubber Co., presented a paper on "Standard Tire Sizes," illustrated with lantern slides. Mr. Hale very ably set forth the work of the S. A. E. in tire standardization, and presented a convincing argument for the restriction of tire diameters to two or possibly three sizes—32, 36 and 42 inch in fine. This review complete, he next took up the question of further standardization, standardization of load capacity for given capacity. At present there are some makes of tires of given size that are rated to carry loads that other makes of the same size are not. This often necessitates having the wheels made over in changing from one make of tire to another, and should not be.

He advocated complete standardization of sizes, capacities, and methods of attachments, although compounds, shapes of cross-section, etc., he naturally left to the individual maker. But in endeavoring to standardize carrying capacities of different sizes of tires, the S. A. E. has been confronted with the necessity of having accurate data on tire wear, and up until the present such data has not been procurable.

S. V. Norton, of the B. F. Goodrich Co., read the paper which he previously presented to the Motor Truck Club in New York City. His statements were confined to the solid tire, consisting of the causes and remedies for wear and destruction of these tires. He also made a strong plea to manufacturers for more honest load ratings, and a square deal for the tire man in regard to tire sizes. He predicted the abandonment of tire guarantees, and extolled the virtues of oversized tires.

A rather interesting fact that is not as well known as might be the case was brought up in the discussion of overloading. It was pointed out that whereas the actual weight of the vehicle and its load may be well within the safe limit, a long overhang, or a load that projects for a considerable distance at the rear will be responsible for overloading the tires by reason of the leverage which reresults.

Driver Worst Enemy To Successful Truck Operation

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Chicago Dealer Asks for Clearing House for Drivers To Protect Owners and Dealers

"There is a foundry company in Chicago that put a careless driver on its truck with the result that in 6 months the truck was shipped back to the factory to be rebuilt. When it was returned a first-class truck driver was engaged and the result is that this truck has now been in use 4.5 years, it is still in perfect condition and the same driver is still handling it. It is not brought to our service building once a year and is a credit to its maker and its owner." In these words, H. S. Dunlavy, a Chicago truck dealer, outlined the difference between a good driver and a poor one in his paper entitled "Driver's Relation to Successful Motor Truck Operation." Mr. Dunlavy in still further showing the value economically of a good driver continued: "There is a truck user in Joliet with three Federal trucks, two of which he has had for 2.5 years and one for 6 months. He has two drivers operating them and outside of tires the maintenance on these three trucks for the entire time he has had them has not amounted to $70. His drivers are men who have worked for him for years; they drove his horse teams; some of them have been with him for 15 years.

"There should be a clearing house for truck drivers, so that motor truck owners could get some protection against carelessness and inefficiency. Motor truck dealers and branch managers should write to all of their owners asking them to give the names and addresses of their drivers. They should also be asked for such information as length of time they have been on the job; and whether they are good, fair or poor. This information should be listed on a card index field in the clearing house. Truck owners should be furnished with cards on which they could give all particulars when a driver is discharged. Such information should be entered on the index card of the respective driver.

"If this plan were put into operation, so that when an owner wished a driver he would consult the clearing house, it would not take long for the drivers to realize that unless they gave proper service, took good care of their trucks, and attended strictly to business, they would be classed as poor, if they were discharged, and would consequently have great difficulty in procuring new positions. It would have the effect of stimulating drivers to give better service. If a driver were incapable he would not get positions excepting at very poor salaries."

"Credit sales to purchasers of motor trucks must be distinguished from selling passenger cars on terms," began Walter E. Parker, President of the Commerce Motor Truck Co., in speaking on this subject. "The latter is poor business," continued Mr. Parker, "and has earned the condemnation of all economists and bankers. That the evils of this method of making sales without regard to good business principles should be visited upon motor trucks is unfair, inasmuch as the truck is a business investment capable of yielding substantial returns, and not a luxury. An economical necessity to its user, and not a convenient toy which represents only in rare instances a necessity of business."

Time Payment Plans

Mr. Parker emphasized the fact that many concerns whose credits were good and who conducted their business along conservative lines for legitimate profit were not in the habit, or prudently able to take sufficient funds from their business to pay for an entire investment of such magnitude as is represented by motor truck purchase. The cash basis of selling motor trucks was a heritage from the passenger vehicle industry, and should not be permitted to restrict the market to such a great extent as it must.

Wild-cat credit schemes were the cause of many failures, and were naturally to be discouraged. He submitted a plan, therefore, for the standardization of credit arrangements, with a method of financing and securing such ventures. The salient features of this scheme were the formation of a motor truck guaranty association to be made up of manufacturers and dealers in motor trucks, the $500,000 capital to be subscribed in equal proportions by manufacturing and selling members of the organization. Terms were based on payments down of 25 per cent. of the price, the balance to be paid within 10 months, the notes to be discounted and secured by chattel mortgages and insurance.

In further taking up the question of the time payment plan for commercial vehicles, Frank M. Gregg, president of the American Commercial Co., Cleveland, O., stated that "The deferred payment plan, when used in conjunction by the manufacturer and agent, is a powerful factor in the sale of automobile trucks. The deferred payment plan, when used by the agent alone, is weak and of little value.

He supplemented this statement by adding that any plan which leaves the making of the terms of payment to the dealer alone is not only ill-advised but is immoral in that it encourages him to take risks which he would not take.

(*Continued on page* 741)

U. S. Banks Needed in South America

Banking and Credit Are Indispensable Elements in Developing Our Trade with South America—Foreign Banks Now Reaping the Profits Aid Foreign Firms

By Donald McLeod Lay

Being a digest of a report prepared for the Department of Commerce by Edward N. Hurley.

"AMERICAN BANKS ARE IMPERATIVELY NEEDED IN SOUTH AMERICA AS A DEPENDABLE RESOURCE IN THE CAMPAIGN FOR GREATER TRADE. The growing keenness of competition with nations already thus equipped renders reliance on their support increasingly perilous." This is the essence of a report prepared by Edward N. Hurley for the Department of Commerce under the title Banking and Credit in Argentina, Brazil, Chile and Peru, being No. 90 of the Special Agent series. The report incorporates observations and conclusions, from a manufacturer's point of view, of the existing banking situation as relating to present and future American trade in these countries. The following article is a brief digest of this report.

Banking Neglected

Banking and credit are indispensable elements in developing our trade with South America. American industries are extending their sales organizations, but the banking facilitation of the trade is still left in the hands of foreign banks primarily organized for the development of the commerce of competing European nations. The functions of these foreign banks in South America are: Exchange, collections, loans and discounts, credit information and investment.

Any international banking with South America must proceed on the promise that London is the center of the world's money market. One fundamental feature of the effort of German banks to control German over-sea financing was the establishment of branches of German banks in London. Stability of exchange in London is a great advantage not only to the centralization of credits there, but the expansion of British exports to South America. Exchange on New York is quoted in the chief banking centers of South America, but bills are not offered in large number or constant supply. Although the trade between the United States and Brazil in 1912 was valued at $190,000,000, the balance of trade was adverse to the United States by $94,000,000. As between Argentina and United States the balance of trade favors the latter. At present, conditions are not propitious for the development of a larger direct export trade with the United States.

London Exchange Favored

Bankers state that exchange on New York in South America is usually at a disparity of from to 1 to 1 1-2 per cent. as compared with exchange on London. Thus New York exchange in South America sells at 1 to 1 1-2 per cent. less than London exchange and costs buyers 1 to 1 1-2 per cent. more. The large toll that the United States annually pays London can only be estimated but an idea may be gained from the fact that bills on London in 1912 were valued at £1,805,000,000, as against a total export trade of £1,231,000,000 on every one of these £1,800,000,000 sterling of which some profit was made or some commission earned.

Saving $1,316,173 a Year

Foreign banks charge from 1-8 of 1 per cent. to 1 per cent. for collections, according to the remoteness of the debtor. These banks offer the most effective avenue open to the American exporter in reaching customers. Assuming a commission of 1-2 of 1 per cent. on $526,468,815 worth of products sold by Latin-America to the United States in 1912, the total cost of payments through London would be $2,632,344. On the basis of a banker's statement that well established American banks in Latin-America would save half the commission, the saving would be $1,316,173. Credit is far more freely given in South America than in the United States. Single name paper is very generally accepted, individual houses often deal with six to ten banks and overdrafts on current account, for which the depositor pays 9 per cent., are encouraged.

Since the foreign and native banks in South America are called upon to accept drafts representing credits in the export and import trade they must maintain credit information services. Foreign banks supply their home offices in Europe with ratings and characteristics of South American firms and individuals. German trade has been extended largely by aid of longer credits than were accorded by British houses.

British investments in Latin-America are estimated at more than $5,000,000,000 yielding approximately $250,000,000 in annual interest. South American exports to the United Kingdom in 1912 reached a total of $310,210,806, so that the earnings of British investment went far to pay for these purchases. The United States has little investment in South America and American purchases from South America must therefore be paid for outright. Since our capital does not largely enter the South American field, the manufacturers of the United States lack the potent support that national investment supplies. German banks in South America are intimately related to German manufacturing industries, steamship lines and insurance and cables companies. Therefore, every influence that may be derived from the investment of German capital is intensively exerted for the extension of German commerce and prestige.

Five British Banks

Here the report mentions five large British banks in South America, the London and River Plate Bank, Ltd., London and Brazilian Bank, Ltd., Anglo-South American Bank, Ltd., British Bank of South America, Ltd., and Banco del Peru y Londras, the total of whose capital is $68,131,000. The report then takes up the development of British banks in South America along with the trade, the German banks being contrasted as organized as a stimulus and an aid for progress in markets held by others.

Three German Banks

Three large German banks are mentioned, Banco Aleman Transatlantico (Deutsche Ueberseeische Bank), Banco Germanico de la America del Sud, and Brasilianische Bank fur Deutschland. The capital of these banks totals $14,399,000. The German branch banks in South America are the result of the industrial development begun about 1870 and were organized for the purpose of providing financial accommodations for the sale of Germany's tremendous manufacturing output.

Other European banks of South America include the Banque Francaise et Italienne pour L'Amerique du Sud with a capital of $4,825,000 and the Banco Suizo-Sud Americano, with a capital of $3,860,000. The successful establishment of these two institutions shows that oversea banking is an enterprise by no means depending upon an established trade.

Argentine Trade Growing

The report then takes up banking and credit in Argentina, giving the names of the principal foreign and national banks together with statements of their capital, etc. It then takes up the monetary system, the currency being described as stable on a gold exchange standard basis protected by the government office for the conversion of currency. Argentina's foreign trade has grown more rapidly in recent years, in proportion, than that of any other nation, the United States standing third as supplying imports to the value of $57,057,508, the United Kingdom being first with $114,515,803 and Germany second with $61,703,550 for the year 1912. In regard to the export trade the United States stands fifth with $31,257,458 for the year 1912, the United Kingdom standing first with $117,125,290, Germany second with $52,105,344, Belgium third with $35,954,187 and France fourth with $34,790,189.

The curtailment of foreign investment and withdrawal of loans that brought on commercial depression in Brazil created a monetary stringency in Argentina. Land speculation inflated values and credits were widely extended. Poor crops aggravated the situation. One good result of this crisis was the return to Argentina of many wealthy families who had gone to live in Europe.

Expense Is High

The expense of banking in Argentina is much higher than in the United States, average pay of a trained clerk not doing special work ranging from $1,000 to $2,000 gold per year. Bank premises, rental and equipment are also much higher than in the United States.

Successful banking in Argentina requires a close knowledge of local conditions and the swift changes that sometimes occur in the business world. Promissory notes are extensively used, although with but one name. The negotiable paper accepted in Buenos Aires consist of promissory notes or time drafts up to 180 days. Purchases by the United States are usually covered with cash or drafts against the purchase through foreign bankers. When the Argentine producer or merchant accepts a draft for payment of exports to the United States, he discounts it at an Argentine or foreign bank.

Discount rates charged on overdraft in current account is 9 per cent. The discount rate in Argentina varies from 6 to 12 per cent.

In marked contrast with the universal use of checks in the United States, where more than 90 per cent. of business is thus transacted, checks are but sparingly used in Argentina except by large houses. Banks will not accept typewritten checks.

The clearing house now operating was established January 2, 1913, as a result of an agreement between the Banco de la Nacion Argentina and the other principal banks of Buenos Aires. The admission of a new bank to the clearing house will be determined by vote of the member banks.

Bank Would Succeed

If citizens of the United States should start a bank in Buenos Aires and manage it well, according to a prominent Argentine financier, no question exists but that it would succeed. The present time by reason of the bad condition of business is an advantageous moment to investigate the feasibility of establishing an American bank.

The report then takes up banking conditions in Brazil, giving the names of the principal foreign and Brazilian banks and explaining the monetary system stating that although Brazil adopted the gold standard the year gold was discovered in California the currency remained for many years prior to 1897 an inconvertible paper. A conversion fund was established in 1906 by means of import duties collected in gold. At present the situation is usually expressed in terms of foreign exchange. The actual currency of the country is composed of convertible and inconvertible notes and silver coin.

Progress of Brazilian commerce shows that those nations enjoying the preponderance of its trade are the two great maritime and over-sea banking powers, Great Britain and Germany. Steamship connections have also been greatly to their advantage. The collapse of the rubber trade as a result of far Eastern competition was a heavy blow to business conditions in Brazil for in the Amazon country everything had been sacrificed to rubber, although the region is ideally situated for cattle raising and the dairy industry.

Import Business Profitable

The import business, largely in the hands of foreign trading houses, is large and profitable, but the transactions are complicated by the difficulty of getting shipments through the customs rapidly. Importers are indisposed to accept drafts until they have seen the goods and are satisfied that they comply with the orders and arrived in good condition.

Any foreign bank wishing to operate in Brazil must present a petition addressed to the Government making such request and join thereto its stockholders, its memorandum and articles of association, charter of incorporation—all these documents to be duly legalized by the Brazilian Consul in the country where the bank was originally established. The expense of a foreign bank in Brazil is very high, as wages, rents, taxes, etc., are all heavy.

American Banks Needed

The feasibility for establishing an American bank in Brazil is subject to much difference in opinion. Generally speaking the business profits of prosperous foreign banks in Brazil amount to about 1-8 of 1 per cent. on collections, 1-4 to 1-2 of 1 per cent. on exchange, 8 to 9 per cent. on loans and 3-4 of 1 per cent. on cash discount. American business men constantly feel the lack of prestige which an American bank in Brazil would give them.

The report then takes up the banking situation in Chile, which taxes all capital employed in foreign branch banks 3 mills on a dollar. Banking practice resembles that in other large South American countries, the cost of living, salaries, rents, etc., being lower than either Argentine or Brazil. Consular and diplomatic officers have frequently expressed the opinion that the commerce of the United States with Chile requires more direct banking facilities. An American bank would enjoy an unusual degree of popular confidence from the start.

Peru Is Friendly

The taxes of Peru are collected under a concession at present held at the National Revenue Collecting Co., which has 4 years to run. The director of Administration of the Ministry of Finance has stated that an arrangement would be welcome whereby an American company might take over this corporation. The opportunity for establishing American banks in Peru is excellent.

Several avenues are open for the establishment of American banks in South America: Branches of American national banks, banks organized solely for American business in South America, purchase of an interest in existing native banks and banks for investment and industrial development.

The report concludes with a strong plea for American banks in South America, pointing out that a competitive era with Great Britain and Germany is here. American disadvantages are given and a brief summary of commercial methods. The report points out that the Federal reserve act, if interpreted to cover American branch banks in South America, will not facilitate credits to American business men in those countries, as it will restrict the activities of the banks too much to allow them to compete with British and German establishments.

Protecting the Investment in Car Finish

Present Garage Methods of Washing Cars Ruinous to Luster and Life of Finish—The Correct Method of Cleaning Body, Chassis, Top and Upholstery

By M. C. Hillick

CAR finish represents an investment on the part of the owner of no small value. To better acquaint himself with the character and importance of this investment let the car owner ask the local distributing agent or the automobile manufacturer concerning the processes and materials employed in painting and finishing the car. When it is understood that anywhere from fifteen to twenty-five applications of expensive material are required to complete the finish on a first-class car with the involved labor being paid for at a high rate, the finish is more appreciated.

Abuses in Washing Cars

Washing the car has been described as a simple process. But the very simplicity of the work has led up to a list of abuses which, unless corrected, promise to wreck the finish. When received from the hands of the maker the automobile is clean and neat—a thing of beauty. Why not maintain it in this condition? The car should be regularly and systematically cleaned and renovated. The varnish on the new car is always benefited by an occasional washing with clear, pure water. The car, even when not in active use, should be so cleaned at stated intervals. In summer, preferably the water should be cool. On a new car occasional washing with cold water serves to harden the varnish, and increase its brilliancy. During the winter, if the washing is performed in a warm place, the use of cold water for an occasional washing may be continued, but cold water applied in a cold place at a frigid season of the year is injurious to the varnish. When the car is being daily used, or following each period of road service, the varnish should be washed, top, if any, cleaned, and the upholstering and interior furnishings of the car renovated. What are the details of this work? First, *never wash the car in the bright sunlight. The sun dries the water up too rapidly, and causes streaks in the finish.* Always use absolutely clean water for the washing. Change the water often enough to keep it clean.

Temper Power of Hose Stream

In many of the leading garages use of the hose is strictly prohibited. In most of the great garages in Paris where the finish on the car is prized to an extent unapproached in any other city of the world, the use of the washing hose is never allowed. In establishments where the hose is tolerated it is usually provided with a rose, which serves to break up the power of the stream. In this country the indiscriminate use of the hose often, unfortunately, entrusted to the hands of roustabouts with little knowledge concerning the washing of the car, and less appreciation of its importance is responsible for the early decay and lack of durability of the finish. It is practically certain that if statistics were obtainable covering the durability of the average automobile finish they would result in an indictment against this method of car washing which would prove absolutely irrefutable. For this reason, then, we shall here advise the use of the pail and sponge to the exclusion of the hose. For the proper washing of the car body two galvanized iron pails with the necessary accompanying soft fleece wool sponges should be furnished. One pail and set of sponges should be kept exclusively for the final rinsing off of the surface. The same equipment should be provided for the chassis, mud guards, fenders, etc.

Clean Top First

Before commencing the washing operations the top, if any, should receive attention. Leather, either machine or hand-buffed, and rubber tops should be sponged off with clean tepid water, and when somewhat coated with road dust, or mud, this water should contain enough castile soap to provide sufficient alkali to cleanse the surface from such accumulations. Follow this cleaning by drying the leather or rubber with a wash leather specially kept for this purpose. If the top is of Pantasote fabric it should receive practically the same washing methods as the leather or rubber. The ordinary cleaning for a genuine mohair top consists of good brushing with a whisk broom. In case the top is too dirty to respond to this treatment it may be washed with a moderate solution of castile soap and water. Genuine mohair tops made with a rubber interlining should, under no circumstances, be cleaned with gasoline, kerosene, benzine or any other by-products of petroleum. In fact, no dissolving medium containing properties destructive to the rubber interlining should be employed in the cleaning of mohair tops.

Vacuum Cleaning for Interior

Cleaning and renovation of the upholstery of the interior of the car is accomplished by means of the vacuum cleaner operated at a pressure suited to the delicacy of the fabrics. Indeed, the modern garage is not complete without this vacuum cleaning apparatus. The work by this system can be so quickly and so thoroughly done it is hardly practical to adhere to any other method. However, in the absence of such cleaning devices a thorough brushing out with broom and brush should be given.

All removable parts had best be taken out of the car for these cleaning operations. Windshield glass, and all other glass attachments should be cleaned with one-third denatured alcohol, and two-thirds water. Dip a soft cloth, or, better still, a small fleece wool sponge, in the water-alcohol mixture, and then into some fine whiting or pumice stone flour and apply to the surface. Let this application dry on the glass, then wipe clean with soft woolen cloths, and complete the work by bringing the glass to a high polish by rubbing with tissue paper. Begin washing the car body by dipping the sponge well into the water, in order to pick up as much water as it will hold, and then begin at the top of the panels and dash the water obliquely and gently from the sponge against the panels to loosen the dirty accumulations, and cause them to drop off.

When Washing Is Delayed

Another way is to squeeze the water out of the sponge at the top of the panels, and, thereby, with the pressure of water carry away the mud or dirt. These are methods for the car that is washed immediately upon its return from road service.

Provided the car has been put away for the night unwashed, and the mud and other road refuse allowed to dry on to the finish it will harm the varnish to apply water, and attempt to remove these dry, crusty accumulations at once. All such surfaces should have plenty of fresh, clean water run down in an easy volume over the finish. Continue this practice until the dirt-encrusted surface is thoroughly soaked up. Then let the work stand for 15 or 20 minutes for the water to so act on the body of dirt and mud that under a fresh flow of water it will freely run away without injury to the finish.

In all cases the mud and dirt should be floated off by a natural flow of water rather than wiped off. This latter practice usually results in the finish being scratched and disfigured by coarse grit and dirt. It must be understood that even a water-loaded wool sponge drawn or rubbed over a dirty or mud-bespattered panel develops a scouring effect. This effect diminishes the brilliancy of the varnish, and reduces its capacity for protecting the undercoats.

The Second Washing

After concluding this first or preliminary washing of the surface a new sponge and a new pail should be taken in hand, and the surface again washed with a fresh supply of clean water. A soft wash brush, oval in form, and chisel pointed should be used to tool around surface ornaments, moldings, panel corners, and other attached body fixtures. Such places cannot be effectively reached with the sponge.

Use the same care and precautions in washing the chassis, and under no circumstances employ for the chassis the tools used in washing the car body, and *vice versa.* In this way avoid transferring grease, and oily stains from one part of the car to another.

Drying the Body and Chassis

For drying off the water from the body of the car or chassis use a wash leather, or chamois skin, so-called, entirely free from lint, and absolutely clean. Ring the skin out after rinsing off in clean water, or, if dirty, after washing out in a solution of soft water and castile soap, and beginning at the part of the car first washed, proceed to pass the skin over the surface with just sufficient pressure to take up all the water with the exception of a mist, which in the air will very quickly evaporate.

To attempt to wipe the car perfectly dry in all parts will result in injury to the luster of the finish. An erosive effect on the surface can be produced under the pressure of the wash leather, and this effect in washing the car must at all times be avoided. To clean the car in the manner as above described will require the time of one man for 2 hours. Many garage attendants and chauffeurs are free to state that the work can be done in half this time or even less, but the particular reference in this article is to first-class work well and carefully performed.

Wash Car Every 24 Hours

There are circumstances, under which a car goes into service, and is returned to the garage several times a day, making it impossible for the people in charge to apply the thorough processes above described. No car which has been in service should be left unwashed for more than 24 hours.

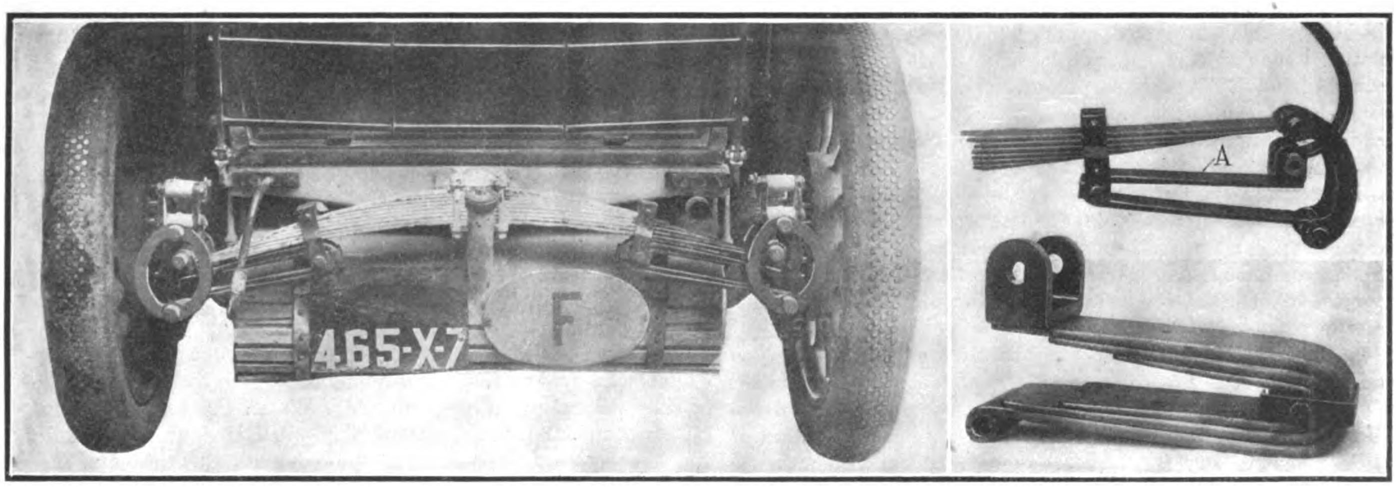
Mud Spots and Cracks Finish

Mud in its various forms in drying on a body of varnish takes up the oil from the varnish, and in so doing destroys the luster thereof. Road dirt or dust picked up on highways largely given over to horse travel is often strongly saturated with ammonia, and all such accumulations are especially destructive to the finish. Such road refuse if left to dry upon the finish, not only spots the varnish but fractures its film, and causes it to decay and crumble away.

Mud and dirt from roads traversing lime districts are likewise highly destructive to both the luster and the fabric of varnish, the latter disintegrating under the effects of the lime. Some varnishes, or in fact, a great many of them will spot under the effect of soapy or dirty water, the alkali and capillary mediums contained in these waters going at once at the luster of the varnish.

The car not systematically and regularly washed will have its finish often spotted from the effects of various gases and garage impurities. Many manufacturing and industrial cities are so poisoned with deleterious fumes that the finish on the irregularly and too infrequently washed car is spotted and deprived of its luster in a comparatively short time. Moreover, loss of luster in the finish, without any apparent spotting of the varnish, is a direct result of failing to wash the car regularly and at proper intervals.

A New Type of Supplementary Spring Construction



A NEW supplementary spring was brought out in Europe just before the war began under the title of the G.P. These devices have nearly all been of the coil spring type, generally with the springs contained in a cylindrical housing. The G.P. differs by having leaf springs of greater flexibility than the main springs, and intended to absorb all the lesser road shocks. The attachment is an elongated U spring, with one, two, or three leaves, according to the car weight. In the case of a three-quarter elliptic spring, it is carried under the main spring, one end being shackled to the extremity of the quarter spring, and the other end to the flat spring by means of a couple of curved shackle bars encircling the extremity of the quarter spring. The supplementary spring is maintained in its horizontal position under the main spring by means of a yoke on this latter. The two ends of the yoke are united by a bolt lodging in the bottom of the U springs. By this arrangement the main springs can lengthen under increased load without interfering with the supplementary fitting. The two shackle pins on the yoke, one of which rests on the top of the main spring, and the other within the U spring are fitted with vibration absorbing sleeves, so that the vibrations of the supplementary spring are not transmitted to the main spring. An advantage claimed for the G.P. suspension is that unlike coil springs it requires no attention.

The Rostrum

Claims Overheating Is Caused By Soot

EDITOR THE AUTOMOBILE:—The cause of overheating of gasoline motors is a very strange subject in that both sides of the controversy may be either right or wrong, depending upon the circumstances. Too rich a mixture and too lean a mixture have both been cited as causes and now I want to apparently contradict both sides by stating that the most heat is produced by a perfect mixture. However, neither side is actually contradicted as overheating may be caused by either too rich or too lean a mixture.

The principal reaction in the combustion of gasoline in the cylinders of a motor is the burning of carbon (C) to carbon dioxide (CO_2) and carbon monoxide (CO). One pound of carbon when perfectly burned, unites with the oxygen of 11.6 pounds of air to form CO_2 and in so doing produces 14,500 BTU, while one pound of carbon imperfectly burned to CO gives only 4,400 BTU. In the case of excess of air, the carbon still burns to CO_2 but a portion of the heat produced is used to raise the temperature of the extra air so that for a pound of carbon less than 14,500 BTU is available for work. This process continues up to a point where the heat consumed by the excess air is so great that combustion cannot be maintained.

As a perfect mixture so evidently produces the most heat, the question naturally arises as to why a motor does not overheat with a perfect mixture but does overheat with any other mixture.

In the case of a perfect mixture every pound of carbon gives 14,500 BTU available for work and the temperature falls rapidly as the BTU are given up in work and to the cylinder walls.

When there is an excess of carbon, too rich a mixture, a portion burns to CO so that instead of having from each pound 14,500 BTU a lesser amount is available. However, in order to produce the same amount of work the same number of BTU must be available which means that more than one pound of carbon must be burned. A portion of the heat is used to raise the temperature of the CO, so that in order to have 14,500 BTU available for work, a greater amount, proportional to the CO, must be produced in the cylinders. This excess heat is not only unavailable for work but the mixture is sooty so that the passage of heat through the cylinder walls is retarded: hence overheating.

The conditions are similar in the case of excess air, too lean a mixture, except that in this case the extra heat must be produced to raise the temperature of the excess air. Here the carbon is burned to CO_2 with the maximum production of BTU so that a very large excess of air can be heated: hence a greater liability to overheat with a lean than with a rich mixture. With the lean mixture the case is aggravated by the fact that burning will often continue entirely through the exhaust stroke. In fact the flash back in the carbureter is caused by the mixture burning when the intake valve opens.

However, in actual practice overheating occurs more frequently from too rich than from too lean a mixture for the reason that the lean mixture gives notice of its presence by popping in the carbureter.

New York City. C. J. MORRISON.

—We do not agree with your explanation of overheating. This trouble is entirely due to the greater amount of wall surface that is exposed to the heat due to the slower combustion of the charge.

With an improper mixture less power is developed and therefore under a given set of conditions a greater throttle opening is required, but the actual production of heat for a given power requirement should be about the same whether the mixture is too rich, too lean or just right. In other words when the motor is called upon to develop a certain horsepower it may require the formation of 100 BTUs per explosion stroke to give this power. If the mixture is correct then these 100 BTUs are produced without waste of fuel and with a minimum throttle opening, but if the mixture is too rich, for instance, while a larger throttle opening will be required and more fuel will be drawn into the cylinder, only about 100 BTUs are necessary to produce the power.

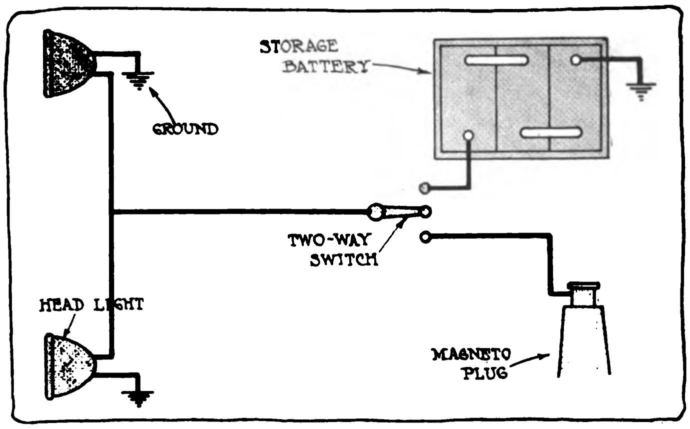


Fig. 1—Diagram showing wiring of storage battery and Ford magneto for electric lights

Recommends Extra Treads

Editor THE AUTOMOBILE:—I have tried the use of a worn out shoe over another as a tread, but without success as it is impossible to keep it on. I have been using, however, treads, made for this purpose, which are made of rubber with piano wire in the sides so that when the tire is inflated it can not budge. The cost for 3 1-2-inch tires is but $6. They are the finest things of the sort which I have ever used. I have one at present on a tire which is 3 years old, and has gone over 7,000 miles on three cars, has been discarded several times because of being worn down through the first layer of fabric. During this time it has been lying on the floor of the garage without attention. About a month ago I put on one of the treads and have run it 800 miles and it is still as good as ever.

Washington, D. C. DR. J. RUSSELL VERBRYCKE, JR.

Reader Wants Information on Extra Casings

Editor THE AUTOMOBILE:—I note in your issue of September 24 an answer to my query of September 10 relative to using old casings over new. Mr. W. M. Prichard, Coolidge, Tex., very kindly informs us that such is done successfully in his section and gives instruction for adjustments, etc. Does Mr. Prichard mean to say he uses casings of the same circumference; or larger size over smaller ones? I am using a Ford and have four casings with good treads but the side walls are not safe.

Following his directions, I find that it is impossible to fit a 30 by 3 casing, when tread is practically new on both, over another 30 by 3. Perhaps he means to use casings that have been used on pavements with badly worn treads. Will he kindly give us a little more light on the subject?

In your issue of October 1, Mr. L. C. Kyle, Gladsden, Ala., gives his experiences as a failure in using old casings over new. Did Mr. Kyle remove the bead on casings before fitting and were his under casings badly worn? Will he kindly inform us and if others have had experiences that are of worth, will they not let your readers know of them?

Back Bay, Va. W. B. DULING.

To Wire Ford Electric Lights

Editor THE AUTOMOBILE:—Will you kindly tell me what is wrong with the method of wiring for electric headlights on a Ford as shown by the attached sketch? I wired it in that way to be sure of having at least one light in case either bulb should burn out. I thought I saw such a method in THE AUTOMOBILE some time ago, but cannot find the copy.

The lights burn all right so long as the engine receives its current from the batteries, but as soon as I throw the switch to the magneto the engine stops. Where is the trouble?

Gladstone, N. J. J. M. HARPER.

—You have not shown where the battery is connected and therefore it is impossible to say where you have made a mistake in your connections.

A simple diagram that you might use is shown in Fig. 1. A two-point switch directs the current from the storage battery or the magneto as desired.

Specifications of Medium-Priced Cars

Editor THE AUTOMOBILE:—We would like to have the factory price, bore and stroke, piston displacement, wheelbase, horsepower size of tires and style, whether demountable or quick detachable, of the 1915 models of each of the following cars: Overland, Buick, Studebaker, Regal, and Maxwell.

Springfield, Mo. DIEFENDERFFER IMPLEMENT CO.

—Below is a table giving the information you desire:

Make	Model	Cyls.	Bore and Stroke	Piston Disp.	Wheelbase	S.A.E. h.p.	Tire Size	Type of Rim	Price of Car
Overland	80	4	4.12x4.5	240.5	114	27.2	34x4	Dem.	$1075
Overland	81	4	4 x4.5	227.5	106	25.6	33x4	Dem.	850
Buick	C-55	6	3.75x5	331.25	130	33.75	36x4.5	Dem.	1650
Buick	C-36	4	3⅝ x5	220.9	112	22.5	34x4	Dem.	1185
Buick	C-37	4	3.75x5	220.9	112	22.5	34x4	Dem.	1235
Buick	C-25	4	3¼ x3¼	165.68	106	22.5	32x3.5	Dem.	1050
Buick	C-24	4	3¼ x3¼	165.68	106	22.5	32x3.5	Dem.	900
Studebaker	C-4	4	3. 5x5	192.4	108	19.6	33x4	Dem.	985
Studebaker	C-6	6	3. 5x5	288.9	121	29.4	34x4	Dem.	1385
Regal	....	4	3.75x5	220.90	112	22.5	32x3.5	Dem.	1085
Maxwell	25-4	4	3.62x4.5	185.8	103	21.08	30x3.5	Clin.	695

Increase of Tire Pressure with Temperature

Editor THE AUTOMOBILE:—In the October 1 issue of THE AUTOMOBILE I noticed a formula for determining the increase of tire pressure with temperature. As I am not much of a mathematician I would like to know whether you could not express this in the form of a curve, in order to save the trouble of calculating the pressure increase?

Lyons Falls, Vt. E. W. W.

—A series of curves for determining the increase of tire pressure with temperature is shown in Fig. 2. For instance, if the original temperature is 60 degrees and the tire pressure 70 pounds, then the point representing these two pressures is located on the diagram. Supposing that the temperature increases to 95, the new pressure is found by following the diagonal running through the point just determined until the intersection of this diagonal with the 90-degree temperature line is reached. The pressure line running through this point indicates the new pressure.

The pressures are gauge pressures.

Where to Buy Strong Springs

Editor THE AUTOMOBILE:—Some time ago we saw a spring starter advertised in THE AUTOMOBILE, and would like to know if you can give us a list of the addresses of the manufacturers of these devices. We are not in the market for a starter, but wish to procure some strong springs of this character.

Portland, Me. E. T. B.

—Spring starters are manufactured by the following concerns, according to the *Automobile Trade Directory:*

American Ever Ready Co., 316 Hudson street, New York City.
Automatic Devices Co., Galesburg, Ill.
Elder Mfg. Co., 2305 N. Illinois street, Indianapolis, Ind.
Gardner Engine Starter Co., 1451 Michigan avenue, Chicago, Ill.
Modern Auto Starter Co., S. Michigan avenue, Chicago, Ill.
J. W. Tudor, 35 Congress street, Boston, Mass.
Universal Mfg. Co., Racine, Wis.

As the above concerns probably buy their springs from specialists in this line of work it might be better to write directly to some of the manufacturers of machinery springs. Below is a partial list from the *Automobile Trade Directory:*

American Steel & Wire Co., 72 West Adams street, Chicago, Ill.
Wallace Barnes Co., Bristol, Conn.
Fort Pitt Spring & Mfg. Co., McKees Rocks, Pa.
Wm. D. Gibson Co., Huron and Kingsbury streets, Chicago, Ill.
Harrow Springs Co., 745 East Vine street, Kalamazoo, Mich.
M. D. Hubbard Spring Co., Pontiac, Mich.
N. Y. Wire & Spring Co., 586 Washington street, New York, N. Y.
Sabin Machine Co., Montpelier, Vt.
Tuck Mfg. Co., 74 Ames street, Brockton, Mass.

Concrete for Garage Construction

Editor THE AUTOMOBILE:—I write to know if you will advance a little advice to help in the planning of a small garage for accommodating a runabout and touring car. Have a small piece of property—50-foot front—and there is room

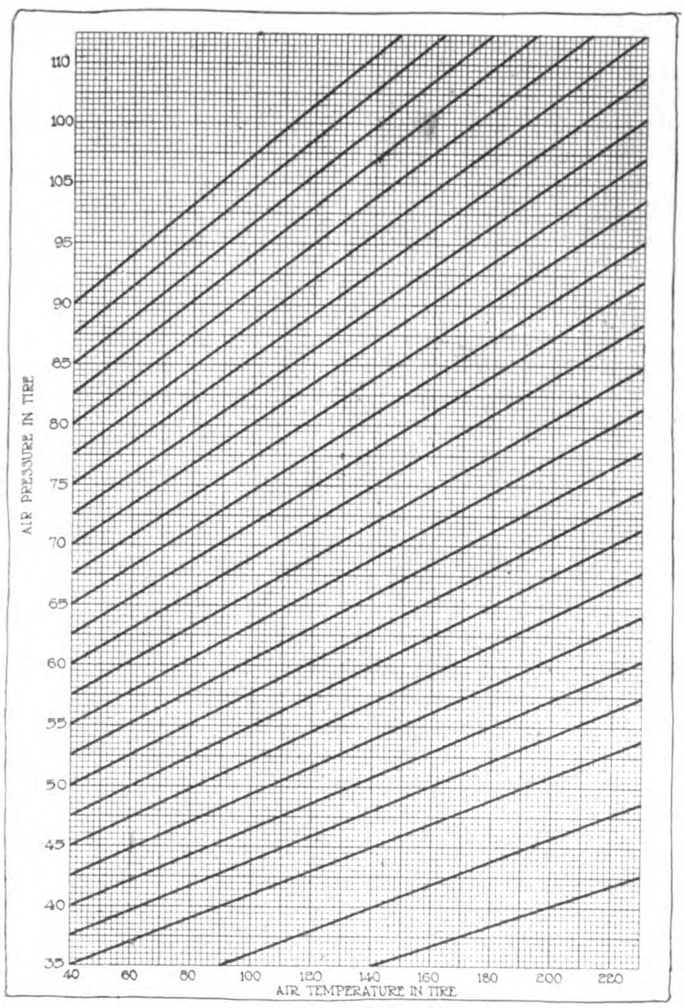


Fig. 2—Curves showing increase of tire pressure with temperature

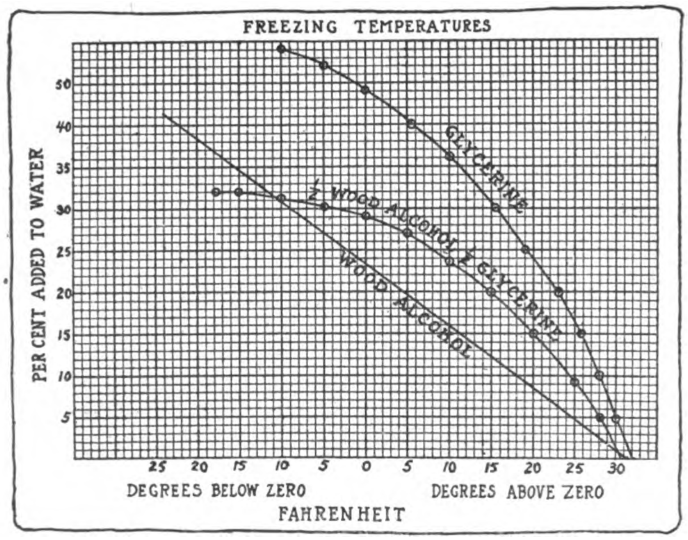


Fig. 3—Curve showing glycerine, wood alcohol and half and half added to water for different freezing temperatures

enough on the side to put down a drive to the street. The lot is 100 feet deep. I had a concrete proposition in mind. Pipes run (under ground) from a hot water heater in the house to the garage to keep it in fit condition for the winter. Thought of a second floor for a billiard table for my boys. I thought of concrete to get away from a frame or galvanized iron frame work, doing away with the paint.

Waterbury, Conn. T. M. BAKER.

—Make your garage about 15 by 20 feet with double doors at the front and windows at the sides and rear to give plenty of light. A garage this size will afford plenty of room for two cars and also will allow the placing of a work bench across the rear. Slope the floor so that water will drain off it. It will also be well to have a pit so that repairs to the under part of the car can be made without inconvenience. Piping hot water from the house is an excellent idea, care should be taken, however, to lay the pipes deep in the ground and if possible they should be insulated. The deeper the pipes are put the less they will be affected by the frost.

Concrete is an excellent material for garage construction and is probably the most durable, but you can obtain satisfaction from any of the common materials.

A billiard room on the second floor is an excellent idea; care should be taken to make a solid floor so that the weight of the table will not cause the floor to settle and throw the surface of the table away from the horizontal.

Formula for Flywheel Weight

Editor THE AUTOMOBILE:—Will you please publish the formula for determining the flywheel weight for a six-cylinder gasoline motor. The motor in question has a 3 3-8-inch bore, by 5-inch stroke with about 50 pounds compression cold.

New York City. M. C. F.

—The necessary flywheel weight can not be calculated without knowing more than the three facts you have given. The weight of the reciprocating parts, the speeds at which the motor normally operates, and several other factors must be taken into consideration.

The flywheel is for the purpose of storing energy. First because the power impulses are intermittent and second because the power demanded from the motor may momentarily become excessive and under these conditions the flywheel may be called upon to aid in propelling the car—as, for instance, when the clutch is engaged suddenly. If the flywheel were very small, the motor would be stalled even with the throttle wide open, but if the flywheel is large the energy in it will be used in starting the car.

When an explosion occurs, all the energy that is not needed for propelling the car throughout this stroke is used in slightly accelerating the flywheel. Supposing that under certain conditions the flywheel on a one-cylinder motor increases its speed from 500 to 550 revolutions per minute during this stroke. Then during the following exhaust, suction and compression strokes it will gradually slow down to the original speed of 500, the drop in speed representing the amount of energy given up.

The inertia forces produced by the movement of the pistons and connecting-rods also have their effect. During each stroke the piston and connecting-rod are at rest at the beginning of the stroke, they are then brought up to full speed near the center of the stroke, which may be 2,000 or more feet per minute, and then they are slowed down again. This is all done by means of the flywheel. The energy that is stored in it by the slowing down of these parts being given up to it by their acceleration during the beginning of the following stroke. Whenever the flywheel gives up energy it slows down and when it is given energy it speeds up slightly. These forces cause an alternate speeding up and slowing down of the flywheel during each stroke, the amount depending on the size of the flywheel with respect to the inertia of the reciprocating parts.

Thus it is seen that the design of a flywheel requires that account be taken of all these matters. It is necessary to assume the pressure diagram during the complete cycle and then, knowing the inertia of the moving parts, the effective turning effort on the crankshaft can be calculated. Knowing this, a suitable size of flywheel can be selected.

Remedy for Overheating

Editor THE AUTOMOBILE:—Those Ford owners that are troubled with overheating, may often overcome this difficulty by drilling 1-4-inch holes in the upper corners of the plates covering the valve mechanism.

I have also found that a slipping cone clutch with a leather face may be made to work until home is reached by throwing some granulated sugar on its face.

Asheville, N. C. C. B. WILSON.

Anti-Freezing Mixtures to Use

Editor THE AUTOMOBILE:—I am desirous of obtaining information in reference to freezing mixtures, for motor cars. Will you kindly advise me regarding any literature which you have published on this subject?

Toronto, Ont. J. C. ROYER.

—We have no published literature on the subject but the main features of the different freezing mixtures may be briefly told.

There are three anti-freezing solutions that have been used extensively and which have proved satisfactory. They are alcohol, glycerine and calcium chloride. There are many others that have a low enough freezing point but are objectionable because they evaporate quickly, do not carry the heat away fast enough, corrode the parts of the cooling system, leave a deposit in the radiator, do not flow freely or are too expensive.

A solution of alcohol in water most nearly fills the requirements of a perfect anti-freezing mixture. Either wood or denatured alcohol may be used and can be purchased at any drug store for about 60 cents a gallon. The advantages of alcohol are that it is very easily handled and has no corrosive action on the metal parts of the cooling system. Wood alcohol has a lower freezing point than the denatured product so a weaker solution is needed for any given condition, but this advantage is more than offset, in most cases, because with the former more is lost by evaporation, due to its lower boiling point. This necessitates adding wood alcohol more often than is the case when denatured is used, in order to keep the solution up to normal strength.

The percentage of alcohol, by volume, to give a certain freezing point can be obtained from the curve Fig. 3, or from the table below:

Freezing Point, Degrees Fahrenheit	DENATURED		WOOD	
	Alcohol, Per Cent.	Water, Per Cent.	Alcohol, Per Cent.	Water, Per Cent.
10	28	72	17	83
0	40	60	24	76
10	52	48	31	69
20	63	37	38	62

So little water is lost by evaporation that it is only necessary to add alcohol to the system, from time to time, to replace that which is used up.

Glycerine and water have also been used extensively for the reason that the boiling point of glycerine is about the same as that of water, so very little is lost by evaporation. The use of glycerine is found objectionable, however, because when enough is added to produce a low freezing point it rots the rubber hose connections and is so gelatinous that it does not circulate readily, especially is this true when it is used in a thermo-syphon system. The proportions of glycerine and water to use are indicated by the curve Fig. 3 or may be obtained from the table:

Freezing Point	Glycerine	Water
+28 degrees Fahrenheit	10 per cent.	90 per cent.
+15 degrees Fahrenheit	30 per cent.	70 per cent.
+ 5 degrees Fahrenheit	40 per cent.	60 per cent.
0 degrees Fahrenheit	48 per cent.	52 per cent.
— 5 degrees Fahrenheit	54 per cent.	46 per cent.
—10 degrees Fahrenheit	58 per cent.	42 per cent.

The difficulties in the way of using glycerine and water alone have led to the use of a mixture containing alcohol in addition. In this way a solution is obtained that has, in a large measure, the good points of both alcohol and glycerine. The presence of the glycerine raises the boiling point, thereby reducing evaporation, yet the glycerine is sufficiently diluted to allow a free flow and to reduce its action on the hose connections to a negligible amount. The alcohol and glycerine are generally added in equal parts to the water, the amount depending upon the freezing point desired. Fig. 3 shows the percentage of mixture to add or this may be obtained from the accompanying table:

Freezing Point	Mixture	Water
+20 degrees Fahrenheit	15 per cent.	85 per cent.
+15 degrees Fahrenheit	20 per cent.	80 per cent.
+10 degrees Fahrenheit	24 per cent.	76 per cent.
+ 5 degrees Fahrenheit	27 per cent.	73 per cent.
0 degrees Fahrenheit	29 per cent.	71 per cent.
— 5 degrees Fahrenheit	30 per cent.	70 per cent.
—15 degrees Fahrenheit	32 per cent.	68 per cent.

Calcium chloride in water is another solution that has been used with success. When purchasing calcium chloride it is very important to ask for the chemically pure salt as the commercial variety contains free acid which reacts on the metal parts of the cooling system. If it is impossible to obtain the former, the latter may be made fit for use by neutralizing the acid. To do this, add ammonia or soda ash gradually to the calcium chloride solution until blue litmus paper no longer turns pink when moistened with the solution. The amount of calcium chloride to use may be found from the curve, Fig. 4, or from the table:

Pounds of Calcium Chloride per Gallon	Freezing Point, Degrees Fahrenheit
2	18.0 above zero
3	1.5 above zero
4	17.0 below zero
5	39.0 below zero

Many other anti-freezing liquids have been experimented with but have been found to be inferior to those described. Various oils, including lubricating oil and kerosene, have been tried but these cause decay of the rubber hose connections, lack sufficient heat capacity, and in many cases evaporate too rapidly. There are any number of salts beside calcium chloride that will give a low enough freezing point but are not suited for use because of their high cost or action on the metallic parts of the cooling system. It is for the latter reason that common table salt and sal-ammoniac are not employed.

Herewith is a list of makers of anti-freezing solutions:

Blue Ribbon Mfg. Co., 27 Baldwin St., Boston, Mass.
Cincinnati Oil Works Co., Cincinnati, O.
Esy Mfg. Co., 1466 Michigan Avenue, Chicago, Ill.
Globe Soap Co., Cincinnati, O.
Hall-Thompson Co., Hartford, Conn.
Horsey Mfg. Co., 6104 Euclid Avenue, Cleveland, O.
Lubro Oil Co., 116 Prospect Ave., N. W., Cleveland, O.
Northwestern Chemical Co., Marietta, O.
Rub-On Mfg. Co., 89 Brayton St., Buffalo, N. Y.
Wadsworth-Howland Co., 225 Carpenter St., Chicago, Ill.

Aluminum a Good Piston Material

Editor THE AUTOMOBILE:—I would like your opinion of a piston head made of an alloy such as Parsons manganese bronze or a special bronze such as used for bearings, or even aluminum.

I would like to know why one of the above metals is not used in making piston heads instead of cast iron. I understand that cast iron is a good deal cheaper, but it seems that a piston made of one or the other of the above mentioned alloys would be much better on account of the fact that they would not be so apt to score even though they were made to fit fairly tight.

In making a piston head of cast iron I understand that they make an allowance for expansion of from .010 to .015 at the top and as much as .005 to .008 at the bottom. This makes a rather large space between that and the cylinder wall which tends to make the compression poor until the parts have heated.

Now would it not be better for a piston to be made of such metal as I mentioned above and not allow near so much clearance, as we know that the two metals will run together without scoring. There may be something that I cannot conceive of which would make the idea impractical and therefore I would like to have your opinion.

Marlboro, Mass. H. E. MOINEAU.

—Aluminum has been used as a piston material, and with success too. Parsons manganese bronze has a different coéfficient of expansion from that of iron, and is probably not used for this reason. If by special bronze used for bearings you mean ordinary white brass, this is objectionable because it is too soft, very heavy and possesses a comparatively low melting point, due to the fact that it is composed of about 30 per cent. zinc and 65 per cent. tin.

The clearance you have named is large for motors with ordinary bores. Half or one-third these amounts would more nearly approximate standard practice. This clearance is measured when the motor is cold. When it becomes warm, the expansion of the piston decreases the actual working clearance. Of course, the cylinder expands also, but not as much for the reason that it does not become so warm.

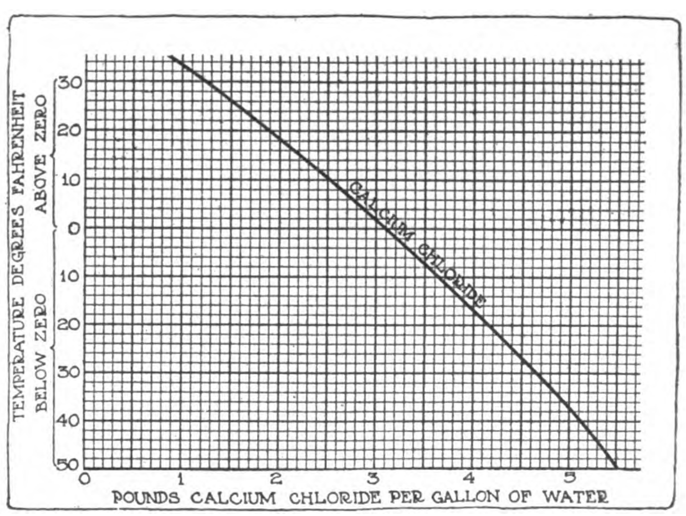


Fig. 4—Curve showing calcium chloride for various freezing points

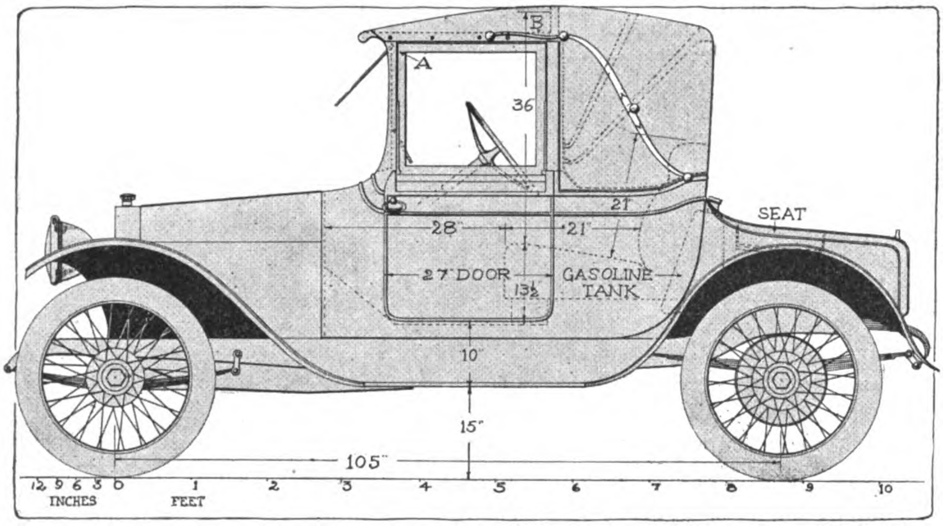


Fig. 1—Side elevation of convertible runabout body, giving principal dimensions

A Convertible Body Design for Runabouts

Closed Form for Winter Use May Be Readily Transformed to Open Car—Conservative Style

By George J. Mercer

THE problem of the hour is to get a suitable winter body for the runabout. It is more difficult to find either a suitable stock body or a design that will be right for a small than for a large car. The latter are generally listed by the manufacturers with both open and closed bodies and in addition body builders carry in stock new and used bodies that can be easily fitted to the large chassis.

The runabout is a car that the owner drives himself, and although the open body can be almost anything that is light and will accommodate two, the closed body is more pretentious and must conform to the owner's individual requirements, and, since the advent of the flush side and blended hood and cowl, it is more than ever necessary for the body to be designed individually for the car in order to have a harmonious effect.

The light-weight, two-passenger car is popular on account of its economy in upkeep and lower tire expense, but to make it an all-year car provision must be made for winter use, and in order to have the closed form as comprehensive as possible, a convertible body, Figs. 1 and 3, is most suitable for the owner who is willing to spend the money.

Not a Cheap Design

This body design is not cheap to buy; the price will vary several hundred dollars according to the shopping abilities and inclination of the purchaser, but the average price will seem large because the body price will equal, if not exceed, the first cost of the average light car.

This design must be well made, be nicely upholstered and painted and proportioned to the chassis on which it is mounted. The illustration shown is of a 105-inch wheelbase chassis having wire wheels and 32 by 3 1-2 tires. The drive is left with center control, and the mudguards and the angle of the steering column are left undisturbed. The car is low. The dimensions, Fig. 1, show 15 inches from the ground to the running board and 10 inches to the door. The interior dimensions in width and length are generous so as to allow for the maximum thickness of upholstery on the sides and back. The seat is low to suit the runabout steering wheel, so the total height is low, because the headroom is registered from the top of the cushion. This cushion is extra wide, Fig. 4, and the control can be operated freely between the driver and the passenger, the doors are wide, not only allowing plenty of entrance room, but also creating ample window space for safe driving, and the closed leather quarters at the rear of the doors, add an air of comfort to the interior when the weather is inclement, and when the days are fine the top can be lowered, Fig. 3, and the advantages of an open body obtained.

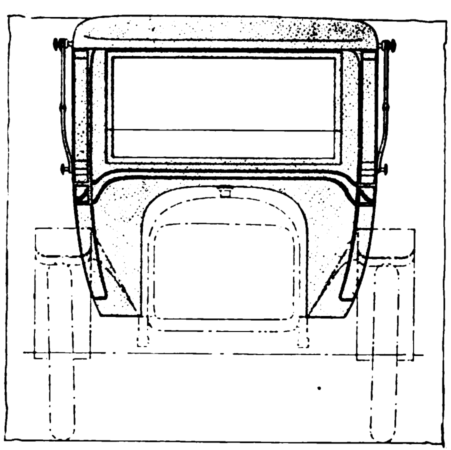


Fig. 2—Front view of convertible runabout body

Top Not in Way

Fig. 3 shows that the top will fold low and not too far back to allow of the use of the disappearing seat at the rear. This seat is wide enough for two small persons and there is luggage space in the rear compartment. A 17-gallon gasoline tank is at the forward end.

On this view it will be noticed that the front posts do not fold down. They are left stationary and form a rigid support for the windshield, which is divided, the upper part swinging outward to form the visor when it rains and the lower swinging inward to permit the cool air to enter.

The construction of the body is wood framing and aluminum panels and moulding, the upper pillars are of wood and the moving parts are made light to make the operation of raising and lowering easy.

The cowl, Figs. 1 and 4, is blended with the hood and on the side elevation the line is continued up the front pillar and terminates with a scroll on the toprail. This scroll is one of the features of the design and finishes the necessary overhang of the top beyond the front light.

The principal over-all dimensions are indicated in the several views. The extreme length from the dash to the rear 92 1-2 inches and from the dash to the back of the top 61 1-2 inches. The height, Fig. 4, is 52 1-2 inches from the top of the chassis to the top of body. The width overall is 52 inches.

Leather Best Material

The style of body here shown is generally called a coupe-landaulet. This convertible body type is becoming more popular, because it has the double advantage of the open and the closed body. The method of raising and lowering of the top has improved within the last few years and when the top covering is of flexible goods the task is quite simple. Leather makes the best looking top and for fine work it is the only thing used, despite the fact that it makes the folding of the top more harsh than the lighter weight waterproof material.

How It Folds

The operation of folding this top is to release the front pillar fastener A, Fig. 3, and release the button fasteners on the sides of the toprail. The toprail is then raised at the front until the dowel pin in the back end of the toprail at B, Fig. 1, slips out of the plate hole in the pillar, the toprail then drops parallel to the pillar and is guided and controlled by the guide.

The side joints are then released and the top folds as in Fig. 3. Sometimes the guide is concealed and placed inside the top, but this necessitates the front end of the body being nearly as wide as the middle. In the design illustrated in Fig. 2 the front is gradually narrowed until it blends with the cowl and this can only be accomplished by having the guides outside as illustrated. This form of top has the regulation flappers on the doors for holding the glass frames and in folding the top the glass is lowered as in the ordinary landau.

For Two Wheelbases

This body design is right for a chassis having either a larger or shorter wheelbase. If shorter the rear compartment will have to be shortened and the rear guards will have to be fitted to the body sweep. With a longer wheelbase, the alteration will be simply to make the rear compartment cover the chassis frame. In any case the steering column should have the angle suitable for a runabout, say not more than 37 degrees.

This will make the body low by placing the seat low. The engine hood should suit the body design. This is not an expensive alteration, and the benefit to the design is out of proportion to the outlay. Five dollars should be enough to cover this cost if only a new top is added to the hood, as the lower sides can in most cases be used again on the redesigned hood.

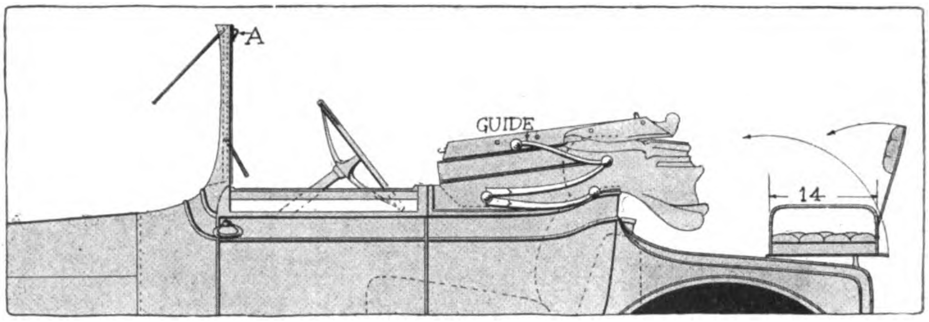


Fig. 3—Convertible runabout body with top folded down and rear seat open

The gasoline tank will have to be special on account of its shape, and it is better to have the filler plug show through, as is easy to test the quantity of gasoline in the tank.

Weighs 800 Pounds

The weight of this body will approximate 800 pounds and it is feasible to have a child's seat that will fold under the cowl and be located on the right side. This is not shown because the rear seat will take care of any additional passenger except small children.

Ordinarily the trimming for the interior of a closed body is cloth throughout, but for this design a departure is suggested that has had satisfactory results. The inside of the top and the sides and back down to the seat sides and back are trimmed with a lightweight brown and gray mixed cord cloth with lace to match. The seat cushion, the seat sides and back and the doors are trimmed with black imitation morocco leather. The carpet matches the cloth and the metal appointments are silver or nickel. The woodwork is either walnut or mahogany.

The toilet appointments are very simple, being only small cases on the doors and door pockets. The instrument board will contain the clock and speedometer. The inside lighting is produced by a small reading lamp on the front of the rear bow.

The roof covering should be landau top leather of the finest quality to insure good wearing. This top leather is fastened by the ordinary bead moulding on the hinge pillar and along the lower edge, but from the hinge pillar forward it is fastened only by glove fasteners to the toprail except across the front rail, where it is securely nailed. Along the sides the glove fasteners simply hold the leather from being blown up by the wind. These fasteners are released when the top is folded because the toprail must turn end for end when in the position shown, Fig. 3. The same thing applies to the head lining, which is free from the toprail except at the front end. The loose part is reinforced to hold its shape as no fasteners are used inside.

Anyone Can Build It

Figs. 1, 2, 3, 4 and 5 show the open and closed side view of the body. In Fig. 3 the seating and the outline of the body are shown and Figs. 4 and 5 show the back and front elevations. The principal dimensions are indicated and the scale rule on the several views enables the reader to get the size and dimensions of all the parts. These different views are accurate and there is enough information to enable anyone to reproduce the job.

The color of the painting is preferably a green or blue. The top leather must be black and the paint must harmonize with this, although there are some light colors such as yellow that will look well with the black top leather. This is a matter of choice and the design will give the same degree of comfort and satisfaction regardless of the paint.

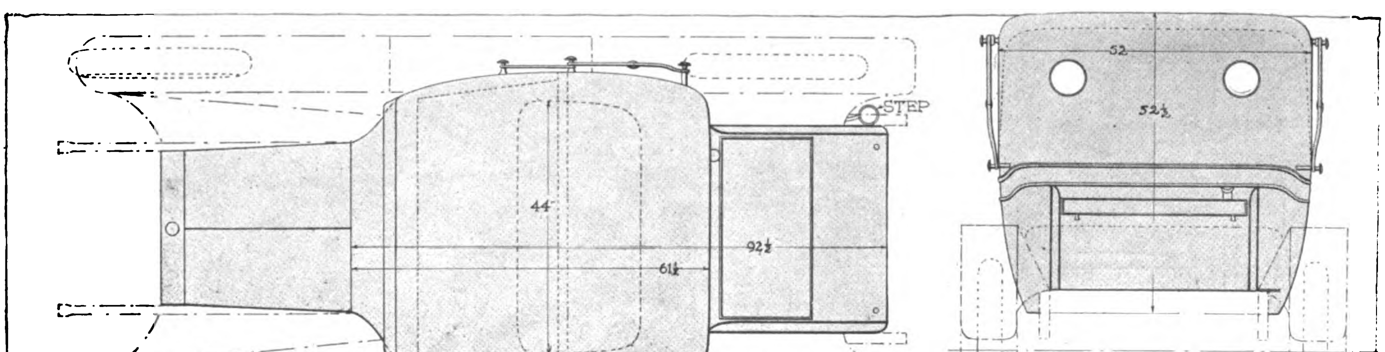


Fig. 4—Left—Plan view of convertible runabout, showing over-all dimensions. Right—View of body from the rear

The Engineering Digest

Facts and Theory of Metal Spraying by the Schoop Method, with Some Data of the Cost

ACCOUNTS of the Schoop method for spraying a permanent or removable metallic surface—or in fact a surface of any fusible material—upon objects of the most varied nature and form have been given several times in these columns (for example in THE AUTOMOBILE of Feb. 12, 1914, pages 408-409) and have been especially explicit with regard to the mechanical construction of the apparatus; yet new facts relating to the method and its results are coming to notice through the gradual development of the process and the experience gained by those who have taken it up. From the state of a promising invention it is now entering among the work methods which are analyzed and whose results are classified and tabulated for different sets of conditions. A report on it rendered to the Institute of Metals in London by R. K. Morcom is recapitulated in the following:

History of Metal Spraying

Practical experience is demonstrating how apparatus of increasing technical convenience for spraying uniform metal deposits on other objects may be made. The earliest attempts were carried out by melting the metal in a pot, forcing it through a fine nozzle under high pressure, and then with steam or a gas spraying it onto a surface. Such apparatus was in many ways troublesome, and the use of it was practically confined to metals and alloys of low melting point. The spraying medium was kept hot by various devices, and an attempt was made to keep the metal molten right up to the moment of application.

The fact, however, was observed that under conditions of temperature and expansion of the gases precluding that the metal could have been molten throughout the process adherent coatings were sometimes formed. These experiments and careful observations of the spreading and adhesion of bullets fired at an iron plate suggested the next stage of development.

Metallic powders were driven at high velocity against the body to be coated by means of gaseous jets expanded from considerable pressure, and the results achieved were a great improvement.

To produce the metallic powders the metal had of course to be subjected to one of the known pulverizing methods, such as distillation, grinding or spraying. The suggestion that the pulverization and the deposition could be combined in one apparatus was then made by Schoop, and his researches resulted in the perfecting of the apparatus covered by his colleague Morf in British Patent No. 2801 of 1912 and illustrated in Figs. 1 and 2 herewith.

The Present Process

The essential parts of the machine, or "pistol," as it is called, are a combined melting and spraying jet and a feed mechanism. The metal in the form of rod or wire is fed to the melting flame. The flame can be formed by coal gas, water gas, acetylene, hydrogen, etc., burning in air or oxygen according to the metal used. The gases are supplied at such pressures as to prevent blowing out and to secure a highly deoxidizing flame. The spraying jet can be of carbon dioxide, nitrogen, air, steam, etc.; it is fed at such a pressure as to produce a sufficiently high velocity for successful coating. The various pressures must carefully be kept constant by accurate gauges and reducing valves.

The feeding of the wire is accomplished by a small pneumatic motor driven by the spraying medium either in series or parallel with the main jet.

The dimensions of the wire, nozzle and feed mechanism vary with the different metals, and the nozzles and feed mechanism are so designed as to be readily interchangeable.

For small work hand operation is sufficient; but probably,

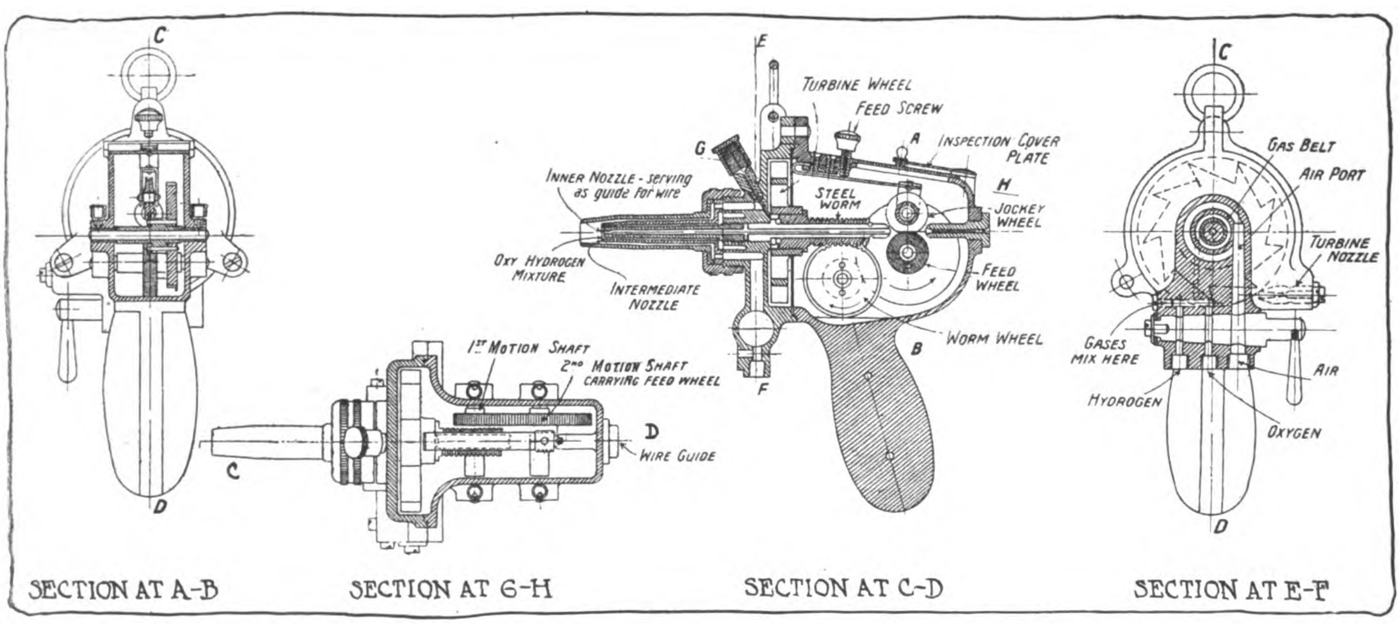


Fig. 1—Mechanism of the Schoop-Morf metal spraying pistol in four sectional views

when large work is undertaken, it will prove convenient to have mechanical traverse and control.

To obtain the best adhesion, the surface onto which the metal is sprayed must be thoroughly clean and of an open nature to give a key for the deposit. Sand blasting with sharp sand has been found best. Such surfaces as fabrics, wood, unglazed earthenware and asbestos require only freedom from grease, as their surfaces give a natural key. Despite the intense flame used, celluloid and even explosives can be safely metal-sprayed, and a brief account of the theory so far developed to explain the operation will make this fact seem less surprising.

Theory of Deposit and Cooling

The melting jet, Fig. 2, is focused at A on the tip of the wire. The spraying jet, cold from expansion, strongly draws forward the products of combustion in the center of its cone and by its draft drags off minute particles of metal, either in the plastic or the molten state. The central cone therefore consists of metal particles, some cooled to solidity, some molten and some perhaps gaseous, all surrounded by a protective reducing atmosphere. This cone is hurled forward with great velocity onto the object to be coated, BC, by the outer jet.

With a given design of jet there is only a certain volume left by the air jet which can be filled with flame, and this flame has a limiting temperature which cannot be exceeded. The wire passing through this cone of flame receives heat, partly by radiation but chiefly by conduction, and becomes melted; but there is a definite limit to the amount of heat which can be picked up by the wire passing through the flame and a definite limit to the rate at which it can be melted. This cannot be increased by forcing more gas into the flame, as the extra gas is merely blown away by the air jet. It is possible to increase the rate of melting by shaping the nozzles so as to leave room for a larger cone of flame, and experiments are in progress on this point.

There is therefore a definite most economical quantity of gas which should be used in the pistol, this quantity being about 1.5 cubic foot of hydrogen per minute and 0.5 cubic foot of oxygen, or about 0.8 cubic foot of coal gas to 0.65 cubic foot of oxygen, for the present standard designs.

For refractory metals these quantities may be increased slightly, as a slightly higher temperature can be obtained if the burning gases are under a pressure greater than atmospheric, and this occurs when the gas quantities are increased, the inner surface of the air jet acting to some extent as an inclosing wall to the flame. On the other hand, for the more easily fusible and oxidizable metals, such as tin, lead and zinc, it is advisable to keep the gas quantities rather below the figures given, so as to avoid any possibility of overheating and burning any portion of the wire.

WEIGHT AND COST OF 1 SQUARE FOOT OF VARIOUS METALS 0.001 INCH THICK

Metal	Density		Weight		Cost of Metal	
	C.G.S.	British, Lb. per Cubic Foot	Lb.	Grammes	Price, Cents per Lb.	Cost, Cents
Aluminum	2.65	177	0.0148	6.62	25	0.372
Brass	8.5	537	0.045	20.2	16	0.72
Bronze	8.8	565	0.047	21.1	19	0.90
Copper	8.9	560	0.0468	21.0	20	0.94
Cupro nickel	8.9	560	0.0468	21.0	.....	.....
Iron	7.8	492	0.041	18.4	7	0.288
Gold	19.3	1210	0.101	45.5	.....	.....
Nickel	8.9	560	0.0468	21.0	72	3.36
Silver	10.5	660	0.055	29.7	.....	.....
Tin	7.3	460	0.0384	17.3	60	2.30
Zinc	7.1	450	0.0376	16.9	22	0.830
Lead	11.4	720	0.0600	26.9	6.5	0.390

FEED RATE AND GAS CONSUMPTION FOR VARIOUS METALS

Metal	Diam. of Wire Used, Millimeters	Rate of Feed, Grammes per Minute	Gas Used per Minute, Cubic Feet			
			Hydrogen	Oxygen	Coal Gas	Oxygen
Aluminum	1.0	9.5	1.5	0.5	0.7	0.6
Brass	0.8	17	1.5	0.5	0.8	0.65
Bronze	0.8	17	1.5	0.5	0.8	0.65
Copper	0.8	14	1.8	0.6	.....	.....
Cupro nickel	0.8	12	1.8	0.6	.....	.....
Gold	0.8	45	1.5	0.5	.....	.....
Iron	0.8	8	2.0	0.7	.....	.....
Lead	3.0	300	1.0	0.35	0.45	0.4
Nickel	0.8	9	2.0	0.7	.....	.....
Silver	0.8	18	1.5	0.5	.....	.....
Tin	2.0	200	0.8	0.3	0.35	0.30
Zinc	1.0	45	1.2	0.45	0.55	0.5

Blanks indicate that experiments are not yet complete.

The outer jet performs a threefold purpose. It keeps the nozzles and wire cool, it cools the object and it produces the requisite velocity.

The velocity of the air leaving the jet will be independent of the volume discharged and depends only upon the pressure at the jet, so long as there is no disturbance due to entraining of air from the surrounding atmosphere.

In addition to this the air jet has to atomize the molten metal and accelerate the particles up to its own velocity, so that to perform this a certain mass of air is required.

As at present constructed the standard pistol uses about 0.55 to 0.6 cubic foot per minute for every 1 pound per square inch of air pressure, so that with an air supply at 80 pounds per square inch, which is a very suitable figure for ordinary spraying, the air consumption will be from 45 to 50 cubic feet per minute. The mass of this will be from 830 to 920 grammes, and the mass of metal sprayed by this air will be from about 8 grammes in the case of iron to about 200 grammes in the case of lead.

How effective the cooling is may be considered most readily shown by the fact that the hand can be held in the jet, so as to receive a coating of metal, without discomfort.

Adhesion Not Quite Explained

The action of deposition is probably a complex one. The minute particles of solid metal are driven with such force against the object that in some cases they fuse, but, owing to their small relative size, they are promptly chilled by the object to which they adhere. If any of the particles are molten or gaseous they will adhere. In addition, the suddenly chilled particles are possibly, or even probably, in the state of unstable equilibrium found in "Prince Rupert's Drops" and act like so many minute bombs bursting on impact into almost molecular dimensions and penetrating the smallest cracks and fissures of the object.

The process requires some care in manipulation, as by varying the conditions it is found possible to spray porous or non-porous coatings and, with some metals, anything from a pure metal to a pure oxide. With care, however, non-porous, oxide-free and adherent coatings can be produced of almost any metal on almost any solid.

In addition to the metals, it is possible to spray fusible

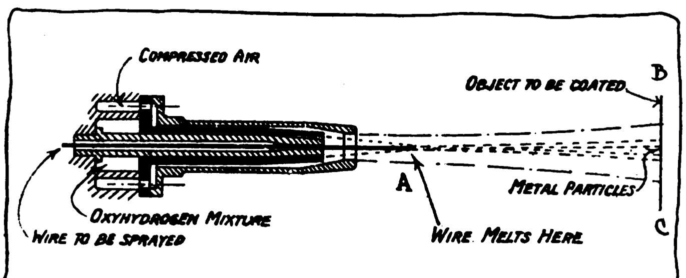


Fig. 2—Illustrating theory of cool and adherent deposits

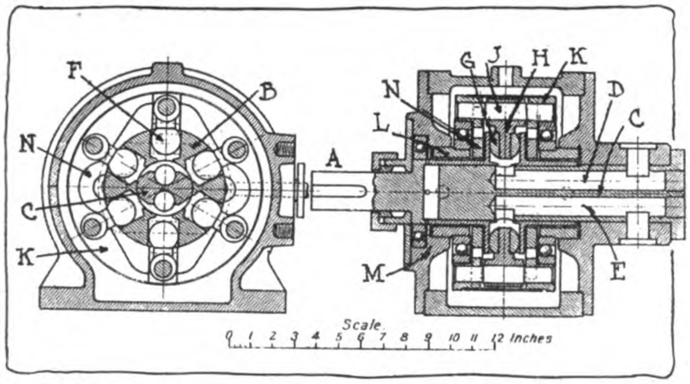


Fig. 3—Carey pump with variable stroke

non-metals or, by stranded wires, alloys of metals or mixtures of metals with non-metals.

Uses and Cost

The process is so new industrially that its uses are still partly to be developed. But it is easy to see that it may have far-reaching value for protective coatings against weather or fire, for ornament, for electrical resistance and conductors, for the production of special alloys [whether true alloys are formed does not seem to be decided as yet, however.—Ed.], for joint-making and for many other purposes.

Quite in a different category comes that of very fine casting. The surface of a pattern, polished or slightly greasy, is most minutely copied, and it is possible to produce electrotypes very rapidly. It may be useful to line molds before pouring in a metal. The application of the process to the production of very fine or coarse metallic powders is being investigated.

The costs of the process are not prohibitive and, even where higher than alternative processes, the great range and adaptability of the apparatus and its independence of muffles, pots, etc., may make it preferable. Some idea of the cost may be gained from the appended tables giving data on the three principal items; metal, gas and time.—From September bulletin of the Institute of Metals.

Main Features of an Oil Transmission with Variable Pump Stroke and Low Bearing Pressures

CAREY'S oil transmission system, which is brought out by Variable Pumps and Motors, Ltd., of England, resembles the Hele-Shaw hydraulic transmission by a radial arrangement of pumps which are worked with variable stroke by attaching the outer ends of the pistons to a ring susceptible of being adjusted to an eccentric relation to the axis of rotation, and in utilizing two channels in an axial shaft for intake and discharge of the fluid. The Carey variable transmission, as made for automobile purposes and for varying the speed and torque of propeller shafts in vessels, is based on the construction of the Carey variable capacity pump, the principal features of which are shown in Fig. 1. With the dimensions represented in this illustration this pump can absorb 20 horsepowers at 1,000 revolutions per minute, registering 1,500 pounds pressure per square inch.

The power shaft A drives the rotor body B in which the cylinder bores are drilled radially with ports to the central space of the rotor. Into the latter there is inserted from the opposite end the fixed shaft C with the two channels D and E, these channels communicating at their inner ends with the rotor ports by means of elongated ports in the tubular wall of the shaft, so that each channel at any time is connected with three of the rotor ports, as most clearly shown in the left portion of the illustration. Each piston, F, is composed of a steel ball G, fitting in the cylinders, to which is rigidly atached a phosphor bronze connector H, and the outer end of the latter is journaled upon a pin J extending laterally into bearings in two rings K which encircle the rotor and revolve on ball bearings carried by adjustable slides L working in grooves in the pump casing M. The slides are adjusted by rods passing through stuffing boxes in the casing. In Fig. 3 the slides are represented as working horizontally and the rods are not shown, but Fig. 4 shows them plainly.

When the rings are held concentrically with the rotor there is no reciprocating motion of the pistons but by pushing them to one side or the other the pumping action takes place, the direction of motion of the fluid depending upon the side where the axis of the rings is located, while the quantity of oil passed depends upon the distance from rotor axis to ring axis.

The rotary motion of the rings, concurrently with that of the rotor, is secured by means of projections upon the rotor and similar projections upon the rings, both entering slots cut at right angles to each other in plates N, the studs adjusting themselves to the eccentricity by sliding in the slots on the principle of an Oldham joint. The two rings carry between them on their outer circumference a thin steel drum which completely encloses the pistons and cylinders and separates the oil in the mechanism in an inner portion, which does the work, and an outer portion which obviates leakage and may be connected with a reserve. The revolving parts present a cylindrical smooth body rotating without paddle wheel action and with a minimum of friction in the outer oil with which the case is filled.

It is the mechanism just described which forms the driving portion of the Carey variable hydraulic transmission shown in Fig. 4, representing dimensions suitable for transmitting 30 horsepowers at 800 revolutions per minute. The variable stroke pump—with the handwheel for actuating the stroke adjustment—is arranged at one end of the casing, and a similar machine, in which the stroke is fixed, however, acts as a driven motor at the other end. Between them there is placed a phosphor bronze valve piece which serves as the valve face for both the pump and the motor, having parts cast through from one side to the other. It also contains two ball valves which allow any shortage of oil in either part to be replenished automatically by suction. In addition it contains a relief valve which is connected to whichever part hap-

(*Continued on page* 739)

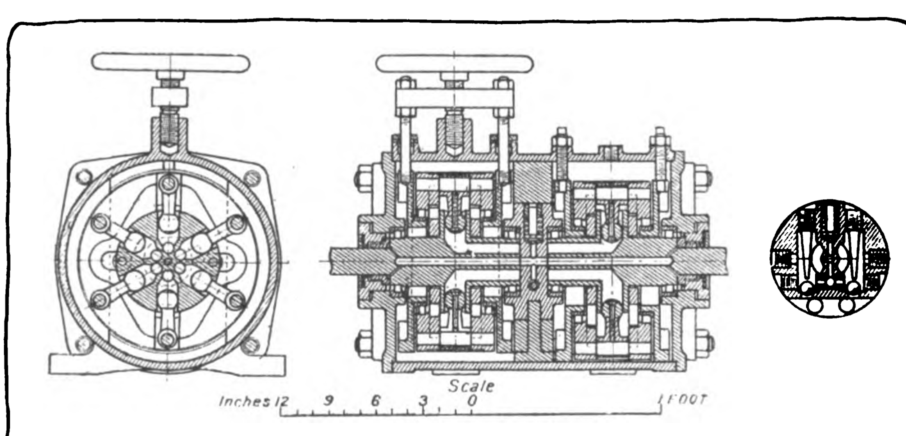
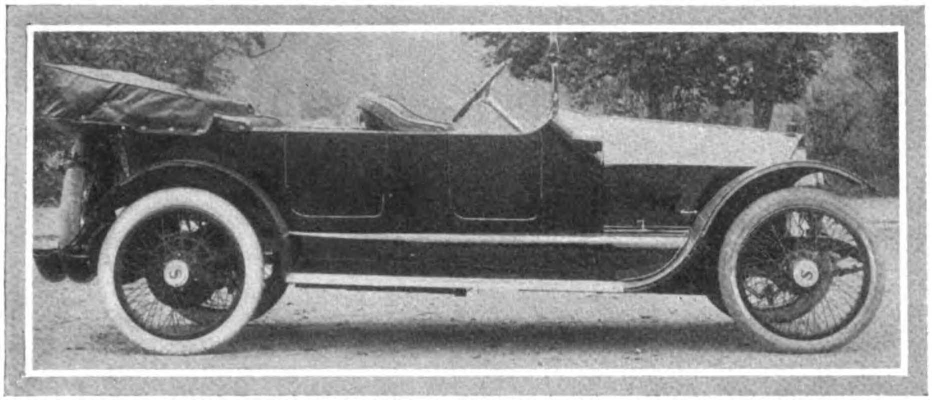


Fig. 4—Combination of oil pumps constituting the Carey hydraulic transmission

Unusual Manifolds on Singer Six



New Singer six with five-passenger body. The pointed radiator, clean running boards and smooth lines are features

Price $2,350—High-Powered-Motor—Cross-Head Pistons—Four-Speed Gearset—Spiral Bevel Axle

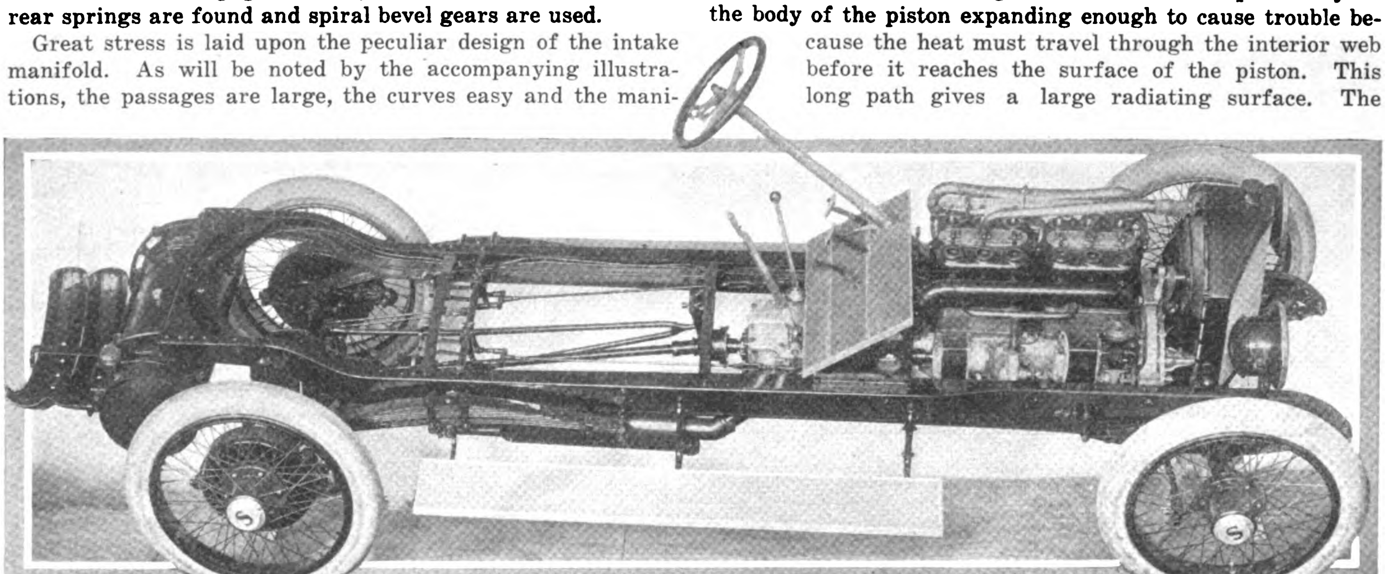
MANY features of unusual interest are incorporated in the six, for $2,350 just announced by the Singer Motor Co., Long Island City, N. Y. It is equipped with a 4 by 5.5-inch motor, dry-plate clutch and four-speed gearset with direct on fourth. These three parts are combined in a unit and suspended on three points. The motor is rated at 50 horsepower, but has developed in excess of 100 at speeds above 2,000 revolutions per minute. This power is sufficient to give the car, which is equipped with a five-passenger body, at a speed of better than 60 miles per hour and yet it is capable of ascending almost any hill on high gear—with a motor to wheel ratio of 3.66 to 1. The weight of the car is 3,800 pounds with all tanks filled and with full equipment. The wheelbase is 135 inches and the tires 36 by 4.5 inches. All cars will be sold directly from the factory to consumer—no dealers will be appointed. In fixing the price at $2,350 the dealer's profit has been given to the purchaser.

In telling of the features of this new car, the most important is the great power and flexibility of the motor which is obtained, it is said, by the use of unusual intake and exhaust manifold designs and the installation of a 1.75-inch C. R. G. carbureter. Cross-head pistons are notable in the motor, which follows usual practice otherwise. The drop arm of the steering gear is adjustable for wear, cantilever rear springs are found and spiral bevel gears are used.

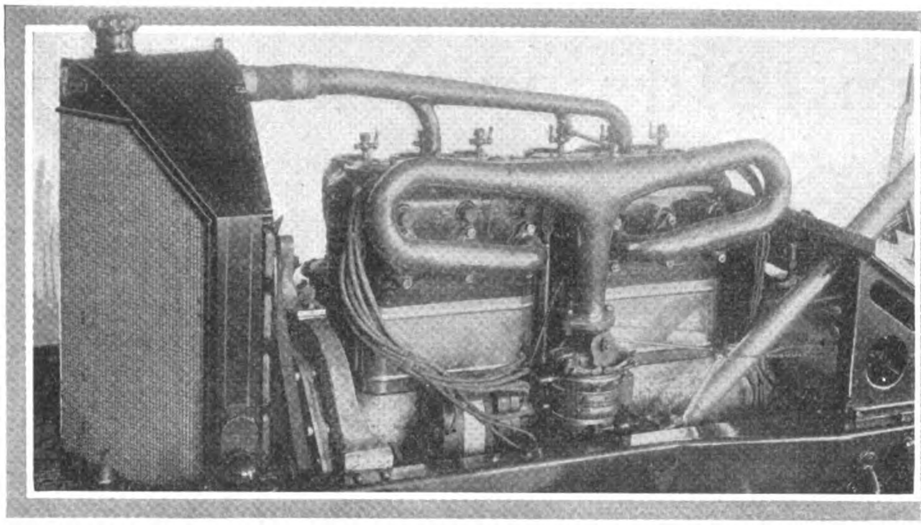
Great stress is laid upon the peculiar design of the intake manifold. As will be noted by the accompanying illustrations, the passages are large, the curves easy and the manifold as well as the carbureter is water-jacketed. The large diameter and the lack of sharp turns allows a good volumetric efficiency at high speed while the liberal water jacketing space prevents condensation and enables quick acceleration. Particles of gasoline that might condense on the walls are converted into vapor by the heat.

Difficulty due to two cylinders exhausting at the same time is overcome by the new exhaust manifold which gives a separate passageway to each set of three cylinders. The illustration shows the simplicity of this construction, there being a wall in the manifold which separates the flow of gas from the front pair of cylinders from that of the rear. The timing is arranged so that the exhausts of two cylinders in the same set are never open together, and therefore there is no interference between the cylinders. There is no danger of the exhaust from one cylinder just opening forcing gas back into another cylinder that has nearly finished this operation.

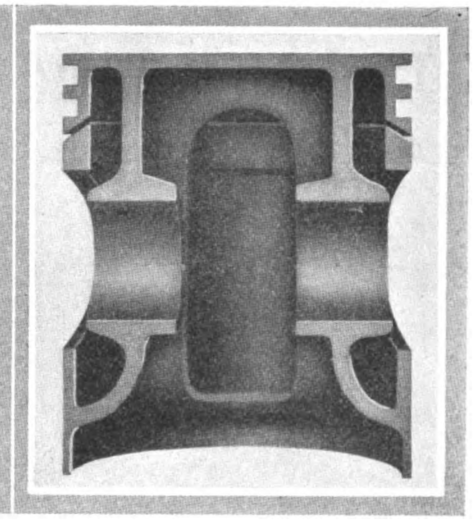
Easily the most important feature of the motor itself, which is a Herschell-Spillman, is the new cross-head piston in which the head, which is exposed to the heat, is practically separate from the trunk of the piston which takes the thrust of the connecting-rod. These two parts are held together by an interior web. The advantage of this design is that the upper part of the piston which carries the two rings, is made a comparatively loose fit while the trunk has only .001 inch clearance. The head can expand when exposed to intense heat without seizing and there is little possibility of the body of the piston expanding enough to cause trouble because the heat must travel through the interior web before it reaches the surface of the piston. This long path gives a large radiating surface. The



Chassis showing arrangement of units. The power tire pump, generator, water pump and starting motor are arranged on the right side of the motor. Note the cantilever spring and the triangular torque rod



Left side of motor showing peculiar intake manifold which is claimed to give increased power. The Y part of the manifold, as well as the carbureter, is water-jacketed to prevent condensation of the gasoline



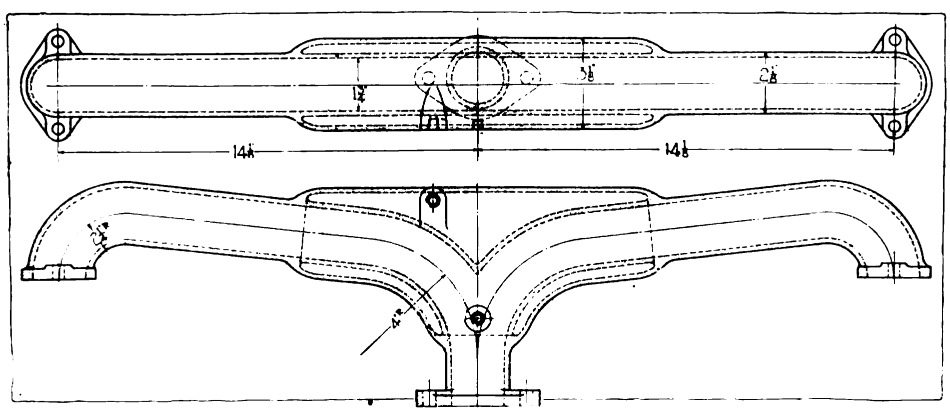
Cross-head piston in which the head is practically separate from the trunk. The head is exposed to heat but the trunk is not

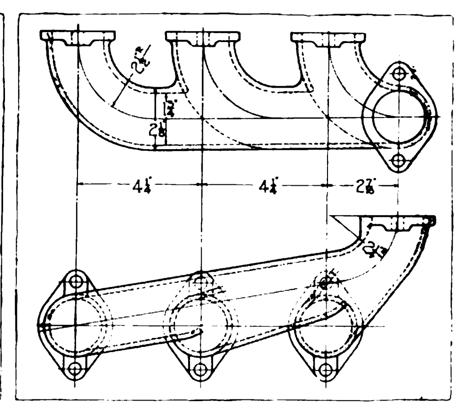
small clearance possible between the trunk of the piston and the cylinder is due to the piston ordinarily being cooler than the cylinder, with the result that it expands less rapidly and therefore there is no tendency for it to stick.

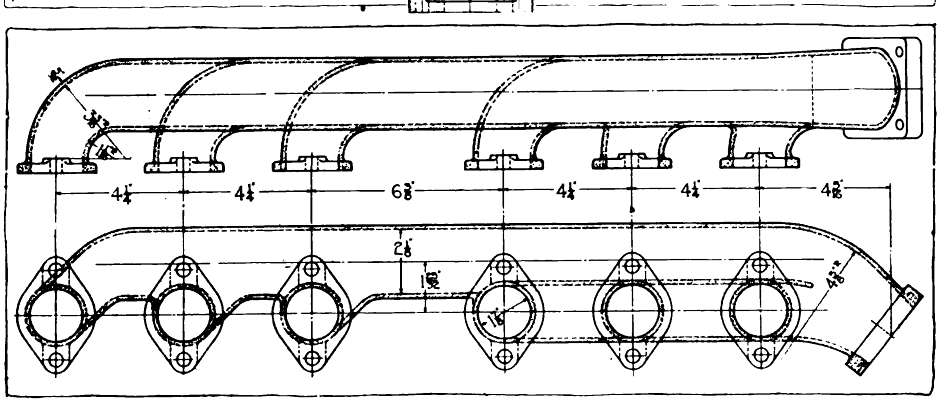
Of more than usual interest is the method of fastening the pitman arm or steering drop arm. The hub of the arm and the shaft on to which it fits have triangular slots milled into it lengthwise. The shaft is tapered so that adjustment may be made as wear occurs by slightly tightening the nut holding the arm in place, it being further on the shaft and thus held solid. This steering gear is manufactured by the Jackson-Church-Wilcox Co., Saginaw, Mich. It is a worm and nut type and is also featured by a 2-inch steering post and a 19-inch wheel with finger grips.

Smooth Body Surface

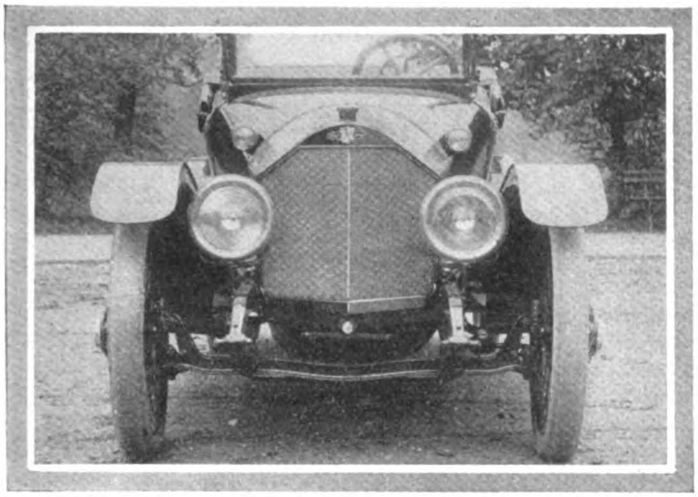
Unbroken body lines characterize the body design and unusually complete appointments are noted. The lines are accentuated by the use of a pointed radiator and slightly sloping hood. Left drive with center control is standard. The windshield is built into the cowl and is a combination rain-vision and break-down type. All instruments are mounted flush on the cowl board. At the extreme left is the primer which consists of a plunger pump which acts on a ball valve and sends gasoline to the throat of the manifold to insure easy starting. Next there is a 100-mile Warner speedometer of standard construction with a small electric light to illuminate it at night. This device is driven from the rear of the gearset. There is a Westinghouse voltmeter and adjacent to this a fuel pump provided with a blow-off. In the center is the switch and coil, which forms part of the Eisemann dual system. A gasoline pressure gauge is provided and this should register about 2 pounds. Next to this is an 8-day clock that is wound through the rim. An oil gauge shows the pressure in the lubricating system and should ordinarily register between 3 and 6 pounds depend-



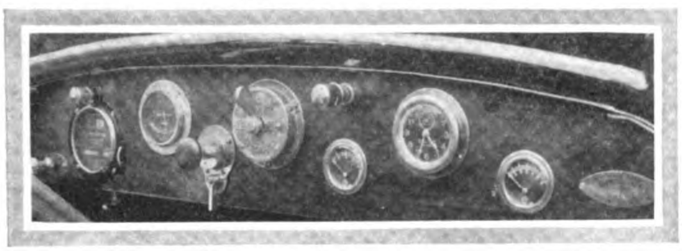




Upper—Left—Intake manifold showing water jackets. Upper—Right—Portion of intake manifold which bolts to cylinders. This manifold construction differs in detail from that shown in the illustration of the motor. Lower—Left—Exhaust manifold showing partition which separates the two cylinder sets



Front of car showing pointed radiator



Arrangement of instruments on cowl board

ing on the temperature and also on the speed of the motor.

At the right, there is a light which illuminates one-half of the instrument board and at the same time it can be removed and used as a trouble lamp, being provided with 10 feet of cord for this purpose. A Pyrene fire extinguisher is placed to the right of the cowl.

Just under the front cushion of the driver's seat is the lighting switch. It is a three-gang type providing for the lighting of the side and tail lights, head and tail lights and for controlling the dash lights separately.

A one-hand top made by the Pantasote company and covered with the highest grade of pantasote is fitted. The front of the top fastens directly to the windshield by means of ball catches that eliminate the need for straps, or other fastenings. Jiffy curtains are included in the equipment. An interesting detail is the use of a flap on the back of the front seat to prevent this panel from being foot marked. Slip covers are fitted as well as the usual robe and foot rail.

At the rear there is a substantial carrier for two spare tires, and license brackets are installed at the front and rear.

Concealed hinges and door latches are used and the running and floor boards are covered with corrugated linoleum. The squeaking of the body is prevented by mounting it on lead strips.

The motor is a T-head design with the cylinders cast in two blocks of three. The valves are inclosed. The carbureter and magneto are mounted on the left, the latter being an Eisemann high-tension design, designated as model E M I R 6. The high-tension wires to the spark plugs are carried in an aluminum conduit. On the right side there are four motor accessories, the power tire pump, generator, water pump, and starting motor being arranged in this order from front to rear. The first three are driven from the same shaft while the starter turns the motor by a pinion meshing directly with teeth cut in the flywheel. The electric units are of Westinghouse make, and the single-wire system is used, but the electric light bulbs throughout the car are of the double wire type because it is easier to obtain these in out-of-the-way places than the single wire type. The return wire from each light is grounded. All wires are encased in flexible metal conduits. Starting current is furnished by an LBA, S L B 610 storage battery, capacity being ampere 110 hours and the voltage 6. The battery is placed under the right front seat where it is easily accessible when water is added or specific gravity readings taken. The left compartment is for tools.

To insure silence of operation the couplings at either side of the pump are leather while the connection between starter armature and the driving pinion is by an Oldham coupling.

Cooling is accomplished by a V-type El Arco radiator which holds about 5 gallons. Water circulation is maintained by a centrifugal pump of large size and the circulation of air is aided by a five-bladed fan which is belt-driven. Adjustment for slack in the belt is provided for by a vertical slot in the bracket that carries the fan.

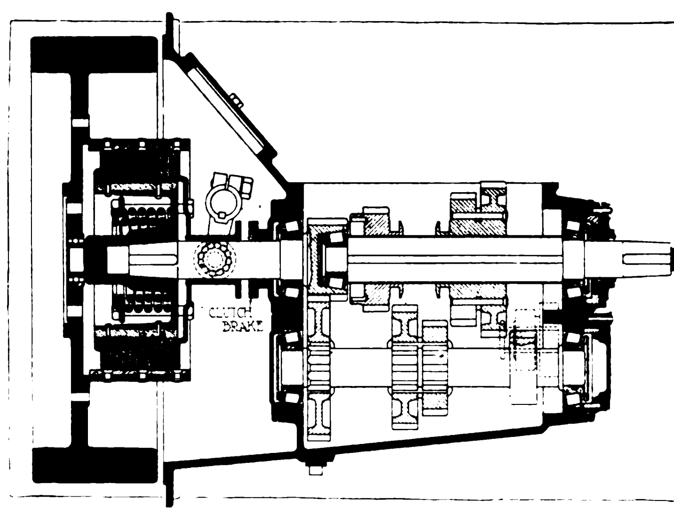
Three Point Suspension

As already stated, the power plant is suspended on three points, one at the front and two at the rear of the motor. The front support consists of an arched cross-member of inverted U-section, a bolt at the center of it carrying the motor. At the rear there are two arms extending from the crankcase.

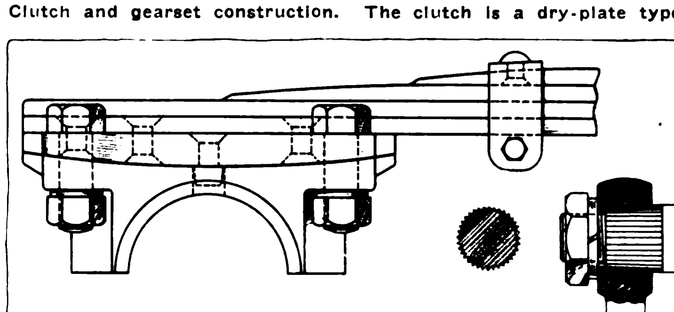
Lubrication is a combination of the splash and force feed methods, there being a gear pump to maintain a circulation of oil and sump in the bottom of the crankcase that holds approximately 1 gallon. Plain bearings are used throughout the motor. Both crank and camshaft are supported on three bearings and the cam followers are the mushroom type. A combined oil filler and breather is located on the left side between the cylinder sets. It is provided with a sight glass and a float to show the level of oil in the crankcase.

Power is transmitted from the motor to the gearset through a dry plate clutch consisting of thirteen steel disks faced with fiber. A double helical spring supplies the pressure for engagement. A simple clutch brake is provided in the form of a fiber plate against which the clutch collar presses.

(*Continued on page* 739)



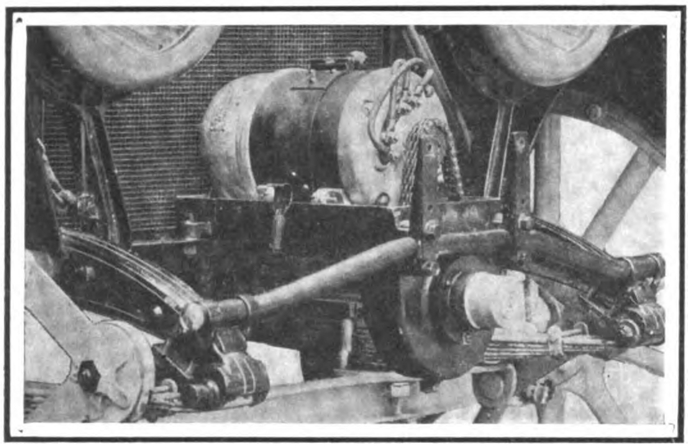
Clutch and gearset construction. The clutch is a dry-plate type



Left—Detail of cantilever where it fastens to axle. Right—Method of fastening steering drop arm to steering gear. The shaft is conical so that play may be removed

A North East System for All Old Cars

Motor-Generator Unit Replaces Crank Handle at Front of Car—Both 12- and 24-Volt Systems Offered



Mounting of North East generator showing method of clamping the cross member to the frame

A STARTING and lighting system that is easily installed on almost every make of automobile has been perfected by the North East Electric Co., Rochester, N. Y. The starting motor and lighting generator are combined in a single unit which is mounted in front of the radiator, the drive being by silent chain to the front end of the crankshaft, at the point at which the starter crank ordinarily attaches. This system is identical with the other systems built by this company for several years past, except that it is designed for mounting on any make of car. It is furnished both in 12 and 24-volt styles. A storage battery, which can be mounted on the running board or in the body, is furnished with the system.

Placed Between Frame Members

The motor-generator unit is mounted between the front frame members by means of two cross bars. The rear bar is an angle iron which is bolted at each end to the webs of the channel frame section by means of small angles. In the front the unit is supported by a heavy tube which is clamped to the horns of the springs. This member may be bent to bring it to the required height.

The armature runs at approximately 2.66 crankshaft speed, the reduction being obtained, as already noted, by the use of a silent chain. The motor-generator unit is placed above the plane of the crankshaft and as the driving chain is at the front, the shaft which runs to the crankshaft passes under the unit. This shaft has long flutes milled in it and it may be cut off to the length desired. The coupling which makes connection between this shaft and the front of the crankshaft is left blank and is machined to suit each particular installation.

Accessibility a Feature

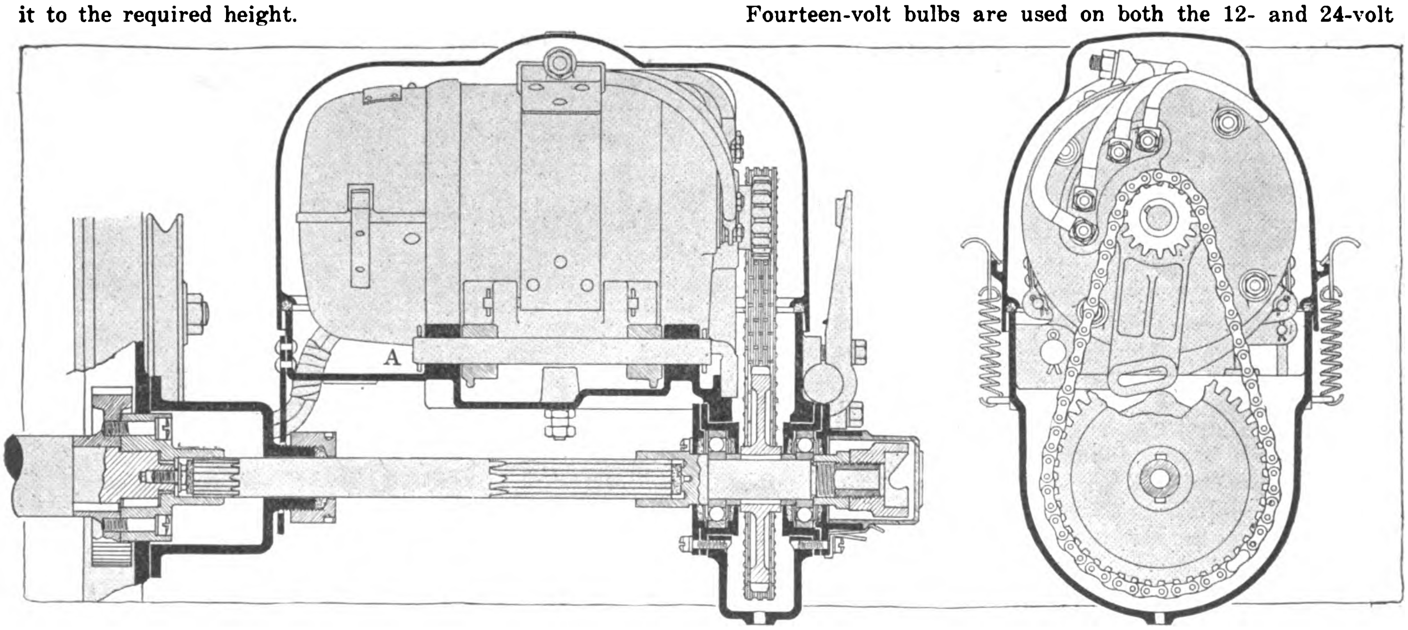
The position of the starter has several advantages: It is easily accessible for adjustments, inspection or repairs and it does not interfere with the accessibility of any of the motor parts. There is little objection to this position as far as the appearance is concerned because the unit is ordinarily covered with the front number plate, as illustrated, brackets being provided for the attachment of the plate.

The unit is suitably protected from the weather by a sheet metal case which may, however, be instantly removed. Adjustment of the driving chain is obtained by swinging the generator about the point A, in the accompanying line drawing, where it is pivoted. There is an adjusting screw for this purpose.

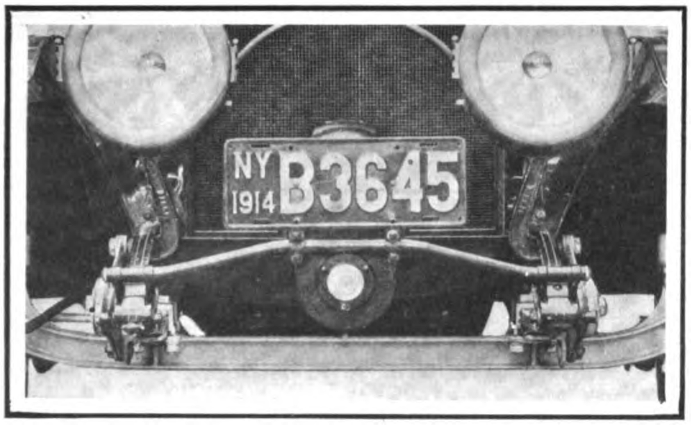
Armature Only Moving Part

Only one moving part is found in the unit, and that is the armature which is mounted on annular ball bearings. No mechanical governor is used. The brush construction is especially for automobile work and the brushes are manufactured from a material having high conductivity and long life. All coils are treated with an oil and moisture-proof compound. The materials give the maximum amount of strength with a minimum amount of weight, it is said.

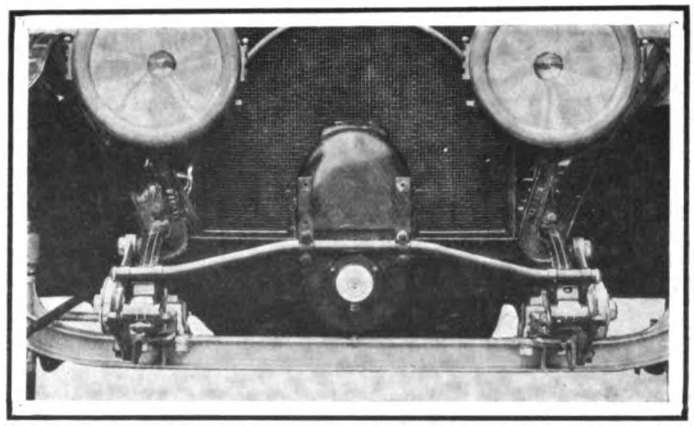
Fourteen-volt bulbs are used on both the 12- and 24-volt



North East starting and lighting unit. At the left the mounting of the unit is illustrated, the driving chain and gears are shown, and the construction of the main shaft given. The right view shows the front end and illustrates the driving gear mechanism. The long splines in one end of the driving shaft permit it to be cut to any desired length



Appearance of North East motor-generator unit before the attachment of the license tag



North East generator almost completely concealed by the license tag. Brackets are provided for its attachment

systems throughout. The head lamps are 21 candlepower, the side lamps 4-candlepower and the tail lamp is also 4-candlepower. Bayonet bases are found throughout. The wiring is extremely simple. Two wires run straight from the battery to the motor-generator unit. To these leads the various lighting wires are attached, while the wires running to the starting switch are on a separate circuit.

A full line of accessories are manufactured to go with the starting and lighting system. These include torpedo headlights finished in japan and brass or japan and nickel, and side and tail lights similarly shaped, and finished. Two types of dashlights are made; one for flush mounting and the other with a ball and socket mounting. In addition a flush type voltmeter showing the condition of the battery, whether charged, or discharged, is offered and a hydrometer syringe for testing the specific gravity of the electrolyte completes the line.

Attachment Is Simple

The installation of the North East system is simple, and can be accomplished at very little expense. The first step is to remove the timing gear cover, and then the dimensions of the end of the crankshaft are taken and the coupling is machined to fit over this end. The large end of the coupling is left soft so that it may be machined without difficulty. When mounting this clutch member it is important that there is sufficient fastening for the keys and bolts so that no trouble will appear from this part coming loose.

If it is necessary to shorten the driving shaft a piece is cut from the end having the long splines. As this shaft is hardened on the surface, however, it is first necessary to grind through this hard surface, after which the remainder of the section may be cut with a saw. The end is then squared up by grinding. If this shaft is too long, damage to the bearings will result.

Starting Switch Near Motor

The starting switch is mounted near the front of the motor and as closely to the motor generator as convenient in order to have the wires as short as possible to cut down resistance losses. The starting button is located on the footboards and the cable running to the switch so adjusted that there is no slack when the button and the switch arm are in their normal positions. Where the run of cable is longer than usual it is advisable to support it in one or two places.

If the car is fitted with oil lamps, side and rear, and gas head lamps, these may be transformed by mounting reflectors in the head lamps and adapters in the side and tail lamps. In case the car is fitted with electric lights, a very careful inspection of the connections and the lamp sockets should be made to see that they are in good order and then the bulbs should be replaced with the standard 14-volt type used with this system.

More Cars, Fewer Horses in Milwaukee

MILWAUKEE, WIS., Oct. 13—According to Tax Commissioner Arnold of this city the number of automobiles owned here is 5,943 as against 4,744 in 1913, there being thus a gain of 1,199 cars within 12 months.

During the same period the number of horses, mules and asses decreased by 193, the total being 11,032, instead of 11,225 last year. While in 1913 the number of cars owned was only a trifle over one-third the number of horses, this year there are more than half the number of automobiles than horses.

The personal property record for 1914 shows a total of $91,348,240, of which $3,791,535 is credited to automobiles, $86,870 to other motor vehicles, $1,189,885 to horses, mules, asses, $568,830 to wagons, carriages, sleighs.

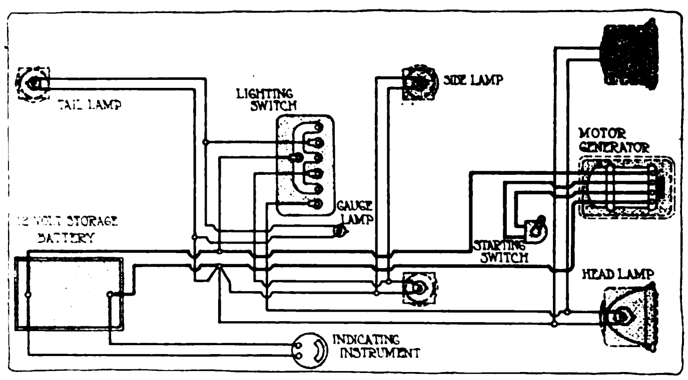


Diagram of 12-volt system. Two leads run from the battery to the motor-generator unit. From those two leads wires branch off to the various lamp circuits. The starting switch is on a separate circuit

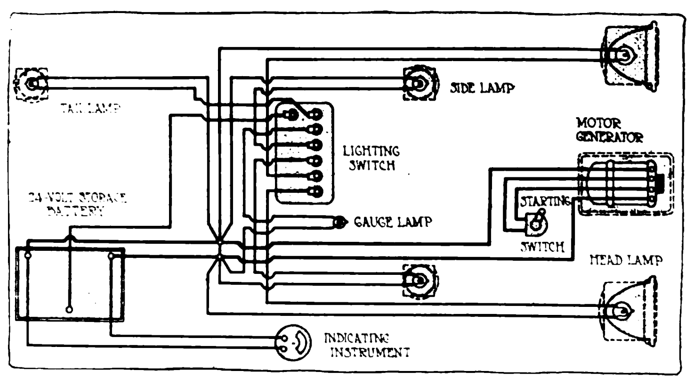
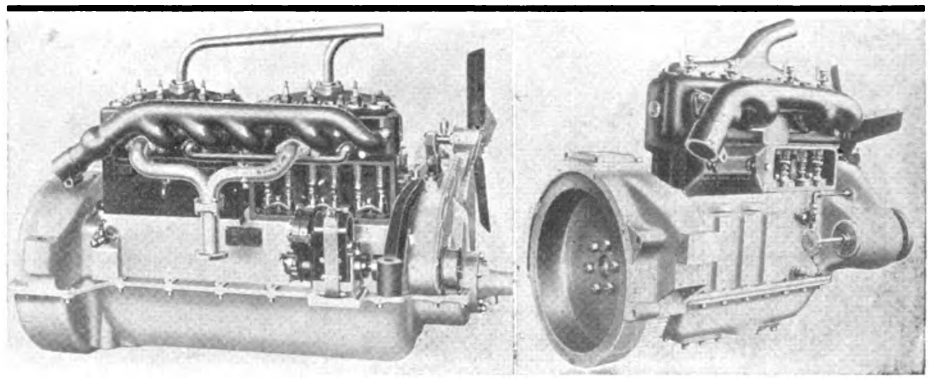


Diagram of 24-volt system. In this system, also, there are two main wires from the motor-generator to the storage battery, and the lamp wires branch off from these two main leads, but in this case each pair of lamps is put in series due to the use of twice the voltage with the same type of lamps

Four and Six Comprise 1915 Davis Line

Four Is Compromise Size Between Two Previous Models—$100 Cheaper—New Streamline Bodies



Left—Six-cylinder motor used in 1915 Davis. Right—Four-cylinder engine used in new Davis with one valve cover plate removed

FOR 1915 the Davis line, manufactured by the George W. Davis Motor Car Co., Richmond, Ind. has been considerably revamped. In 1914 it consisted of a six and two fours. For 1915 there will be one four, a compromise size between its predecessors, and a continuation of the six.

While all the details of the six have not as yet been fully decided, the chassis will be practically the same as before and, as regards the body, it will be offered in five- and six-passenger styles at $2,150 for the five and $2,185 for the six-passenger. This is the same as last year, but the bodies are entirely new.

For 1914 the Davis fours were respectively 3.5 by 5 and 3.75 by 5.25 inches. For 1915 the four will be 3.75 by 5. Outside of the change in dimensions, however, the motor resembles very much the smaller four of 1914 in that it is a Continental unit power plant with three-point suspension and block-cast L-head cylinders.

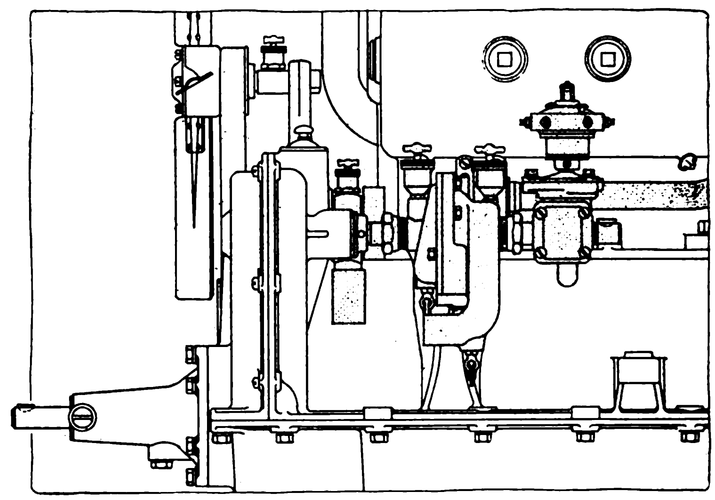
Besides bringing the line down to a two-chassis basis and bringing the bodies up to the latest dictates of streamline fashion, the Davis company has made few alterations in the cars themselves. The bodies, in fact, have been kept up to date by giving them the prevailing molded form, eliminating the side lamps and amplifying the dash equipment.

Bendix Gear for Starter

The changing of the instrument board has been rendered possible by an alteration in the starting and lighting outfit. This is the incorporation in the Westinghouse ignition-lighting unit of the coil. The coil used to be on the dash, now it is under the hood with the generator. Another change in the Westinghouse apparatus, which is used for starting as well as lighting, is the use of the Bendix gear for the engagement of the cranking motor to the engine.

The Bendix gear is an ingenious arrangement in which the drive pinion on the cranking motor is carried loosely on the armature shaft of the motor, being free to travel in a spiral groove with which it engages on that shaft. The loose pinion carries a pendulum and when the armature of the starting motor revolves, the gear is held from revolving with it by the weight of the pendulum. Consequently, the pinion travels along the shaft until it engages with the gear on the flywheel. At this point it has to revolve with the shaft of the cranking motor and thus spins the engine. As soon as the latter starts under its own power the gear is thrown off by the centrifugal force of the pendulum and with the opening of the switch the starting motor is thrown out of action.

Although the unit power plant construction has been maintained without change, a shift has been made from the disk to the cone clutch in the four. This has been effected without a change of housing as is provided in the Continental engine.



Water pump arrangement on six-cylinder Davis motor. Thermo-syphon cooling is used on the four

Another change is in the fuel feed. This was formerly by pressure but since the tank is located beneath the front seat, gravity has been deemed a sufficient method of bringing the fuel to the carbureter.

Thermo-syphon cooling is still used on the four but the new rounded vertical tube radiator adds more cooling surface. A new carbureter, which the Davis engineers state will produce a notable gain in economy, has been adopted. This is the Stromberg, Model K.

Price $100 Lower Than for 1914

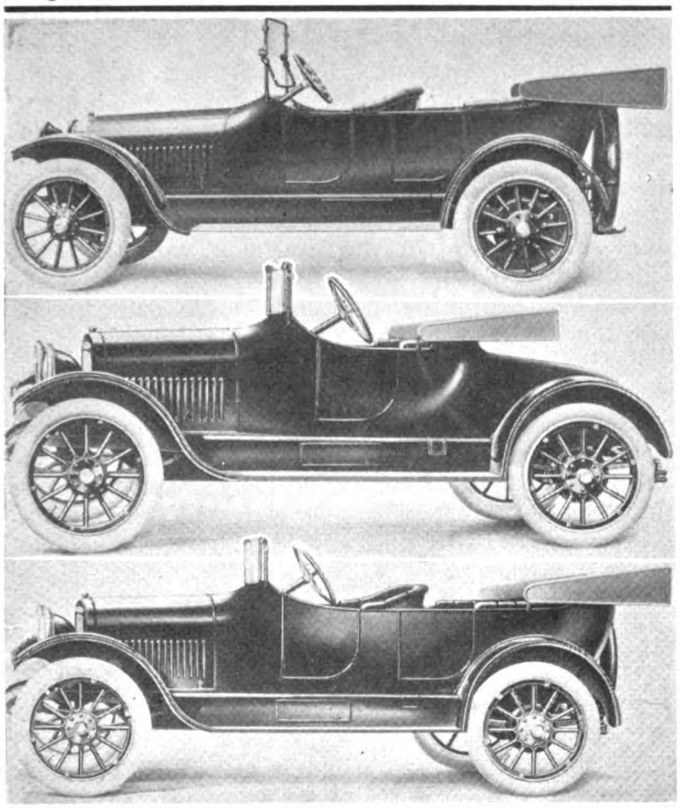
No changes are found in the drive members or in the rear axle, but the wheels are larger and now carry 34 by 4 tires, whereas the previous small four of which this is the outgrowth had 33 by 4. All around, it is a larger car of up-to-date design for less money. The car sells for $1,235 fully equipped in touring or roadster body. This is a reduction of $100 as compared to the smaller four of last season.

The power plant used in the four is the Continental W. It is a block motor with L-head cylinders, suspended at three points and providing a unit plant. The bore of 3.75 and stroke of 5 inches provides a horsepower rating of 22.25, but as the stroke bore ratio is 1.33, this rating is considered very conservative.

Three rings are used on the pistons and conventional practice is followed in regard to I-beam connecting-rods with wide bearings. The crankshaft is of .40 carbon steel analysis.

The disk clutch and gearbox are housed in the same unit, as the crankcase of this motor is carried back past the flywheel ending in a broad face to which the gearset housing is bolted. The gearbox is a Warner three-speed design. The gears in this set are designed for maximum toughness, having a chrome-vanadium composition.

The driveshaft is inclosed in a torsion tube, but the drive is transmitted to the car by way of the rear springs. The rear axles are Weston-Motts, three-quarter floating. A feature of these axles is the ease of adjustment that can be effected on the mesh between the drive pinion and the large bevel gear.



Upper—Six-cylinder Davis five-passenger touring car for 1915 selling at $2,150. Note streamline form and absence of dash lamps. Middle—Four-passenger, two-cylinder roadster type. Lower—Four-cylinder, five-passenger touring car which sells for $1,235

The frame construction is such that a straight taper is given. The springs are Sheldon products, being 2 inches in width and of platform construction in the rear.

A full line of equipment is supplied. The Westinghouse two-unit lighting, starting and ignition is provided. It is a 6-volt job with the lighting and ignition generator in a unit with the step-up coil for high-tension ignition. The distributer is also a unit with the generator. This unit is mounted on the right of the motor. The battery is a Willard. The wheelbase of this car is 112 inches.

Few Changes in Six—New Bodies

The power plant and chassis of the six remains practically the same as for 1914, although parts of the electric equipment have not as yet been determined, and deliveries will not start on the remodeled body until November.

The six L-head cylinders are cast in threes, and have a bore and stroke of 3.75 by 5.25 inches. This is the Continental Six P type. The motor has a three-bearing crankshaft of 90,000 pounds tensile strength. The bearing diameters are respectively 2, 2.25 and 2 inches for the front, center and rear. When finish ground the crankpins have a diameter of 1.875 inches.

The pistons are three-ringed with pins having a bearing length of 1 7-32 by 1 7-8 inches. Connecting-rods are drop-forged I-beams of .40 carbon steel and the caps on the lower bearing are held by nickel-steel bolts.

All valves are inclosed and are on the right side, being driven by a 1 1-16 inch diameter camshaft having three bearings. The timing gears are helical.

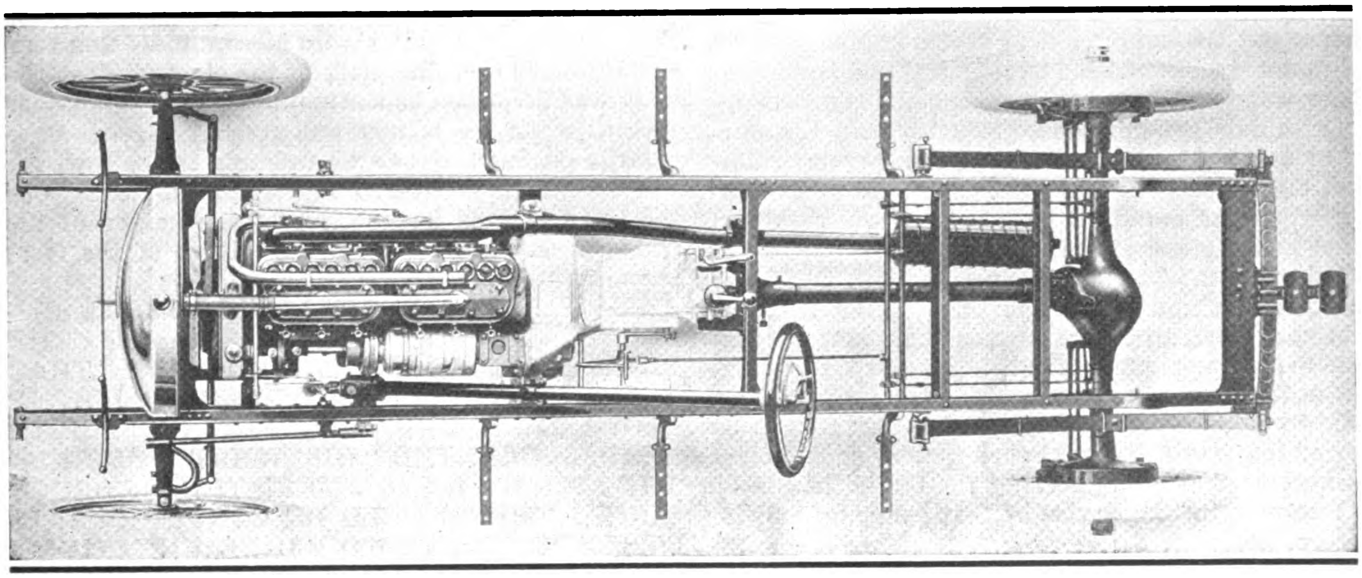
Ignition will be taken care of by a Bosch dual system, the battery end of it being taken care of by a Willard installation. The carbureter is the Stromberg G.

Pump Water Circulation

On this car, pump water circulation is used. Another point of difference between this and the four is the use of a disk clutch and Warner four-speed gearbox.

The rear axle is floating. Left drive and center control, 37 by 4.5 inch tires and a 128-inch wheelbase are features of the chassis.

The new bodies on this car are full streamline effects without a break. Full equipment is sold with the car. The prices on this are $2,150 for the five-passenger and $2,185 for the six-passenger.



Plan view of six-cylinder Davis chassis showing left drive and center control and mounting of Westinghouse starting system at the left of the motor. Note platform rear spring, and extra tire bracket

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Traffic Engineering

LAST week's "get together" convention of a score or more of motor truck makers emphasized the old problem of selling motor trucks and incidentally drove home once more the argument that traffic engineering is daily becoming a greater factor in the selling of trucks.

Three years ago when one of our industrial engineers put the expression of traffic engineering on the motor truck salesmanship map, the traffic engineer was some form of superior personage occupying a middle ground somewhere between the purchaser and the maker. He was not a regular salesman, but a specialist who was called into consultation when the standard proposals of the salesman failed to bring conviction to the buyer.

Today the movement, as expressed last week, has gone further, and now traffic engineering is, or at least should be, an asset of every salesman, who expects to continue in merchandising power transportation in the form of motor trucks. The proposal was made by one of the speakers, and it deserves to be carried into execution, that each factory should open a school on traffic engineering for the education of all salesmen in the service of that company and its dealers.

This is a bold conception and a commendable one. It has but one mission, namely, actually selling motor trucks, in contrast with trying to dispose of them whether they best meet the requirements of the buyer or not.

The establishment of such a school pre-supposes the fact that to date many trucks have been sold that are not well suited to the field of work they have been placed in. There is one result that can follow such a condition—the truck does not work to its maximum capacity, its efficiency factor is too low, the purchaser is not satisfied.

What would you think of a garageman who in order to do his regular line of repair work bought an immense factory lathe, one only intended for special lines of work in a large factory. It would be a very poor investment. But we meet with such absurdities in the truck field. Today you find a merchant with a 3-ton truck when a 1500-pound vehicle would better meet his requirements. Perhaps the salesman was to blame in his anxiety to make a sale.

Traffic engineering, even in its simplest elements, would in the mind of the salesman work against such ill-advised sales, sales which though satisfactory at the beginning will end in disappointment when the buyer becomes aware of his folly.

The day of traffic engineering school in every factory will be welcomed if it will do nothing more than give salesmen the proper perspective of the field of truck operation, so that they will not err in selling to a merchant a type of vehicle entirely unsuited to his field. Better that such a sale were not made, than that it stand to bring discredit later upon the vehicle and its maker.

The Streamline Concept

NO term in the automobile world has been more abused than the expression "streamline." Three years ago when it came on the horizon, in its application to certain aspects of body lines, its misuse began and it has increased ever since in direct proportion to the number of concerns manufacturing bodies that they imagine come under this classification.

The term is misused, largely due to ignorance of the true meaning of the word streamline. One year ago if a cowl took the place of the straight dash the body was described as a streamline one. In another factory when the bonnet was given a flare so as to enlarge gradually from the radiator to the cowl the word streamline covered the situation. This year the word is used irrespective of the nature of the body curves, and for 1915 the misuse of the term promises to be as general.

THE WORD "STREAMLINE" FROM ITS SIMPLEST MEANING SUGGESTS THAT THE LINES MUST BE SIMILAR TO THOSE THAT A STREAM OF WATER WOULD FOLLOW IF FLOWING AROUND AN OBJECT OF SIMILAR SHAPE. GRANTED THIS, WHAT WOULD BE THE FIRST CHARACTERISTIC OF SUCH LINES? THEY WOULD BE CONTINUOUS; IN OTHER WORDS IT WOULD BE UNNATURAL TO HAVE LINES SUCH AS TO SET UP EDDY CURRENTS, OR MINIATURE WHIRLPOOLS

AROUND DIFFERENT PARTS OF THE BODY.

A final test of the streamline conception might be carried out imaginatively if a body were placed in a current of water with the radiator end pointing up stream. Observe if the water flows regularly along the side lines from front to rear. Does it adhere closely, or are there curves which tend to throw the water off, away from the body, and before it returns to the body little eddies are set up.

SUCH AN IMAGINARY TEST REVEALS NOT A FEW ESSENTIALS OF STREAMLINE DESIGN. TO BEGIN: THERE MUST NOT BE ANY CURVE THAT LEADS THE EYE AWAY FROM THE BODY LINES IN REAR OF THAT CURVE; RATHER EACH CURVE SHOULD LEAD THE EYE INTO THE BODY FURTHER BACK.

Apply this test to any body you desire. Does the curve at the cowl lead the eye away from the body and direct it upwards, if so the streamline ideal has been violated, the curve is exactly the reverse of the true streamline one.

In streamline formations the front end is invariably the largest and there is a general tapering towards the rear. The fastest fishes, those capable of sustained speeds of nearly 60 miles per hour, are fashioned true to this conception of the streamline. The largest diameter of the body is much closer to the head than to the tail. Observe such mammals swimming and there is not a place on the entire body where a curve tends to lead out of the body, but rather each curve is formed to lead into the body—it is in short an unbroken line from the tip of the nose to the end of the tail. This is the true streamline conception.

VanDervoort Nominated for S. A. E. President

NEW YORK CITY, Oct. 12—W. H. VanDervoort, president of the Moline Automobile Co., has been nominated for the presidency of the Society of Automobile Engineers for next year by the Nominating Committee, and to succeed Henry L. Leland, who has occupied this post during the present year. Mr. VanDervoort has had wide experience that should qualify him for this post. In addition to his experience as a manufacturer, he was, previous to his connection with the motor car industry, a professor in the University of Illinois.

The complete list of officers nominated follows:

President......W. H. VanDervoort	Second Vice-Pres...Jos. A. Anglada
First Vice-Pres. Frederick R. Hutton	Treasurer ....A. B. Cumner

COUNSELLORS

C. B. Rose.................1915-16	W. P. Kennedy............1915 16
John Wilkinson 1915-16	Frank M. Germane.........1915

Frederick R. Hutton, familiarly known as Prof. Hutton, is associated with the testing laboratory of the Automobile Club of America. Jos. A. Anglada has been a member of the counsel for 2 years, and is a consulting engineer in New York. A. B. Cumner, consulting engineer, New York, is nominated to take the place which has been held by Hermann Cuntz for a number of years.

Packard Surplus is $1,797,820.42

DETROIT, MICH., Oct. 14—The Packard Motor Car Co. in its annual statement issued today shows a surplus of $1,797,820.42. This is $600,000 greater than the surplus for the previous year. This surplus remained after deducting for plant depreciation, paying all expenses of the business and interest on debenture notes or setting aside proper reserves to cover the same and after paying the regular dividends on the preferred stock and a special distribution of the common stock of the company.

During the fiscal year 3,612 vehicles of all types, including passenger and commercial types, were manufactured.

Australian Imports Decrease 8% in 1913

NEW YORK CITY, Oct. 10—At the request of the Motor Traders' Assn. of New South Wales, the Federal Dept. of Trade and Customs has compiled a return of motor-vehicle importations into Australia for the calendar year 1913. A comparison with similar figures for 1912 shows a falling off in chassis imports of 8 per cent., the amounts expended for the respective years being: 1912, $7,063,700; 1913, $6,489,722. Every state with the exception of Tasmania, which gained 32 per cent., lost ground in chassis importations during the year under review. Body imports also declined, the decrease in 1913 as compared with 1912 being $43,488, or about 4 per cent.

The combined chassis imports from the United States and Canada substantially exceeded those from the United Kingdom. This is the first time on record that this has happened, and denotes the great demand for the cheap, light car, to which the American and Canadian manufacturers pay special attention.

Details of the imports into the Commonwealth are given in the accompanying table.

CHASSIS FOR MOTOR CARS (NOT INCLUDING RUBBER TIRES, LORRIES AND WAGONS).

Imported from—	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Commonwealth
United States	$645,787	$394,533	$301,277	$167,330	$102,211	$29,914	$1,641,052
Austria	1,655	7,232	..	..	..	..	8,887
Belgium	47,804	109,545	15,048	25,704	1,445	1,713	201,259
Canada	214,442	235,543	40,489	191,191	76,891	12,780	771,336
France	233,694	362,490	25,699	97,544	3,061	14,760	737,248
Germany	144,268	163,660	6,877	13,475	1,908	5,524	335,712
Italy	129,834	206,846	..	17,061	886	1,187	355,814
Netherlands	2,141	..	..	..	..	..	2,141
Sweden	3,450	..	..	..	..	..	3,450
Switzerland	3,845	29,073	6,020	14,585	3,173	..	56,696
United Kingdom	778,398	811,099	256,502	339,123	90,410	100,595	2,376,127
Total	$2,205,318	$2,320,021	$651,912	$866,013	$279,985	$166,473	$6,489,722

BODIES FOR MOTOR CARS, LORIES AND WAGONS, INCLUDING DASHBOARDS, FOOTBOARDS AND MUDGUARDS.

United States	$166,166	$99,320	$87,310	$58,875	$30,109	$10,862	$452,642
Australia	803	97	..	..	..	..	900
Austria	..	204	..	..	..	..	204
Belgium	136	4,424	..	881	19	..	5,460
Canada	46,865	59,576	11,188	41,847	21,383	2,560	183,419
France	17,480	16,263	326	2,900	156	516	37,641
Germany	7,392	10,103	915	2,151	195	127	20,883
Italy	1,694	2,428	..	..	..	..	4,122
Netherlands	443	..	..	..	..	..	443
New Zealand	268	..	..	..	..	..	268
Norway	..	6,614	..	..	..	..	6,614
United Kingdom	134,992	100,522	23,997	39,769	21,778	19,139	340,197
Total	$376,239	$299,551	$123,736	$146,423	$73,640	$33,204	$1,052,793

372 Companies Allotted Space for National Shows

New York Has 188 and Chicago 184—Ninety-five Car Exhibitors for New York—Five Electrics—Chicago Has Ninety-six, with Seven Electrics

NEW YORK CITY, Oct. 12—Final allotments of space for the automobile shows at this city, on January 2-9, and at Chicago, January 23-30, were made on October 8. A total of 372 companies received space allotments for the two shows, New York leading with 188 and Chicago with 184, as compared with 353 in 1913, with 183 for New York and 170 for Chicago.

There will be ninety-five passenger car exhibitors at New York City, divided up into ninety gasoline and five electric car companies, while Chicago will have ninety-six passenger car exhibitors, with seven of these being electric car exhibitors. Seventy-four of these are N. A. C. C. members.

Last year there were seventy-nine car exhibitors at New York and sixty-five at Chicago.

There will be ninety-three accessory exhibitors at this city and eighty-eight at Chicago. Last year there were 104 at this city and 105 at Chicago. This decrease is due to the tire, axle and ball bearing people's refusal to exhibit this year. Only two of these concerns have expressed their desire to exhibit and they are the Bock Bearing Co., Toledo, O., maker of roller bearings, and the Bearing Co. of America, Lancaster, Pa., maker of ball bearings and universal joints.

Those companies which are exhibiting for the first time at the shows are the American Cyclecar Co., Detroit, Mich.; Argo Motor Co., Jackson, Mich.; Cresson-Morris Co., Philadelphia, Pa.; Durant Dort Carriage Co., Flint, Mich.; Enger Motor Car Co., Cincinnati, O.; L. P. C. Motor Car Co., Racine, Wis.; Cowles-MacDowell Pneumobile Co., Chicago, Ill.; Milburn Wagon Co., Toledo, O.; W. A. Paterson Co., Flint, Mich.; Sphinx Motor Car Co., York, Pa.; Remington Motor Co., Rahway, N. J., Crawford Automobile Co., Hagerstown, Md.; Entz Motor Car Corp., New York City; Scripps-Booth Co., Detroit, Mich., and the Pilot Motor Car Co., Richmond, Va.

Those companies exhibiting at last year's show which will not be present this year are the following: Pope Mfg. Co., Hartford, Conn.; American Motors Co., Indianapolis, Ind.; Palmer-Singer Mfg. Co., Long Island City; Simplex Automobile Co., New York City; Thomas-Howard Co., Jackson, Mich.; Vaughan Car Co., Kingston, N. Y.; Norwalk Motor Car Co., Martinsburgh, W. Va., and the Selden Motor Vehicle Co., Rochester, N. Y.

In the drawing for space the first choice fell to the Overland, followed by Studebaker, Buick, Cadillac, Chalmers, Hudson, Packard, Maxwell, Hupp, Reo, Oakland, Pierce, Paige-Detroit, White, Jeffery, Cole and Locomobile. The complete order of drawing is given at the end of this article.

Exhibitors at New York and Chicago Automobile Shows

Abbott Motor Co.............Detroit, Mich.
American Electric Car Co......Chicago, Ill.
Anderson Electric Car Co......Detroit, Mich.
Apperson Bros. Automobile Co.Kokomo, Ind.
Auburn Automobile Co........Auburn, Ind.
Austin Automobile Co..Grand Rapids, Mich.
Baker Motor Vehicle Co....Cleveland, Ohio
Briggs-Detroiter Co. ....Detroit, Mich.
Briscoe Motor Co..........New York, N. Y.
Buick Motor Co................Flint, Mich.
Cadillac Motor Car Co........Detroit, Mich.
Cartercar Co. ....Pontiac, Mich.
J. I. Case T. M. Co., Inc........Racine, Wis.
Chalmers Motor Co............Detroit, Mich.
Chandler Motor Car Co....Cleveland, Ohio.
Cole Motor Car Co.......Indianapolis, Ind.
Cunningham, Son & Co., Jas.Rochester, N. Y.
F. I. A. T.............Poughkeepsie, N. Y.
H. H. Franklin Mfg. Co.....Syracuse, N. Y.
Garford Co. ....Elyria, Ohio
Haynes Automobile Co........Kokomo, Ind.
Hudson Motor Car Co..........Detroit, Mich.
Hupp Motor Car Co..........Detroit, Mich.
Imperial Automobile Co.......Jackson, Mich.
Inter-State Automobile Co.....Muncie, Ind.
Jackson Automobile Co.......Jackson, Mich.
Thomas B. Jeffery Co.........Kenosha, Wis.
King Motor Car Co............Detroit, Mich.
Kissel Motor Car Co..........Hartford, Wis.
Kline Motor Car Corporation.Richmond, Va.
Krit Motor Car Co............Detroit, Mich.
Locomobile Co. of America.Bridgeport, Conn.
Lozier Motor Co..............Detroit, Mich.
Lyons Atlas Co...........Indianapolis, Ind.
McFarlan Carriage Co.....Connersville, Ind.
Mack Bros. Motor Car Co..New York, N. Y.
Marion Motor Car Co.......Indianapolis, Ind.
Maxwell Motor Co., Inc........Detroit, Mich.
Mercer Automobile Co.........Trenton, N. J.
Mitchell-Lewis Motor Co.......Racine, Wis.
Moline Automobile Co......East Moline, Ill.
Moon Motor Car Co..........St. Louis, Mo.
Motor Car Mfg. Co.........Indianapolis, Ind.
National Motor Vehicle Co.Indianapolis, Ind.
Nordyke & Marmon Co....Indianapolis, Ind.
Oakland Motor Car Co..........Pontiac, Mich.
Ohio Electric Car Co..........Toledo, Ohio
Olds Motor Works...........Lansing, Mich.
Packard Motor Car Co.........Detroit, Mich.
Paige-Detroit Motor Car Co...Detroit, Mich.
Peerless Motor Car Co.......Cleveland, Ohio
Pierce-Arrow Motor Car Co...Buffalo, N. Y.
Premier Motor Mfg. Co....Indianapolis, Ind.
Pullman Motor Car Co.............York, Pa.
Rauch & Lang Carriage Co...Cleveland, Ohio
Regal Motor Car Co..........Detroit, Mich.
Reo Motor Car Co...........Lansing, Mich.
Saxon Motor Co..............Detroit, Mich.
S. G. V. Co...................Reading, Pa.
Speedwell Motor Car Co.......Dayton, Ohio
F. B. Stearns Co............Cleveland, Ohio
Stevens-Duryea Co....Chicopee Falls, Mass.
Studebaker Corp..............Detroit, Mich.
Stutz Motor Car Co......Indianapolis, Ind.
Velie Motor Vehicle Co..........Moline, Ill.
Waverley Co. ....Indianapolis, Ind.
Westcott Motor Car Co......Richmond, Ind.
White Co. ....Cleveland, Ohio
Willys-Overland Co.............Toledo, Ohio
Winton Motor Car Co.......Cleveland, Ohio
Woods Motor Vehicle Co........Chicago, Ill.

The following manufacturers who are not members of the National Automobile Chamber of Commerce will exhibit at both New York and Chicago.

Allen Motor Co.................Fostoria, O.
American Cyclecar Co.....Bridgeport, Conn.
Argo Motor Co................Jackson, Mich.
Cresson-Morris Co..........Philadelphia, Pa.
Crow Motor Car Co............Elkhart, Ind.
Davis Motor Car Co..........Richmond Ind.
Durant-Dort Carriage Co.........Flint, Mich.
Enger Motor Car Co......Sioux Falls, S. D.
Herff-Brooks Corp........Indianapolis, Ind.
Herreshoff Motor Co..........Detroit, Mich.
L. P. C. Motor Co............Racine, Wis.
Lexington-Howard Co....Connorsville, Ind.
McIntyre Co., W. H............Auburn, Ind.
Metz Co....................Waltham, Mass.
Monarch Motor Car Co.........Detroit, Mich.
Milburn Wagon Co...............Toledo, O.
Paterson Co., W. A.............Flint, Mich.
Partin-Palmer Motor Car Co..Detroit, Mich.
Remington Motor Co.........New York City
Sphinx Motor Car Co...............York, Pa.
Scripps-Booth Co............Detroit, Mich.
Twombly Motors Co..........New York City

The following, made up of non-members of the N. A. C. C. are on the list for the New York show only: Pilot Motor Car Co., Richmond, Ind.; Fischer Motor Corp., New York City; Grant Motor Co., Findlay, O.; Crawford Automobile Co., Hagerstown, Md., and Entz Motor Car Corp., New York City.

The following non-members of the N. A. C. C. will exhibit at Chicago only; Bartholomew Co., Peoria, Ill.; Buckeye Mfg. Co., Anderson, Ind.; Empire Automobile Co., Indianapolis, Ind.; Cowles-Macdowell Pneumobile Co., Chicago, Ill.

Accessory Exhibitors of New York and Chicago Shows

American Bronze Co............Berwyn, Pa.
Apple Electric Co..............Dayton, Ohio
Automobile Supply Mfg. Co..Brooklyn, N. Y.

Badger Brass Mfg. Co., The..Kenosha, Wis.
Bearing Co. of America, The..Lancaster, Pa.
Benford Mfg. Co..........Mt. Vernon, N. Y.
Blackledge Mfg. Co., John W...Chicago, Ill.
Bock Bearing Co., The..........Toledo, Ohio
Brown, William H.........Cleveland, Ohio
Brown-Lipe-Chapin Co......Syracuse, N. Y.
Brown-Lipe-Gear Co........Syracuse, N. Y.
Byrne, Kingston & Co.........Kokomo, Ind.

Carr Co., F. S.................Boston, Mass.
Champion Ignition Co............Flint, Mich.
Cowles & Co., C..........New Haven, Conn.
Cramp & Sons Ship & Engine Bldg. Co., The Wm..................Philadelphia, Pa.

Detroit Lubricator Co.........Detroit, Mich.
Dixon Crucible Co., Jos....Jersey City, N. J.
Doehler Die-Casting Co.....Brooklyn, N. Y.
Double Fabric Tire Co..........Auburn, Ind.
Dunlop Wire Wheel Corp..New York, N. Y.
Dykes, John L. G.............Chicago, Ill.
Dyneto Electric Co..........Syracuse, N. Y.

Electric Storage Battery Co., The, Philadelphia, Pa.

Findeisen & Kropf Mfg. Co....Chicago, Ill.

Gabriel Horn Mfg. Co.......Cleveland, Ohio
Garage Equipment Mfg. Co..Milwaukee, Wis.
Garford Mfg. Co., The..........Elyria, Ohio
Gemmer-Detroit Starter Co....Detroit, Mich.
Globe Machine & Stamping Co., The, Cleveland, Ohio
Golde-Patent Mfg. Co......New York, N. Y.
Gray & Davis................Boston, Mass.

Halladay Co., L. P.............Streator, Ill.
Harris Oil Co., A. W......Providence, R. I.
Hartford Suspension Co....Jersey City, N. J.
Hassler, Robert H.........Indianapolis, Ind.
Heinze Electric Co., The......Lowell, Mass.
Hoffecker Co., The............Boston, Mass.

International Acheson Graphite Co., Niagara Falls, N. Y.

J. M. Shock Absorber Co..Philadelphia, Pa.

Kellogg Mfg. Co...........Rochester, N. Y.
Kent Mfg. Works, Atwater..Philadelphia, Pa.
Kokomo Electric Co..........Kokomo, Ind.

Leather Tire Goods Co..Niagara Falls, N. Y.
Lovell-McConnell Mfg. Co....Newark, N. J.

Mosler & Co., A. R........Mt. Vernon, N. Y.
Motsinger Device Mfg. Co..LaFayette, Ind.

National Screw & Tack Co., The, Cleveland, Ohio
National Tube Co...........Pittsburgh, Pa.
N. Y. & N. J. Lubricant Co..New York, N. Y.
North East Electric Co....Rochester, N. Y.

Pantasote Co., The........New York, N. Y.
Pittsburgh Model Engine Co..Pittsburgh, Pa.

Randall-Faichney Co., The....Boston, Mass.
Rose Mfg. Co.............Philadelphia, Pa.
Royal Equipment Co., The.Bridgeport, Conn.

Sager Co., J. H............Rochester, N. Y.
Schrader's Son, Inc., A......Brooklyn, N. Y.
Schwarz Wheel Co., The..Philadelphia, Pa.
Shaler Co., C. A...............Waupun, Wis.
Sparks-Withington Co., The..Jackson, Mich.
Spicer Mfg. Co..............Plainfield, N. J.

Splitdorf Electrical Co.......Newark, N. J.
Standard Thermometer Co....Boston, Mass.
Stewart-Warner Speedometer Corp., Chicago, Ill.

Stromberg Motor Devices Co...Chicago, Ill.

Taylor Instrument Co. (Motometer Co.), New York, N. Y.

United States Light & Heating Co., The, Niagara Falls, N. Y.

Vacuum Oil Co.............New York, N. Y.
Valentine & Co.............New York, N. Y.
Van Sicklen Co., The Aurora, Ill.
Veeder Mfg. Co., The........Hartford, Conn.
Voorhees Rubber Mfg. Co.Jersey City, N. J.

Waltham Watch Co.......Waltham, Mass.
Warner Gear Co...............Muncie, Ind.
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.
Wheeler & Schebler.......Indianapolis, Ind.
Willard Storage Battery Co..Cleveland, Ohio.

Accessory Exhibitors at New York Show Only

Bosch Magneto Co........New York, N. Y.
Budd Mfg. Co., Edward G..Philadelphia, Pa.

Coes Wrench Co..........Worcester, Mass.

English & Mersick Co....New Haven, Conn.

Hartford Machine Screw Co..Hartford, Conn.
Haws, Geo. A.............New York, N. Y.
Herz & Co................New York, N. Y.

Light Mfg. Fdry. Co..........Pottstown, Pa.
Manufacturers Fdry. Co., The., Waterbury, Conn.
Perfection Spring Co........Cleveland, Ohio

Sloan & Chase Mfg. Co. (Motor Compressor Co.) ....Newark, N. J.
Springfield Metal Body Co..Springfield, Mass.
Standard Welding Co., The..Cleveland, Ohio

Ward Leonard Electric Co..Bronxville, N. Y.
White & Bagley Co., The..Worcester, Mass.

Accessory Exhibitors at Chicago Show Only

Buda Co., The..................Harvey, Ill.
Continental Motor Mfg. Co....Detroit, Mich.
Edison Storage Battery Co....Orange, N. J.
Ham Mfg. Co., C. T........Rochester, N. Y.
Imperial Brass Mfg. Co., The....Chicago, Ill.
National Coil Co.............Lansing, Mich.
Remy Electric Co............Anderson, Ind.
Sulzberger & Sons Co...........Chicago, Ill.
Vesta Accumulator Co.........Chicago, Ill.
Warner Mfg. Co...............Toledo, Ohio

Order of Drawing for Space

1. Willys-Overland
2. Studebaker
3. Buick
4. Cadillac
5. Chalmers
6. Hudson
7. Packard
8. Maxwell
9. Hupp
10. Reo
11. Oakland
12. Pierce-Arrow
13. Paige-Detroit
14. White
15. Jeffery
16. Cole
17. Locomobile
18. Franklin
19. Lozier
20. Kissel
21. Case
22. Mitchell-Lewis
23. Peerless
24. Winton
25. Velie.
26. Stevens-Duryea
27. Krit
28. Stearns
29. Cartercar
30. Moon
31. Jackson
32. Olds
33. Regal
34. National
35. Haynes
36. Apperson
37. Saxon
38. Premier
39. Mercer
40. Chandler
41. Marmon
42. Briggs-Detroiter
43. Auburn
44. Stutz
45. Garford
46. Abbott
47. Marion
48. Imperial
49. Pathfinder
50. Cunningham
51. F. I. A. T.
52. Moline
53. Pullman
54. Avery
55. S. G. V.
56. King
57. Speedwell
58. Westcott
59. Inter-State
60. McFarlan
61. Kline
62. Briscoe
63. Lyons-Atlas
64. Great Western
65. Austin
66. Dodge Bros.
67. Chevrolet

Eight Electric Makers Exhibit at Palace

Both Passenger Cars and Trucks Are Displayed—Batteries, Machine Shop, Etc.

NEW YORK CITY, Oct. 10—Over fifty cars are shown by eight exhibiting companies at the Electrical Exposition and Motor Show which opened in Grand Central Palace on Wednesday, October 7, to remain open until October 17. In addition there are a score of other companies exhibiting products of interest and use to electric vehicle owners, while the machine shop and garage shown on the third floor are of interest to gasoline car owners as well.

There are five exhibitors of passenger cars, the Baker Motor Vehicle Co., Cleveland, O., S. R. Bailey & Co., Boston, Mass., Anderson Electric Car Co., Detroit, Mich., Flanders Electric, Pontiac, Mich., and Rauch & Lang Carriage Co., Cleveland, O. There are three exhibitors of trucks, Commercial Truck Co. of America, Philadelphia, Pa., General Vehicle Co., Long Island City, and Ward Motor Vehicle Co., New York City. Some of the exhibits are described herewith:

The Baker exhibit consists of a single car—a double-drive brougham model BBD upholstered in dark green cloth. The lever control system is fitted with an interlocking device preventing the use of more than one set at a time. The control lever is set just above the steering lever and is considerably shorter. The controller is of the continuous torque drum type and gives six speeds forward and three reverse. An automatic circuit cuts off the current when the emergency brake is applied and the current cannot be turned on again until the brake is released. The body work is up to date, the panels being of aluminum, window sashless with mechanical lifters and equipment being complete. The car sells for $3,000 with bevel gear drive and $3,250 with worm drive.

The Rauch & Lang company shows two cars, both broughams, one a double drive model costing $3,200 and the the other a single drive at $2,950. The former is finished in gray and the latter in black. Both have the characteristic R. & L. worm drive system in which the motor drives through a short propeller shaft with two universal joints direct to the worm. The worm is carried on ball bearings above the gear. The springs are long and flexible, sashless windows, deep and comfortable upholstery, complete lighting and full equipment being provided.

The Anderson company has the largest exhibit of pleasure cars, showing two Detroit Electric broughams and one cabriolet. These models were fully described in THE AUTOMOBILE for October 8 and further comment is unnecessary than to state that they are up to date in every particular and fitted with the most complete equipment. All but one of the six body types for 1915 are mounted on 100-inch wheelbase underneath worm drive chassis, while the other is fitted to a 94-inch bevel drive chassis. Among the improvements on the new cars are: The new wiring method, facilitating body removal, increase in battery capacity, better protection for mechanism, and the drip molding over the doors for production against the rain. Prices on Detroit electrics range from $2,660 for the 94-inch wheelbase car with lead battery to $3,880 for the five-passenger with Edison battery.

The General Vehicle Co. shows a 2-ton chain drive chassis on the third floor which is painted in a variety of colors, each color distinguishing a separate system; for instance, the brake system is all one color, the control system another, the drive system another, and so on. There is a large chart explaining the significance of the various hues. On the track there is a 1,000-pound chain drive car with a standard department store type of body. The exhibit on the main floor consists of two cars, a 1,000-pound worm driven truck with panel body and doors, as in pleasure cars, at the driver's space, and a 1-ton chain drive model with standard panel body.

The Commercial Truck Co. shows a 1,000-pound truck with two-motor drive direct to the wheel, there being no axle shafts or other intermediate members except for the reduction gears, which are built into the casing between the motor and the wheel. Thus the differential is eliminated and a strong type of double axle used. The company builds trucks up to 7 tons capacity and in the models from 3 1-2 tons up, four wheel drive is employed, there being steering pivots for all four wheels, permitting four wheel steering also. The motors swing with the wheels. In the small type worm drive also is employed. Upstairs on the track, on the third floor, there is a 1-2-ton truck running and also a two-motor taxicab.

An extensive exhibit is made by the Ward company comprising four trucks and a chassis, ranging from the new little delivery car with steel panel body, the price of which is $875, to a big 5-ton truck. The little car is a new model having a Westinghouse motor driving through a jointed propeller shaft to the Timken rear axle. The carrying capacity is 750 pounds. Equipment is complete. The regular battery equipment of the Ward trucks is Philadelphia, although any battery the purchaser prefers will be installed. Other Ward exhibits include the 1,000-pound trucks used for delivery and heavier types in which final drive is through a jackshaft and chains and to the jackshaft from the motor through a silent chain.

The garage and machine shop exhibit on the third floor includes a variety of machine tools ranging from a heavy motor driven lathe to a light drill press. There are milling machines, shapers, electrical controls and switchboards, forges, vises, etc. The Andrew Greis Co., New York City, shows a corrugated steel garage beside the track on which demonstrations and tests are being given.

Philadelphia, Exide, Edison and Gould batteries are shown complete and in detail and although there are no radical changes it is noticeable that thin plates are much favored for lead batteries. By designing these plates so that the sediment spaces are sufficiently large to hold all the deposit until the plates are worn out, the necessity for washing is eliminated.

The Automobile Club of America has an exhibit where information on roads, sign boards of various types and general tourists' information is available. The Electric Vehicle Assn. of America has an exhibit of charts of electric truck operation costs, amount of money invested by express and transfer companies, public utilities companies, department stores, Federal Departments, etc. The reduction in charging rates brought about during the last few years is also charted.

Hupp to Continue Model 32

DETROIT, MICH., Oct. 13—The Hupp Motor Car Co., has decided, owing to the general demand of its dealers, to continue to manufacture in 1915 the Model 32, in addition to the new model K announced some time ago.

Next season's price for the model 32 roadster and touring car is $950 f.o.b. Detroit instead of $1,050 this year, and the price in Canada is $1,230 f.o.b. Windsor. At these figures electric starter and lighting system are not included, but with such equipment the price will be $1,050, as compared with $1,200 in 1914.

The two models, roadster and touring cars, will remain the same in general construction as they have been this year, except in refinements of details.

The 32 has a four-cylinder block motor, 3 1-4 by 5 1-2, multiple-disk clutch, cooling by thermo-syphon, positive-feed lubrication, high-tension ignition and selective three-speed gearset. The rear axle is a floating type. The wheelbase is 106 inches. Tires either 32 by 3 1-2 or 33 by 4, the latter with cars having the electric starter and lighting system.

24 Makes of Small Cars at Boston

BOSTON, MASS., Oct. 12—Twenty-four makers and dealers of small cars are holding an exhibition or show in Horticultural Hall this week, opening today and continuing until Saturday. Thirty-one cars are on exhibition, representing twenty-four different makes. There is a great difference between the machines exhibited and the cyclecars seen in this city last spring. Instead of the twin air-cooled motor there are many four-cylinder, water-cooled types, and the belt system of transmission has largely given way to selective sets with shaft drive. The narrow tread with tandem seating is not present in such quantities as it was 10 months ago, there being a tendency to approach nearer to the standard 56-inch tread, although there are several treads under 40 inches, in which staggered seating is used.

One purpose of the present show seems to be a concerted movement to impress on New Englanders the change that has been wrought during the last 10 months, demonstrating the passing of the cyclecar and the stepping up into the regular automobile field. Today it is a standard design of motor, only smaller; a standard gearset, only smaller; a standard transmission system, only smaller;; a standard body design, only smaller; in fact, there is not any division in the automobile field as many would like to make out, rather the cyclecar movement has almost spent itself, and those who have come through the last year of development are today building smaller-sized motor cars, that have all of the components, or most of them, of the moderate car.

Among the different makes exhibiting are Coey, Carnation, Dayton, Dudley, Imp, Kearns, Merz, Mohawk, Morgan, Mercury, Peter Pan, Princess, Remington, Sigma, Scripps-Booth, Saginaw, Salvador, Trumbull, Tiger, Twombly, Vim, Vixen and Zip.

There are twenty-one different makes exhibiting four-cylinder motors, practically all of which are water-cooled types, a fact which proves the passing of the twin two-cylinder, air-cooled motor which was so much in the public eye when the cyclecar movement was started. The majority of the cars exhibited are for two passengers in which they are seated side by side rather than tandem. Some of the concerns which manufactured some of the cars on exhibition are not manufacturing at the present time.

Hess-Bright Wins Bearing Suit Appeal

Conrad Patent on Continuous Race Held Valid and Lower Court Reversed

PHILADELPHIA, PA., Oct. 7—Reversing the decision of lower court, the Philadelphia Circuit Court of Appeals today handed down a decision in favor of the Hess-Bright Mfg. Co., in its suit against the J. S. Bretz Co. alleging infringement of the Conrad patent Numbers 822,723 and 838,303 covering the continuous and uninterrupted race type of construction in ball bearings.

The suit was brought last year by the Hess-Bright Mfg. Co. of Philadelphia, Pa., and the Deutsche Waffen und Munitions Fabriken of Germany, against Hedwig Fichtel and Ernst Sachs of Germany, doing business as Fichtel & Sachs, and their exclusive American representative, the J. S. Bretz Co., of New York.

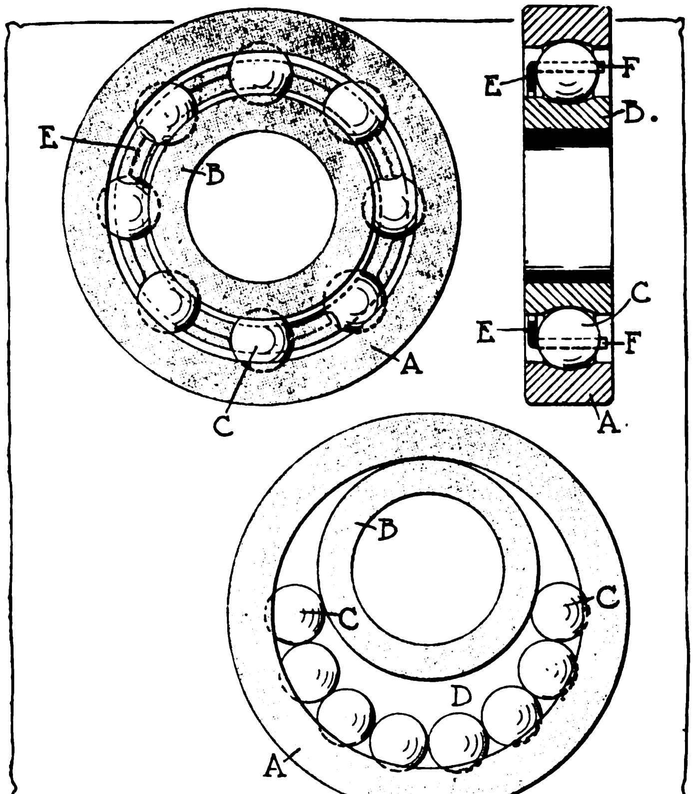
Judge McPherson in the U. S. District Court of Philadelphia handed down a decision in favor of the defendants last December, and shortly afterward the Hess-Bright interests appealed the case to the Circuit Court of Appeals, which has just decided in their favor.

In a nutshell the decision states that the F. & S. bearing infringes because it is a ball bearing with a continuous grooved race surface while in actual operation. Although the F. & S. bearing has an opening in the groove through which the balls are inserted, the groove is not fully interrupted and therefore is continuous after the bearing has been assembled.

The case was argued before Circuit Judges Buffington and Hunt and District Judge Witmer. In the decision Judge Buffington brought out the following points:

"It will be noted that Conrad patents for finished ball bearings adapted for use and not for the method of assembling. Thus in his patent he says: 'I do not claim in the present application to describe method of assembling the parts of my improved ball bearing, this method being claimed in a divisional application filed May 18, 1906.' And, as showing that his patent was for a finished ball bearing, adapted for use, he says: 'The principal advantage of the new bearing lies in the continuity of the size of the groove, which insures the regular running of the balls, and consequently great durability of the bearing.'

"The practical ball bearing art as practiced prior to Conrad's patent was well described by Judge Holland in 177 Fed. Rep. 144 in these words: 'Many patents have been issued for ball bearing devices, which have not been entirely satisfactory for the reason that the tracks or ways were interrupted and the ball consequently could not travel freely therein. It was old to have inner and outer rings with opposing grooves, but the sides of these grooves were interrupted in one way or another to permit the introduction of the balls. In some cases, filling openings were provided and in some instances these were filled up or plugged after the balls had been introduced in order to prevent the escape, but these prior devices were defective in that the raceways would crumble or were at the interrupted parts of the raceway, and then the injured balls would cause undue wear to the remaining portions of the raceway, and thus the bearing suffered a rapid depreciation, and often entire failure in a comparatively short time, and where the filling openings were plugged to prevent the escape of the balls the



The Conrad ball bearing patent embodies two concentric rings, A and B, having between them a number of balls, C. Each ring has a groove, the sides of which overhang the balls to a slight extent. The edges of the rings are spaced so far apart that they may be displaced, leaving a crescent-shaped space, D, for the insertion of the balls. The rings can then be restored to the concentric position and the spaces, F, which are held together by the ring, E, shown in section, keep them in their relative positions

plugs could not be given precisely the same temper as the rings forming the remaining portion of the raceway, and unequal wear would ensue which resulted in injury to the balls and raceway, and an undue shortening of the life of the bearings. These bearings could safely be subjected only to light loads, and were entirely unsatisfactory and not fitted for use in heavily built rapid moving vehicles."

"Conrad simply brought into the art a metallically unbroken groove pathway for the balls. This pathway he kept unbroken by introducing the balls by eccentric displacement of the rings; the retention of the balls and the concentricity of the rings he effected by ball spreaders. Conrad's novelty and contribution to the art consisted in disclosing the actual use of a continuous or unbroken groove as a pathway for a ball bearing.

"The specification as originally made, together with all the claims, were not satisfactory to the office—a fact possibly due to the non-familiarity of the foreign applicant with American patent requirements—and in the subsequent proceedings each and every one of the original claims were rejected. The entire original specification was then withdrawn and another substituted. These facts are all important for the contention of the defendant in effect is, that the claims granted should be given the effect the claims originally made would have had. That the device itself for which Conrad received his final claims was the same one for which he sought his original claims there is no question. But while Conrad had in view the broad, general character of the ball bearings he there disclosed and illustrated, we think, his specification as originally drawn did not specifically and with exactness define wherein the precise inventive feature of his device lay nor did he properly confine his claims to such inventive feature. As we have seen, the gist of the ball bearing disclosed by Conrad was the unbroken, continuous, unrecessed and integral grooved pathway. When, however, he came to make all three of his original claims they were each and all not for such grooves, but for rings 'unrecessed and unbroken.' While of course, such an 'unrecessed and unbroken' ring undoubtedly physically had on its face Conrad's 'unrecessed and unbroken' groove, yet the unbroken face of the ring was a mere mechanical strengthening incident for no matter how much the ring face, as a face unbroken and unrecessed, the invention did not lie in the integrity of the ring face but in the continuity of the sides of the groove. Such being the case, it is clear that the claim originally made for rings 'unrecessed and unbroken' needlessly embodied in the claim the narrowing limitation of necessitating the ring surface to be unbroken when the real invention lay in requiring the groove side to be unbroken and unrecessed. And anticipating what will later be apparent we may here say that if Conrad's claims had thus remained for 'unrecessed and unbroken' rings the defendant would have avoided infringement of this narrow claim by merely slotting its rings though in doing so it had cut into and broken the continuity of the sides of the groove. Presumably attention must have been called to this fact by the office, since in the new specification and the claims which met the office approval, this oversight was remedied and in the new specifications it was shown that 'the principal advantage of the new bearing lies in the continuity of the side of the groove' and new claims were made, not for rings 'unbroken and unrecessed' as before, but for 'opposing grooves on their adjacent faces, the sides of said grooves being uninterrupted throughout their circumference,' 'each ring having a groove both sides of which overhang said balls and are continuous and practically integral throughout their circumference.'

"We find nothing in the way of prior patenting or use that suffices to shear Conrad's device of patentable novelty, for without entering into a discussion of the prior art, we may say that while ball bearings were known and used, there was prior to Conrad no use of ball bearings in the high speeds and heavy loads which his device has made possible. . . . We therefore hold the claims of his patent here involved are valid.

"The question of infringement practically and mechanically turns on the effect and sufficiency as a ball confiner of a steel dam or barrier so slight in height that its gradual rise from the central line of the balls' grooved pathway ceases when 44-10,000 of an inch is reached. The Court below said: 'How such a minute fraction as 44-10,000 of an inch would 'overhang' is not perceptible.' At bar, counsel for complainant stated, that if this defendant cut his channel entrance deeper by 44-10,000 of an inch all questions of infringement would be abandoned. That the curve does 'overhang' the ball is, we think, self evident.

"The methods of introducing the balls are practically the same in the case of both complainant and defendant, the slot-inserted additional balls of the defendant's device being the mechanical equivalent of Conrad's spreaders.

"The decree dismissing the bill must therefore be reversed and the case remanded with directions to the court below to enter a decree holding the claims in issue valid and infringed and directing an accounting."

Cuts Gasoline Price—Raises Storage

NEW YORK CITY, Oct. 13—The movement on the part of New York's West Side garagemen to raise storage $5 a month and place gasoline on a 5-cent profit basis has not met with the success anticipated. About thirty garagemen were affected and it was expected that they would make their rates $35 and $40 a month in non-fireproof garages and $40 and $45 in fireproof garages.

One of the leaders in the movement was Morris Segall, of the Apthorp Garage, 214 West Eightieth street, and when, as he states, he found that his competitors were cutting storage rates and taking in cars at the old schedule he decided to take action against them. Accordingly he has reduced gasoline to 16 cents—a 3-cent profit—and is selling it at that figure. His storage remains at the new schedule.

Under the old rates of about 22 cents for gasoline and the old prices for storage, garagemen stated that the sole profit of the business came from gasoline, oil and supplies, and the storage increase was sought as a real business move.

Disappearing Safety Signs for Detroit

DETROIT, MICH., Oct. 12—The Police Department has presented a project for the establishment of disappearing safety zone posts, that would be in the shape of iron standards carrying a marker upon which the words "Safety Zone" would be written. The posts are to be embedded in the streets fitting in an iron casing in which they would be locked up at night. They could be raised and lowered by the traffic officers and will have chains attached to them to mark off the street car stopping zones. The advantage of such posts will be to leave the streets entirely free for parades or any special events and would also do away with the suggested platforms. If desired a light could be provided for the posts.

Illinois Garage Owners' Association Formed

CHICAGO, ILL., Oct. 13—The National Garage Owners' Assn. has been formed in Chicago and has opened offices at 2431-41 Cottage Grove avenue. F. E. Christian is president and G. E. Pfleger is secretary of the garage men; M. I. Iles is president and C. B. O'Hare is secretary of the supply men.

Maxwell Earns 12 Per Cent. on First Preferred

Net Earnings for Fiscal Year Total $1,430,444.52—Quantity Production Economical

NEW YORK CITY, Oct. 12—The annual report of the Maxwell Motor Co., Detroit, Mich., whose fiscal year ended July 31, 1914, shows net earnings of $1,430,444.52, or 12.26 per cent. on the first preferred, after deducting costs of manufacturing and expenses of advertising, selling, administration and taxes. Other income, including cash discounts on goods purchased and sundry miscellaneous revenue, amounted to $339,979.02, while the total income amounted to $1,770,423.54. Deductions, that is, depreciation on buildings, machinery and tools, over and above repairs and replacements, amounted to $264,956.45, bringing ten net income, or surplus, for the year to $1,505,467.09.

The general balance sheet shows: Assets—real estate, machinery and equipment, $4,462,222.42; investments, $694,656.15; good-will, models, patents, trade marks and trade names, $26,500,000; current working assets, inventories, $4,588,972.70; accounts receivable, $428,495.55; notes receivable, $212,455.36; prepayments, $50,898.46; cash, $1,785,992.68,992.68, total assets, $38,723,693.32.

Liabilities: First preferred stock, $13,000,000; less in treasury, $720,667.99; second preferred stock, $11,000,000; less in treasury, $872,532.01; common stock, $13,000,000; less in treasury, $221,942.42; real estate, mortgages, $30,160.60; current liabilities, $951,490; reserve for depreciation of capital assets, $280,132.68; reserve for contingencies, $100,000; surplus, $1,505,467; total liabilities, $38,723,693.32.

In his report to stockholders President Walter E. Flanders says: "Early in the first fiscal year the management became convinced of the wisdom of concentrating its energy on a large volume of production of moderate priced Maxwell cars. Accordingly preparations have been under way during the past 10 months to bring the factories in Dayton, Newcastle and Detroit up to a large production which is particularly adapted to a quantity production of one model car has been installed at all of these plants. The Maxwell Motor Co., Inc., is especially fortunate in that it produces nearly the complete automobile from raw materials in its own factories, which effects a large saving in costs over assembled cars.

"The net working assets of approximately $6,000,000, of which over $1,750,000 is cash, place your company in a strong position. Although the net earnings of the company amount to more than $1,500,000 as against annual dividend requirements on the first preferred stock of $895,553, the management has deemed it advisable to conserve the liquid assets of the company for the development and extension of its business. Therefore, no dividends have been declared."

Market Reports for the Week

A few prices declined in this week's market reports. These were $0.00 1-4 for antimony, $0.50 per ton for Bessemer steel, $0.20 per barrel for cottonseed oil, $0.04 for linseed oil and $0.87 per 100 pounds for tin. Electrolytic copper rose to $0.11 7-20 while the Lake copper rose to $0.11 1-2 per pound. Rubber, fine Up-River Para remained constant throughout the week at $0.64.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.11 1/4	..	.11	.11	.11	.11	—.00 1/4
Beams & Channels, 100 lbs	1.26	1.26	1.26	1.26	1.26	1.26	......
Bessemer Steel, ton	20.00	20.00	19.50	19.50	19.50	19.50	—.50
Copper, Elec., lb	.11	.11	.11 3/5	.11 3/5	.11 3/5	.11 7/20	+.00 7/20
Copper, Lake, lb	.11	.11	.11 5/11	.11 5/11	.11 5/11	.11 1/2	+.00 1/2
Cottonseed Oil, bbl.	5.40	5.39	5.35	5.35	5.30	5.20	—.20
Cyanide Potash, lb.	.28	.28	.28	.28	.28	.28	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.92	.92	.92	.92	.92	.92	......
Lead, 100 lbs	3.50	3.50	3.50	3.50	3.50	3.50	......
Linseed Oil	.53	.53	.49	.49	.49	.49	—.04
Open-Hearth Steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	.64	.64	.64	.64	.64	.64	......
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb	30.75	30.50	30.75	30.20	30.15	29.88	—.87
Tire Scrap	.05	.05	.05	.05	.05	.05	......

Franklin's Sept. Shipment Increase 743%

SYRACUSE, N. Y., Oct. 13—The Franklin Automobile Co., this city, is showing a large increase in business. Shipments during August and September show an increase of 254 per cent. over the same 2 months of last year. For September the shipments were 743 per cent. over the same period of last year. For the 3 months of July, August and September the shipments were 124 per cent. over the same period last year. For the 12 months ending September 30, sales were 88 per cent. over the previous 12 months.

Efficiency Survey in Financial Difficulties

CHICAGO, ILL., Oct. 14—*Special Telegram*—An involuntary petition in bankruptcy was filed in the United States District Court, in Chicago, Monday, October 12, against the American Efficiency Survey of Motor Car Units, a corporation formed for the purpose of making tests of various motor car parts and accessories. The liabilities of the concern are said to be in excess of $60,000. The Central Trust Co., Chicago, has been made receiver;; the assets, according to the attorney for the petitioning creditors, consist of office furniture in the company's twelve-office suite on Michigan Boulevard.

The American Efficiency Survey of Motor Car Units came into prominence 6 months ago when its president, Harry Newman, announced that day and night tests were being conducted at the testing laboratories of Purdue University with a view to advising motor car manufacturers as to the merits and demerits of their products or parts. No reports have been made public up to this time, but it was stated by the president some weeks ago that data for publication would be ready in a short while.

Electric System for Saxon, $70 Extra

DETROIT, MICH., Oct. 14—*Special Telegram*—The Saxon Motor Co. is now furnishing its cars with an electric starting and lighting system, if so desired, at an addition of $70, the price of the car thus being $465.

26,811 Cars Licensed in Connecticut

HARTFORD, CONN., Oct. 12—The secretary of state's business for the year which has just come to a close amounted to $406,623.34, an increase of $85,826.82. Licenses issued for passenger and commercial cars were the greatest source of revenue.

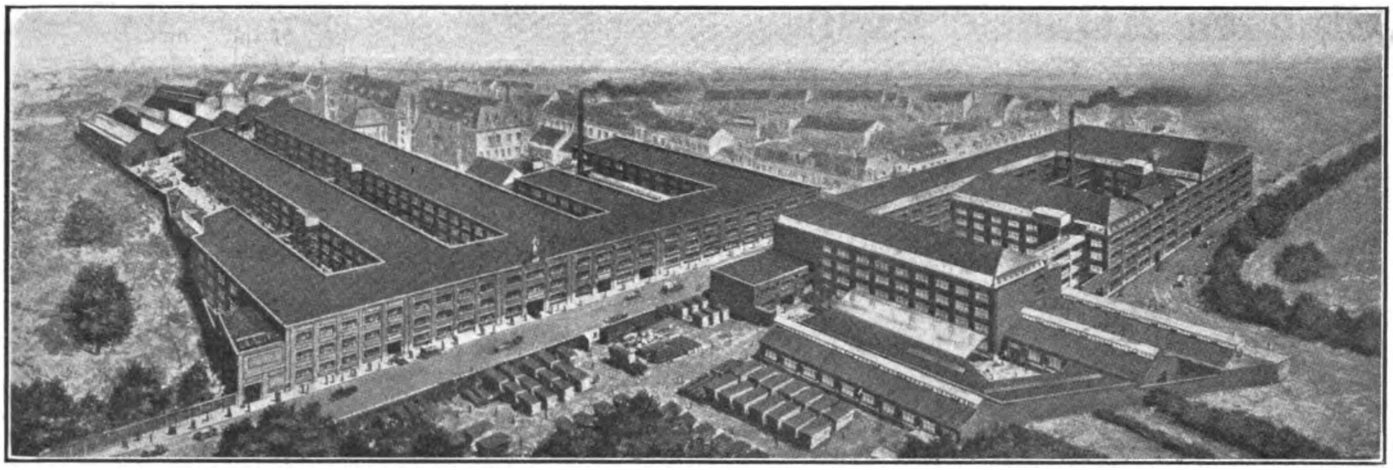
In 1913, 22,440 licenses were issued, for which the sum of $226,650.10 was received.

For the fiscal year of 1914 the number of licenses was 26,811 and the revenue was $291,371.36. There were 823 livery cars licensed in 1913 and 1,289 in 1914, the revenue increasing from $6,529.30 to $10,302.10.

There was a big drop in the number of dealers' licenses. In 1913, 372 dealers were registered, in 1914, 171, a drop of approximately 54 per cent., which may be accounted for by the fact that the dealers' rate was increased this past year which had a tendency to eliminate many of the so-called dealers who never registered more than one car. This past year the dealers' rate was $50, against $20 a year back. However, the revenue increased from $6,955.82 in 1913 to $7,224.97 in 1914, or approximately an increase of 3 per cent. There were 36,372 operators' licenses issued in 1914, against 30,199 in 1913, a jump of 20 per cent., and the fees jumped from $60,398 in 1913 to $72,744.

163,604 Cars Registered in New York

NEW YORK CITY, Oct. 13—Mitchell May, Secretary of State, announced recently that since February 1 last, 163,604 automobiles have been registered in this state, 69,197 representing new machines registered and driven for the first time by resident owners, 28,888 being resident owners of New York City. After August 1, when the law allows one-half rate for all original registrations, there have been 8,578 new cars, 3,425 belonging in New York City. The total number of cars registered for the entire 12 months of last year amounted to 134,405, of which 61,094 were originals.



Bird's-eye view of the Minerva Motor Works at Antwerp, destroyed in the recent siege of the city. One of the buildings was used by the Belgians for making firearms and ammunition

90 Per Cent. of Passenger Cars in Red Cross Work

NEW YORK CITY, Oct. 12—J. R. Clarke, recently with the Packard company in Paris, France, has just returned to this country after serving nearly 1 month as driver of a Packard car in the service of the Signal Department of the Allied Army. During 18 days of service of this capacity he had an opportunity of observing many of the conditions that motor trucks and passenger cars are confronted with in the war work. Fully 90 per cent. of all the passenger cars are being used in Red Cross work. These cars are suffering largely from lack of drivers. Frequently taxicab drivers are placed on high-powered cars with which they are not familiar and accidents are frequent. Many of these taxicab drivers are not familiar with necessary care a car should receive, and consequently there are many cars destroyed through sheer carelessness.

There is much danger connected with driving cars in any service, largely because the lights are put out in the city streets and at points along country roads for safety purposes. They are not allowed to use headlights and as there is practically as much driving done at night as in the daytime there are many cars destroyed. Many Ford cars are at present being used in the ambulance service. When war broke out a number were requisitioned by the government and at that time the company started to equip a number of chassis with ambulance bodies which are proving satisfactory.

Mr. Clarke had an opportunity of observing the work of the motor truck convoys in the transportation of ammunition and supplies. At times 150 to 300 trucks are run in convoys, successive trucks being about 50 yards apart. They travel generally at 15 miles per hour and keep on the regular roads, there being such a network of these that it is not necessary to do any cross-field work.

At present the English army is losing approximately 100 trucks a week and the French army an equal number due to the average destruction which occurs. For example, a truck halts at the roadside to make some repair and if the driver leaves it there is danger of the drivers of other vehicles stealing magnetos, carbureters, or other spares which they require. Because of this many trucks are eventually destroyed for minor troubles.

The broadest use of motor trucks for the different armies is from what is known as Pailhead, which means the end of the railroad system in use, to within a short distance of the firing line, in fact, provision wagons are operating right up to the trenches in some places and Red Cross vehicles are also working right to the firing line.

The Goodrich tire factory in Paris is being operated by the government which is manufacturing solid rubber tires for trucks. Practically all of the other factories in France are being operated by the army, but in many the output is very restricted because of lack of material.

At present ten Packard cars are being used in service of the American ambulance and Red Cross work.

Minerva Works Near Antwerp Destroyed

AMSTERDAM, Oct. 12—Dispatch to London *Daily Chronicle*—The following details of the occupation of Antwerp by the Germans have been given by Dutchmen who have been there since Friday:

Most of the damage done by shells is in the southern part of the town in the suburbs of Berchem and Zurenberg. Among the buildings destroyed were the St. Joseph's Church, Hippodrome and the Minerva Motor Works.

The Minerva works consisted of two large four-story buildings, on opposite sides of the street. The newer of these two buildings was largely filled with American-made machinery, while the old building was used for repair work, pattern-making, drafting, etc. Early in the war a great deal of machinery was brought down from the F. N. works in Liege. This machinery was used in the manufacture of fire arms and ammunition, automobiles, motorcycles, etc. It was installed in the old Minerva works, and most of the Belgian shells were made there. Owing to this fact it is probable that the Belgians blew up the buildings rather than let them fall into the hands of the Germans. The capacity of the Minerva works was fifteen automobiles a day. The buildings were situated just across the street from the fortifications, the ends of both structures being toward the forts.

The S.A.V.A. works, which manufacture the S.A.V.A. car, are situated nearer Antwerp, being nearly a mile from the Minerva works, so they may have escaped destruction.

The F. N. works at Liege, as well as the Derihon factory, are intact and some departments are working.

$200,000 May Be Devoted to Armored Trucks

WASHINGTON, D. C., Oct. 10—According to information gleaned from army officers and members of Congress, the next military appropriation bill will carry a paragraph setting aside $200,000 for the purchase of a certain number of armored motor cars for the use of American troops. Sentiment for such an appropriation has developed in Congress with surprising rapidity since the European dispatches began to tell of the extraordinary efficiency of armored cars in the present conflict abroad.

It is pointed out that today the United States is the only great world power which has no armored cars in its military equipment. Europeans have recognized their theoretic value for the past two or three years and the conclusions which they have reached in time of peace have been more than verified by the events of the war.

Representative Anthony, of Kansas, as previously reported in these columns, has announced he will shortly introduce a bill for the purchase of armored cars for the war department. He is convinced that there is more than enough sentiment in Congress to pass his bill through both houses. His opinion of the necessity of acquiring this equipment for the troops is backed up by the expert opinion of many army officers.

An army officer who does not wish his name to be used at this time, in discussing the subject said: "It is the opinion of many authorities on this subject that it is high time for this government to begin developing the possibilities of the armored car. It seems only reasonable that as the motor car is developed more and more, all food and other supplies will be transported by means of that vehicle. And, by the same token, it seems safe to assume that an attempt will be made to have all these cars armored as thoroughly as possible. Therefore, it does seem that the United States cannot afford to lag behind any longer in developing what is bound to become one of the most important and essential features in all military equipment."

Chicago Athletic Assn. Wins Interclub Run

Captures Ray Cup—Automobile Club Wins Cup For Most Perfect Scores

CHICAGO, ILL., Oct. 17—The Chicago Athletic Assn won the interclub team match between it and the Chicago Automobile Club with a score of 177 demerits as against 244 for the losers. There were sixty cars in the contest, thirty-seven representing the C. A. C. colors and twenty-three for the other club. In addition there were eight official cars.

The winning club took the Allen S. Ray cup while the automobile club took the Carelton White cup, given for the greatest number of perfect scores, the C. A. C. having twenty-nine as against sixteen for the C. A. A.

The run was a 1-day affair, going to George Ade's farm at Brook, Ind., for the noon stop, a distance of 95 miles. The afternoon run was 82 miles, finishing at the South Shore Country club, where the losing team paid for the dinners.

A feature of the match was the competition of Ralph de Palma and Joe Dawson. Both made perfect scores, de Palma driving a Chandler and Dawson a Marmon. This was Dawson's first appearance since his accident at Indianapolis on May 30.

Three failed to finish and in each case there was a penalty of 250 points given. Forrester in a Packard was put out when another contesting car punched a hole in his gasoline tank. Hosmer in a Hudson was disabled, while Rankin in a Cole never checked in. Most of the other penalties were of a minor character.

Mitchell Perfect in St. Louis Run

ST. LOUIS, MO., Oct. 10—A Mitchell was the only car to make a perfect score and get 1,000 points in the 126-mile owners' reliability run today conducted by the Automobile Club of St. Louis. It contested in Class B for roadsters.

In the Class A division for touring cars the first five cars to finish were Franklins with respective scores of 996, 995, 994, and two with 993 points each.

In the roadster division a Mercer was second to the perfect-score Mitchell with a score of 996 points and a Henderson was third with 995 points.

Two women drove in the contest, one in a Stutz finishing fifth in the runabout division and the other finishing third in a Franklin.

The route was over the hilly roads outside of the city and seven checking stations were used. The roads were poor owing to recent rains.

A penalty of 1 point was given for being off schedule, while other penalties were given for the stopping of the motor, rendering of assistance to contestants, taking on supplies at any other than the one checking station at Pond, for hitting or being hit by another car and for being arrested.

London Dealer Secures American Agencies

NEW YORK CITY, Oct. 10—Frank Morriss, a motor car and accessory dealer from London, England, and who has recently been in this country for upwards of 3 weeks, has secured numerous agencies for cars and parts which shows the activity towards American goods that is being manifested abroad at the present time. Among the arrangements made are those covering Salisbury axles, Zephyr carbureter, Imperial car, Scripps-Booth small car, Signal truck and farmer motor.

Six Entries for Corona Road Race

CORONA, CAL., Oct. 7—Six entries have been received for the Corona road race to be held here Thanksgiving Day. Three Mercers have been entered by the Pacific Coast Mercer agency.

Walter M. Brown, Los Angeles sportsman and manager of the Stutz interests throughout Southern California, has entered three Stutz cars. Earl Cooper, winner of the Corona classic last year, has been named as the driver of one of the cars. Gil Anderson is the second member of the Stutz team and Barney Oldfield is slated as the driver of the third Stutz.

Frank Young has announced that he will enter the Ono racer which was wrecked at Tacoma, July 4. The Ono is the Fiat which won the Santa Monica road race two years ago. The Fiat engine has been displaced by a Pope-Portola motor and the car has been rebuilt completely.

Sigma Stars at Small Car Races

BOSTON, MASS., Oct. 10—A program of small car races was held at Combination Park, Medford, this afternoon before a good crowd. There were ten machines entered. The opening event was 5 miles for Class A cars and it was won by the Dudley Bug. The Sigma won three events, the 5-mile class B, 2-mile match race between this car and the Tiger and Zip and a special match race with the Tiger at 2 miles. The big event was the 50 kilometer, free-for-all. The race was won by the Tiger, with the Coey Bear second and the Imp third.

Fuel Tax Protests Flood Congress

WASHINGTON, D. C., Oct. 13—*Special Telegram*—Despite the fact that the Senate Democratic caucus decided to eliminate the tax on automobiles and gasoline, Congress continues to be flooded with protests against the proposed tax. If the house has any idea of reviving the tax the thousands upon thousands of protests surely will tend to convince the representatives of the people that such a tax would be a death blow to one of the greatest industries in the country.

Senator Simmons, Chairman of the Senate Finance Committee in a speech, said that a war emergency tax would prove unpopular.

Senator Borah in a sensational speech yesterday predicted that another revenue measure would have to be passed in a short time imposing additional taxes, and if this were so automobile manufacturers are likely to suffer.

Yesterday, Senator Simmons tried to get an agreement by unanimous consent for vote on the war revenue bill October 22, but Senator Overman objected and disclosed for the first time that senators from the cotton growing states were preparing to offer as an amendment to the war bill, legislation to help out cotton planters in the South.

To Reorganize Piggins Truck Co.

RACINE, WIS., Oct. 13—The Piggins Bros. Motor Truck Co., Racine, Wis., which went into bankruptcy about a year ago, is being reorganized by the Piggins brothers and expects to resume operations about November 1 in the former plant on West Sixth street. The entire equipment was sold at bankrupt sale to the Badger-Packard Machinery Co., Milwaukee, and most of it has now been repurchased and is being installed in the plant. The Racine company has secured ample financial backing.

Voiturette May Auction Off Cars

DETROIT, MICH., Oct. 9—At the meeting of the creditors of the American Voiturette Co., held at the Detroit Trust Co., receiver, it was decided to continue and build quite a large number of Car-Nation cars and a few Keetons for which all the needed parts and material to assemble them is on hand. Together with the finished Car-Nations on hand there will be 375 such cars which will be offered for sale at a uniform price of $250, while the Keeton cars will be offered at $1,000. If the Detroit Trust Co. does not receive a satisfactory offer within the next few days, it is likely that an auction sale will be arranged to dispose of the cars.

According to the statement which was issued by the Detroit Trust Co., concerning the affairs of the company, the total assets are $477,294.76, while the liabilities are $508,889.77.

Urges Adoption of Metric System

LONDON, ENGLAND, Oct. 3—The metric system of weights and measures prevails in the great majority of neutral countries with which hitherto Germany has carried on a very large trade, and if the efforts to capture that trade are to be successful British manufacturers and shippers must adapt their methods to those of their customers. This is made quite clear by the recent Board of Trade reports which confirm what this association has been preaching for years past.

The Decimal Assn. will do its best to help manufacturers and merchants who need advice on this subject, and if sufficient support be forthcoming for the campaign a series of lectures under the auspices of Chambers of Commerce will be held during the winter. Legislation is obviously out of the question for the time being, but every effort will be made to awaken public opinion to the necessity for the change, and to show that in many centers it is indeed impatiently demanded. Not only do our obsolete and cumbersome weights and measures hamper our external and internal trade, but the time wasted in teaching them in schools might well be put to very much better use.—G. E. M. JOHNSON, Secretary of the Decimal Assn.—*The Autocar.*

Governor Will Ride in New York Pageant

NEW YORK CITY, Oct. 13—When a Committee from the New York Commercial Tercentenary Commission, including Colonel Louis Annin Ames, Commissioner William J. Lee, and E. A. Norman, visited Governor Glynn at Albany last Tuesday and extended the Commission's formal invitation for him to participate in the Tercentenary Automobile Pageant on the night of Wednesday, October 28, the Governor not only accepted and agreed to review the Pageant from the Court of Honor, but to ride in the parade over the full line of march as well. He also will be accompanied by his military staff. Mayor Mitchel and numerous other high officials have been invited to ride in and review the pageant, including Secretary of Commerce Redfield, Secretary of State Mitchell May, General Nelson A. Miles, Mayor Preston of Baltimore, and the Mayors of numerous other cities.

Indiana S. A. E. Studies Cord Tire Making

INDIANAPOLIS, IND., Oct. 14—The October meeting of the Indiana Section of the Society of Automobile Engineers was held in the Hoosier Motor Club Rooms, Claypool Hotel, last evening. The subject of the evening was: Steps in the Process of Manufacture of the Latest Types of Automobile Tires with Special Reference to the Cord Tire and Its Advantages, by Otto F. Wagenhorst, of the B. F. Goodrich Co., Akron, O.

The Engineering Digest—Carey's Oil Transmission

(*Continued from page* 722)

pens to be under pressure, this automatic throw-over valve consisting of a ball working between two conical faces; it also connects the balancing areas of both the pump and the motor valves to the pressure side of the apparatus. Some of these details are indicated in the section to the right of the illustration.

With regard to the practical advantages of the Carey construction, it is noted that the whole machine is contained in a single body casting of even bore throughout and is easily accessible, as all the parts can be withdrawn from either end by unscrewing the end covers. The machine work is simple and internal packings are not required, the only packings being leather washers around the ends of the rotating shafts, and these have little pressure upon them, being separated from the working oil by a series of minute passages, in the shape of play in the various bearings, acting as reducing valves.

Further developments of this transmission, in the direction of adapting it for use in automobile chassis, are expected.—From *The Engineer*, August 14.

Utilizing the Camshaft for Power in Renault 8-Cylinder Motor

With the advent in the American market of the 8-cylinder V-type motor some of the features which have been associated with this style of motors in Europe claim attention and serve to throw light on possible new developments. The reduction in the size of cylinders which would naturally follow, for given power requirements, where an 8-cylinder power unit were adopted to take the place of a 4-cylinder one, suggests at the same time cooling by air draft instead of by water. While the De Dion-Bouton 8-cylinder motor is water-cooled, the Renault aviation motor which is arranged on the same plan, though with either 8 or 12 cylinders, is air-cooled. It also is remarkable for being arranged to drive a propeller screw through its camshaft, which is located in the crotch of the V, and the camshaft gears are consequently made substantial enough for transmitting the power. The main object of this arrangement is to reduce the speed of the propeller to 900 revolutions per minute with a motor running at 1,800 revolutions at its best—the propulsion efficiency being thereby increased 15 per cent., it is said—but when it is contemplated to use a similar motor for automobile purposes, especially for trucks, and to get the advantage in compactness to be obtained by using a motor of small dimensions and relatively high speed, the value of reducing the speed of the power shaft without introducing additional gearing becomes as conspicuous as in the case of aeroplanes, and the question comes up whether Renault's expedient to this end or the adoption of a worm drive will in the end prove the more acceptable method, and whether perhaps in some cases both these means for accumulating torque at the rims of the driving wheels should be combined. In the case of automobiles, the utilization of the camshaft for power would at first glance seemingly also involve the use of two flywheels instead of one, one in front on the crankshaft and another at the rear of the motor on the camshaft, for action with the clutch, but with an 8-cylinder motor these flywheels could of course be relatively light, so as to render it practicable to use them efficiently for ventilation also, and the distribution of the flywheel weight would tend to a better distribution of stresses and the avoidance of vibrations in either shaft.

Unusual Manifolds on Singer Six

(*Continued from page* 725)

The four-speed gearset is provided throughout with Timken bearings. The shifting mechanism is simple, the gear lever being mounted directly on the gearcase cover.

Two Spicer universals and a drive shaft of the same make carry the torque from this point to the rear axle, which is a Timken type of extra heavy construction. A triangular torque member is fitted. Internal and external concentric brakes 5 by 2.5 inches are used.

The fuel is carried in a 25-gallon cylindrical tank at the rear of the chassis. The filler cap is conveniently situated on the right side while in the center there is a gauge. Pressure is supplied by means of a small air pump operated from the rear end of the exhaust camshaft.

An exceptionally heavy frame design has been adopted. The depth of section is 5 inches while the flanges are 4 inches. Houk wire wheels or Schwarz wooden wheels are optional. With the latter Firestone demountable rims are furnished. Plain tread tires are used on the front while Goodyear All-weather tread tires are found on the rear.

A feature of the radiator mounting is the use of ball trunnions allowing a slight amount of movement in every direction.

Liberal springs are used and an interesting detail of their construction is the slitting of the ends, of each spring leaf, which fit into bosses on the next larger leaf, these serving as guides to prevent shifting. The cantilever spring is 54 inches long without load and 56 inches width. It has nine leaves 5-16 inches thick and 2.5 inches wide. The front springs are 35.5 inches long, 2 inches wide and nine leaves 3-16 inch thick are used.

Cole Four Averages Over 22 M. P. G. in Tests

Six 1-Gallon Economy Runs Made—Highest Average 24.4 Miles—Conditions of Tests Varied

INDIANAPOLIS, IND., Oct. 9—A Cole four averaged 22.459 miles to the gallon of fuel at an average speed of 23.6 miles per hour in six 1-gallon economy tests held yesterday and today under the supervision of the American Automobile Assn. The highest average was 24.426 miles per gallon, which was accomplished in the fifth trial, held this morning; the lowest was 20.844 miles, made in the second trial. After these tests were over, the car was subjected to a 30-minute speed trial in which an average speed of 55.63 miles per hour was maintained. All these records were made with the top down and the windshield folded back.

The object of the tests was to determine the fuel economy of the four-cylinder Cole, with and without hot air connection to the carbureter, with pressure, gravity and vacuum feed and with various passenger loads.

The car used in this test was a four-cylinder series 11-4 with a bore and stroke of 4 1-4 by 5 1-4 equipped with a Stromberg H2 carbureter, 1 1-4 inch size, Silvertown cord tires, 34 by 4 all around and Delco starting lighting and ignition units. The car weight is given as 3,230 pounds without passengers.

In order to be able to use either pressure, gravity or vacuum feed a separate 5-quart tank was carried, the main tank at the rear being disconnected. The test tank was provided with connections so that it could be used for the different systems of feeding. For gravity a measured gallon was poured into the tank and the latter fastened to the left windshield bracket. For pressure feed the same tank was placed on the running board and a hand pump used to force air into the tank. For vacuum feed the tank was left on the running board but the feed was through a Stewart vacuum tank behind the dash of the car.

Four Trials Yesterday

Yesterday four fuel economy trials were held, the first starting at 11.20 a. m. when the thermometer showed 81 degrees. The feed to the carbureter was by gravity. No hot air connection was used and the Cole, driven by engineer Charles Crawford and accompanied by another passenger, ran out of its 1 gallon of fuel after completing 22.496 miles.

This was at an average speed of 23.20 miles per hour. The fuel used was purchased of the Crescent Oil Co., is known as Coalene and was of 67 degrees Baumé. This fuel was used in all of Thursday's trials. On the first trial the car weighed 3,586 pounds complete.

On the second trial a standard gallon of fuel was fed to the carbureter under 2 1-2 pounds pressure and during this trial the weather was very unsettled, a shower and a severe drop in temperature coming in the second half. At the start of this trial the thermometer showed 81 degrees and at the finish 74. That the motor was affected by this is evident by the notometer readings which varied from 100 at the start at 12.40 p. m. to 115 at 1.05 p. m. to 100 at 1.10 p. m. and 110 at the finish. The run was made with the driver and one passenger and the engine stopped for lack of fuel at 20.844 miles after traveling at the rate of 23.38 miles per hour. The drop in mileage per gallon may be directly attributed to the varying temperatures. No hot air connection was used.

The third trial was made with the carbureter fed from the tank by the Stewart vacuum system. No hot air connection was used and with one passenger and the driver the car completed 22.028 miles on 1 gallon of gasoline, the speed of the car being 22.1 miles per hour. The temperature was slightly higher on this trial, being 90 degrees at the start and 82 at the finish and the motometer showed 110 degrees at both start and finish, due to the settled weather following the shower which interfered slightly with the previous trial.

The fourth and last trial of the day was made with seven passengers in the car, giving a total weight of 4,350 pounds. No hot air connection was used and the fuel was fed to the carbureter by the vacuum system. The Cole went around the speedway for 20.454 miles before the measured 1 gallon was exhausted and the speed for the trial was 23.40 miles per hour.

Two economy trials with hot air connections to the carbureter and one speed trial were held today and in all three events gasoline of 61 degrees Baumé was caused.

The first trial today was made at 10.10 a. m. with the carbureter fed by the vacuum system and fitted with a hot air tube leading from a stove on the exhaust manifold to the carbureter. Two passengers were in the car including driver Crawford who piloted the Cole for 24.462 miles at a rate of 24.55 miles per hour, before the 1 gallon of fuel was exhausted. The car weighed 3,650 pounds, the added weight being due to a supply of gasoline taken on for use in succeeding tests. A heavy shower caused various changes in the registrations of the motometer. At the start of the run it showed 120 degrees; at 10.32, 140 degrees, at 10.45, 120 and at the finish, 110 degrees. The air temperature was 70 degrees at both start and finish.

With Seven Passengers

The last fuel-economy run was made with the same fittings as in the previous one, but there were seven passengers in the car. The weather was by far the most favorable of the day and the 1 gallon of fuel gave out at 24.135 miles, the car having traveled at the rate of 24.75 miles per hour. The total weight of the car with passengers was 4,390 pounds and the air temperature was 72 at the start and 71 at the finish. There were, however, greater variations in the motometer readings, the start showing 150 and the finish 135.

The last event was the 1-2 hour speed trial in which Lew Pettijohn, the driver, the only one in the car, drove it at the rate of 55.63 miles per hour for 1-2 hour. The car was given a flying start and eleven laps of the speedway were covered, the total distance for the half hour being 27.815 miles and a feature of this trial was the consistency of the car. During this trial the fuel was fed to the carbureter by pressure from the regular rear tank.

Plantation Tires Make 4,000 Miles in Test

LONDON, ENGLAND, Oct. 3—Four tires made entirely from Hevea plantation para have been submitted to a 4,000-mile test under R. A. C. observation. The trial was made at the instance of the North British Rubber Co., of London and took place from June 18 to August 1. A certificate has just been issued in which the following facts have been noted:

The tires were of the non-skid type, size 895 by 135 millimeters fitted to a 60 horsepower (R. A. C. rating) six-cylinder Napier car. The car weighed 4,411 pounds and the load carried was 643 pounds, giving a total running weight of 5,054 pounds. The car was fitted with wire wheels and the inflation was 90 pounds. The trial was held over the ordinary roads met in England and Scotland. The first cover burst at 3,077 miles and was withdrawn. The second ran 4,018 miles and while no work was done upon it the casing was found to be sound at the end of the trial. The third was deflated at 3,134 miles due to a pinched inner tube and again at 3,622 miles by a blowout through the cover. With this patched the two completed the test. The fourth was deflated at 2,727 miles due to the tube being nipped in some cracks in the inner lining of the casing. A tube cover completely en-

Results of 1-Gallon Economy Tests of Cole Four at Speedway

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Time of start	11:20 A. M.	12:40 P. M.	2:25 P. M.	3:53 P. M.	10:10 A. M.	12:05 P. M.
Distance	22 mi. 2,691 ft.	20 mi. 4,151 ft.	22 mi. 152 ft.	20 mi. 4,543 ft.	24 mi. 2,251 ft.	24 mi. 712 ft.
Finished miles	22.496	20.844	22.028	20.86	24.462	24.135
Time	58:07:8	53:30:0	59:45:0	53:31:0	60:15:4	58:20
Miles per hour	23.20	23.38	22.10	23.40	24.55	24.75
Weight with pass	3,586	3,586	3,586	4,350	3,650	4,390
Ton miles	40.35	37.35	39.50	44.50	44.6	53
Temp., start	81 deg.	81	90	80	70	72
Temp., finish	81 deg.	74	82	72	70	71
Motometer, start	110	100	110	100	120	150
		115 at 1:05	110	90	140 at 10:32 A. M.	140 at 12:17
Motometer, finish	115	100 at 1:10			120 at 10:45 A. M.	140 at 12:47
		110 at finish			110 at finish	135 at finish

Weight of car empty, 3,230.
Grand average, 22.459 miles per gallon.

veloping the tube for its entire length was fitted and with this the two completed the test. In a word, three out of the four successfully completed the run of 4,000 miles.

I. A. E. Discusses War and Trade

LONDON, ENGLAND, Oct. 14—At the meeting of the Institution of Automobile Engineers held tonight, L. H. Pomeroy will present a paper entitled, Automobile Engineering and The War. Mr. Pomeroy will commence his paper by indicating the duties of the I. A. E. in connection with the war. In his paper he will bring out the necessity of having ample supplies of war material as well as efficiently equipped work shops and scientific production methods.

The most important part of this paper will deal with the substitution of British made parts and accessories for those formerly secured on the Continent, and he will propose that a committee be appointed to see what can be done in the way of promoting scientific research along the line laid down in the large Continental factories. In closing his paper he will point out the necessity of increasing the production of commercial vehicles for war purposes and also the fallacy of using passenger vehicles for the commercial work.

DETROIT, MICH., Oct. 7—At the meeting of the common council held Tuesday night, the aldermen voted 27 to 7 in favor of the maintenance of street or curb gasoline pumps, notwithstanding the opposition of the Corporation Counsel, who stated that the city had no right to grant permission for the establishment of such gasoline pumping stations upon its streets. To this one of the aldermen replied that it might be so, but, that during the last 10 years the aldermen have done many things which they had no right to do. Besides, said this good alderman, these pumps are an accommodation to the public. Which was shown by the vote.

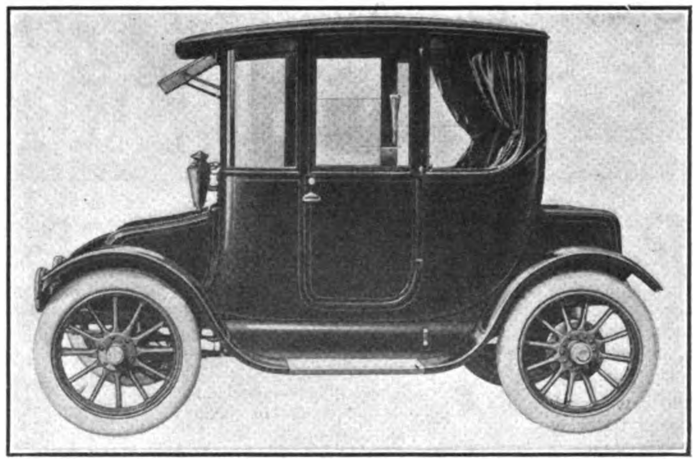
Alco Discontinues Service Station

NEW YORK CITY, Oct. 13—The American Locomotive Co. has announced that it has discontinued the operation of its automobile service station on Jackson avenue, Long Island City.

Owners of Alco vehicles in this city and vicinity requiring parts for Alco vehicles can obtain them at the service station of the International Motor Co., West End avenue and Sixty-fourth street, this city, with which company an arrangement has been made to carry a complete stock of Alco parts.

Minerva Motors Co. Takes Moline Agency

NEW YORK CITY, Oct. 13—The Minerva Motors Co., Broadway and Sixty-sixth street, this city, has taken on the agency for the Moline Automobile Co., East Moline, Ill. The Minerva company is moving from the above location to the salesroom formerly occupied by the Thomas Motor Car Co. This company has a territory which includes the Metropolitan district, Long Island, Western Connecticut, New York State as far as Poughkeepsie and northern New Jersey.



THE LATEST BAKER ELECTRIC COUPÉ

The new car weighs 1,000 pounds less than many of the electrics seen on the streets today. A unique feature of the new Baker is its seating arrangement. The front seats are of a new disappearing type and fold back out of the way when not in use. Hence, the car can be instantly converted into a three or two-passenger car.

Fafnir Co. to Sell Direct from Factory

NEW YORK CITY, Oct. 12—The Rhineland Machine Works Co., this city, reports that since a part of its business, which covers the importation of Rhineland and R. B. F. ball bearings, is so greatly interferred with by the European war, it has been arranged that the Fafnir Bearing Co., New Britain, Conn., for which it has been heretofore acting as selling agent, will market its products direct from the factory, which will in the future be the sales headquarters of the company.

D. D. Davis, who has been the Chicago manager of the Rhineland company, will make his headquarters at New Britain, and take charge of the sales of the Fafnir company. The Rhineland company will continue to assist in the sale of Fafnir bearings in conjunction with the sale of its stock of imported bearings, and such R. B. F. and Rhineland bearings as are now coming in from Europe.

Merchandising Reforms at Truck Convention

(*Continued from page* 709)

"The manufacturers alone can control the evil of cut prices, and makers can only continue in the industry by honestly placing their list prices at a reasonable figure over and above all manufacturing, administration, sales and overhead costs, and then maintaining these prices." In this sentence J. C. Millman, of the Stegeman Motor Car Co., outlined his conception of his topic "Reforms Needed in Merchandising Motor Trucks."

Mr. Millman decried extravagant discounts to dealers from inflated list prices to permit dealers to cut retail prices as a sales inducement, and stated that overproduction and inexperienced salesmanship were largely responsible for cut prices in the commercial vehicle industry.

Inefficient salesmanship is another evil. It is bred by inexperience and incompetence, and is a strong factor in the creation of the price-cutting evil. The evil of improper ratings and extravagant overload claims is disappearing. He advocated the standardization of load capacities for given specifications and referred to the practice of overload guarantees as a dishonest practice, resulting in cheating of the buyer who in his simplicity endeavors to employ his truck in defiance of natural and mechanical laws.

The trading evil, the practice of taking in used trucks as part payment on new vehicles at inflated valuations, was suggested as soluble by the discontinuance of appraisal by the dealer in the new truck, and substitution therefor, appraisal at a minimum figure by the owner and sale by the dealer for the best figure above such minimum possible. Another suggestion that struck at the root of the evil was that of restricting the creation of the used car supply by regulating and restricting the application of trucks where their adaptability to the conditions of use is iu doubt, thus permitting the user to keep his truck in service, instead of attempting to trade it back for one better suited after he has learned by experience that the salesman had made a faulty recommendation in order to compete in price with his competitors.

Mr. Millman did not condemn time payments, but advocated their restriction and placing upon a sound business basis. He stated that he considered any first payment of less than one-third unsafe, and that there was no reason why the manufacturer should turn banker, but that the matter of financing the sale be left between the buyer and his bank. There was no reason why the manufacturer should be expected to take risks that the banker will condemn. The knocking evil was not taken seriously.

FIRESTONE Uses 12,000 Tons of Steel—C. C. Carlton, head of the rim department of the Firestone Tire & Rubber Co., Akron, O., quotes figures regarding the company's rim plant, in which 12,000 tons of steel were converted into rims during the past year. It required 150,000 square feet of floor space and almost 400 mechanics to handle this material. Sixteen electric welders were required, one of them especially constructed to handle stock 14 inches wide. The storage space required to carry the stock of raw steel necessary to insure prompt handling of all orders amounted to 15,386 square feet. It requires about 1,000 box cars to carry away the season's output of rims. If these cars were made up into one train they would stretch out for almost 8 miles. Firestone rims will be used exclusively during the 1915 season by forty-nine automobile manufacturers.

Warren Rubber will Add—The Warren Rubber Co., Warren, O., will begin at once the erection of a large addition to its factory.

Wood Co.'s Motor Truck Plant—J. L. Ware, manager of Wood Motor Vehicle Co., plans to erect a motor truck factory in St. Paul, Minn.

Hupp's Dynamometer Test Dept.—The Hupp Motor Car Co., Detroit, has recently installed a dynamometer test department at an expense of over $75,000.

Manufacturing Piston Rings in Vancouver—Harmington & Diggs are arranging to open a factory in Vancouver, B. C., for the manufacture of piston rings.

Sphinx Operations Increased—Operations at the new plant of the Sphinx Motor Car Co., York, Pa., are being gradually increased, and within the next 30 days the factory will be working to capacity.

Purchases Michigan Top Equipment—The A. C. Knapp Co., Detroit, Mich., manufacturer of tops, hood warmers, slip-covers, trimmings, etc., has purchased the entire equipment of the Michigan Top Co.

Large Maxwell Shipment to California—One of the largest shipments of automobiles ever received on the Pacific Coast was the trainload of Maxwells delivered to the Lord Motor Car Co., Los Angeles, southern California distributer.

Adamson Machine Will Add—Adamson Machine Co., Akron, O., maker of automobile tire molds, will enlarge its plant with an addition 80 by 100 feet, to be used for a foundry. Some new machinery will be installed.

2,200 Fords Assembled Since March—A statement just issued by the Ford factory branch in Seattle, Wash., shows that 2,200 Ford automobiles worth $1,281,347 have been assembled and completed in Seattle since last March, when the $300,000 plant was completed.

Hill Co. Will Add—The J. Lawrence Hill Co., Cambridge street and Park avenue, Rochester, N. Y., manufacturer of carriages and automobiles, will continue the manufacture of its present lines and will not produce batteries or their parts, as has been reported elsewhere. It will add to its factory equipment.

Berry Pump Co. Secures Factory—The Berry Automobile Pump Co., Detroit, has been incorporated with a capital stock of $10,000 by H. J. Berry, W. W. Gunn and Charles Redder. The new company, which will engage in the manufacture of pumps and other devices, has already secured factory quarters.

Anderson's New Repair Plant—Because it interfered greatly with the regular work at the factory and also occasioned much congestion the Anderson Electric Car Co., Detroit, Mich., has decided that all the repair work and service department will be taken care of hereafter from the salesroom and service station at 687 Woodward avenue.

Die Castings Plant in Madison.—The Berkely-Fourness Co., organized at Madison, Wis., several weeks ago, to manufacture die castings, stampings and appliances, including a regulator for motorcar lighting systems, has established a plant at 619-621 Williamson street, Madison. The concern is also bringing out an improved lock-nut for motor car and railroad work.

Braender Rubber Enlarges Factory—The Braender Rubber & Tire Co. is erecting a large addition to its present factory at Rutherford, N. J., which will increase the capacity of its plant to approximately 1,000 tires and 1,000 tubes per day. The new building has been designed along the most up-to-date lines of factory construction. It will be 141 feet wide by 129 feet long and built entirely of brick. It will be four stories high, fireproof throughout and equipped with all the latest time and labor-saving machinery for tire and tube making.

Edwardsville Exploiting New Car.—Edwardsville, O., has a new industry, an automobile manufacturing concern, well under way. The capital stock is $100,000, of which $50,000 has been paid in. The company is building a factory 550 feet long and 150 wide in the southern part of town, and expects to turn out 5,000 machines a year. The company is incorporated as the American Standard Automobile Co., and its machines will be known as American Standards. Six types of cars, to retail at $1,375, $1,000 and $750, will be manufactured and known as American Standards. Henry Trares, Jr., Judge John E. Hillskotter, Peter Bernhardt, of Edwardsville, and H. B. Gardner, of Chicago, are directors. C. H. Gerling, of Edwardsville, and Louis Karsch, of St. Louis, are large stockholders.

The Automobile Calendar

Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 10-17	Boston, Mass., New England Light Car and Cyclecar Show, Horticultural Hall.
Oct. 17	New York City, Motor Contest Dealers' Assn., First Dinner, Healy's Restaurant.
Oct. 17	Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-23	Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1	Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 23-24	Peoria, Ill., Illinois State Assn. of Garage Owners; Semi-Annual Convention.
Oct. 28	New York City, Commercial Tercentenary Celebration.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov. 7-8-9	Los Angeles, Cal., Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 8-9	El Paso, Tex., El Paso-Phoenix Road Race, El Paso Auto Club.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 12	Phoenix, Ariz., Track Race, Maricopa Auto Club.
Nov. 26	Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4	New York City, Annual Meeting of the American Society of Mechanical Engineers.
Dec. 12-19	Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Show.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb. 15-20	Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13	Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn. Boston Commercial Motor Veh. Assn.
Mar. 7	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 9-15	Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

The Week in  the Industry

McCULLA Goes to Knox—W. R. McCulla, who has been with the Packard Motor Car Co., Detroit, Mich., for several years as assistant research engineer, has resigned to become assistant chief engineer of the Knox Motor Co., Springfield, Mass.

Brown Resigns—F. L. Brown, formerly manager of the Stutz Motor Car Co., of Connecticut, with headquarters in Hartford, has severed his connection with that concern.

Worfolk Regal Advertising Manager—The Regal Motor Car Co., Detroit, has appointed C. E. Worfolk as its advertising manager.

Tisch Advertising Manager — The Paige-Detroit Motor Car Co., Detroit, Mich., announces that Roy Tisch has been appointed manager of its advertising department.

Gray Apperson Branch Manager—W. C. Gray has been appointed manager of the Apperson Bros. Automobile Co., Detroit, Mich., established at 1581 Woodward avenue.

Douglas Joins Stewart-Warner—S. A. Douglas, formerly Jones speedometer sales manager for the Johns-Manville Co., has taken a position as special factory representative for the Stewart-Warner Speedometer Corp., Chicago, Ill.

Butler Succeeds Clute—L. L. Butler has taken over the management of the Vancouver Island Motor Car Co., Ltd., Victoria, B. C., replacing Mr. Clute, who has resigned.

Mann Bowser District Manager—W. M. Mann has been appointed district manager in Texas for S. F. Bowser & Co., Fort Wayne, Ind. His offices will be located in the Commerce Bldg., Dallas, Tex.

Woods Goes to New Haven — T. G. Woods, who has been connected with the White company's sales forces at Boston and Providence, has gone to New Haven to act as commercial sales manager for the White agency in that city.

Avery Forms Advertising Agency—M. LeRoy Avery, who until recently was advertising manager of the Regal Motor Car Co., Detroit, Mich., and F. W. Reed, an advertising man, have organized the Avery-Reed Advertising Agency.

Snow Appointed Manager—H. M. Snow has been appointed manager of the branch just opened in Copley square, Boston, Mass., by the Ford company, and which will eliminate the sub-branches in that city. The branch will be under the control of the big wholesale distributing plant at Cambridge, Mass.

Coulter Joins Firestone—C. W. Coulter, formerly with the Western Rubber & Supply Co., of Pasadena, Cal., has joined the Firestone Tire & Rubber Co.'s branch at Los Angeles and is to handle the trade of Santa Barbara and Ventura counties.

Allen Oldsmobile Montreal Manager—W. A. Allen, lately manager of the Pope Hartford Motor Co. of Canada, has been appointed manager for the Gordon Motor Co., which handles the Oldsmobile cars in Montreal, Que. Larger premises and show rooms have been taken at the New Birks building, Montreal.

Recent Minneapolis Changes—K. E. Corrington is the new district salesmanager for the Empire Tire & Rubber Co., headquarters Minneapolis, Minn. R. E. McComas, who came to Minneapolis a year ago from the Chicago office of the Woods Electric Car Co., to the Owl Electric Garage Co., agent for the Woods car, has taken an interest in the company and is now secretary and manager. J. N. Johnson is president, W. A. Simonson is vice-president and A. M. Wintheiser is treasurer. The P. J. Downes Co., representative of the Jeffery car, will push the truck department and have added two men to the branch work, H. B. Foley of Cleveland and F. M. Trew of Minneapolis.

Automobile Agencies Recently Established

PASSENGER CARS

Illinois

Jacksonville	Saxon	Andre & Andre
Kankakee	Oldsmobile	Frank Miller
Morris	Oldsmobile	J. A. McCormick
Princeton	Oldsmobile	Guy Kasbeer
Rockford	Oldsmobile	Geo. Maurer
Rock Island	Saxon	A. E. Shalline
Verona	Oldsmobile	John F. Stitt
Victoria	Glide	W. J. Seiboldt

Indiana

Ashley	Oldsmobile	E. A. Tisch
Bluffton	Saxon	Spitler Bros.
Hartford City	Oldsmobile	A. W. Tindall
Huntington	Oldsmobile	People's Garage
Remington	Franklin	C. B. Johnston & Son
So. Bend	Oldsmobile	J. W. Elkart
Terre Haute	Oldsmobile	Olds Motor Car Sales
Wolcottville	Oldsmobile	F. P. Sanders & Sons

Iowa

Bellevue	Herff-Brooks	Harold H. Lahmeyer
Charles City	Herff-Brooks	C. M. Hansell
Davenport	Oldsmobile	Union Motor Co.
Deep River	Herff-Brooks	H. H. Hatter
Dennison	Oldsmobile	Dennison Auto Co.
Des Moines	Oldsmobile	Oldsmobile Co. of Iowa
Dubuque	Oldsmobile	Kassler Auto & Tire Co.
Elkader	Oldsmobile	Allen Bros.
Hampton	Herff-Brooks	A. C. Bird
Melrose	Herff-Brooks	L. D. Lemley
Sioux City	Oldsmobile	H. E. Sohberg Motor Co.
Waterloo	Oldsmobile	Wagner Wood Auto Co.
Williamsburg	Herff-Brooks	H. A. Dunlap

Kansas

Hilly City	Saxon	Ivan B. Parker

Kentucky

Louisville	Oldsmobile	Kentucky Auto. Co.

Maryland

Baltimore	Saxon	S. S. Greenwall
Baltimore	Oldsmobile	Auto Sales Co.
Cumberland	Oldsmobile	W. F. Robbosson
Hagerstown	Oldsmobile	Chas. E. Schenk

Massachusetts

Belchertown	Herff-Brooks	M. C. Baggs
Dorchester	Oldsmobile	Proctor Bros.
Egypt	Oldsmobile	Egypt Garage & Machine Co.
Everett	Oldsmobile	Outlet Furniture Co.
Haverhill	Oldsmobile	Renton Motor Car Co.
Lowell	Oldsmobile	Arthur L. Cummiskey Motor Car Co., Inc.
Rockport	Oldsmobile	A. Carl Butman
So. Deerfield	Oldsmobile	E. C. Gibson
Springfield	Oldsmobile	Forest Park Garage
Springfield	Saxon	Baxter-McKinzie Co.

Mexico

Torreon Coahuila	Oldsmobile	E. Ramos Barrora

Michigan

Adrian	Oldsmobile	A. W. Raymond Auto Sales Co.
Battle Creek	Oldsmobile	Henry L. Phillips
Caro	Oldsmobile	J. D. Sutton
Constantine	Oldsmobile	Fish & Tarnutzer
Detroit	Oldsmobile	Oldsmobile Co.
Elkton	Oldsmobile	Paige Brothers
Grand Rapids	Oldsmobile	E. C. Bliciley
Ionia	Buick-Ford	Benedick-Buick Co.
Ionia	Oldsmobile	Ogilvie & Wilkinson
Lansing	Oldsmobile	Union Garage
Mason	Oldsmobile	J. E. Taylor
Northville	Oldsmobile	F. S. Neal
Pt. Huron	Oldsmobile	Geo. E. Yokom
Saginaw	Oldsmobile	The Bolton Auto Co.

Minnesota

Minneapolis	Dodge	H. E. Mack & Co.

Mississippi

Columbus	Oldsmobile	Columbus Auto Co.
Meridian	Oldsmobile	Edwin S. Curtice

Missouri

Arbela	Herff-Brooks	J. L. Racey & Son
Boonville	Cadillac	G. A. Brownfield & Son
Hamilton	Oldsmobile	E. A. Hawkes
Kansas City	Oldsmobile	Bond Motor Co.
Kirksville	Saxon	Charles C. Gardner
Oregon	Oldsmobile	Auto Sales Co.
Pleasant Hill	Oldsmobile	Hanicke & Wester
Quittman	Meteor	Edward N. Malvern

Nebraska

Scotts Bluff	Oldsmobile	Edwards & Morse

Nevada

Ely	Oldsmobile	Ely Garage & Supply Co.

New Hampshire

Berlin	Franklin	R. B. Wolf
Dover	Oldsmobile	Central Garage
Groveton	Oldsmobile	E. C. Brown
Laconia	Oldsmobile	Lougee-Robinson & Co.
Littleton	Oldsmobile	Ralph & Downing Garage Co.
Manchester	Oldsmobile	Hanover Street Garage

New Jersey

Camden	Oldsmobile	Ford Service & Sales Agency
Flemington	Oldsmobile	Harvey Kuhl
Jersey City	Oldsmobile	Krone & Minnerly
Long Branch	Oldsmobile	John P. Bradley
Morristown	Oldsmobile	W. H. Dutton Co.
Netcong	Oldsmobile	A. A. King
Newark	Oldsmobile	Essex Automobile Co.
Paterson	Oldsmobile	Oscar Peterson
Peapack	Oldsmobile	John Burd's Garage
Pennington	Oldsmobile	Pennington Garage
Trenton	Oldsmobile	Motor Shop
Union Hill	Oldsmobile	Union Automobile Co.

New Mexico

Carlsbad	Oldsmobile	R. Ohnomue & Son
Deming	Oldsmobile	Deming Auto Co.
Las Vegas	Oldsmobile	Charles Ilfeld Co.
Roswell	Oldsmobile	H. T. Bailey
Wagon Mound	Oldsmobile	B. P. Robinson

New York

Albany	Oldsmobile	Wm. L. Schupp & Sons
Albion	Oldsmobile	Albion Garage, Inc.
Alden	Oldsmobile	Arthur W. Eastwood
Arcade	Oldsmobile	Pinney & Louis
Attica	Oldsmobile	E. J. Seagert
Binghamton	Oldsmobile	Binghamton Ford Sales Co.
Brooklyn	Oldsmobile	C. B. Derby & Co.
Buffalo	Oldsmobile	The Oldsmobile Co.
Buffalo	R & L	Daw Electric Car Co.
Buffalo	Velie	Monroe Motor Car Co.
Caledonia	Oldsmobile	Central Garage
Caneadea	Oldsmobile	Fred Litchard
Castile	Oldsmobile	K. W. Lamberson
Elmira	Oldsmobile	LaFrance Garage Co.
Gowanda	Oldsmobile	Sipple & Dean
Hamburg	Oldsmobile	Daniel Brodbeck
Hoosick Falls	Oldsmobile	Phoenix Garage
Ithaca	Oldsmobile	E. J. Trapp
Jamestown	Oldsmobile	Jamestown Auto Sales Co.
LeRoy	Oldsmobile	Thomas Watson
Malone	Oldsmobile	Eldredge & Mason
Mexico	Oldsmobile	Oswego County Auto Co.
Monroe	Oldsmobile	Monroe Garage Co.
Newburgh	Oldsmobile	Mayer & Berg
New York City	Oldsmobile	J. Grose Simmons

Automobile Agencies Recently Established

PASSENGER CARS

Alabama

Aliceville	Oldsmobile	J. V. Park
Birmingham	Oldsmobile	Highland Garage Co.
Dothan	Oldsmobile	Douglas Baker
Montgomery	Oldsmobile	Cole Motor Co.
Union Springs	Oldsmobile	O. L. Hayes & S. P. Rainer, Jr.

Arkansas

Russellville	Saxon	Neal & Butler

California

Cedarville	Oldsmobile	Wakefield & Wilson
Fillmore	Oldsmobile	John Opsahl
Fresno	Oldsmobile	California & Investment & Auto Starter Co.
Gustine	Oldsmobile	J. E. Hollingsworth & Jenson Bros.
Hollywood	Oldsmobile	F. C. Ford
Lincoln	Oldsmobile	Lincoln Garage
Long Beach	Oldsmobile	James R. Ricketts
Los Angeles	Chandler	Peacock Motor Sales Co.
Los Angeles	Herff-Brooks	De Vaux Motor Car Co.
Los Angeles	Oldsmobile	Oldsmobile Co.
Napa	Oldsmobile	B. M. Norton
Oakland	Oldsmobile	M. Koenig & R. Drum
Pasadena	Oldsmobile	O. F. Boadway
Redding	Oldsmobile	Adolph Bystle
Riverside	Oldsmobile	Stever & McCulley
San Diego	Dodge	C. W. McCabe
San Diego	Oldsmobile	McQuigg Bros.
San Francisco	Chandler	Bearson Motor Car Co.
San Francisco	Oldsmobile	Oldsmobile Co.
San Jose	Oldsmobile	Granger & DeHart

Santa Ana	Oldsmobile	C. F. Isaacson & Son
Santa Cruz	Oldsmobile	Hubbs & Brisac
Stockton	Oldsmobile	Jake F. Meyer
Woodland	Oldsmobile	Simpson Bros. & G. D. Simpson
Yuba City	Oldsmobile	The Sutter Garage

Canada

St. John, N. B.	Oldsmobile	New Brunswick Motor Car Co.
London, Ont.	Oldsmobile	London Motor Sales Co., Ltd.
Sarnia, Ont.	Oldsmobile	R. Milligan

Colorado

Boulder	Oldsmobile	Wolcott & Blake
Colorado Spgs.	Oldsmobile	Markensheffel Motor Co.
Denver	Oldsmobile	W. W. Barnett
Fort Morgan	Oldsmobile	Wittwer & Wittwer
Greeley	Saxon	John E. Camfield
Pueblo	Oldsmobile	Pueblo Auto Co.
Walsenburg	Oldsmobile	Adolph Unfug

Delaware

Wilmington	Chandler	Postles Auto. Brokerage Co.

District of Columbia

Washington	Dodge	Semmes-Kneessi Co.
Washington	Hudson	Semmes-Kneessi Co.

Florida

Miami	Oldsmobile	W. W. Charles
Quincy	Saxon	H. T. Sharon

Georgia

Augusta	Oldsmobile	J. G. Ivey
Columbus	Oldsmobile	Jas. A. Lewis, Jr.
Cordelo	Oldsmobile	Webster Motor Co.
Dawson	Oldsmobile	Lamer Auto Co.
Dublin	Oldsmobile	J. B. Glover
Hawkinsville	Oldsmobile	Moboley & Parsons
Macon	Oldsmobile	Henry J. Lamar
Richland	Oldsmobile	Alsto & Cannon
Rome	Oldsmobile	Louis Wright
Sycamore	Oldsmobile	Dr. H. W. Harris

Hawaii

Honolulu	Franklin	Von Hamm-Young Co

Idaho

Boise	Oldsmobile	Rendall-Dodd Auto Co. Ltd.
Twin Falls	Oldsmobile	Western Auto Co.

Illinois

Bushnell	Oldsmobile	Ball Brothers
Chicago	Oldsmobile	The Oldsmobile Co.
Chicago	Oldsmobile	Ropp Motor Co.
Cornell	Oldsmobile	Lishness & McVay
DeKalb	Oldsmobile	G. H. Deane & Co.
Dixon	Oldsmobile	Moeller & Wilson
Elkville	Meteor	C. T. Bass
Freeport	Oldsmobile	W. J. Maurer
Geneseo	Saxon	Velie & Chevrolet Motor Car Co.
Hinckney	Oldsmobile	Graige C. Kennedy
Jacksonville	McFarlan	J. F. Claus

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

California

LOS ANGELES—L. A. Automobile Works; capital, $10,000. Incorporators: Thomas E. Mitchell, John Stintin and others.

SAN FRANCISCO—Foard Starter Mfg. Co.; capital, $20,000; to manufacture motor cars and supplies.

Florida

JACKSONVILLE—Florida Tire Co.; capital, $25,000; to deal in motor cars, tires and supplies. Incorporators: George Adams, George M. Hopkins and Claude M. Shine, all of Jacksonville.

Illinois

CHICAGO—Shasta Machine Co.; capital, $21,000; to manufacture motors, etc. Incorporators: Edward J. Carey, Helen Dias and Charles C. Mull.

CHICAGO—Carman Mfg. Co.; capital, $2,500; to manufacture and deal in motor car parts and accessories. Incorporators: Edward L. Archibald, Richard V. Megary and Charles R. Brown.

EDWARDSVILLE—American Standard Automobile Co.; capital, $100,000; to manufacture and deal in motor cars. Incorporators: P. Berhardt, C. H. Gerling and L. Kirsch.

ROCKFORD—C. B. Williamson Corporation; capital, $2,500; to manufacture and deal in motor vehicles, accessories, supplies, etc. Incorporators: C. B. Williamson, F. C. Gleasman and O. V. Williamson.

Iowa

DES MOINES—Successful Motor Sales Co.; capital, $25,000.

MUSCATINE—Muscatine Motor Car Co.; capital, $25,000; to buy, sell, rent, lease and deal in motor vehicles and operate a garage and repair department. Incorporators: F. C. Vetter, J. G. Campbell, C. M. Weber, R. K. Smith, W. F. Bishop and G. A. Chaudoin.

Kentucky

COVINGTON—Madison Motor Car Co.; capital, $5,000; to deal in motor cars. Incorporators: E. J. Moore, Jr., Charles E. Madris and Maria Moore.

Maryland

CAMBRIDGE—Chersaw Motor Car Co.; capital, $5,000. Incorporators: R .B. May and others.

Massachusetts

BOSTON—E. A. Gilmore Co.; capital, $20,000; motor cars. Incorporators: Earnest A. Gilmore, Augustus C. Gilmore and Arthur P. Teele.

Missouri

KANSAS CITY—Kansas City Auburn Auto Co.; capital, $8,000. Incorporators: R. W. Gall, B. P. Gall and E. H. Farmsley.

Ohio

AKRON—Smith Motor Co.; capital, $5,000; to deal in motor cars. Incorporators: E. D. Smith, E. E. Smith, F. W. Hachtel, W. S. Nicodemus and Mary Distel.

CLEVELAND—Cleveland Motor Car Sales Co.; capital, $25,000. Incorporators: M. D. Bramley, Harry C. Walker, Arthur Hutt, M. Barthelman and J. C. Simon.

NEWARK—Blair Motor Truck Co.; capital, $100,000; to manufacture motor trucks. Incorporators: J. F. McCune, C. A. Smith, R. W. Smith, C. H. Spencer and W. S. Weiant.

Oklahoma

MUSKOGEE—Muskogee Buick Sales Co.; capital, $3,000; to deal in motor cars. Incorporators: Hugh Swift, Fay H. Swift and W. T. Wisdom, all of Muskogee.

South Dakota

MITCHELL—Motor Mart; capital, $2,500; to deal in motor cars. Incorporators: M. P. Fugel, C. A. Allison and Mary E. Allison.

SIOUX FALLS—Cadillac Sales Co.; capital, $25,000; to deal in motor cars. Incorporators: D. P. Fargo, C. M. Fargo and M. F. Beveridge, all of Sioux Falls.

Washington

EVERETT—Paddock-Fowler Auto Co.; capital, $10,000; to deal in motor cars. Incorporators: W. R. Paddock, G. W. Fowler, Harry B. Gay and A. C. Edwards, 211 Realty Building.

Wisconsin

LACROSSE—Moll-Savage Co.; capital, $10,000; to deal in motor vehicles, etc. Incorporators: A. L. Moll, M. D. Savage and George H. Gordon.

GARAGES AND ACCESSORIES

California

RIVERSIDE—Fairmont Garage & Machine Works; capital, $50,000. Incorporators: A. A. Gamble, W. W. Gamble, R. E. Gamble, L. W. Gamble and Dora V. Gamble.

SAN FRANCISCO—Ford Starter Mfg. Co.; capital, $20,000; to manufacture motor car starters. Incorporators: E. P. DeBerry and W. L. Hoyt, both of Berkeley; F. L. Dreber.

Delaware

WILMINGTON—Hester Tire & Rubber Co.; capital, $300,000; to manufacture tires, tubes, etc. Incorporators: B. H. Friel, L. A. Brownhill and G. M. Purcell.

Illinois

CHICAGO—Boiler Insulated Wire Co.; capital, $20,000; to manufacture and deal in motors, electrical appliances, machinery, etc. Incorporators: Peter Boiler, William N. Boiler and W. H. Bentley.

PEORIA—National Electric & Supply Co.; capital, $75,000; to manufacture electrical and motor car supplies. Incorporators: Ralph V. Miller, Theodor E. Bass and H. H. Moody.

Indiana

INDIANAPOLIS—Indiana Garage Co.; capital, $2,000. Incorporators: Roger Kenny, H. N. Siefert and Oscar Siefert.

INDIANAPOLIS—Indiana Taxi Co.; capital, $2,000; to conduct a motor transit and taxi business. Incorporators: R. Kenney, H. N. Siefert and O. Siefert.

Massachusetts

BOSTON—American Motorists' Protective Association; capital, $50,000. Incorporators: Frederick L. Keith, Richard R. Snow and Alfred P. Goodell.

WORCESTER—Stoddard Rubber Co.; capital, $60,000. Incorporators: Charles A. Stoddard, F. Madge Stoddard and Samuel L. Cowitz.

Michigan

DETROIT—Addison Garage Co.; capital, $8,000. Incorporators: W. F. Malow, George C. King, Edward E. Esper and W. T. Phillips.

Minnesota

MINNEAPOLIS—Automobile Trail Blazing Assn.; capital, $50,000; to mark and blaze trails through America and sell guide books. Incorporators: A. L. Meigs, Ira Farr and L. C. Meigs, all of Minneapolis.

MINNEAPOLIS—Tire Supply Assn. to Western Automobile Supply Co.

Missouri

ST. LOUIS—Best Service Auto Truck Co.; capital, $30,000; to conduct a general motor vehicle business and operate a garage. Incorporators: E. H. Abadie, E. E. Scott, Lewis Perry, Robert B. Snow and E. G. Curtis.

New Jersey

NEWARK—The Gasolene Protectometer Co.; capital, $100,000; to manufacture gasolene and other protectometers. Incorporators: W. Reppein, C. A. Alliston and L. Olschewski, all of Newark.

NEWARK—S. & S. Starter Co.; capital, $40,000; to manufacture starters for automobiles. Incorporators: W. M. Golden, Jr., Brooklyn, N. Y.; A. L. Whitmer, Newark; J. W. Shinholser, Bretton Hall, N. Y.

New York

BROOKLYN—Russian American Rubber Tire Works; capital, $100,000. Incorporators: Rose Miller, 477 Stone avenue; Isidore Kelner and Sruel Bilik, both of 1549 Pitkin avenue.

BUFFALO—Davis-Rae Oil Co.; capital, $5,000; to sell oils and other motor car sundries. Incorporators: Frank B. Rae, 713 Park avenue, Rochester; Albert H. Davis and Lillian E. Davis, both of 1018 Main street.

NEW YORK—Advertising Auto-Car Co.; capital, $100,000. Incorporators: Rocco J. Cipriano and Antonio DiGiorgi, both of 107 Broad street; Julius J. Lusardi, Raritan, N. J.

NEW YORK—Drubin Funeral Car Co.; capital, $10,000; motor cars for funerals. Incorporators: Arthur W. Drubin and Herman Drubin, both of 127 West 26th street; Alexander Schneeweiss, 1941 7th avenue.

POUGHKEEPSIE—S. L. S. Electric Co.; capital, $30,000; to manufacture storage batteries and automobile accessories. Incorporators: A. Bolognesi, Highland; A. M. Sherer, Poughkeepsie; J. B. Ball, Milton.

Ohio

CINCINNATI—Palmer Automatic Gear-Shaft Co.; capital, $10,000; motor car supplies. Incorporators: R. P. Palmer, S. R. Palmer, W. H. Palmer, C. P. Lindsay and G. W. Frank.

Oregon

PORTLAND—Electric Service Vehicle Co.; capital, $25,000. Incorporators: A. E. Blair, F. S. Robinson and R. A. Leiter.

Texas

SAN ANTONIO—Alamo Packard Auto Livery Co.; capital, $4,500; to operate a motor livery. Incorporators: Jennie D. Tucker, Arthur M. Tucker and George T. Tucker.

Utah

OGDEN—American Auto & Transfer Co.; capital, $25,000; to operate a motor transit line. Incorporators: P. W. Madsden, Ogden, and others.

Washington

SEATTLE—Western Auto Subcasing Co.; capital, $100,000. Incorporators: Hiram S. Nettleton and Marius S. Williams; Wright, Kelleher & Caldwell, 402 Burke Building.

CHANGE OF NAME AND CAPITAL

Illinois

CHICAGO—Kloeber Motor Co. to Exchange Motor Co.

ROCKFORD—Barnes Motor Sales Co. to Williamson Motor Co.

New York

BUFFALO—Lumen Bearing Co.; from $200,000 to $300,000.

Ohio

CLEVELAND—Overland-Garford Sales Co. to Overland-Cleveland Co.

Accessories for the Automobilist

ROTHERMICH Combination Light—A simple combination tail light, signal light license pad illuminator and holder is announced by A. P. Rothermich, St. Louis, Mo. This device consists of a regular tail light with a glass and metal case around it, this case being attached to the license pad by two irons. The construction is such that by moving a lever, within easy reach of the driver, the case containing the tail light may be moved. When set in one position the word SLOW faces the car behind. as shown in Fig. 1, and in the same illustration the other position is shown in which the warning signal is turned down. However, the license pad is illuminated, when the word "slow" is turned down, by light passing through the signal glass. When set as shown at the top of the illustration the pad is illuminated by a transparent glass at the bottom of the case. This signal affords a simple means of warning the driver of a car that a turn is to be made or that the car will make a sudden stop.

Fig. 1—Rothermich combination light

Bremer Pump Nipple—Motorists who are in the habit of holding the tire pump nipple in place over the valve stem will be interested in a new nipple which does not require attention once it is set. The new device is a product of the Bremer Cycle Co., Milwaukee, Wis., and is said not to leak when once properly set over the stem. The parts of the nipple. which is shown in Fig. 2, are made of brass and steel. There are four parts, two of which form the body and the means of adjustment, one to receive the lead from the pump, and the other which slips over the valve stem. The nipple sells for 50 cents.

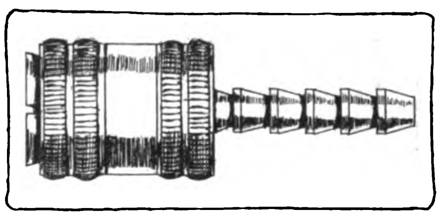


Fig. 2—Bremer pump nipple

Scott Tread Economizer—An arrangement to make possible the using of old tire treads, as outer treads for other tires, has been patented and placed on the market, under the name of the Scott Economizer, by the Scott Economizer Co., Bromford Lane, Erdington, Birmingham. England.

The tendency of former arrangements of this kind to cause the outer covering to creep has been overcome by this system. Two chains are passed around the circumference of the wheel. one on the outside, one on the inside. These chains may be tightened by a screw adjuster, and springs are interposed on each chain to keep up the tension should the tire become slightly deflated. V-shaped links are attached to the old tread, acting as the outer cover, and from which, of course. the bead has been cut off, by two small bolts and nuts; consequently they can be removed and attached to another cover when necessary. This makes the device applicable to any number of old covers, and to any size, as the chain can easily be lengthened or shortened.

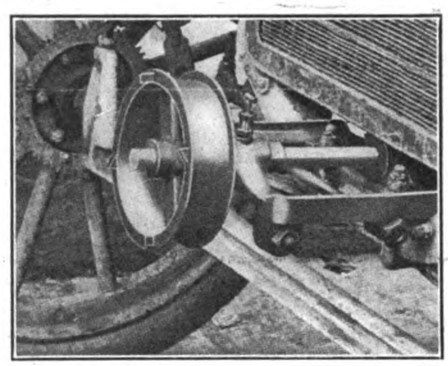


Fig. 3—Ruff-Ford power transmitting attachment

Fitting the old cover over the new can be done by one man in 5 minutes. A kink is put in the sound cover by bending it against the operator's knee. It is then folded and placed inside the economizer cover, the kink gradually worked out by pressing with the foot, and finally by bouncing the combination on the floor. The two covers are then put on the wheel in the ordinary way, the tube inserted, chains adjusted and the tire pumped up. All can be done within 45 minutes, it is claimed.

Ruff-Ford Power-Transmitting Attachment—Power for driving machine tools, pumps, etc., can be obtained from a Ford by means of the attachable pulley and bracket shown in Fig. 3, which is manufactured by the Ruff Tire Trading Co., 50 William street, Newark, N. J. The price of the attachment is $20.

Go Motor-Speeder—In the device shown in Fig. 4 carburetion is aided by introducing a stream of hot air into the main passageway of the intake manifold. This is heated by a coil of pipe passing around the exhaust pipe. The amount of air flowing through the coil is regulated by a valve that is connected up to the throttle. The device is manufactured by the Go Motor-Speeder Co., 318 Flint avenue, Three Rivers, Mich., and sells for $10, ready to install.

Rochester Fanhorn—A combination radiator fan and diaphragm horn has been announced by the Rochester Mfg. Co., Rochester, N. Y., the feature of this device being that the rotation of the fan operates the horn. The horn is controlled by a hammer, which normally is out of contact with the diaphragm of the horn, but upon pressure of a button it is brought into contact. The greater the pressure on the button the louder the sound emitted from the horn, and the higher the engine speed the greater the volume of sound. The tone can be made loud or soft, to suit conditions. On a country road, for example, the loudest note would be more appropriate, whereas in the city a more subdued tone would be advisable. The elimination of the care necessary with a separate horn unit and the saving due to mechanical operation are two features of this Fanhorn, as it is called.

Another product of this concern is a combination gasoline gauge and filler cap fitting. This bringing together of two units with two distinct functions into one unit of two functions is the feature of the instrument. The indicator of the gauge is in the form of a ring provided with numerals, these numerals being visible through a small glass window at the front of the instrument. The numerals register gallons of fuel.

The inside of the filler tube just above the indicator is provided with a protecting grill to guard the indicator and the entire construction allows ample space for the free passage of gasoline to the tank. It is designed in sizes and types for use either with rear mounted tanks of the pressure or vacuum system, or for tanks carried in the cowl. In the latter, the instrument is furnished with an escutcheon plate to trim the gauge upon the instrument board and is furnished either with a straight tube, when the angle of the gauge, which is decided by the shape of the tank, will permit, or with an upturned tube, when it is desired to bring the opening nearer vertical for convenience in filling. It is also

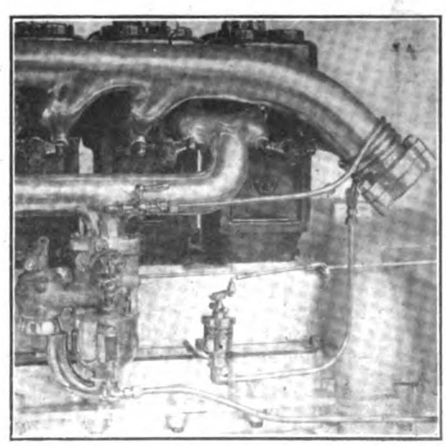


Fig. 4—Go Motor-Speeder for heating the charge

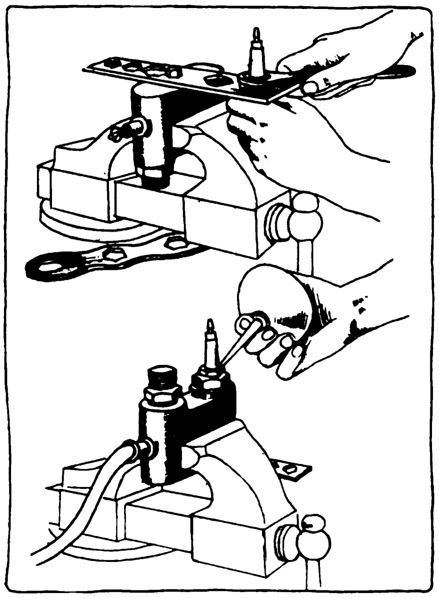


Fig. 5—Method of using Cico spark plug fixture

furnished with a flanged base for screwing to the tank flange or collar instead of the threaded base shown. The standard finish is black.

Cico Spark Plug Fixture—A handy garage tool for use in cleaning, repairing and testing spark plugs has just been brought out by the Champion Ignition Co., Flint, Mich. This tool consists of a cast-iron box, as shown in Fig. 5, with two openings at one end to receive spark plugs, and an arrangement on the other to hold a plate for securing plugs when they are desired to be taken apart. The upper illustration shows the plate in position and a plug about to be disassembled. The holes in the plate are for different size plugs. Two wrenches also are supplied, which will fit the bushings on all standard plugs. The lower illustrations show how the tool is used in testing plugs. For this operation the box is reversed in the vise and the plug inserted into one of the openings of the box, which now is made to act as a compression retainer. Connection is made with a tire pump or similar source of compressed air and after the air has been pumped into the box the conventional leak test is made. This consists in squirting a little oil over the plug joints and should bubbles appear the plug is leaky.

Goodyear White Vulcanizing Cement—The Goodyear Tire and Rubber Co., Akron, O., has recently put on the market a white vulcanizing cement after testing it thoroughly in its repair department. This new product has the advantage that the repair is the same color as the rest of the tire whereas the dark-curing cement formerly used made the repaired spot darker than the original tread.

In the most recent issue of the No-Rim-Cut News, the house organ published by this company, some good advice to repairmen is given regarding the vulcanizing of treads: "Sand bags may be used instead of air bags, in curing tread cuts. Internal pressure only is needed against the tread in such repairs. For each sectional mold size one sand bag and one steel bar will be needed. The bag should be of heavy canvas, shaped like a common salt bag and filled loosely, not packed, with fine sand. The steel bar should be of 1-inch section about 1 foot long, and curved so it will fit within the mold.

"The sand bag is placed within the casing, the casing dropped within the sectional mold, and the steel bar laid along the sand bag, concave side up. The clamp screw is screwed on the mold against the center of the bar. This spreads out the sand bag and supplies the necessary pressure against the tread. It is a good plan to drill a hole or slot in the bar so that the clamp screw can get a grip."

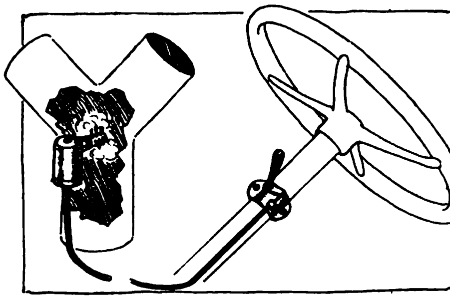


Fig. 6—Jumbo gasoline economizer

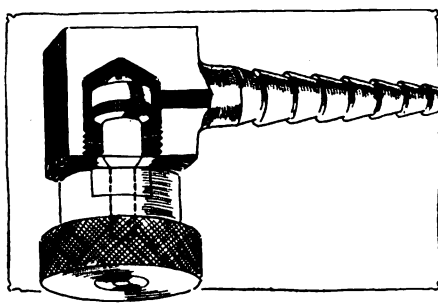


Fig. 7—Edelmann automatic air chuck

Jumbo Gasoline Economizer—E. Edelmann & Co., 225 W. Illinois street, Chicago, Illinois, is offering the simple economizer shown in Fig. 6 for $2.50. It consists of a steering-wheel controlled air valve that allows more or less air to enter the manifold as desired. The valve is operated from the wheel by means of a small lever and a flexible cable suitably encased. It is stated that it can be attached in ten minutes.

Edelmann Automatic Air Chuck—An improved form of air chuck for connecting the pump hose to the tire valve is illustrated in Fig. 7. It is manufactured by the E. Edelmann & Co., 225 W. Illinois street, Chicago, Ill., and the Eastern agent is Asch & Co., 1779 Broadway, New York City. To operate this device it is merely necessary to force it over the valve stem. No screwing is required. When it is removed, the valve closes automatically until again used. All parts are renewable. It sells for $1.00.

Alpha Grease—High melting point petroleum greases suitable for the lubrication of bearings subjected to intense heat or bearings affected by water are manufactured by the Albany Lubricating Co., Adam Cook's Sons, proprietors, 710 Washington street, New York City. These greases are sold under the trade name Alpha and are of especial value for clutch grease cups, or water pump grease cups where the grease is liable to melt and allow a leakage of water.

Mabey Electric Patching Tool—An electric patching tool for use in vulcanizing small cuts and holes in tires is announced by the Mabey Electric & Mfg. Co., Indianapolis, Ind. It is simple in construction and consists of a hand grip with a metal terminal at one end for centering the heat for vulcanizing. The Mabey vulcanizer tool is operated from a 6 or 12-volt circuit and incorporates an automatic temperature regulator. It is 6¼ inches long, consumes ¾ ampere and is sold for $2.75 complete with 8 feet of lamp cord and vulcanizing rubber.

Lubcke Frameless Windshield—An uninterrupted view is the goal aimed at by the windshield brought out by Charles Lubcke, M.E., 320 Fremont street, San Francisco, Cal. The new design is shown in Fig. 8, where it will be noted that it is made in two pieces hinged at each end. The lower half is braced and the few metal fittings required are made from dull-finished brass. The bottom clamp is a felt insert to give a cushioning effect. It is stated that the windshield has sufficient mechanical strength to resist any stress.

American Valve Grinders—Adjustable to any size valve, of which they will grind a set in thirty minutes, the American Adjustable Valve Seating and Facing Tools, of which there are two, are being placed on the market by the American Valve Tool Co., of Stamford, Conn., to save motor car owners the $3.00 to $5.00 charges which they pay for this service and the loss of time consequent. The set as shown in Fig. 9 sells for $10.00.

Canvas Garages—What is probably the most portable of portable garages is the tent garage manufactured by the Couch Brothers Mfg. Co., Cincinnati, O. These are made in eight different sizes and are of six different grades. The prices range from $41.35 for a 9½ by 12-foot, 8-ounce army duck, to $119.88 for especial United States Government tan duck, which is rain and mildew proof. The garage tents may be used as a permanent housing for the car, and as they make a very small package when packed up, tourists can take their garages with them on trips.

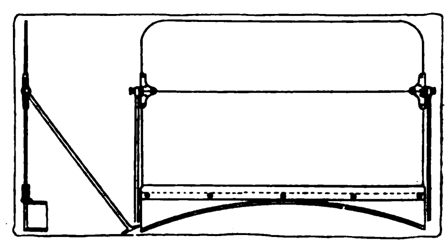


Fig. 8—Lubcke Frameless windshield which gives clearer vision

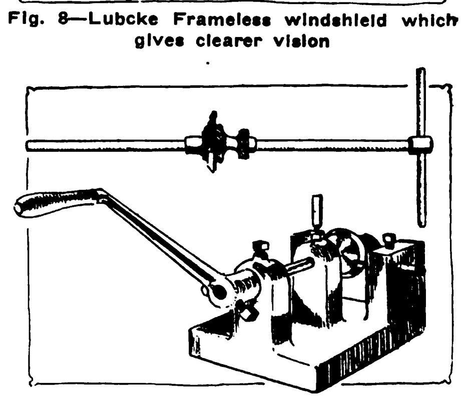


Fig. 9—American valve grinder for quickly resurfacing valves and seats

VOL. XXXI NEW YORK—THURSDAY, OCTOBER 22, 1914—CHICAGO No. 17

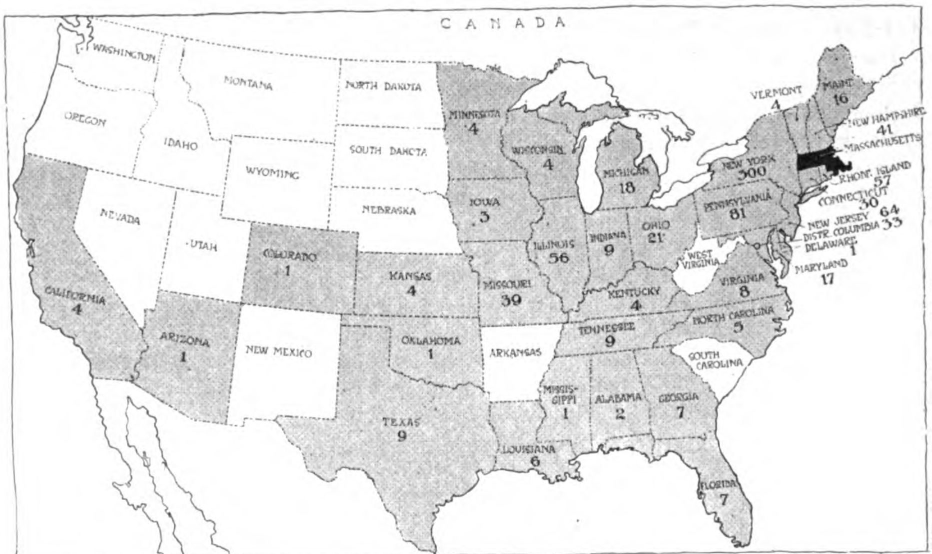
The AUTOMOBILE

New England–Tourists' Realm

72,790 Visiting Cars, from Nearly Every State in the Union, with 129,400 Owned in New England Bring a Revenue of Over $8,000,000

By James T. Sullivan

BOSTON, MASS., Oct. 1—If any-one were to state casually—having in mind that these are supposedly not very good times for business—that in 2 months this summer, July and August, automobilists spent more than $8,000,000 while touring in New England it would seem like a very exaggerated statement. Yet conservative figures place the sum at that amount. When one figures that there were more than 202,000 cars on the highways of that section in 2 months, or some 12 per cent. of the entire registration in the United States, some credence must be given to the amount spent.



Shaded portions of the map indicate states represented by automobile tourists in New England during the past summer, figures giving the number of cars

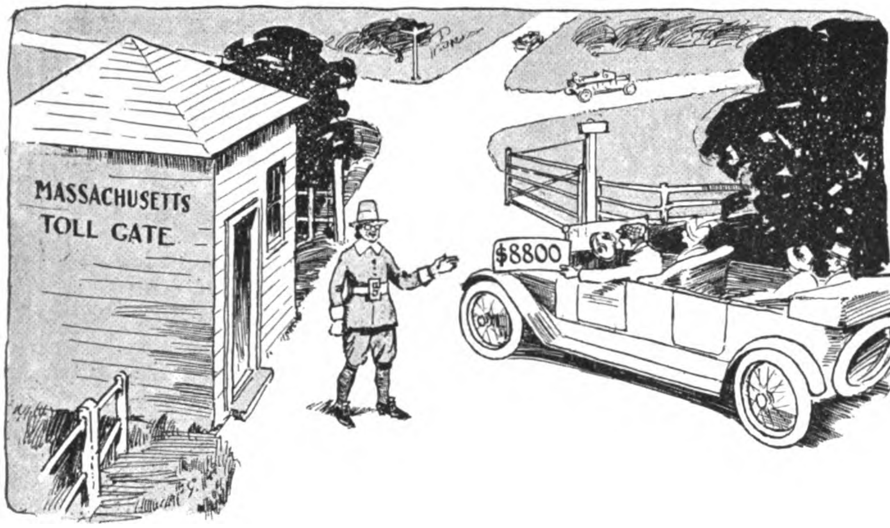
129,400 Cars in New England

On July 1, admittedly the beginning of the touring season, according to THE AUTOMOBILE, there were registered in this country 1,548,350 cars. Now it is not stretching a point too far to say that in the next 2 months the registrations all over the United States put the figures close to 1,600,000. Taking that for granted the registrations in the New England States totaled 129,400, or about 8 per cent. of the total registration. By a process of deduction to be explained later some 72,790 visiting cars toured that section, making a total of 202,190, or about 12 per cent. of all the cars owned in this country.

Giving each car an average of three passengers it makes a total of 606,570 who were making trips. It is not putting the figure too high to say that each car used up at least $1 worth of gasoline and oil a day. No account is taken of the money spent for meals, hotels, etc., for the writer wants to keep his figures as conservative as possible. Certainly many cars showed a daily expenditure of its occupants, even if only three, for car and occupants together as high as $15 a car or more. So when the figure is held down to $1 it more than counterbalances any idea of exaggeration.

$8,491,900 Spent on Tours

Therefore taking the 129,400 cars owned by New Englanders, and which were daily on the road for 60 days, it gives a total of $7,764,000 at the $1 a day average. Adding to that the 72,790 visitors, and allowing that they spent at least 10 days on an average here, and it gives $727,900 more, a total of $8,491,900 for the summer. That is the reward New Eng-



Owners of cars from other states contributed $8,800 in license fees to the state of Massachusetts alone during the past summer

land is reaping for opening to tourists her shore resorts, splendid boulevards and state highways. And if there is one real convincing fact, that proves more than any other that New England is the Mecca for motorists yearly, it is found in the figures that show that in 3 years, out of all the states and territories comprising the Union only ten were not represented in the list of non-resident registrations in Massachusetts, and these non-residents registered were those who came here to stay for a period long enough to take out such a license. In that same period eight foreign countries were represented. The ten unrepresented states were in the Far West where motoring has not taken a very strong hold.

A 1-Day Census in Maine

However, it is the figures that count. Maine now has approximately 14,000 pleasure cars registered. The Maine State Automobile Assn. officials take a great interest in motor affairs, and a year ago a census was taken of cars on various roads. This year there was other important work on hand and it was not possible to give the time to a similar census. But just to get some data on 1 day in August, not a Sunday or holiday, a man was stationed for 2 hours on the road several miles from Portland to make some statistics. In that time he noted 125 cars coming into Maine and 115 leaving, all non-resident machines. There were about 150 Maine cars passing in both directions also. Taking that as a basis, and allowing that it was for 2 hours only, it gives a total of 240 foreign cars. Multiplying that by 60 gives 14,400 for 2 months.

New Hampshire Is Popular

New Hampshire had 1,157 non-residents registered in 1913 and 1,200 this year up to September 1. That state watches visitors carefully, and they have but 10 days to remain in the state without taking out a license. As it is a very popular touring section set in a place where it is bordered on all sides by states having many motorists it is not putting the average too high to say that for each one registered there were at least twenty-five who went through without registering. That would give a total, including the registered ones, of 31,300. For Vermont it would not be over-estimating the figure to say that 50 per cent. of the New Hampshire visitors crossed over into the other State, it being so near, and has so many attractions. That would give some 15,600 cars. From New York State with its immense registration and other New England States it is not claiming too much to say that some 4,400 cars went in and out, giving a total of 20,000. The non-resident law is so broad that few take out registrations and no separate list is kept of them. Vermont has about 8,000 cars registered.

Massachusetts is recognized as the pioneer touring place because of its splendid roads built for many years, and its fine summer attractions. So it is not surprising that its figures would exceed all others. To get to some of the other states the Bay State must be traversed. Until this year the law allowed but 10 days for motorists to stop without registering. This year when many visitors came here they found that the law had been changed to 30 days. At first it seemed a very hospitable act. But it had its joker. The non-resident with 10 days only could register for 3 months at a reduced fee. This year, if he remained more than 30 days, and many of them did, it meant paying an entire year's fee. It created a rumpus. At first it was thought that the total of non-residents would dwindle, but they did not. On the separate list this year, those registering for 1 month, there were only thirty-nine, but the total for all non-residents who had to pay the yearly fee ran up to 880. This was an increase of 140 over the same period in 1913.

Now it is well known that for every car registered to stay 2 or more months there are some fifty cars that come in and out of the state for short periods. This year they seemed more numerous than ever about the streets and around the hotels. On Sundays there were constant streams of them heading over our boulevards. So multiplying the 880 regulars by the fifty transients and one gets, including the 880, a total of 44,880. The state registrations show about 60,000 pleasure vehicles.

Connecticut, being the entering state from southern New York and the South, many of the visitors to New England pass through there. Others go through there leaving New England. Then there are many others who go from New York for brief visits to summer homes along the Sound, and others from Rhode Island. If we take 50 per cent. of the Massachusetts visiting cars it gives 22,440. And certainly from New York and Rhode Island during the 2 months there are at least 2,560 to make a total of 25,000. The state registration is some 23,500. Rhode Island has a lot of shore re-

Non-Resident Tourists Visiting Massachusetts

	1912	1913	1914		1912	1913	1914
Alabama	2	0	2	North Dakota	0	0	0
Arizona	0	0	1	Ohio	40	29	21
Arkansas	0	0	0	Oklahoma	0	0	1
California	7	4	4	Oregon	0	0	0
Colorado	2	0	1	Pennsylvania	78	80	81
Connecticut	43	43	30	Rhode Island	42	42	57
Delaware	0	2	1	South Carclina	0	2	0
Florida	3	8	7	South Dakota	0	0	0
Georgia	1	2	7	Tennessee	6	5	9
Idaho	0	0	0	Texas	8	10	9
Illinois	39	45	56	Utah	0	0	0
Indiana	3	7	9	Vermont	2	4	4
Iowa	2	5	3	Virginia	5	5	8
Kansas	1	9	4	Washington	0	0	0
Kentucky	4	9	4	West Virginia	0	1	0
Louisiana	4	3	6	Wisconsin	1	2	4
Maine	3	6	16	Wyoming	0	0	0
Maryland	17	16	17	Dist. of Col	12	23	33
Michigan	15	13	18				
Minnesota	2	4	4	*Foreign:*			
Mississippi	0	0	1	Canada	2	3	7
Missouri	40	41	39	Puerto Rico	2	4	3
Montana	0	0	0	England	0	1	1
Nebraska	4	3	0	Germany	0	0	1
Nevada	0	0	0	Portugal	0	0	1
New Hampshire	12	10	41	Cuba	1	1	3
New Jersey	56	80	64	Honolulu	1	0	0
New York	209	220	300	Brazil	1	0	0
New Mexico	0	0	0				
North Carolina	0	2	5	Totals	671	744	879

sorts, among them Newport and Narragansett Pier. Others not so well known, however, are very popular for Massachusetts and Connecticut motorists. So by a further process of deduction by taking 25 per cent. of Connecticut visitors, giving 6,250, and allowing 3,750 from Massachusetts and Connecticut regular registrations one gets 10,000, not a very extraordinary number. The state has some 14,000 registrations, so it is quite a motor section. All non-residents are merged with the regular registrations. From these figures one gets the following statistics:

New England Summer Figures

	STATE REGISTRATIONS.	VISITING CARS.
Maine	14,000	14,400
New Hampshire	9,900	31,300
Vermont	8,000	20,000
Massachusetts	60,000	44,880
Rhode Island	14,000	10,000
Connecticut	23,500	25,000
Totals	129,400	145,580

Now if 50 per cent. of the visiting cars are dropped as being machines which have duplicated by touring various states, or comprise also New England cars, it leaves a total of 72,790. And so, adding this latter figure to the state registrations, it gives the 202,190 cars touring in New England. And by multiplying each car by three one gets 606,570 motorists on the roads this summer.

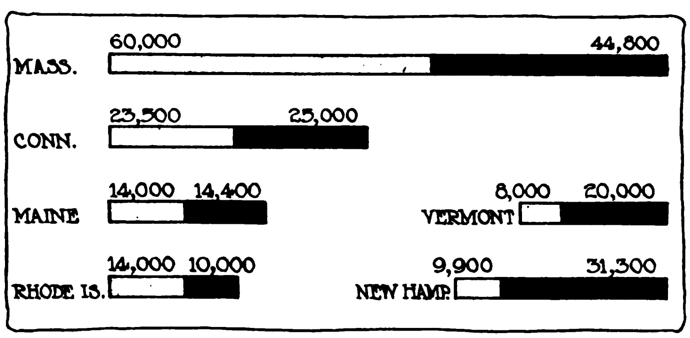
Here are the recapitulated figures:

Cars on the road, resident, daily	129,400
Cars on the road, non-resident, 60 days	72,790
Daily expenditure, resident	$129,400
Total expenditure, resident, 60 days	$7,764,000
Total expenditure, non-resident, 10-day average	$727,900
Total cars on road for summer	201,190
Total expenditure, all cars, all summer	$8,491,900
Total motorists touring, all cars, all summer	606,570

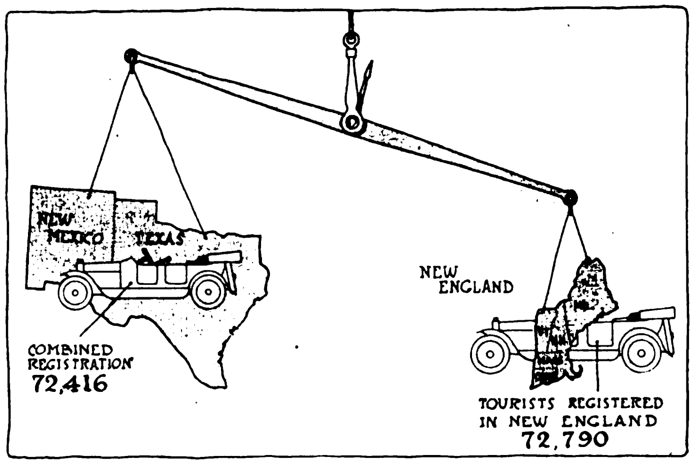
As New Hampshire registers her non-residents from the place where they happen to be staying while in her state, and Massachusetts gives the home address of visitors it is through the registrations on the Bay State books that one gets an idea of the cosmopolitan character of the visitors to New England every summer. The figures show that in 1912 there were twenty-nine states represented on the regular non-resident list. There were five foreign countries represented. Last year the number had been increased to thirty-one with but four foreign countries. This year there are thirty-three states on the list, with six foreign countries. The non-residents in 1912 were 671; in 1913 they jumped to 744, and this year the figures show 879. They would have gone higher but for the new law. The foreign countries represented during the 3 years comprise Canada, Porto Rico, England, Germany, Portugal, Cuba, Honolulu and Brazil.

New York Sends Most Tourists

For purposes of comparison the various states have been grouped together somewhat geographically. They give some interesting tables for a 3 years' comparison. New York, as a state, individually leads all others every year, having about



The shaded portions indicate the car registration of the New England states, while the black sections represent the number of visiting cars during the past summer



Cars from other states visiting New England last summer totaled 72,790, or more than the combined registration of the two great states of Texas and New Mexico

30 per cent. or more of the total. The other two big states are Pennsylvania and New Jersey, they being even with eighty each a year ago, but the former gaining one this year and the latter losing sixteen, dropping into third place.

The first group chosen naturally is New England. Maine made a big gain of ten, New Hampshire, thirty-one, Rhode Island, fifteen, Vermont remaining the same and Connecticut dropping thirteen. So the total is 148, a gain of forty-three over last year.

New England Group

	1912	1913	1914
Maine	3	6	16
New Hampshire	12	10	41
Vermont	2	4	4
Rhode Island	42	42	57
Connecticut	43	43	30
Totals	102	105	148

The Atlantic Coast group also shows a gain. Alabama and Mississippi are added this year, the first time for the latter. The District of Columbia shows a gain of ten, which, with the gain of a few here and there, offsets the big drop of New Jersey, and so there is a total of 150, a gain of seven.

Atlantic Coast Group

	1912	1913	1914
New Jersey	56	80	64
Maryland	17	16	17
Florida	3	8	7
Virginia	5	5	8
Louisiana	4	3	6
Delaware	0	2	1
North Carolina	0	2	5
South Carolina	0	2	0
Georgia	1	2	7
Alabama	2	0	2
Mississippi	0	0	1
District of Columbia	12	23	33
Totals	101	143	150

The Middle West group also shows up well with its increase of eight over 1913. Illinois gained eleven, Missouri lost two, Ohio, eight, while Michigan gained five.

Middle West Group

	1912	1913	1914
Illinois	39	45	56
Missouri	40	41	39
Ohio	40	29	21
Michigan	15	13	18
Iowa	2	5	3
Minnesota	2	4	4
Indiana	3	7	9
Wisconsin	1	2	4
Totals	142	146	154

The border line group shows the largest gain, due to New York, the total of that state this year being 300, a gain of

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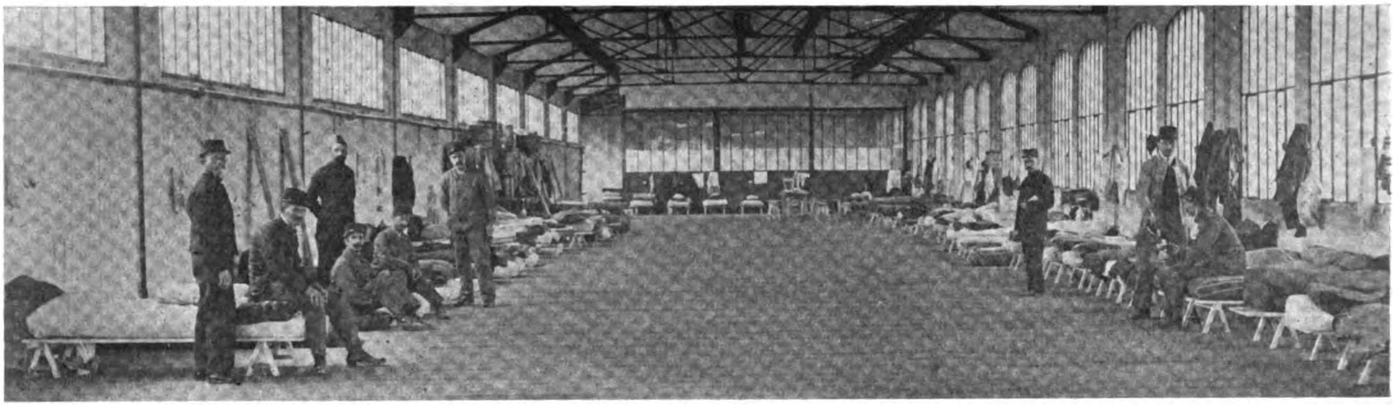


One of the shops in the Darracq factory at Paris used as a dormitory for the French soldiers

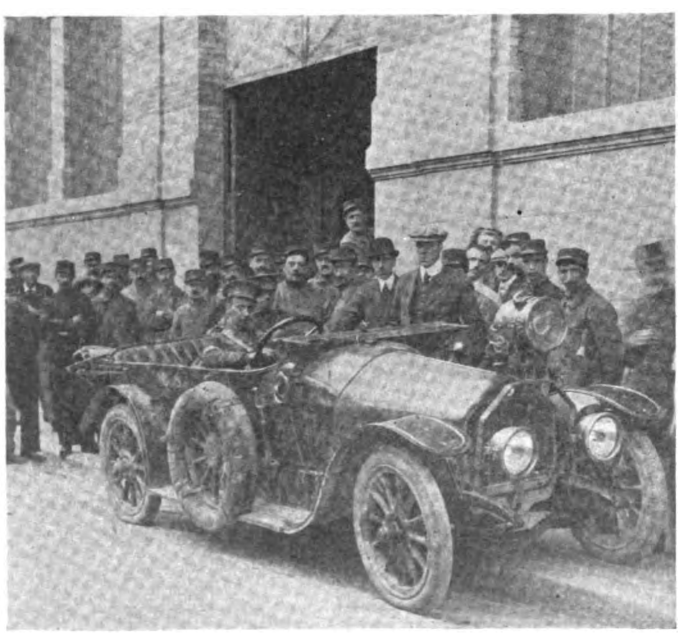
French Regulations Grow Stricter

Cars Confiscated if Rules Are Violated

By W. F. Bradley

Special Representative of THE AUTOMOBILE *with the Allied Armies in France.*

PARIS, Oct. 7—Non-military motorists are being held down tighter than ever. It may be an inconvenience to the motorist, but it is a remarkable testimony to the value of the automobile. Individual passes to use a car are given out by the military governor of Paris and must be renewed every week. These passes allow the holder to travel within an area approximately 6 miles around the city walls. If the car is taken beyond these limits it is confiscated. Special passes for a single journey to some town which must be stated are given out after personal examination of the applicant. If the town is in the war district, the application is rigorously refused. Even for other parts of France, not at all affected by the war, the pass will not be given unless it is shown that the applicant has real business to perform. These single journey passes must bear the photograph and signature of each person carried in the car. If these regulations are not observed the car is seized and the occupants returned under escort to their homes.



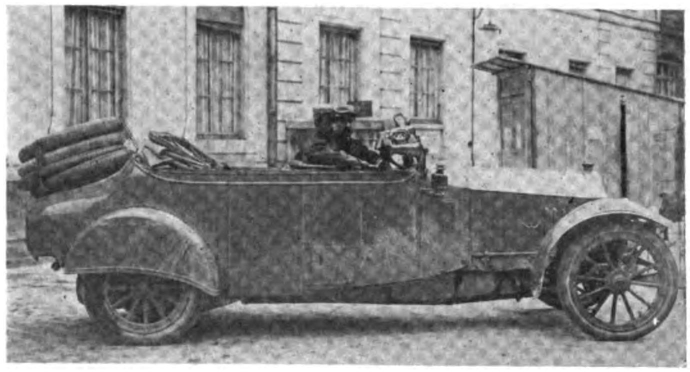
Lieutenant Director of Supplies leaving the Darracq factory for the front

Up to quite recently a number of cars have been going out to the Aisne battlefield to bring in wounded to the Red Cross hospitals. Although the drivers of these cars were registered and were always accompanied by an officer in the British army, orders have been given that they must be withdrawn. In future the wounded will be brought in by hospital trains to suburban stations and carried from there to the hospitals by car. R. N. Goode, manager of the Packard company in Paris, was one of the first to volunteer to bring in wounded from the front. In connection with the American Hospital, he has made a journey every day for a month to the battlefields, bringing in from one to three wounded officers and men on each occasion. In common with others he will have to stop this useful work.

A Packard has been the victim of an unusual adventure. A special pass having been obtained from the military governor of Paris, one English and three American journalists were taken out to the battlefield. The officers in the field refused to recognize the pass given by the Paris governor. The journalists were sent back by train and put under parole not to write anything for 9 days. The car and chauffeur were retained, the latter being ordered to instruct another man to drive it. After being put to rough usage for a week, the car was returned to Paris, but the chauffeur was kept under military observation for a week longer.

L. K. Clarke, one of the demonstrators attached to the Paris Packard branch, also broke through the lines with a body of journalists. The newspaper men were sent back and the car was seized. Mr. Clarke volunteered to serve with the English staff as driver of the car. His offer was accepted, and for a time he remained near the firing line, dressed in the British uniform, carrying English officers from point to point on his American car.

The stringency displayed towards motorists appears to arise from a fear of spies. A car is the most valuable adjunct a spy can possess. Only a few days ago a car entered Versailles carrying German spies disguised as British officers. Another party drove to the dock at Boulogne and were about to step on the boat for England when a slight mistake in their papers led to their arrest. In the districts where fighting is in progress it is absolutely forbidden for a civilian to take a car. In other parts of France the use of cars by civilians is cut down to the lowest possible numbers. In this way it is believed that a more rigid control can be kept on motorists and that spying and the spread of information can be arrested. People who have a need to travel and who cannot conveniently make use of the railroad are annoyed at the restrictions under which they are placed. They cannot protest effectively, for the military authorities will not admit discussion and newspapers will not publish their complaints.



Mercedes 60-horsepower armored car captured from the Germans and now used by French headquarters staff

Big Tire Business Expected After War

Goodrich Foreign Manager Thinks American Makers Should Reap Harvest

PARIS, Oct. 7—How the war has affected American tire interests in Europe was related to the Paris correspondent of THE AUTOMOBILE by Arthur Lumsden, general manager of the French and English auxiliaries of the Goodrich Tire Co.

"Our men had been paid as usual at noon on the Saturday France mobilized her army. At 4 30 o'clock the notices were issued putting the nation on a war basis. As our pay list is made up on Wednesday evening, arrangements were made for the cashier to be at the office on Sunday morning at 5 o'clock, in order that the men who were going to the front could collect their arrears of wages. In this way every man who left our works to go on active service went away fully paid.

"On Monday morning I was curious to see what the conditions would be at the factory. We found we had eighty men who were not eligible for active service. These men included most of those engaged in the band tire department. According to a previous arrangement with the French government, this department went under military control automatically as soon as war was declared, and we were put under an obligation to produce certain quantities of tires for army trucks." (This arrangement, it should be explained, is a part of the French army subsidy scheme. A couple of years ago Goodrich tires were admitted as part of the equipment of army subsidy trucks. Only the fact that the Goodrich company actually manufactures in France and has on its French board of directors men who have military responsibilities under the French law enabled this arrangement to be made.)

"London and Paris were violently panicky as soon as war broke out. The leading French tire firm, doing an immense business in England, called in all its stocks and refused to do business on anything but strictly cash terms. This move was followed immediately by the leading English firm. Deal-

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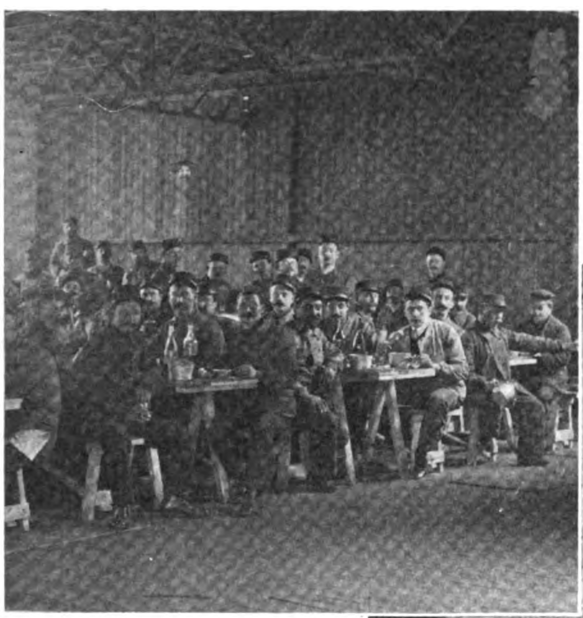
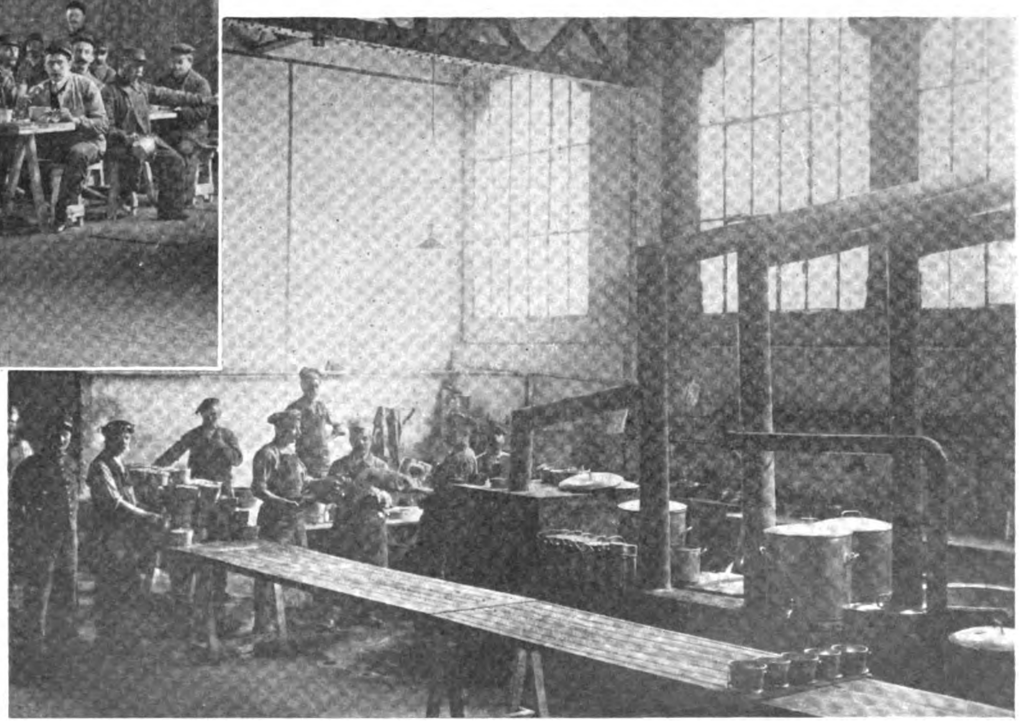




Above—Part of the Darracq automobile factory at Paris used as a mess room for the French troops

Right—Army kitchen installed in the washing room of the Darracq factory for the use of the French troops stationed there

Electric Vehicle Convention Opens—Over 400 Delegates Gather in Animated Session

Attendance of 500 Expected—Passenger Car, Truck, Battery, Parts and Accessory Makers Represented as Well as Central Station Interests

Interesting Papers Provoke Lively Discussion—More Activity in Building Business Urged

PHILADELPHIA, PA., Oct. 19—The fifth annual convention of the Electric Vehicle Association of America opened in this city today its 3-day session for the discussion of topics pertinent to the use of passenger and commercial electric vehicles.

By noon over 300 delegates had registered and it is expected that 500 will be in attendance before the convention closes. Those present represent the passenger and commercial vehicle departments of the industry, together with battery makers and other builders of component parts, such as motors, tires, frames and chassis necessaries. Over one-half the delegates are from central station interests, that is concerns in many cities manufacturing electric current for varied purposes.

More Activity Is Needed

The general sentiment among the delegates is that the electric vehicle industry has not progressed as it should and that more activity is necessary.

James H. McGraw, a New York publisher, read a very analytic paper, in which he endeavored to explain why the industry has not progressed as the conditions of the time warranted. Mr. McGraw regards the present condition of the industry unsatisfactory for three reasons: First, the novel character of the business has been depended upon to carry the business to a point where exhaustion has set in. Second, those responsible for the administrative conduct of the business have done little in a constructive or creative way to open up new lines of business and have depended too much on the routine of subordinates. Third, the central stations have not co-operated to the extent they should have in pushing the industry.

While considering the industry in its present condition Mr. McGraw thinks that all these ills can be corrected without superhuman effort, by simply applying to them such reasoning as will develop adequate comparison with progress made in other lines of business, and by adapting principles which have been known to bring results.

Dr. Steinmetz Answered

J. Crawford Bartlett, of Philadelphia, read a brief paper answering a paper read some months ago by Dr. Steinmetz, the eminent electrician of the General Electric Co., and one who ranks highest in the world in many electrical matters. In his paper Dr. Steinmetz prophesied the $500 electric that will travel 20 miles on one battery charge and have a speed of 15 miles per hour. He predicted 1,000,000 of such vehicles within 10 years.

Mr. Crawford in replying said: "Dr. Steinmetz predicted an electric of 20-mile radius for $500, and not an electric of 60 or 70-mile radius. I can take care of Dr. Steinmetz's $500 car for $7.50 or $10 per month as he prophesied. We had that kind of a car 10 years ago, but who would buy it today? Before 1909 I drove to Atlantic City in a 1,200-pound electric car, but today the public wants heavier cars and now I ride in one weighing 3,200 pounds. The public today does not want your puny, weak, electric, but is demanding the swift, sturdy, comfortable car that will go 75 miles on one battery charge. The greatest setback the electric vehicle industry received was the low-priced small vehicle of 10 years ago."

To Suit the Public

George H. Kelly, of the Baker Motor Vehicle Co., agreed with Mr. Bartlett that the public today wants the big car and not the little one. The electric vehicle makers are going to give the public what it desires in a car, rather than following a missionary course of trying to convince the public that it should use the light-weight, short-radius vehicle.

The Committee on Garages and Rates created much discussion when its report was read. The report contained a map of the Lincoln Highway, extending from New York to San Francisco. The majority of the report consisted of the tabulation of mileage on the Lincoln Highway, the ostensible inference to be drawn from the report as presented being that it was to show the possibility or impossibility of touring by electric from Coast to Coast. No sooner had the report been presented than George H. Kelly moved that it be laid on the table because the manufacturers of electric vehicles advertised their passenger cars for city use and not for country use, and that while the report on the map proved interesting information they were all wrong so far as the spirit of the electric is concerned. In America there are 225 cities of over 25,000 population, and in these the electric vehicle manufacturer should hope to make his sales for several years to come, and to these centers the association through its Committee on Garages and Rates should endeavor to assist the industry.

Animated Discussion

Immediately the convention was divided into two factions, those favoring the electric as a vehicle possible for touring, and those representing the industry considering it more in its present form as a vehicle for city use. P. D. Wagoner, of the General Vehicle Co., in siding with Mr. Kelly, believes that the public will not generally adopt the electric for touring purposes through the country until the speeds of the vehicles are higher than at present, and until batteries are perfected so that they will carry an entire day or until they are perfected along other lines which will permit them to be recharged or boosted in as long a time as it takes to fill a gasoline tank in a gasoline touring car.

The entire convention was not, however, of this belief. Day Baker, of Boston, Mass., and Treasurer of the Association, is a staunch believer in electrics and does his country touring in a machine that he has used for 8 years. With it he regularly makes the trip from Boston to Providence, 46 miles in 3 hours, whereas the average gasoline car making the trip does it in 2 hours and 30 minutes.

Improvements Necessary

Additional realism was added to the possibilities of cross-country touring by two electrics which recently made the trip from Washington to Philadelphia, and averaged 12 miles per hour for the entire distance. They do not recommend that people go touring in the ordinary electric vehicle as built today, as trouble will surely be encountered. The batteries are of not sufficient capacity, and other improvements are necessary in the vehicle.

J. M. Skinner, of the Philadelphia Storage Battery Co., believes that it is possible to use electrics for touring throughout all of the eastern United States, and corroborated his belief by citing that he has frequently made the trip from Washington to Boston without difficulty, averaging 50 miles per charge.

With the present charging facilities, there are only fifty charging depots on the line of the Lincoln Highway between New York and San Francisco, and of this number there are only fourteen west of the Mississippi River. With the present distribution it would be impossible for the tourist to even get from New York to Chicago, as there is one jump of 123.2 miles in Pennsylvania between Chambersburg and Greensburg, where there is not a charging station. This is the longest gap between New York and the Mississippi. West of the Mississippi there are but three stations between the Mississippi and the Missouri at Council Bluffs. There is not a single station between Omaha and Cheyenne, and from the time you leave Salt Lake City you do not meet with another charging station until you reach Sacramento, Cal.

Electric Taxicabs

An interesting part of the report was the fact that there are 600 electric taxicabs, or were before the start of the war, in Berlin, Germany. To keep these taxicabs supplied in batteries there are two battery maintenance systems in the city, one with 700 batteries, and the other with 450, the batteries having 250 amperehour capacity. These maintenance companies charge the operators 3 cents per kilometer for battery service, including minor repairs to the car, but not including washing and garaging. The chauffeurs receive as their compensation 25 per cent. of the fare, plus all tips. The expense of washing the cab is 25 cents, and one-half of this charge is taken out of the percentage earned by the drivers.

Changing the Batteries

The changing of batteries is handled as follows: The drivers are required to report at the maintenance depots at specified hours for changes of batteries, this practice distributing the load and reducing the number of employees in the depots. When the cab reports for a fresh battery the odometer reading is taken, and collection is made of the chauffeur or driver for the previous charge. When it is noted that a certain minimum mileage cannot be secured from a charge the taxi is required to go to the shop for overhauling. At the charging station the workmen are paid a premium when the battery life exceeds 10,000 kilometers.

The following are some interesting facts in connection with these system:

Number of taxicabs in Berlin	600
Taxi speed maximum miles per hour	20
Taxi income average per mile	$0.16
Battery capacity, at 5-hr. discharge rate, A. H.	250
Number of cells in battery	40
Life of battery plates, positive, miles	9,375
Life of battery plates, negative, miles	18,750
Time of battery change at depot, minutes	2.5

The prevailing conception that there are few electric vehicles in use in the different cities of Europe was fairly well exploded by P. D. Wagoner, of the General Vehicle Co., who has recently spent considerable time in Europe, investigating different aspects of the industry. Nearly every city in Europe has its quota of electrics. Thus Berlin in addition to its taxicab equipment has twenty-four electrically driven pieces of fire apparatus, thirty electric water carts for sprinkling the city streets, which are effecting a saving of $400 per vehicle per year over the previous horse system, sixty-seven electrics in the mail delivery service, etc. In Munich there are twelve three-wheel electrics used in the postal service, and Leipsig has twenty electric postal vans.

That the Electric Vehicle Association of America is not idle in its efforts to bring the electric vehicle before the attention of the postal authorities in Washington was well demonstrated in the report of the Committee on Parcel Post Delivery which was delivered by J. H. McGraw, who is Chairman of the Committee. This committee has been in touch with the Postal Departments, and has prepared a booklet entitled "The Electric Vehicle in Parcel Post Service for Economy and Reliability." Special letters together with a copy of this booklet have been sent to the President and his Cabinet, and to all members of the Senate and House of Representatives, to the Collectors of Custom of the principal parts of the country, to the postmasters in all cities of 10,000 population or over in the United States and Canada, and to all Departments of the Government, including army, navy, civil service, etc. The campaign was extended to Canada by having the Canadian Electrical Assn. take up the propaganda and spread it throughout the country.

In Parcel Post Work

The committee has gone further in developing the parcel post business in favor of electrics, and has secured detailed analyses undertaken by the Post Office Department to determine the parcel traffic in each of fifty of the principal cities for specific periods. The combined figures for these fifty cities, which have a total population of over 25,000,000, show that nearly 11,000,000 parcels were mailed out from these fifty post offices during the interval of October 1 to October 15, 1913, and 3,500,000 parcels were received at these fifty post offices for delivery during the same period. The average weight per parcel was 1 pound 11 ounces and the average parcel charge 10 cents. The cost of delivery by automobile was 5 cents per parcel.

Stimulating the Progress of the Electric Vehicle Industry

Inclination To Be Satisfied with Easily Secured Business Must Be Checked

James H. McGraw

TWO features of the problem which stand out boldly are the wealth of possibilities for large development, and the abundant resources among those engaged in the business. Yet in spite of great possibilities there is evidence of sterility in the comparatively little progress made. I say comparative progress judiciously, because I am not unmindful of the great number of vehicles already in service; but in view of what can be done and will be done, this is only a very limited beginning.

Three Reasons of Failure

If, therefore, we may be permitted to regard the present situation as unsatisfactory what are the causes? Aside from the generally depressed condition of business throughout the country, my investigations indicate that there are three reasons for the slow growth:

First, the novel character of the business, which, while it has brought large installations in the commercial field and successfully launched the passenger car, has been depended upon to carry the business to a point where exhaustion has set in.

Second, those responsible for the administrative conduct of the business have done little in a constructive or creative way to open up new lines of endeavor in exploiting their product, and have depended too much upon the routine performance of subordinates.

Third, defective collaboration from central station companies furnishing energy supply has not been received to the extent to which it must be exerted.

Taking up the first cause, we have a condition analogous to that which previously existed in nearly every other field of commercial endeavor where the introduction of new methods or of improved equipment became a problem. And in no case has substantial progress been accomplished until the impediments of novelty have been ruthlessly brushed aside by the stern and irresistible necessities of commercial enterprise.

This is the case with the electric vehicle. It has hardly reached a transitory stage. It is not yet commercialized. We are still fondling it as a luxury, hesitating to put behind it that dynamic energy necessary to force it upon the public which does not know its value and which is waiting to be convinced that it must have it and use it in great numbers as an economic necessity.

Considering the second cause, it must be evident to every keen observer that the solution of most of the many difficult problems now left to the salesmen must be made by those justly responsible for administrative functions. The inclination to drift with the tide of things, and be satisfied with business that can be readily secured, without any effort to sift out and win by sheer merit the more difficult but more profitable undertakings, must be checked.

The present semblance of weakness must be entirely changed, and upon the administration must be laid the task of discovering, testing and establishing those methods of organization and management by which all business productive energies may be united, stimulated, guided and rewarded.

A Great Opportunity

It is as much within the province of companies selling electrical energy to supply it for moving freight and merchandise as for other power applications, illumination, or passenger transportation. Yet the project has never been taken up seriously enough by them to realize the significance of its comparative value with the load now sought in their routine channels. The fact remains, however, that a great opportunity is passing by, practically unseen, except for a limited attention which is insignificant in comparison with what the prospect demands.

It requires but little observation to discover that the field has enormous scope. Every pound of material of any kind within the range of our vision in cities, excepting alone the original virgin soil and natural growths, has been moved at one time or another in some form of vehicle over the city streets. Every building has been carted in on wheels. All the vast equipment we make use of in any way whatever has been transported. In addition there is the enormous quantity of transitory merchandise, constituting our commerce, as well as our consumed materials; the sum total of which transportation might, and probably some day will, be performed electrically.

Some conception of this city vehicle load may be gained by reference to the volume of our transported materials in other directions. The annual tonnage originating on railroads for the past 8 years has averaged 800,000,000 tons. An equal amount was transferred to connecting railroads, thereby making the total annual rail tonnage over 1,500,000,000. It would be fair to assume that at least one-third of this finally reached our principal cities and was carted there at least twice over a distance of only one mile. We have a minimum of 1,000,000,000 ton-miles per annum. If the public service electric companies secure this business as completely as they have secured city rail passenger transportation and illumination, and it is practically within their reach, their profit would be enormous because there would be no such permanent investment or expense as is required in the present fields of their activity.

It is generally conceded that the freight tonnage reaching cities is handled many times over, but assuming as above that it was simply handled once from the railway to business premises and afterwards to the consumer, the above 1,000,000,000 ton-miles at an average energy consumption of 5 kilowatt-hours per ton-mile, would at the 4 cent rate reach a total figure of $200,000,000 per year, or nearly the present gross income of the central stations.

Now to consider the third cause. It may be well acknowledged that the attitude of the majority of central station organizations is favorable towards the advancement of electric vehicle projects, and that at least a half dozen of the larger ones are conducting organized departments for the advancement of vehicle use. Furthermore, all of them have liberally contributed to the funds of the general advertising campaign which has done such effective educational work in the past few years. However, it is equally plain that the central station effort is not at all in keeping with the enormous vehicle load which stands practically at its doors.

Millions in It

I have indicated in what direction the salvation of the industry lies. **We need to show the central stations of the country the great market offered by electric vehicles when they come into their own, and to induce them to preach their use in season and out of season as they do the use of lamps, motors and heating devices. Freight loads are larger than passenger loads and possess greater diversity. If, therefore, it is profitable to transport human beings electrically, how much more so would it be to transport freight; and if central stations are eager for railway loads, they should be even more keen to secure electric vehicle loads. I think they only need to be shown.**

European Development of the Electric Vehicle Industry

Discounting the War, Present Outlook for the Electric Abroad Is Very Bright

By P. D. Wagoner

As early as 1836, an American called Davenport of Brandon, Vt., built a model electric locomotive which was exhibited in London in 1837. In 1839 Robert Davidson, Aberdeen, Scotland, constructed a crude road machine that would move two persons along a rough floor. In 1840 Uriah Clark built at Leicester, Eng., a small storage battery weighing 60 pounds. Sir William Grove constructed his celebrated gas battery in 1842, and Gaston Platé began his researches in 1859, perfecting his battery 15 years later. Camille Faure took out his patent for material for the pasted plate in 1881, and in the same year Rafford of France brought out what Hasluck calls the first electrically driven road vehicle, followed by one G. Trouve 6 months later. The Ayrton (English) electric tricycle appeared in 1882. The first practical American Electric was probably the one built by Fred M. Kimball of Boston in 1888, and the first successful commercial electric, usually credited to Riker, materialized in 1897.

Electric Vehicles in Europe in the Spring of 1914

Country	Passenger	Trucks	3-Wheelers	Postal Cars	Total
Germany	862	554	3	270	1,689
Holland	70	38	1	6	115
Denmark	2	21	..	5	28
Sweden	2	2	..	2	6
Austria-Hungary	132	117	1	15	265
Belgium	1	..	..	..	1
France	100	190	..	28	318
Russia	3	4	..	1	8
England	201	62	..	25	288
Switzerland	131	69	..	..	200
Roumania	..	..	..	1	1
Spain	12	..	..	1	13
Italy	60	173	..	5	238
Total	1,576	1,230	5	359	3,170

Rafford's electric (1881) was a tricycle driven by an electric motor of less than 1-8 horsepower, fed by twelve small Faure accumulator cells. The whole vehicle weighed 176 pounds. Ponchain's 6-passenger phaeton appeared in 1893 with a Dujardin battery weighing 1,100 pounds, over one-third as much as the entire vehicle. In 1896 Darracq exhibited at the Paris Salon du Cycle, a very interesting electric coupé.

There were developments in England and Germany about 1896 and the Jenatzy car and delivery car is mentioned in an English engineering paper in 1897. In 1899 Jenatzy won the kilometer record (mileage contest) in France with his torpedo shaped electric called "Jamais Contente." The De Dion Bouton people brought out a light electric in 1901, the accumulator consisting of forty-four cells of twenty-one plates and giving 200 ampere hours capacity.

The British Electromobile Co. developed an electric in 1902 and the Waverly Co., and the Vehicle Equipment Co. invaded England the following year with electric passenger cars. The Compagnie Francaise des Voitures Automobiles brought out a car early in 1900 which had forty-four cells of Faure-King accumulator, with a maximum speed of 11.1 miles per hour.

The gasoline-electric automobile carriage appeared in France as early as 1899 and in 1902 an alcohol-electric run by Krieger was entered in French tests. The car weighed 2,910 pounds, the forty-four cell battery 882 pounds, and the car had a speed of 9.32 miles per hour.

In 1898 there were contests between electrically propelled hackney carriages in France and electric cabs were relatively successful there from 1899 to 1902. The Opperman Co. (German) placed an electric van in the service of the London Post Office in 1901. American built commercial electrics were shipped abroad that year also.

Europe's Important Part

I mention the foregoing to illustrate that Europe had a very important part not only in the development of storage batteries, but of electric vehicles as well. But all this development practically stopped so far as the electric vehicle is concerned about 1903. The progress made from 1903 to 1909 appears to have been spasmodic.

I regret to say that I cannot tell you positively how many going concerns are manufacturing electric vehicles and batteries in Europe today, but the number of the former probably does not exceed eight or ten. There are a number of automobile manufacturers who build a few electrics in conjunction with their regular line.

There are today approximately 3,200 electric vehicles in the whole of Europe. Probably 25 per cent. of the electric passenger cars in England are of American manufacture and possibly 10 per cent. of those in France. The number of commercial electrics exported to Europe is to date almost negligible.

The number of electric trucks in Europe is very small. The development has been along highly specialized lines; taxicabs, municipal apparatus and postal vehicles predominating, with a few score buses, public utility and mine working vehicles scattered through various countries. Few of the passenger electrics compare with our luxurious cars and many of the mail wagons are of the frail light weight, inexpensive tricycle type. Electric vans for wholesale dry goods, grocery and general heavy delivery service are used to only a very small extent in England and parts of Germany and France, and fleets of from twenty-five to fifty 5-ton or even 2-ton trucks are unknown.

Cabs in Berlin

Motor cabs first made their appearance in Berlin in 1900. Early in 1914 there were 3,090 horse cabs, 1,946 petrol cabs and 386 electric cabs in use in the city of Berlin.

A very interesting phase of the taxicab situation in German cities is the demand made by the police authorities that for every motor cab placed in service, one if not two or more horse cabs must be retired. In Breslau and Bremen, two cities having an unduly large number of horse cabs, five and four horse cabs respectively are removed for each motor cab licensed.

In some cities no motor cabs are allowed to start operation beyond a certain predetermined number, with the result that some hack drivers in Berlin have sold their permits to motor cab operators for 2,000 marks (about $475). In Munich the motor cab operator must show 100 marks operating capital and pay 3,000 marks to displace a horse cab operator who has been in business five years.

The Allegemeine Berliner Droschken Gesellschaft operates 200 taxicabs. They have several charging stations and 400 batteries. The battery is placed under the driver's seat. Batteries are changed in about 2 minutes by means of hydraulic lift. When fully charged these electrics make from 50 to 60 miles and some of the cabs can be speeded up to 22 miles per hour. Other taxicab companies operate smaller fleets in Berlin and other German cities.

Higher Speed Made

Electric trucks and delivery vans have a higher rated speed in Germany than vehicles of the same capacity in this country. One-half and 1-ton vans often have a speed of from 15 to 18 miles and at more moderate speeds give as high as 62 miles per charge, while 5-ton vehicles at 7 1-2 to 9 miles per hour give from 37 to 44 miles per charge.

Bakers and dry goods firms are beginning to use the electric in Germany and a few electric vans have been placed in storage warehouse work. Electric water carts are very largely employed, about thirty being used in Berlin alone. These carts water about 49,000 square yards of pavement per day of 8 hours against 30,000 square yards for horse apparatus. The saving of the electrics over horses is about $400 per electric car per year.

The Berlin Fire Brigade was using twenty-four electrically driven vehicles in March of this year. Electric dust carts are extensively used in Hamburg and Altona. Electric tractors are attached to water carts, slop vans, snow carts, street sweepers, etc., in some German cities. The Great Berlin Tramways use several unique electric tower wagons or break-down cars. The tower is placed on a 3-ton chassis and is removable.

In Mail Service

Berlin has sixty-seven electric vehicles in mail service. Nineteen of these are of the tricycle type, 500 pounds capacity; thirteen of the same type are of 900 pounds capacity; the remaining thirty-five are four-wheel vehicles of 3,700 pounds capacity.

Munich has twelve light three-wheel vehicles in postal service and Leipsig twenty-six electric postal vans of 3,500 pounds capacity. The latter are used principally in parcels post service though some move mail in bulk.

On March 1, 1912, the Vienna postoffice approved an experimental electric for

(*Continued on page* 782)

To Develop South American Trade

Establishment of Dollar Exchange and Perfection of Our Selling Machinery Recommended by Latin-American Trade Committee—Financial Assistance Needed by South America

ACCORDING to the Latin-American Trade Committee appointed by the Hon. W. C. Redfield, Secretary of Commerce of the United States, the best methods to remedy the present disorganization of our trade with Latin-America and to place it on a permanently satisfactory basis are the following:

1—The establishment of a dollar exchange, *a*—By the ultimate creation of a discount market; *b*—Pending the establishment of such for the extension of credit by the banks, an establishment of reciprocal balances in the United States and in Latin-America for financing trade.

2—Perfection of our selling machinery, *a*—By furnishing additional support to commission houses already familiar with Latin-American business; *b*—By forming associations of merchants and manufacturers to be jointly represented in Latin-America; *c*—By obtaining information as to the possibilities of developing retail stores in large Latin-American cities.

Extracts from the report and recommendations of the committee fellow:

An Opportunity

"An opportunity is now afforded to place the trade of the United States with other American nations upon a firm foundation, supporting a more comprehensive structure which may be built as the situation again more nearly approaches normal.

"The Committee feels, however, that there is great danger that our merchants and manufacturers unfamiliar with Latin-American conditions may be induced by recent publicity to undertake ventures in that field which not only will be unremunerative but actually disastrous, and, in their ultimate result, make for a reaction of the very healthy and much to be desired interest in foreign trade now manifest throughout the United States, an interest which, if properly directed, should be of great permanent value.

"The trade of the principal South American countries with England, Germany and the United States is shown by the accompanying table.

Our Exports Concentrated

"Our export trade to South American countries particularly, and to a lesser degree the Central American States, is concentrated. It is estimated that 75 per cent. of our principal exports to South America are the products of large organizations. Our principal exports to the River Plate may be roughly stated to consist of agricultural machinery and allied products, steel products, oil products—kerosene, gasoline, etc.—and printing paper of various kinds. Our exports to Brazil, Chile and Peru are largely limited to steel and oil products, locomotives and electrical machinery. Our trade in cotton cloths, shoes, stockings wearing apparel, and miscellaneous goods, has not made up an important part of the total because of our unwillingness or inability to meet British and German competition.

Our Imports Increase

"Even before the war our export trade to all Latin-America, and notably South America, had begun to decrease on account of the prevailing financial stringency. Our imports, however, increased in value, and the trade balance adverse to the United States for the fiscal year 1913-14 greatly exceeded that of 1912-13, both for all Latin-America and for South America alone.

"Since August 1 of this year the countries in South America whose currency is not already on a gold basis have experienced a serious depreciation of their paper money.

"The export of copper, tin, nitrates, coffee and other products has been curtailed because of loss of the normal European markets. As indicative of financial conditions, bank holidays and moratoria were declared at the outbreak of hostilities which were extended in certain countries from 60 to 90 days. The effect has been damaging to American exporters as, under such circumstances, drafts due in August will not be liquidated until November or December. This means a large accumulation of draft indebtedness never contemplated by the shipper. Specie payments were suspended.

"Collections throughout South America, therefore, are difficult, orders are falling off, and after our exporters have completed their contracts for this year, there seems less prospect for new business unless steps are taken to relieve the situation.

"Since the balance of our trade with South America is heavily against the United States, there should be exchange facilities which would enable our exporters to obtain payment from balances created in New York in settlement for goods imported into this country from South America. Such balances, however, are not maintained in this country.

"The external debt of the South American Republics (Federal, State and Municipal), amounts approximately to $1,632,488,580. The bulk of those funds were borrowed from Great Britain. South America therefore invariably has payments to make in London.

Britain's Supremacy

"The greater part of South American banking business, moreover, is conducted by British owned institutions. These facts, together with the facilities offered by the London discount markets, have induced German and other European owned banks trading in South America to maintain London agencies. Sterling credits, therefore, have been the basis of South American trade.

"Our exports to, and imports from, Latin-America are shipped direct. They are, however, (almost exclusively in South American trade, and largely in Central American trade) paid for in sterling bills of exchange.

"United States exporters have, in the past, converted their dollars into sterling at the rate of the day, drawing against their South American customers at 90 days' sight, payable in 90 days' bills on London. Importers have accepted 90 days' sterling bills, which they have liquidate at the current rate of exchange.

"Thus, although the balance of the South American trade of the United States has been increasingly heavy against this country, we do not make settlement direct. We have been obliged, either by the shipment of gold or goods, to settle this adverse balance by remitting to England either gold or goods, to meet interest charges on the South American debt, and to pay for goods purchased in Europe by the South American countries.

Present Problems

"Production in the United States can be maintained if there be a sufficient market at home and abroad for American goods. Production in South America may continue but cannot be further developed unless financial assistance be obtained.

"At the present time steamships are available and sailing regularly from this country to the principal ports of Latin-America and from those ports to the United States. Many of these vessels are unable to obtain full cargoes. Although only a limited number are under the United States flag the above will clearly indicate to exporters, importers and manufacturers that they need not hold back from entering the field on this account.

"Before trade can resume its normal course, the exchange problem must be solved, either by the restoration of old, or by establishment of new, credit facilities.

New Credit Machinery

"Old methods may no longer be serviceable in the situation which will result from the readjustment following the war. It should now be possible indeed, in the mutual interest of the Latin-American Republics and ourselves, to create new credit machinery to perform the functions of the old, and which will at the same time rid us, at least partially, of a dependence upon the London credits and European financial markets which, though essential in the past, has proved to be seriously embarrassing.

"It has been increasingly the practice of European bankers to stipulate the use of European material in the projects which they financed. Latin-America is now turning to the United States for funds. This country is hardly in a position to undertake considerable investments at the present time, **but industries with an already considerable trade at stake may well consider the necessity of protecting that trade by obtaining for their customers some relief from the present stringency. Such investments, if judiciously made, would yield an ultimate fair return and meanwhile provide a market for American materials which cannot now be sold.**

A Security Market

"The question of creating a market for Latin-American securities in the United States, therefore, is highly important. The development of our trade with those countries is largely dependent on its satisfactory solution.

"Unless the restriction of commercial credits be remedied, however, we will not only be unable to extend our trade but we will lose a considerable portion of that which we already have.

"The present effort to secure co-operation of American bankers in massing a gold fund to satisfy our obligations abroad by promising to cause London exchange again to approach normal, will lessen to the American importer the expense of liquidating in London his South American indebtedness. It will nevertheless give effect to the old alienation of the selling power we should derive from purchases of South American products. Liquidation of our South American indebtedness in London will pay for British exports to Latin-America, at a time when American merchandise, intimidated by moratoria, remains congested on our docks. Our available money will serve Great Britain's effort to capture South American markets vacated, perforce by Germany.

"Whenever there is a great disturbance of the world's finances, American exporters and importers in South American trade are injured, because of their dependence on London. **This has happened four times in 25 years.**

"So long as South America must meet interest settlements in London by shipment of goods to the United States, under the old three-cornered system, our South American trade must, to a certain degree, depend upon London exchange.

Independence Needed

"But in view of the facts above mentioned, it has seemed to your Committee that the need for independence, emphasized by the present situation, should be recognized. We feel that an attempt should now be made to evolve some plan whereby we might take advantage of our large direct trade with Latin-America to make a market for bills drawn in dollars, and establish a direct exchange, not with the view to eliminating sterling credits now or later, but in order to provide an exchange channel which will supplement, offset or compete with London, and be available in an emergency when London exchange is disorganized.

Co-operative Exchange Proposed

"A plan for the establishment of a Merchants' 'Co-operative Exchange,' or clearing house for Latin-American trade, has been proposed. This, it has been suggested, would enable importers and exporters of goods to and from Latin-America to watch credits, balances to be remitted on definite settling dates.

"The Committee, however, after careful consideration, feels that the suggested "co-operative exchange" would not be practical, although a powerful banking group or large banking institution willing to assist in maintaining and developing our Latin-American trade might be able to secure and render mutually beneficial the organized co-operation of exporters and importers in matching credits.

'The Committee, however, believes that the extension of credits might be facilitated and some relief afforded, pending the establishment of the Federal Reserve Banks, if, in addition to permitting national banks, which have signified their intention to enter the Reserve Associations, to accept commercial paper, action be taken by the Federal Reserve Board to make immediately effective the rediscount provision of the new banking system, thus assuring early establishment of a discount market.

Extension of Trade

"The question of extending American commerce with Latin-America depends primarily, as does the problem of maintaining our trade, upon the establishment of commercial credits, upon our ability to finance Latin-American enterprise, purchase the products of its soil and industries and upon the perfection of our selling machinery.

"Your Committee feels, however, that merchants and manufacturers now contemplating an entry into the Latin-American field should be careful to avail themselves of the easily accessible information concerning these markets. It is suggested that they should, at the outset, remember that the cost of maintaining individual representatives would probably be too great for any one of them to bear themselves. It is therefore suggested that associations consisting of the smaller firms or corporations engaged in kindred lines of production might be formed, and that either one or more representatives should be sent to South America to look after the interests of such associations, thereby bringing the cost of representation within a reasonable limit."

Trade of Principal South American Countries With England, Germany and the United States

		England		Germany		United States	
Country	Year	Imports	Exports	Imports	Exports	Imports	Exports
Argentina	1913	$126,305,556	$116,154,937	$68,815,721	$55,888,788	$59,861,703	$22,096,385
Brazil	1912	77,509,079	43,006,473	52,945,352	51,856,965	48,043,322	141,720.216
Chile	1912	38,599,282	55,340,706	33,189,070	28,321,776	16,806,341	24,526,811
Peru	1913	7,779,616	16,561,235	5,138,902	2,970,857	8,541,934	14,761,355
Ecuador	1911	2,835.854	986.148	2,385,758	2,139,552	2,591,629	3,190,069
Uruguay	1912	*12,575,508	6,508,127	*7,849,094	7,860,272	*5,638,402	2,655,371
Paraguay	1912	†1,295,248	‡799	†1,500,958	†843,459	†304,888	†590
Colombia	1912	†7,838,878	†4,376,182	†4,201,125	†1,854,211	†7.612,037	†15,832,882
Venezuela	1913	3,994,733	767,031	2,586,986	5,563,768	6,944,136	8,470,563
Bolivia	1912	3,528,042	26,044,974	6,423,802	4,357,101	1,787,321	152,583

*Figures are for 1911 and are taken from the Almanach de Gotha.
†Figures are taken from U. S. Daily Consular and Trade Reports.
‡Figures are for 1911 and are taken from Pan American Union publication.

Autumn Painting and Varnishing of the Car

Protecting the Surface During the Autumn and Winter Months a Matter of Economy

By M. C. Hillick

PAINTS and colors on the automobile wear in proportion to the measure of protection afforded them by the varnish. At this season of the year, after the brunt of the summer campaign is well over, the average car surface is in urgent need of the additional protection which a coat or two of varnish applied at this time or during the next few weeks, will afford.

Saving Repainting

A great many car owners have come to appreciate the importance of varnishing, and, if necessary, of both painting and varnishing, the car during the middle or late autumn. Sometimes a coat of color and a coat or two of varnish applied in the autumn will save a lot of thoroughgoing painting repairs which otherwise might be necessary a few months later. **It is of the utmost importance that the exceedingly sensitive and delicate color coats be kept amply protected by varnish.**

Even car owners, usually indifferent to the actual paint and varnish needs, have in these later years learned to respect the value of maintaining plenty of varnish protection on the automobile. These men, fortunately, have recognized, and are more and more recognizing, that not alone the color coats but the pigments united into a foundation for the support of these colors need the protection which only a strong body of varnish can give.

Autumn Finish Needed

It is due to them, and to the information which they are prepared to give their fellow car owners that a more general autumn painting and varnishing of the automobile is now regularly being done. It is all a very real matter of economy. The surface of varnish that has been, during the summer months, cleaned, renovated and polished, until it would fairly seem stripped of all its substance, has very little left with which to protect and give life to the color coats, and, incidentally, to the coats protecting them.

The cleaning and polishing materials now so extensively employed upon car surfaces have a decided erosive effect. This erosion systematically practiced for a few months will, upon examination, be found to leave a very thin film of varnish to protect the undercoats.

Some Polishes Injurious

A recent examination of a number of different makes of cars which for a period of from 4 to 5 months have been regularly cleaned with patent renovators and polishes discloses the fact that in all cases the varnish has been worn practically threadbare, and in some, the finish has virtually disappeared, leaving the delicate fabric of the color entirely exposed.

Continued examinations of this character would doubtless disclose at this time an amazing percentage of car surfaces with the finish worn until it is no longer capable of serving as a protector of the painting.

Revarnish Every 6 Months

It has been demonstrated over and over again within the past few years that maintaining a strong and ample body of varnish on the car represents the very highest economy.

It has also been proved by numerous tests conducted by automobile painters that the average finish on the car exposed to daily road service needs replenishing at the expiration of 4 or 5, and at the longest, 6 months. To carry the finish along beyond that time without at least a coat or two of varnish, as local needs and conditions may suggest is to trifle with a matter of expense running up close to, and often reaching, three figures.

When the finish is found to have been worn through to the color, with this color materially affected by contact with direct sunlight, the weather, city gases, and other deleterious substances, a fresh application of varnish will not suffice to restore the surface to its original condition. More thoroughgoing measures are needed.

It would be a good plan for every car owner, or everyone invested with authority, to keep it in condition to examine the finish on the car carefully, in order to know personally about what the requirements are at this season of the year. In the main, the ultimate decision as to what the finish precisely needs should be left with the painter. The list of requirements at this time of the year runs, usually, from a simple revarnishing with one coat of varnish to the application of two coats of varnish, one rubbing and one finishing, and from that to a coat of color and two coats of varnish, and finally to thorough repainting throughout. As a rule, however, this latter class of repairs can be deferred until spring by the application of color and a couple of coats of varnish.

Varnish Indispensable

Under no circumstances should the finish, when showing visible signs of wear and tear, be left to get through the winter without the additional protection afforded by at least one full coat of varnish. The cases where a coat of rubbing, and over this a coat of finishing is necessary are provided by surfaces which show a dry and parched condition with more or less fine checks traced here and there through the varnish. The surface showing this condition will first need rubbing down with water and pulverized pumice stone. This process will break down the worn and harsh texture of the finish, cut away the dirt specks, grease, and foreign substances, and in a general way, put the surface in a receptive shape for the varnish coats.

Touching Up Spots

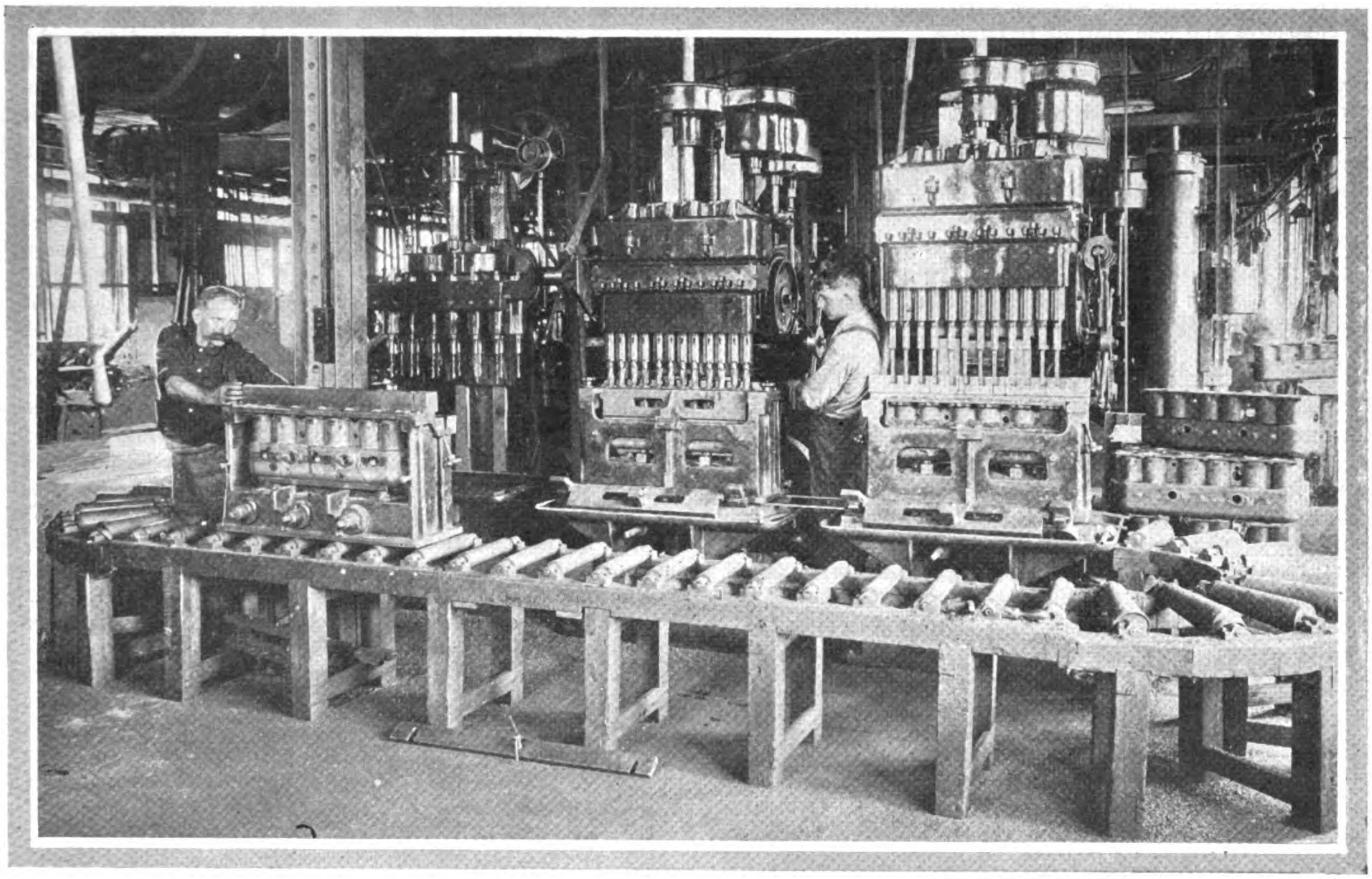
Following this rubbing process the surface should be carefully washed in clean water, and if marred or disfigured in any part, such places should be touched up with fresh color, matched to the existing field color. Making this match color is really one of the most important processes of all. A good eye for color, and experience in working in colors is required. Much depends upon touching up these bruised spots. This should be done with a small pencil brush, and the color should be confined exactly to the bruise. The expert colorist lays much store by this process, and he invariably mixes the color with enough varnish to cause the mixture to dry with a decided gloss, thus excluding the light from the pigment and causing it, when dry, to retain the same tone and shade displayed when mixed for application in the container.

Sealing Up the Checks

When the touch-up color has dried on the surface thoroughly, apply the coat of rubbing varnish. A considerable percentage of this coat will be taken in by the old finish, this absorption serving to seal up the fine checks and the weather beaten fabric of the old finish. Let this coat dry hard and firm, and then rub it down uniformly with water and pumice stone flour, after which wash and clean up thoroughly, and apply one coat of finishing varnish. The finish now presents its royal self once more, and is prepared, with a reasonable degree of care, to stand up strong and intact through the rigors, and the generally hard conditions, of winter service.

If the surface is in such shape that the rubbing coat of varnish is not necessary, a light rubbing with water and pumice stone will only be needed to make it fit to receive the finishing varnish. Touching the surface disfigurements, as above advised, with color will, of course, rank as one of the needed processes. In a general estimate, it may be said that the finish on very few cars which have been used throughout the past season is in a condition to undergo, without a fresh supply of varnish, the rigors of winter service.

Studebaker Machines Cylinders à la Merry-Go-Round and Saves Both Time and Labor



The extent to which the quantity production of high-grade motor car parts has been developed is often illustrated by specially-built machinery and equipment, but it is doubtful if a better illustration of this specialization can be found than the arrangement used by the Studebaker Corp. in its cylinder machining department. In drilling the stud holes, and in drilling and reaming the valve stem guide holes and push rod guide holes in a six-cylinder block casting only 15 minutes are consumed. There is no lost motion, though the blocks of cylinders are not light to handle by any means. One hundred blocks are handled a day by this crew of two men.

The three multiple-spindle machines are arranged in line so that the operator can manage all three at one time. The loader simply places the block of cylinders in the big jig and then pushes it around on the rollers to the first machine, the level of the roller conveyor being even with that of the table of the machine so that it is an easy matter to slide the casting in its jig onto the machine. Then the operator sets the drill in motion, drilling the thirteen stud holes at one time.

This finished, the operator pushes the jig over onto the table of the adjacent machine for drilling the valve stem and push rod guide holes, there being twelve of these. The casting finally progresses to the third machine where the last holes drilled are reamed out. The jig and casting are then shoved back onto the rollers, the jig removed and the casting picked up by a monorail conveyor which carries it to another machine for further work The heavy jig is then rolled around on the circular track to the loading point, when, after reloading, it goes again to the first drill.

There are several jigs so that there is no wait between loading and machining, the loader always having a new block casting ready for the first machine. This merry-go-round method saves the services of at least one more man, and perhaps two if the greater daily production which it makes possible is taken into account.

Thinks 12-Volt Electrical Systems Are More Efficient

The Automobile Engineers' Forum

Finds 6-Volt Types Satisfactory in Principle and Operation, but Considers 12-Volt Ultimate Favorite—Reader Points Out That All Standards Change—Opinions Differ on Economy of Using Oversize Tires

EDITOR THE AUTOMOBILE:—In our opinion, the 12-volt starting and lighting systems will ultimately be preferred by manufacturers of motor cars for the following reasons:

1—It is possible to use smaller wires and these are both less expensive and less difficult to handle.

2—Starting motors and lighting generators can be made lighter with the same efficiency or, if made to have the same weight, can be designed for higher efficiency.

3—If a single cell becomes ineffective because of a short circuit or broken jar, only 16 2-3 per cent. of the battery voltage is lost instead of 33 1-3 per cent., as would be the case with a 6-volt system.

4—The drop in voltage caused by the momentary heavy load of cranking the engine, does not result in as great a loss of efficiency in the motor nor is the drop as great in percentage in the individual cell.

Six-Volt Systems Are Good

We do not think that present-day 6-volt systems are in any way unsatisfactory either in principle or in operation, but feel that the 12-volt design is a part of the natural evolution toward improved efficiency.

We are convinced that just as strong and just as efficient lamps can be made with 12-volt filaments, once the manufacturers turn their attention to this problem.—WILLIAM S. GOULD, vice-president, Gould Storage Battery Co.

Takes Exception to Pneumatic Ideal Car Ideas

NEW YORK CITY—Editor THE AUTOMOBILE:—Willis A. Swan is interesting, without doubt an enthusiast, and that is in this dry age exceedingly refreshing. Unfortunately, automobiles are not built by enthusiasts, otherwise Mr. Swan would have by this time the pleasure of seeing his dream realized. I reread the epistle on two-stroke cycle engines on page 486 of THE AUTOMOBILE for September 10, written by a woman. At least, it speaks there contemptuously of "mere man." "Show me your friends, and I will tell you who you are." Since that epistle is of the broader scope I will answer that first with as much seriousness as is within my command.

The Changing Conditions

Alas, you dreamer, "the light of knowledge" is a very frail thing of but short existence. Where are the altars erected by those gone before us? Pilate, the governor of the conquered province of what we now call Palestine called out, "What is truth?" It is like knowledge, an intangible, everchanging phantom. As we are holding the knowledge of those of former days lightly; so will our day's knowledge be held in contempt some future day.

Even in mechanics we cannot establish a truth, for evermore this no one knows better than those who trod the unbeaten path, the "inventors." I hear Mr. Swan cry out that 2×2 makes 4 and forever will be, and that, therefore he has stated a truth which knows no time. My dear Mr. Swan, you have then stated that red was red, or green green. An accepted term of human intercourse is not Truth. A Truth is susceptible to interpretation and is therefore flexible. The same must be said about Knowledge; that, too, is like a river flowing. But see what you say:

Likes to Hear Motor

To quote: "The low volumetric efficiency and the fuel extravagance of the two-cycle are the results of poor design and poorer inventive ability." And later on: "Efficiency greater than that of the Diesel engine." H. A. B. does not seem to know that the Diesel engine is built in four-cycle as well as two-cycle; the statement therefore is not logical. When H. A. B. complains fuel extravagance then he or she is equally limping: What the comparison? The four-cycle engine? Are there not two-cycle engines showing as good an exhaust as four-cycle engines? that so, there would be no extravagance. Maybe, too much is expected from the two-cycle engine; everything has its limitations. To quote again: "Silence made absolute." There is no difficulty at all in producing a silent engine. Any good designer will take an order to eliminate what little noise there is left; but, dreamer that you are, you have not as yet experienced the pleasure of perceiving the music there lies in a motor which can be heard. But not alone that an experienced operator knows the need of an engine not silent, he learns to understand its language and in so doing the two become friends. Should the engine become distressed, its friend the operator will at once perceive the need of the helping hand and will apply himself in the right direction. But the grand finale: IT CAN BE DONE; IT HAS BEEN DONE.

Now, my dear Mr. Swan, do not conclude because I do not answer fully that what you have said is unanswerable. I have no wish to be rude, I have to keep in mind that space is limited and that the blue pencil of the editor is—well, is but a blue pencil.

Standards Ever Changing

Look backwards: Where are the standards of yesteryear? Do not be deceived because your horizon is small, that is no evidence that the world is no larger than you can perceive it.

All life is a never-ceasing battle; there are a great many standards in various fields of human endeavor that are this moment defending themselves against the onslaught of change or, as some call it, improvement. Our standards are but our momentary resting places; sitting-places, very necessary to keep our strength. They are after all but a link in the chain of events. Absolute standardization means abolishment of inventor and designer alike, and still you admire

H. A. B., who bids both to bestir themselves and produce?

Mr. Swan, you are happy to report that your Wheeling friends are able to produce alcohol so cheaply; but come now; think what would be the case if the U. S. government had standardized the methods of producing alcohol. What supreme master is to sit in judgment to say when the standard is reached?

Nevertheless, you will do the government a service if you will call attention to the misinformation they are handing out, whatever their intention. As to patent No. 692,218, I am sorry to say I am unable at this writing to consider it; I will hasten, however, to send for a copy of this patent, although the weight given is nothing worth mentioning, over 7 pounds per horsepower; when some engines of the first class weigh about 2 1-2 pounds per horsepower, and four-cycle engines, too.

Sees Difficulties in Operation

To quote you: "How simple. All we have to do is to run our present motor at a constant speed, at which it operates most economically." But, since you are unwilling to use gears and clutches, you will have to gear, pardon me, connect your motor to your axle, so that you run at about 3 miles per hour; many times, running between other vehicles, you must maintain that speed for long stretches; but would that not be rather slow? Connect at 20 miles per hour you say. Quite so, but then how are you going to slow down? Meanwhile you forget that your engine is running at about 2,000 revolutions per minute; to have an engine right on the axle under those conditions you will have to use rather small driving wheels, would you not, say of about the size of a spool of cotton thread? Maybe I am all wrong and those are little details you leave to the designers.

When saying that the internal gear is for the horsepower transmitted the most efficient of all; then I admit I have great difficulty in following you; do you measure efficiency in a gear by the surfaces engaged? The rolling friction is the least, you grant that? The rubbing friction the greater; now just study a common spur gear and you will find that if the teeth were but formed heart shape there would be an almost ideal rolling friction; now such gears are made for clocks and the like only, for the reason that at their bottoms they have no strength; the ordinary tooth of a gear is a compromise (as everything else in engineering if you but realized it). Now try an internal gear and you will find an amount of rubbing friction that makes that style useless for most purposes: For example, a certain chain hoist had such an internal gear, but the same people who made that hoist, instead of using but two gears as that hoist had, use now common spur gears and, if I remember correctly, five of them. Why, pray?

And air motors can be had at 5 pounds per horsepower! But an air motor cannot produce power. A gasoline engine is complete, but look at the air motor: You must have an air compressor to operate it that weighs how much? Five pounds per horsepower? That makes now 10 pounds per horsepower. You must have an engine to operate the air compressor that weighs 5 pounds per horsepower? That makes 15 pounds per horsepower. Things are getting rather heavy, are they not?

Carbureter Not Always Used

But, just think: Why not use the engine in the first place to drive the car? Ah, maybe I am a little dull. You are going to use that combination in lieu of gears. But, I am trembling with emotion! Common gears as now used are far more efficient than that, less costly and more reliable.

The three engines finally mentioned I confess I am well familiar with, but pardon me for differing with you; the Diesel engine is sure enough a type. By Hornsby you probably mean a type of engine built by the Hornsby-Akroyd people of England. I know of the Secor engine, but I have never heard anyone referring to that engine as a type. Nor are they the only people who do not use a carbureter.—B. H. BRITT.

Oversize Tires Economical for Both City and Country

NEW YORK CITY—Editor THE AUTOMOBILE:—In the majority of instances, the car manufacturer in selecting his tire equipment, merely takes into consideration the weight of the car when leaving his factory, regardless of what the actual weight of the car may be when it ultimately is delivered to the consumer and put into service by him.

For Overhead Work

What we particularly refer to is the added weight from extra equipment such as gas tanks, trunks, extra tires or even carrying more passengers than the intended capacity of the car. For this purpose tire manufacturers have constructed an oversize tire, which increases the outside diameter of the tire 1 inch and the cross-section diameter 1-2 inch—in this way making it possible to use a larger casing without necessitating any change in the wheel size. The enlarging of the tire takes care of the additional weight, preventing overloading of the tire equipment.

Oversize Increases Comfort

In addition to this, owing to the increased inner or tube surface of the casing, owing to the larger cross-section diameter of the tire, the car will consequently ride with considerably more resiliency, increasing the comfort of driving.

Oversize tires are constructed in such a way so as to properly fit the same rim as is built for the smaller tire, and if the tire is properly seated on the rim and kept properly inflated, there should be no side rolling movement.

It is just as advantageous to the city motorist to use oversize tires as to the country driver. Aside from the advantages of easy riding, this naturally will lessen the possibility of bruising the tires or injuring the carcass from riding over car rails and holes or unevenness in pavement, thereby greatly increasing the service obtained from the tires.

Although the initial expense of adopting the oversize casings may, at first, seem to be greater than would warrant the change, the fact of so many automobile owners adopting these larger size tires and the resultant additional service they get from them is, in itself, proof-evident that it must be to the owner's interest to make such a change.—AJAX-GRIEB RUBBER CO.

Thinks Use of Oversize Tires Is Seldom Necessary

NEW YORK CITY—Editor THE AUTOMOBILE:—We feel that the matter of oversize tires is often overdone.

The majority of the cars that are put on the market come out of the factory equipped with the minimum sized tire that the factory could equip the cars with for ordinary running purposes, but, as is generally the case, people use cars for touring over roads that put the tires to a rather severe test. Therefore, as a general rule, we would advocate oversized tires up to a casing of 5 inches cross-section, but when it comes to putting a 5 1-2-inch as an oversize on a 5-inch tire, we think the additional expense is out of proportion to the actual running service that they render unless it is a car that is being used under extremely hard circumstances and carrying a load of over 6,200 pounds.—COLUMB TYRES IMPORT CO.

The Rostrum

Suggests Hydraulic Clutch for Smooth Starting

EDITOR THE AUTOMOBILE:—Automobile operators use a low gear to get under way and high or direct for driving. This changing requires an undue amount of attention and labor which could be avoided.

The usual friction clutches do not allow slipping to any great extent such as would be necessary to get started on high gear ratio in the first place, but why be content with that?

Some 20 years ago a number of fluid clutches were designed to work in conjunction with electric motors on street cars. The present so-called series-parallel system of control device soon appeared and took its place.

Why not use fluid clutches in our automobiles? If this were done, the gearshift for starting purposes would be avoided and the cost of such a clutch is not prohibitive by any means.

A fluid clutch is not a positive hydraulic transmission device; whatever slipping takes place is lost power but the great convenience derived by its use makes up for it.

In simple form it is merely a rotary pump mounted upon the crankshaft of the engine, the rotor is keyed to the crankshaft and the housing to the shaft of the change-gear box. The pump is full of oil and the discharge is connected to the inlet with a valve in circuit. If this valve be wide open then the clutch is out and the oil will circulate continually. When the valve is entirely closed the oil, unable to leave the discharge, locks the rotor and the mechanism rotates as a whole. If the valve be partially open, the oil flow will find resistance at the valve and will in proportion to this resistance have a turning effort on the housing which is mounted upon the gearbox shaft—the greater the resistance to such oil flow, the greater the turning effort, that is, to speed up, one closes the valve and the car will get under way in proportion to the time used to close the valve. Simple, is it not?

Gearbox Also Required

It does *not* replace the gearbox although it permits the motor to run at maximum speed and the car at any speed, a mere creeping even. At full speed, like a planetary gear the mechanism moves almost as a unit, but not entirely so. There will be some leakage within the mechanism. At all other speeds the power represented in the difference of speed between car and motor is a total loss.

A fluid clutch heats, and that in proportion to the slippage. For this reason as great a radiating surface as possible is provided. It is likely that trucks would need to use a fan to keep the fluid clutch from overheating. Fluid clutches are filled with a heavy oil, and when hot this oil becomes as thin as water so that a definite notch in a quadrant cannot be used to set the control lever by. According to the degree of thickness or thinness of the oil the control lever requires to be set more open or more closed.

For very heavy work like gas-locomotives, which have great trouble to keep their clutches in order, a positive clutch must be employed in addition to the fluid clutch, so that the ultimate working strain will not be borne by the fluid clutch.

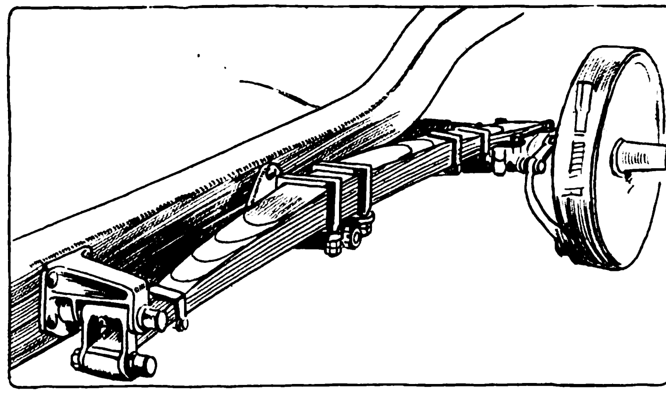


Fig. 1—Cantilever spring construction showing attachment to frame and axle

The life of a fluid clutch is much greater than a friction clutch, it will stand more abuse, since a car is brought up to speed more gradually by its use.

The fluid clutch offers a peculiar advantage in that it may be easily arranged to prevent the stalling of an engine, the clutch opening up automatically when engine drops below a given speed.

New York City. P. G. TISINER.

Wants to Install Cantilevers

Editor THE AUTOMOBILE:—I have been figuring on changing the rear springs on my car from platform to cantilever. If it is possible will you please show me by drawing how this is done, particularly how the spring is fastened to the rear axle, also whether or not it will be necessary to have radius rods.

New Albany, Ind. LEE E. SMITH.

—The cantilever may be used with or without radius rods. It is ordinarily fastened to the axle at the rear, pivoted at the center and shackled to the frame at the forward end, as shown in Fig. 1.

It is inadvisable to change your spring suspension as with your lack of knowledge of the subject you will decrease rather than increase the riding qualities of your car.

Six-Cylinder Two-Cycle Gives Smooth Torque

Editor THE AUTOMOBILE:—Since the gasoline motor does not begin to produce much turning effort of the crankshaft until 15 degrees after top dead center and produces its greatest turning effort at about 60 degrees, would not a six-cylinder two-stroke cycle so timed that when one cylinder was producing its greatest turning effort the next cylinder would fire, and at 15 degrees thereafter, would not this second explosion increase in turning effort as fast as the previous explosion increased?

2—If not, how many cylinders would be required?

3—To reduce vibration and weight, please show what, in your opinion is the best angle for a V-shaped, high-speed, six-cylinder two-stroke cycle motor not having crankcase compression, how to place balance weights on the crankshaft for this motor so that the best rotary balance is obtained, and how to eliminate the unbalanced centrifugal force at high speed, the shaft to be mounted on large ball bearings at each end.

Six-cylinder two-cycle all-in-line motors in flying boats run with very little vibration but I do not favor long crankshafts.

Tampa, Fla. L. C. HANNA.

—1—The turning effort of a six-cylinder two-cycle motor is very uniform as will be noted by the curve shown in Fig. 4. This curve was produced by combining six curves as shown in Fig. 3 which is the turning effort diagram for a certain single cylinder two-cycle motor. The crankshaft throws are set at 60 degrees. This turning effort curve is obtained from the curve of net piston pressures which is the upper one in Fig. 2.

2—No noticeable improvement in smoothness of turning effort would be obtained by the addition of more cylinders.

3—Probably the cylinders set at 90 degrees would give the best results. The method of balancing the cranks was described in the October 8 issue of THE AUTOMOBILE on page 663.

Valves Carbonize Very Quickly

Editor THE AUTOMOBILE:—I would be pleased to have your opinion on the following: A 1914 Ford car has been run about 4,000 miles, and carbon collects under the exhaust valves in from 50 to 200 miles after the valves are ground. I have had oversized pistons fitted, new valves, valve springs, carbureter, timer, plugs and coils, also master vibrator, fitted, and have used different oils and gasoline. The valves have been ground about fifteen times and after each grinding the car runs perfectly in every way, until the engine loses compression, when carbon will always be found packed under the exhaust valves. The exhaust does not smoke as though the engine was getting too much oil; there is plenty of play between the valve stems and push rods, and the timing is correct. The Ford magneto seems to give plenty of current, and the engine starts as easily on the magneto as on batteries.

Santa Rosa, Calif. W. E. V.

—There seem to be only one detail that you have overlooked and that is whether the spark is advanced as far as possible at all times. Even supposing that you drive with the spark lever advanced there is a possibility that the linkage has become loose so that the movement of the spark lever does not result in a corresponding advance of the timer.

Wants Racing Body for Ford

Editor THE AUTOMOBILE:—I would like to purchase a Ford chassis and fit a racing type of body to it. Will you please tell me where I can obtain such a body and what changes would have to be made in the chassis?

Grottoes, Va. DR. R. O. CONADA.

—The body can be obtained at a reasonable figure at any body makers. Probably $100 would cover the cost of fitting two bucket seats, gasoline and oil tanks, and painting.

Below are a few companies that are listed in the *Automobile Trade Directory* that might do this work for you:

Baily & Co., Lancaster, Pa.; Budd Mfg. Co., Philadelphia, Pa.; Collins Vehicle Co., St. Louis, Mo.; Schnabel & Sons, Pittsburgh, Pa.

The changes that you will make in the chassis depend on whether you desire a fast car or not. As far as the new body is concerned all that will be necessary is to lower the steering wheel and remove one leaf from the rear spring. If you desire an increase in speed, see the Rostrum for August 27, 1914, page 406.

Information on Most Powerful Engines

Editor THE AUTOMOBILE:—1—What cars made in America have the largest and most powerful engines?

2—What cars made in Europe have the largest and most powerful engines?

3—What cars made in America have the longest wheelbase?

4—What cars made in Europe have the longest wheelbase?

5—What cars are the longest including length of frame and wheelbase?

6—Will you supply me with the addresses of the Peerless and Marmon companies?

7—Can you inform me if the Thomas Co. is still making cars?

8—Who represents the French Berliet and the Itala cars in this country?

Ashland, Va. R. B. DEVINE.

—1—Below is a list of cars with more than 500 inches piston displacement:

Make	Cylinders	Cubic Inches	Bore and Stroke
Austin	6	667.9	4½ by 7
Chadwick	6	721.	5 by 6
Crane	6	563.7	4¼ by 6¼
Klinekar	6	503.8	4.32 by 5¾
Locomobile	6	524.8	4½ by 5½
Marmon	6	577.5	4½ by 6
Mitchell	6	595.8	4¼ by 7
Moyer	6	577.1	4½ by 5
Peerless	6	577.5	4½ by 6
Pierce	6	529.8	4½ by 5.3
Pierce	6	824.8	5 by 7
Simplex	4	590.	5⅜ by 6½
Winton	6	529.8	4½ by 5½

2—Cars in Europe with more than 10,000 cubic centimeters piston displacement are:

Make	Cylinders	Cu. Cen.	H.P.	Bore and Stroke
Benz	4	10,080	100	130 by 190
Cottin-Desgouttes	4	10,618	60	130 by 200
Isotta-Fraschini	4	10,618	100	130 by 200
Itala	6	10,634	60	127 by 140
Itala	6	12,912	75	140 by 140
Opel	4	12,978	80	130 by 165
Opel	4	15,216	100	140 by 165

3 and 4—The Simplex has a wheelbase of 12 feet while the Pierce-Arrow measures 11 feet 8 inches. Foreign cars with wheelbases of over 12 feet are: Berliet, 12 feet 6 inches; Delauney-Belleville, 12 feet; Metallurgique, 12 feet; Opel, 12 feet 4 inches; Pipe, 12 feet 2 3-4 inches; Renault, 12 feet 3 1-4 inches.

5—Cars, over sixteen feet in length over all are:

Daimler	16.8	De Dion Bouton	16.2½
Hotchkiss	16.2	Mercedes	16.3¼
Napier	16.	Opel	17.
Pierce	16.5	Rolls Royce	16.
Simplex	16.3	Spyker	16.4
Unic	16.2	Wolseley	16.6

6—The Peerless Motor Car Co. is located at Quincy Ave. and S. E. Ninety-third street, Cleveland, O. The Nordyke

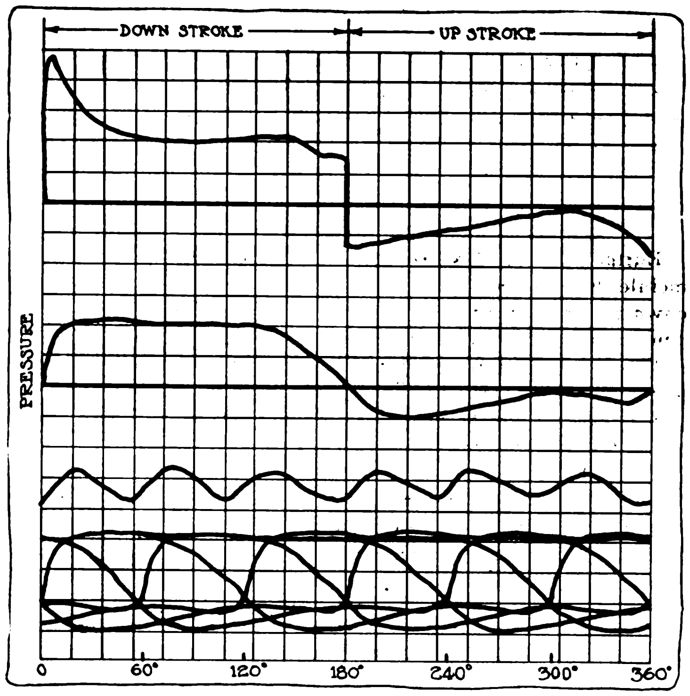


Fig. 2—Upper—Curve showing the net pressures on the piston of a single-cylinder, two-cycle motor throughout one complete cycle. This curve is a combination of the gas-pressure and inertia curves

Fig. 3—Upper, middle—Turning effort diagram produced from the above curve

Fig. 4—Lower, middle—Turning effort diagram for a six-cylinder, two-cycle motor with the cranks set at 60 degrees

Fig. 5—Lower—The six individual turning effort curves from which the combined turning effort curve, just above, was plotted

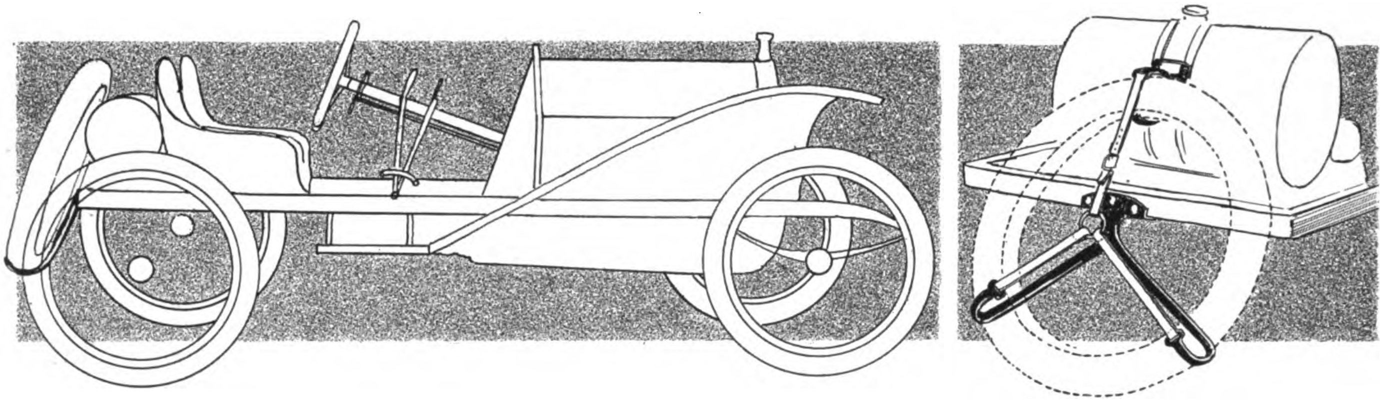


Fig. 6—Left—Hupmobile fitted with raceabout body. Right—Detail of tire carrier. Two brackets are used. One is fastened to the tank and the other to the frame, the tire being held by straps

and Marmon Co., at 1101 West Morris street, Indianapolis, Ind.

7—The Thomas Company is still making cars at the same factory, at Buffalo, N. Y.

8—The Berliet is no longer imported. Itala cars can be obtained from the Itala Import Co., Broadway and Fifty-seventh street, New York City.

Information on Acetylene Welding

Editor THE AUTOMOBILE:—Kindly inform me where I can get some information on acetylene welding? I am a blacksmith and would like to carry it along as a side line.

Is there a book published on the subject and where can I buy the necessary tools or apparatus?

Lawrence, Mass. CARL CASSE.

—A book which will probably suit your purpose is Welding, Theory, Practice and Tests, by Richard N. Hart, the McGraw-Hill Book Co., 239 West Thirty-ninth street, New York City.

Below are a few of the concerns, taken from the *Automobile Trade Directory,* that make welding apparatus: Cox Brass Mfg. Co., Albany, N. Y.; Dyer Apparatus Co., 39 Piedmont street, Boston, Mass.; Monarch Mfg. Co., 523 Stillwater avenue, Dayton, O.; Prest-O-Lite Co., 1400 Speedway, Indianapolis, Ind.

Stripping Down a Hupp 20

Editor THE AUTOMOBILE:—As I have just put my Hupmobile 20 machine up for the season and intend to strip it down to a raceabout when I get the time, I would like to have you suggest just how to go about it.

2—I would like to know how to get more power as I have had to throw it into low on nine out of ten hills that I have come in contact with this season.

3—How could I make a tire carrier for the rear end?

Springfield, Mass. F. C. S.

—1—The Hupmobile chassis is so short that it is difficult to place a good-looking raceabout body on it unless you go to the expense of lengthening the frame. However, the appearance of the body may be improved by moving the seats about 4 inches nearer the dash and fitting a round gasoline tank. There will still be enough leg room and the rear end of the body will look longer. If you have one of the early models which are equipped with bucket seats and gasoline tank in the rear, it is hard to see how you can improve on this design either as regards weight or appearance. But if you have one of the later fore-door designs you can replace this body with bucket seats. If possible, it would be best to get one of the old Hupmobile bodies of this type. Otherwise we advise you to have a suitable body built at the nearest body makers.

2—If your car is developing less power this year than heretofore it is very evident that something is wrong. Test the compression and grind any valves that require it. Then adjust the clearance between the valve stems and push rods. If there is not sufficient space to insert a calling card between each valve stem and push rod when the cam is out of contact, then the end of the stem must be filed if your motor is an early type or if a later one the push rods may be adjusted. Adjust the carbureter carefully and examine the ignition system. See that all the brushes in the magneto make good contact, that the breaker points have a gap of 1-64 inch when separated and that the magneto is correctly timed. Push the car over the floor and if it runs hard look for dragging brakes or excessive friction in other parts. Make sure that the clutch is not slipping. If it is, on opening the throttle suddenly the motor will be found to accelerate more rapidly than the car.

3—Any well-equipped garage can forge brackets for carrying the tires at the rear. Two brackets are required, made out of round bar stock and these are shaped as shown in Fig. 6. This figure shows a Hupmobile with unlengthened wheelbase, but with bucket seats placed on the floor and moved forward 4 inches, and a round gasoline tank fitted to the rear of the seats.

No Solvent for Graphite

Editor THE AUTOMOBILE:—Please give a formula for dissolving graphite.

2—In what direction is the strain of the torque arm on a Studebaker car in starting, stopping and reversing?

3—What is the percentage of increase of strain with an increase of speed?

King, La. C. D. JOHNSTON.

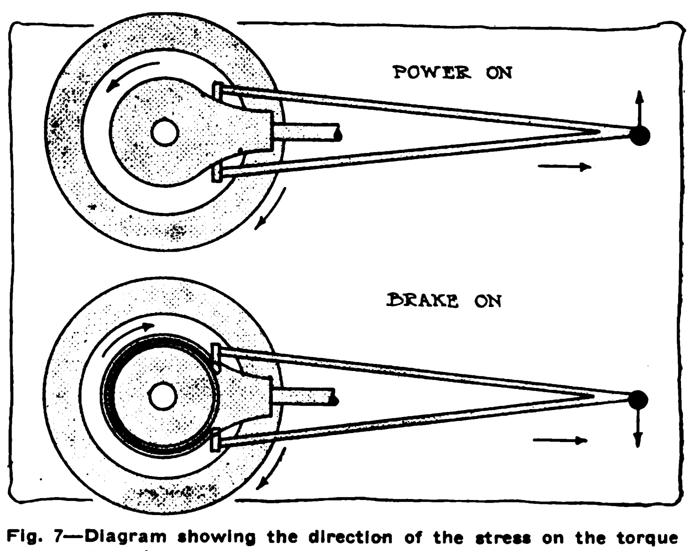


Fig. 7—Diagram showing the direction of the stress on the torque arm when the brake is applied and when the power is put on

—1—There is no substance that will dissolve graphite. Graphite is one form of pure carbon. There is a popular impression that many of the carbon removers are capable of dissolving carbon but this is not so. The compounds merely dissolves the oil holding the carbon to the walls of the combustion chamber.

2—As is shown by the arrows in Fig. 7, the stress on the torque arm when stopping is in a downward direction, the brake wheels tending to carry the axle housing and everything attached around with them, hence the downward pull on the torque arm.

In starting the stress is just the opposite, the driving pinion tending to rotate around the crown gear and carry the housing and everything attached with it.

Reversing produces a stress in the same direction as braking, the pinion tending to rotate the housing and the torque arm, downwardly.

3—The percentage increase in strain with increase of speed can not be stated without knowing the power that it takes to drive the car at different speeds.

Seven-Inch Tires Operate at Low Pressure

Editor THE AUTOMOBILE:—We have read with interest the paragraph headed Large Mileage from 7-inch Tires on page 558 of THE AUTOMOBILE dated September 17, based on information communicated to you by Mr. Thomas L. Robinson. We think this gentleman must have been mistaken with regard to the pressure at which our 7-inch cord tires are run. Contrary to the very general opinion that the larger tires call for higher pressures the reverse actually holds good, as you will see from the pressure table below:

Load per Wheel,	Minimum Inflation Pressure in Pounds per Square Inch							Load per Wheel,
Cwts.	3" 75 and 80 m/m Light Car	3½" 90 m/m Light Car	3½" 90 m/m	4" 105 m/m	5" 120 m/m	6" 135 m/m	7" 175 m/m	Lbs.
2½	35	30	..	..	..	..	..	280
3	40	36	30	..	..	..	..	336
3½	45	42	35	..	..	..	..	392
4	50	48	40	32	..	..	..	448
4½	..	54	45	36	..	..	..	504
5	..	60	50	40	..	..	..	560
5½	..	66	55	44	..	..	..	616
6	..	72	60	48	42	..	..	672
7	..	..	70	56	49	35	..	784
8	..	..	80	64	56	40	..	896
9	..	..	..	72	63	45	..	1008
10	..	..	..	..	70	50	40	1120
11	..	..	..	..	77	55	44	1232
12	..	..	..	..	84	60	48	1344
13	..	..	..	..	91	65	52	1456
14	..	..	..	..	98	70	56	1568
15	..	..	..	..	105	75	60	1680
16	..	..	..	..	..	80	64	1792
17	..	..	..	..	..	85	68	1904
18	..	..	..	..	..	90	72	2016
19	..	..	..	..	..	95	76	2128
20	..	..	..	..	..	100	80	2240
22	..	..	..	..	..	..	88	2464
24	..	..	..	..	..	..	96	2688
26	..	..	..	..	..	..	104	2912

The average load on the back axle of cars such as the Rolls Royce, Sheffield Simplex and Daimler referred to in Mr. Robinson's letter is 24 hundredweight. To carry this load a 7-inch Palmer tire only has to be inflated to a pressure of 48 pounds per square inch, a very different thing to the 110 and 125 pounds mentioned in your paragraph. The front axle weight is seldom more than 1 ton for which a pressure of 40 pounds per square inch is sufficient. Any of the smaller six-cylinder English cars fitted with open touring bodies are run with our 7-inch tires inflated to pressures of 35 and 40 pounds respectively for front and rear tires.

The 7-inch Palmer Cord Tire is capable of dealing with loads up to 2,900 pounds per wheel and for this load they have to be inflated to a pressure of 104 pounds, but no touring car approaches anything like this weight and it is only on motor lorries or as we believe you call them, trucks, that such loads and pressures are usual, even then a total back axle load of 2,240 pounds calling for a pressure of 80 pounds per square inch is more general.

We have only recently become subscribers to your journal and we have already found in it much information of interesting value which is not to be found in the automotor journals on this side.

London. G. A. PARSONS, The Palmer Tire, Ltd.

Wiring Diagram of 1913 Studebaker

Editor THE AUTOMOBILE:—1—Please show in your columns the wiring diagram of the Studebaker-Wagner single unit starter generator used on the model 35 Studebaker car made in 1913.

2—The generator does not close the relay. After the relay has been closed by hand, the output is low, gradually building up to the right amount. All this happens at the same engine speed. Generally after the car has been driven a few miles with the generator working, the relay closes and opens as the car speed varies but sometimes it opens and stays open if not closed by hand.

The machine has been cleaned with sand paper and the brushes on the back end have been advanced, but this does not seem to help it.

Omaha, Neb. EVERETT M. ROGERS.

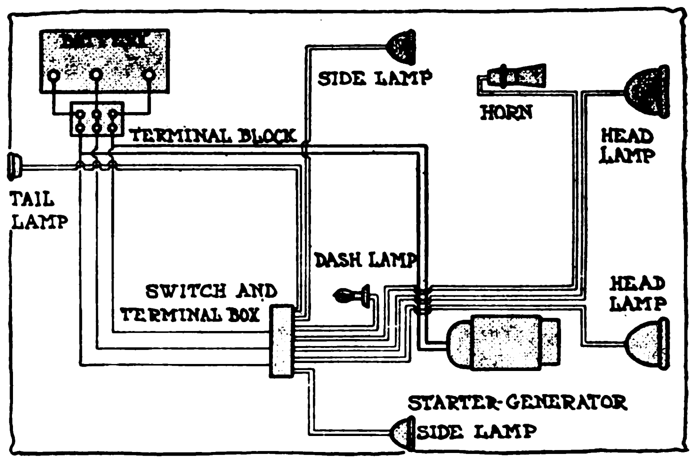


Fig. 8—Diagram of wiring of starting and lighting system used on 1913 Studebaker. Starter, generator and battery operate at 12 volts while 6-volt lamps are used. The wires from generator to battery are shown in black

—1—Fig. 8 shows a diagram of the wiring system used in 1913 Studebaker automobiles. It is a 12-volt system of the double wire type. Starting motor and lighting generator are combined in one unit. The wiring connections for the starting system are shown by the heavy lines and the other lines represent the lighting wires. Since the lamps and horn are designed for 6 volts a three-wire system is used to carry current from the battery to the terminal box from which these units are supplied. In other words, the difference in electrical pressure between the two outside wires is 12 volts but the difference between each outside wire and the central one is only 6 volts. The lamps and horn are connected to the junction box.

2—The mica insulating the commutator segments has probably worn faster than the metal in the segments, and particles of metal have bridged the gaps between the segments. The remedy is to cut these small particles of metal away with a knife but this is a job that should only be intrusted to an expert. You should take your car to a Studebaker service station.

The Engineering Digest

Latest German Omnibus Construction Follows London in Worm-Drive Type But Establishes Competing Model

LAST May the Berlin Elevated Railway Company placed its first motor omnibus feeder line in operation and the vehicles of this new enterprise distinguish themselves from other motor omnibuses in Berlin by quietness and other constructive advantages. Out of the 60 new omnibuses now in commission 20 are made by the NAG company (Neue Automobil-Gesellschaft) at Berlin-Oberschöneweide and in their construction the type of compound spurwheel and bevel gear drive in the rear axle which for the last 1 1-2 year has been found acceptable by the General Berlin Omnibus Company has been adhered to. The other 40 vehicles are made by the Daimler Motoren Gesellschaft at Berlin-Marienfelde and are largely based on the latest experiences made with Daimler omnibuses in London, having the gear changes operated by silent chains and the final drive by worm in the rear axle.

A previous motor omnibus feeder line system which was adopted by the Grosse Berliner Strassenbahn A. G. (Large Berlin Street Railway Company) did not prove financially successful, but it is believed that the conditions in the present case are far more favorable, partly because much useful experience with regard to the constructive requirements has been accumulated since and partly because a feeder system is much more urgently needed for the long-distance elevated railways than for the close network of surface street cars.

In the new NAG as well as in the German Daimler omnibuses it has been one of the main objects of the builders to avoid permanently all strident noises from gearbox, rear axle and motor, while the first cost of production, the wear and the maintenance expenses and other standard considerations for omnibuses are of course also kept in view throughout. The means adopted for these purposes, so far as design is concerned, will be made clear from the following descriptions and illustrations.

Construction of the NAG Omnibuses

The chassis of the NAG buses shows in the main standard arrangements apart from the rear axle drive. The frame reaches, pressed from 8 millimeter sheet steel, extend for almost their entire length at a height of 154 millimeters from the ground and at a uniform distance of 770 millimeters from each other; that is, without narrowing at the front. The steering angle is nevertheless sufficient, as the front wheels are so far apart as to track in the middle plane of the twin-tired rear wheels, and not with the inner rear wheels tires. Of the transverses one lies under the radiator, the next one between the clutch and the gearbox, so as to support the front end of the latter, the third and strongest one at about the middle between the axles, where it takes up the entire traction push. The fourth one comes near the front shackles of the rear springs and the fifth so far from the rear end of the reaches as to leave room for the convenient riveting of two brackets for the support of the boarding platform of the omnibus. These brackets are braced by diagonal struts, though this is not shown in the plan view, Fig. 2.

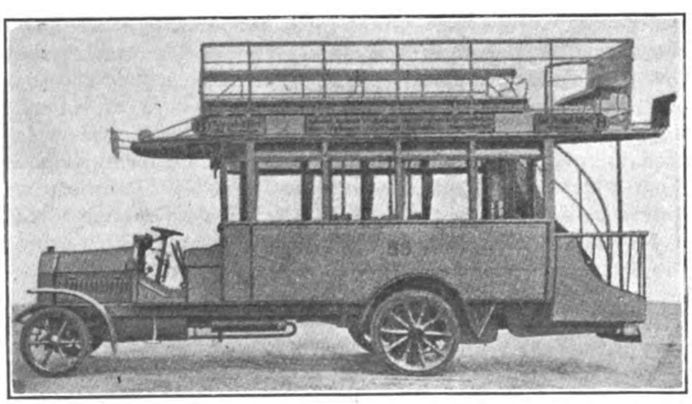


Fig. 1—New NAG omnibus, of which 20 are placed in commission in Berlin. A relatively cheap construction with danger spots carefully reinforced

Motor Very Conservative

The four-cylinder motor, with cylinders of 110 by 150 millimeter bore and stroke, develops 32 to 35 horsepowers at 900 revolutions per minute, and is of the T-type, the cylinders cast in pairs. It is supported in the frame by two transverse steel straps which are sufficiently flexible to protect the crankcasing against any bad effects from warping of the vehicle frame. Silence of valves is secured solely by suitable shaping of the cams and not by the usual boxing. The carbureter is placed between the two cylinder castings and draws its air through a pipe with intake around the exhaust manifold on the other side of the motor. The magneto and the centrifugal water pump are on the exhaust side on a shaft parallel with the camshafts and driven from the camshaft gear. Automatic oiling of the three crankshaft bearings is effected by means of a gear pump driven from the middle of the camshaft on the intake side by miter gear and a vertical shaft, as shown in Fig. 3. The oil is not driven to a level higher than that of the crankshaft and thence led by gravity to the bearings but is forced into a distributer tube along the wall of the casing and from this tube by short leads upward into the bearings; a longer branch tube takes a portion of the oil to a sight glass on the dash. The quantity of oil in the circulation is determined experimentally and is not subject to adjustment. Similarly the oil in the sump for cylinder lubrication by splash remains at an unchangeable level, so as to obviate smoky exhaust as much as possible by simple means.

Cone clutch, four-speed gearbox with direct drive on high gear and service brake at the rear and, finally, the usual driveshaft with universals at the ends transmit the power to the compound bevel and spurwheel gear on the rear axle which is the principal feature departing from standard design. The gear ratio between the driveshaft *a* and the rear wheel shaft *l* is here determined by the bevel gear proportion of 13 to 45 and the spurgear proportion of 21 to 41 giving a total ratio of about 1 to 6.75 on high gear, at which *a* revolves at the same speed as the motorshaft. The maximum vehicle speed at a motor speed of 900 revolutions is hereby limited to 21.6 kilometers per hour, a centrifugal governor on the camshaft limiting the motor speed by throttling the carbureter.

The rear axle consists in the main of three parts. The steel casting *f* in the middle is divided lengthwise horizontally

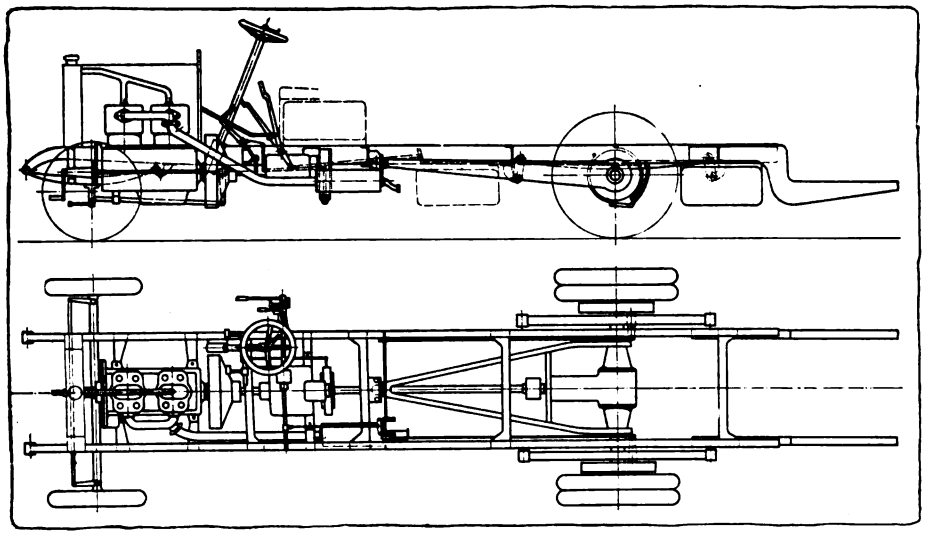


Fig. 2—Outline views of NAG omnibuses with T-type, low-speed motor and compound spur and bevel gear in rear axle

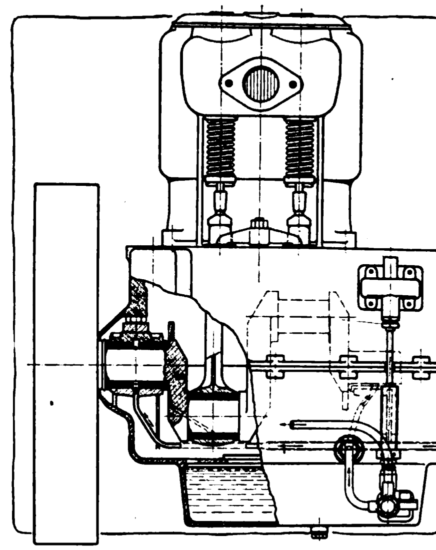


Fig. 3 A—Side view partly in section, showing oiling system, of NAG motor

and carries the transverse box g which is undivided and completely inclosed to the exterior and in which the short jackshaft h for the small spurwheel d runs in very stout ball bearings. The large bevel wheel c is mounted on the same shaft h, jaw-coupled to spurwheel d, but it is not mounted with a drive-fit and is therefore susceptible of such slight lateral displacement as has been found in practice to secure quiet running. The correct alignment of the spurwheel d is secured by the small end-thrust bearing on one side and the adjustment nut i on the other. The final spurwheel e is mounted on the housing k of the differential which runs on ball bearings in the axle and contains the usual cluster of bevel pinions mounted by means of bushings, and the hubs of the pair of pinions splined to the wheelshafts are especially long, the details of the whole construction being shown very plainly in the scale drawing, Fig. 4. The bevel gear driving-pinion b is made in one piece with shaft a and is carried very securely in the front portion of the casting f by means of three radial and one side-thrust ball bearings. The splines in the hubs of the side pinions of the differential and those upon the wheelshafts l are made very accurate, so that the shafts may be withdrawn easily after unscrewing the wheel caps m, in case of an exchange of driving-wheels.

The wheels are pressed upon steel hubs o, which are provided with the oilcups shown in dotted lines, and these revolve upon bushings between steel rings p and q. Ring p is screwed upon the axle and ring q is secured by nut r which is furthermore pinned to the axle end.

The customary triangular frame transmits the driving thrust and torque to the middle transverse of the vehicle frame without any intermediation of the vehicle springs and abuts with its front end against a steel ball; it follows therefore every small lateral movement of the rear axle which can occur when the rear springs are flexed unevenly. The reaches s of the triangular frame are secured by bolts to hubs t which are pressed upon the rear axle, and boxings carrying the rear springs are mounted upon the same members. The reverse torque arising from braking is also taken up in the axle construction without reaching the springs, the brakeshoe carriers u being secured to the axle by cones and

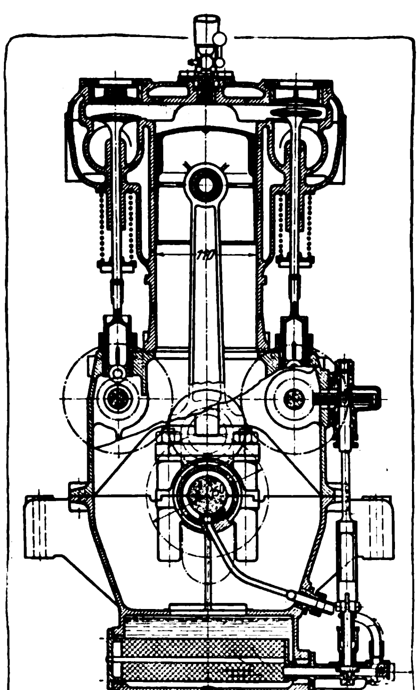


Fig. 3 B—Cross-section of NAG omnibus motor silenced by gentle cams, low speed and accurate gears

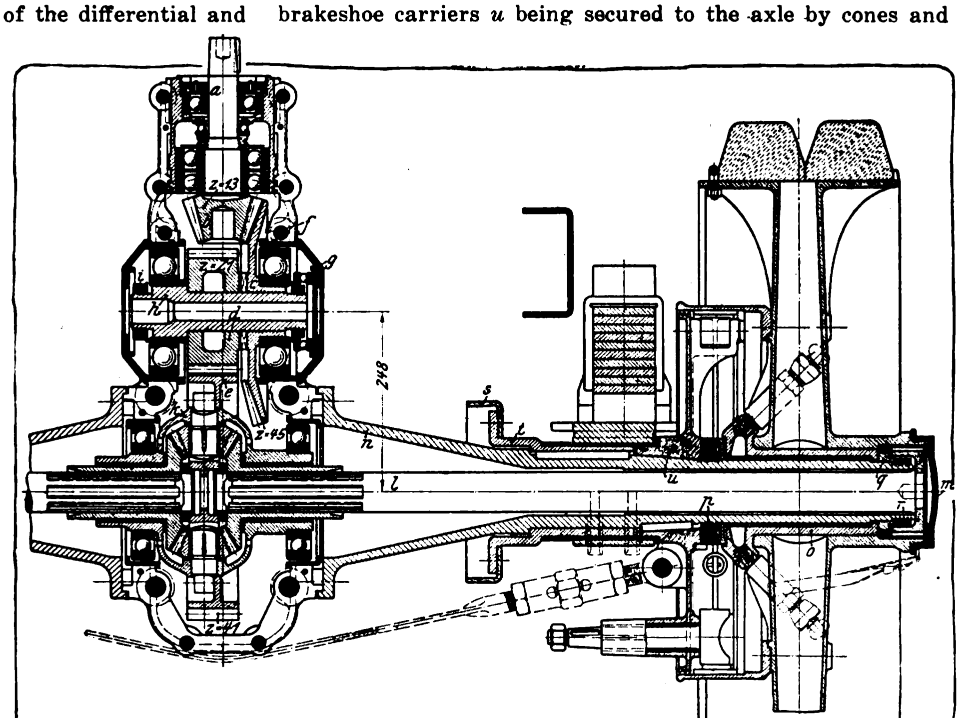


Fig. 4—Rear axle gear and drive of NAG omnibuses, involving many details intended to secure noiselessness and durability. Casing is divided horizontally, excepting middle portion g, which is undivided. Parallel wheel bearings

wedges; they are formed as disks which snugly close the face of the brake drums and the brace rod under the axle is secured to them.

By the construction described the driving system remains entirely unaffected by the load or turning movements of the vehicle, this being an urgent requirement where the question is of such weights as come into play in the case of omnibuses. The silence of the system is due in some measure to the gear reduction arrangement by which the bevel gear precedes the final spurwheel gear, rather than having the action of the latter incorporated in the gearbox, as it is an old experience that it is more difficult to quiet a spur gear than a bevel gear above certain circumferential speeds.

The objections to the system lie perhaps exclusively in the great weight of the rear axle gear which involves severe stresses on rough pavements and may come in conflict with regulations prescribing maximum axle loads.

Construction of the German Daimler Buses

As compared with previous types of Daimler buses the general arrangements of the chassis show the change that the gearbox has been moved further back and is supported separately from the gear-shifting shaft. The pressed-steel frame is relatively narrow and the front wheels track with the inner ones of the rear twin tires.

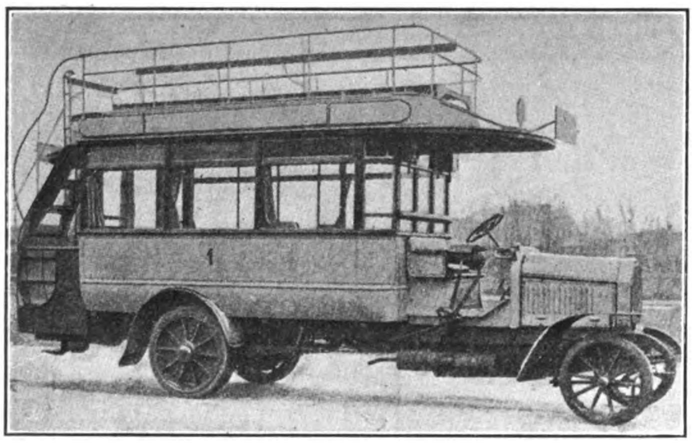


Fig. 5—German Daimler omnibus with worm drive and silent-chain gears; 40 placed in commission in Berlin

The motor is hung in the frame at three points, with the apex in the front transverse; the cylinders are cast in pairs, and the valves, in removable boxings in the cylinder heads, are operated from a single camshaft by rocker arms, the advantages in fuel economy being those generally obtained from this type. At the speed of 1,150 revolutions, which gives 43 horsepowers, the maximum, a mean piston pressure of 6.4 atmospheres is maintained, which is unusual. [Details and illustrations of the motor are here omitted, as it follows the well-known Daimler type closely.—Ed.]

The cone clutch differs from previous designs for omnibuses by eliminating end-thrust upon the motorshaft from the clutch spring whether the clutch is in or out. That this is the case when the clutch is in action is immediately apparent from Fig. 6 which shows the construction. When the clutch is released by pressure on pedal *d*, the toggle joint of levers *e* and *f* is flattened and, as *f* abuts in the ball bearing *h*, which is fixed, the other ball bearing *g* is shoved forward, and thereby the cone *b* is released from the flywheel, being at the same time braked by the resiliently mounted brake ring *i*. The axial pressures from clutch spring *a* are completely balanced between the bearing *h* and the spring cup *c*. As, further, no pressure can be transmitted backward to the pedal through the flattened toggle joint, the operation of the clutch does not become fatiguing.

The leather disk universals between clutch and gearbox, as

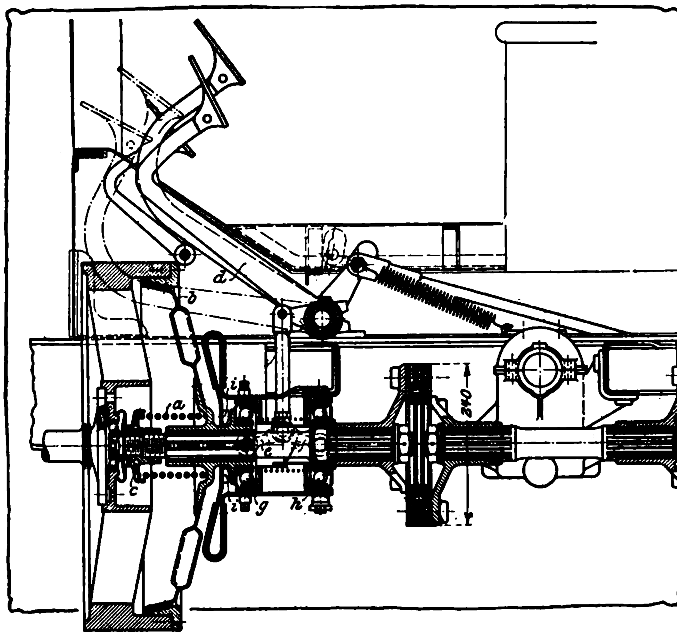


Fig. 6—Self-contained clutch with automatic brake and anti-fatigue toggle lever

well as between gearbox and rear axle, constitute an innovation in German practice. Each joint consists of three rings of sole leather separated by sheet steel disks and riveted together, and they are gasped from the opposite sides by three-armed spiders which are staggered with relation to each other; at least one of the spiders, whose hubs are splined to the shafts, is capable of longitudinal movement.

The change-gear, Fig. 7, differs from the British prototype by its larger dimensions. To obtain silent operation, the third speed, being that mostly employed, is direct, and the other gears are actuated by silent chains and non-slidable sprocket wheels.

From shaft *a* shaft *d* is constantly driven by the gear *bc*. Shaft *e* runs reversely with minimum speed when the spurwheels *f* and *g* are in mesh, and with the highest forward speed when the clutch wheel engaging its hub portion is shoved forward and couples the chain gear *hi* to shaft *e*. The second speed is obtained by coupling sprocket *m* to shaft *e* by means of clutch *k*, and the third speed by moving the same clutch forward, connecting shafts *a* and *e* directly. All engagements are protected against unintentional displacement by the well-known locking system for the shifting-rods.

The dimensions of the gearbox are necessarily large with the chain system, and intermediate bearings are therefore required for the shafts to avoid vibrations. For the same reason the casing is braced by horizontal transverses at two different levels. Underneath it a rounded pan protects the street from drippings.

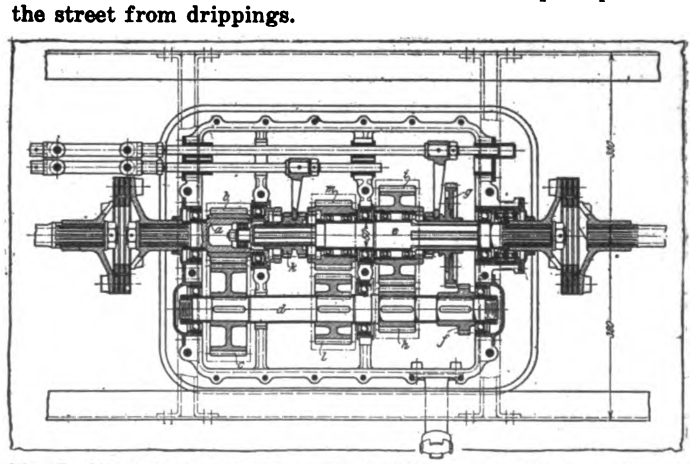


Fig. 7—Silent-chain gearbox with direct drive on third speed and leather universals

The rear axle design is shown in Fig. 8. Its most characteristic feature is of course the worm drive. The quintuple steel worm *a* is hardened and ground and drives a 32-teeth bronze wormwheel *b* mounted on the differential housing. The whole drive is so mounted in the cover *c* of the rear axle casing *d* that it can be removed easily in its entirety from above. The worm is as usual secured by an exceptionally strong double-acting end-thrust bearing at the end of the shaft, and the wormwheel is secured laterally by thrust bearings at the sides of the differential. The steel casing *d* is stiffened by internal ribs and is bolted to the flared axle tubes. These are supported at their outer ends in ball bearings, and the connection between the forged end-pieces of the wheelshafts and the wheel hubs are in the nature of slightly movable spur joints. To compensate for the lack of a service brake on the transmission, each wheel carries two separate brakes side by side, and their drums, 20 inches in diameter, are separately removable.

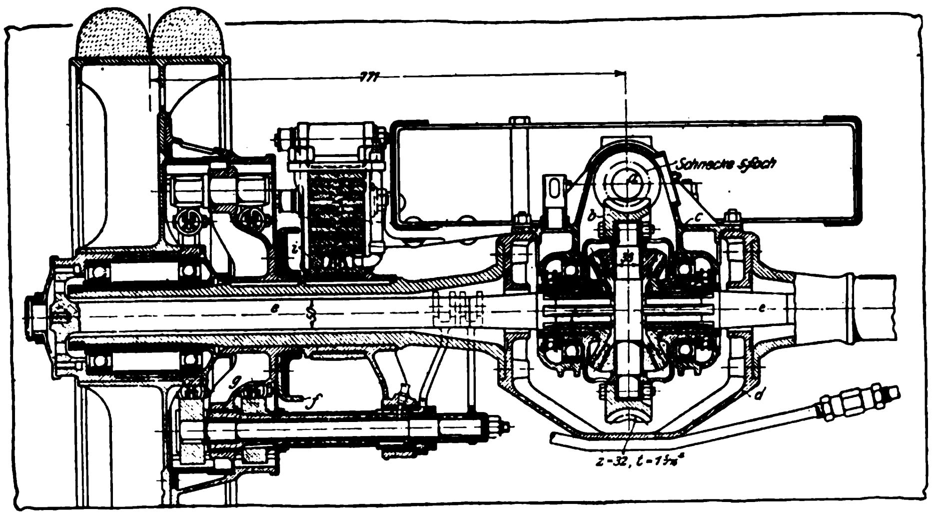


Fig. 8—Rear axle construction of German Daimler omnibus

The rear axle transmits traction thrust, as well as reactions from starting and braking, by two struts which are bent to an upward curve at their forward ends and susceptible of turning upon horizontal pins in the middle transverse of the frame. The rear ends *f* of the struts are rigidly secured to the brake-shoe carriers *g* which are pressed upon the rear axle. For further security the middle front portion of the rear axle is braced against a transverse *h* connecting the two struts as shown in Fig. 9, so that all torsions are taken up at this point and the pressed and wedged joints are relieved. The springs are also relieved of all traction and torsion stresses; their clip boxings are mounted with bushings which can turn upon the rear axle and are provided with special grease cups to prevent them from rusting on.—From *Zeitschrift des Vereines Deutscher Ingenieure*, August 8.

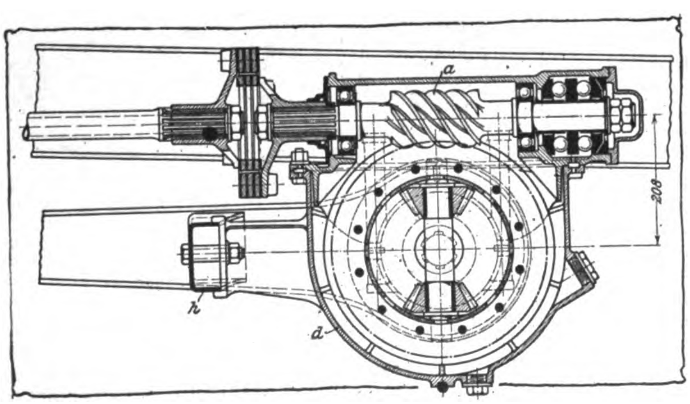


Fig. 9—Worm drive, showing also brace h for torsion struts

Recent Court Decisions —Father Pays Damages

Court says that an 11-year-old boy is so young that he is presumed to be inexperienced and unfit to drive a large automobile.

In a recent case a man sued because his wife had been run down and injured by an automobile driven by an 11-year-old boy. It appeared that the man sued had purchased the car for his son and allowed him to drive it; that the boy had used the car several months and had driven 3,000 miles.

The Court said that it was not willing to hold that a powerful, heavy machine, such as the one in question, in the hands of an 85-pound boy, not yet in his teens, speeding along the streets of a populous and busy town might not become a menace to the lives of the people attempting to cross the street in front of it. It further stated that an automobile could not be held to be a dangerous appliance as a matter of law, because they have grown to be a part of the life of the country and when properly handled, and driven, are useful and convenient vehicles. Judgment was given against the father, however, by the Court on the theory that the parent had not used reasonable care and should have anticipated an accident as a result of permitting the child to use the car.—*Allen vs. Bland*, 168 *S. W.* (*Texas*) 35.

Experiment Not Admissible

Man may not testify that, by experimenting with his automobile, he found he was able to stop within a shorter distance than a chauffeur stopped who ran down a person.

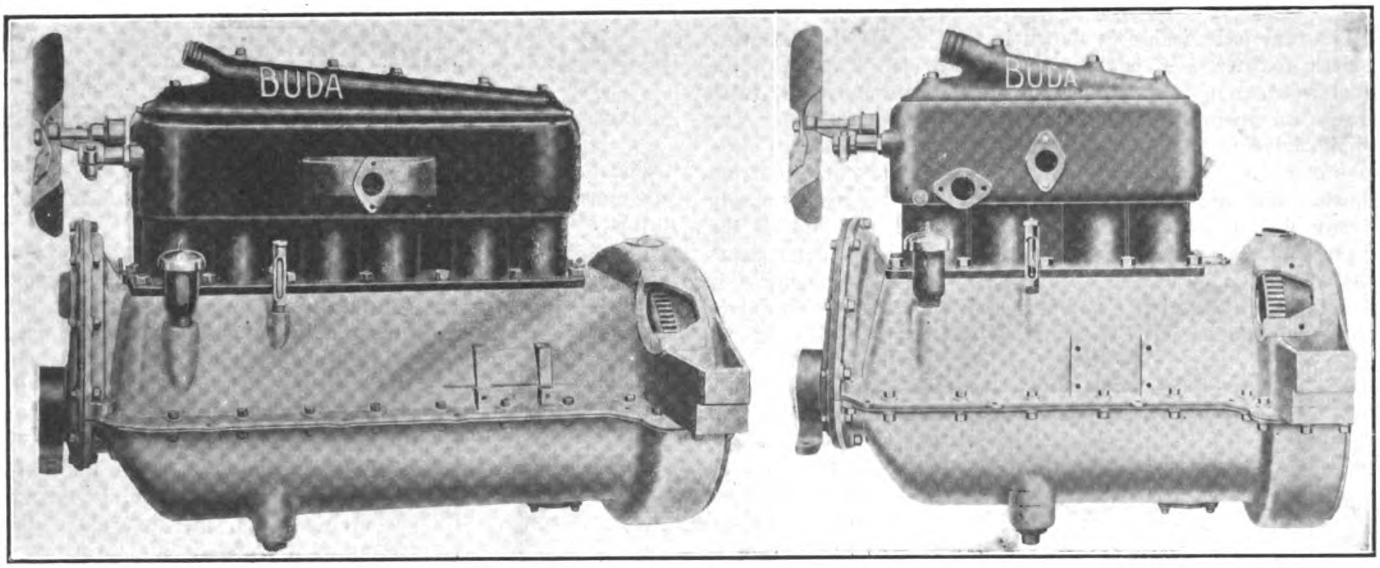
A man was injured in a collision between a carriage, in which he was riding, and an automobile, which was coming along the road in an opposite direction. The injured party endeavored to have a friend testify that he had experimented with his car at the place of the accident and had found that he could stop quicker at a given speed than the chauffeur had done.

The Court held that, as the conditions were not the same at the time of the accident as they were at the time of the experiment, the testimony was not proper, and that this evidence was particularly improper because the cars were not of the same make or of the same horsepower.—*Beckley vs. Alexander*, 90 *Atlantic* (*New Hampshire*) 878.

Owner Responsible for Family

In Washington an automobilist must pay damages to an injured person when his car is negligently driven by some member of his family.

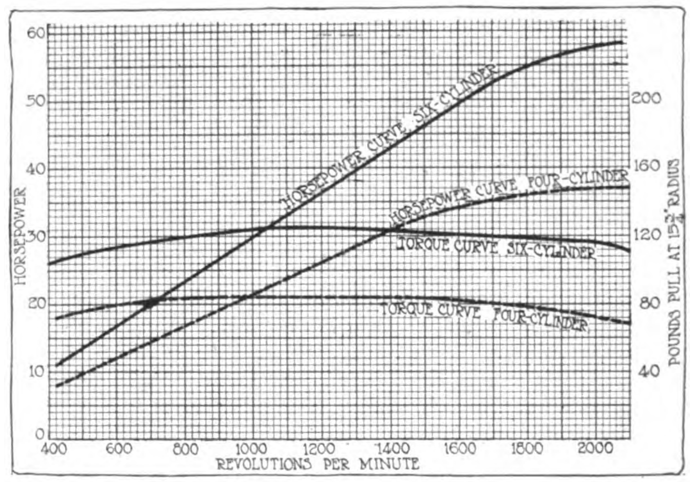
A motorcycle and an automobile collided at a street crossing and the motorcyclist was thrown and injured. The automobile was owned by a husband and wife as community property and was used by them together and also for selling real estate. The wife was not in the car at the time of the accident, but it was being driven by her daughter. The motorcyclist sued the husband and wife together for his injuries and the Court held that the owner of an automobile, who purchases the same for the use of his family, must pay damages to a third person who is injured through the negligent driving of any member of his family who has permission to drive the car.—*Switzer vs. Sherwood*, 141 *Pacific* (*Washington*) 181.



Left—Left side of new six-cylinder Buda motor showing clean exterior of block casting. Right—New four-cylinder Buda type. Note provision for attaching electrical systems to both models

Buda Brings Out New Four and Six

Both Block Designs of L-Head Type—Unit Feature Is Optional



Horsepower and torque curves of new four and six-cylinder Buda motors

TWO new power plants have been brought out by the Buda company of Harvey, Ill., manufacturer of the Buda automobile motors. Both of these are 3.5 by 5.125 inches, one being a six and the other a four. The design of the two is exactly similar throughout save for the number of cylinders. Both have their cylinders cast in a single block and are of L-head design.

Both Three-Point Suspended

The weight of the four, which is known as model "RU" is given by the manufacturer as 375 pounds with regular equipment. The six is stated to be 525 pounds with regular equipment, Both motors are designed for three-point suspension, and, although intended originally to be unit types, will be furnished without the unit feature if desired.

The cylinders are of gray iron and have been made with an extra large waterjacket space. To further insure efficiency in cooling, the water is baffled so that it is discharged from the pump directly beneath the valves and arranged to secure a complete circulation around each individual cylinder. The top of the cylinder is provided with a cover which can be removed, allowing for access to the upper part of the waterjacket space. The base flange of the cylinders is extended in the form of a shelf and the valve lifter guides are mounted in openings drilled in this shelf. This gives a compact arrangement for supporting the guide lifters and pushrods and provides for lubricating these parts by means of communication with oil from the crankcase.

Mudpan Hangs from Lugs

The crankcase is cast from aluminum alloy and divided horizontally into two parts. The upper part contains the complete crankshaft bearing supporting members and includes the entire bearing assembly. The lower half of the crankcase serves as an oil pan. A feature which will be appreciated from the standpoint of accessibility is the fact that lugs are placed on the crankcase to support the mud apron, doing away with the necessity of hanging this from the main frame.

In arranging the crankcase for the three-point suspension, the rear supporting members are two in number and are provided for by arms cast integrally with the upper half of the case and arranged to bolt directly to the main frame. The forward end of the motor is supported at the crank center by a trunnion bracket arranged to rest upon a dropped cross member of the frame. This means of support allows the bottom end of the crankcase to be removed without interfering with the upper part.

Clean Exterior Appearance

The exterior appearance has been kept clean by inclosing the valve mechanism, which is all on the right side of the motor, allowing plenty of room for installing the steering gear in left drive cars. The length overall of the six-cylinder motor from the face of the fan to the rear of the cylinders is 35 11-16 inches. This dimension on the four is 25 9-16 inches.

The pistons are cast iron ground to size and in accordance with up-to-date practice, are drilled with oil relief holes through recesses to prevent the lubricant from being drawn up into the combustion space, causing smoking and carbonization. The rings are cast iron, diagonally split eccentric. They are ground on the periphery and also on the sides.

Open hearth steel is used for the piston pins and these are case-hardened and finish ground to fit the pistons.

Open hearth steel drop-forged and heat-treated is also used for the connecting-rods which are I-beam section. These are machined and reamed to accurately locate the centers and are not offset. The upper end of the rod is bushed with phosphor bronze; the lower end is fitted with die-cast nickel babbitt bearings. Connecting-rod bolts are heat-treated steel.

Four main bearings are employed on the six and three on the four. The crankshaft is drop-forged open-hearth steel, heat-treated, machined and balanced on a Norton machine. The heat-treating process, according to the Buda company, gives the crankshafts a tensile strength of 120,000 pounds per square inch and an elastic limit of 85,000 per square inch. The dimensions of the three bearings on the four are as follows: Front, 1.75 by 2.875; center, 2 by 2.25; rear, 2.125 by 3.25. On the six the diameters and lengths of the main bearings are as follows: Front, 1.75 by 2.875; two centers, 2 by 2.25; rear, 2.125 by 3.25. In both motors the connecting-rod bearings are 1.875 inches in diameter and 2 inches in length.

Helical Timing Gears

Helical timing gears, cut on automatic hobbing machines, drive the camshafts. The timing gearset is composed of one crank, one cam and one pumpshaft gear which are accessible by the removal of the gearcase cover. The camshaft and cams are forged in one piece from open-hearth steel, machined and case-hardened. On the four the camshaft is carried on three bearings and on the six, on four. The cams are designed for quietness and are a modification of the sharp contour type, avoiding hammering between cams and followers.

Cooling is by means of a centrifugal water-circulating pump fitted with a bronze runner. The water pipes are exceptionally short and are designed to connect to the radiator without a bend in the hose. The fan is mounted on anti-friction bearings and has a belt-tension adjustment.

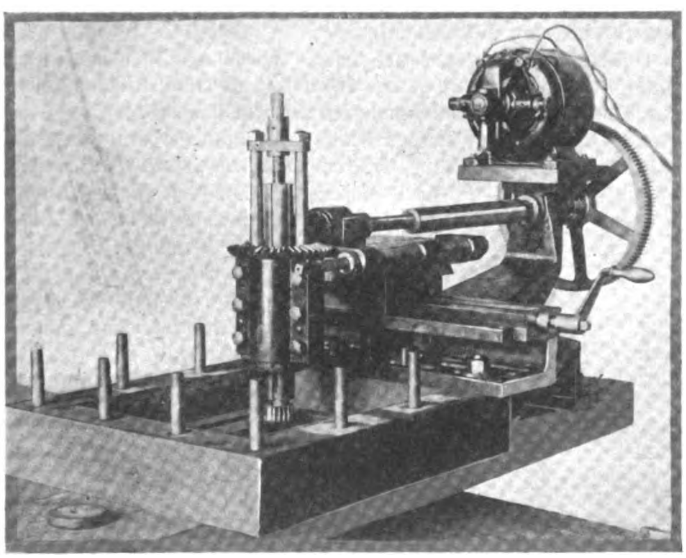
Force-Feed and Splash Lubrication

Lubrication is accomplished by force feed as regards the main bearings and by splash to the rest of the motor. The oil is pumped from the reservoir in the crankcase by a gear pump to the main bearings, the lead from the pump entering the top of the bearing and providing oil for the frictional surface at these points under pressure. Overflowing from the forward and rear ends of the main bearings, the oil enters the splash pockets and the dip of the connecting-rods into these provides the oil space which takes care of the cylinders and all other interior working parts. A separate lead takes a constant stream of oil from the pump to the timing gears.

Provision for Accessories

Provision is made for attaching most of the standard ignition starting and lighting systems. The clutch may be housed in the flywheel, which is attached to the crankshaft by a large flange with six steel bolts. The diameter of the flywheel in both motors is 17.25 inches. This follows the practice of making everything interchangeable on these two motors, reducing to the utmost manufacturing costs. In both engines the intake manifold is designed for a 1.25-inch carbureter. S. A. E. standards are used for connection of accessories, and the spark plugs are also to the society's dimensions, being 7-8 inch, 18 standard thread.

Portable Electric Milling Machine for Small Jobs on Heavy Work



Portable electric milling machine of new design manufactured by the Pedrick Tool and Machine Co., Philadelphia, Pa.

A PORTABLE electric milling machine can be used to good advantage for small jobs on heavy work. In this state of affairs it is much cheaper to carry the machine to the work rather than the work to the machine. Accompanying illustration shows the machine of new design that will be found very convenient for a great variety of purposes.

This is a portable electric milling machine suitable for being carried to the work and mounted on it. In this manner it can handle many jobs on an assembled part that would be exceedingly awkward on a regular milling machine and which in fact would generally require the dismantling and removal of the part upon which it is working.

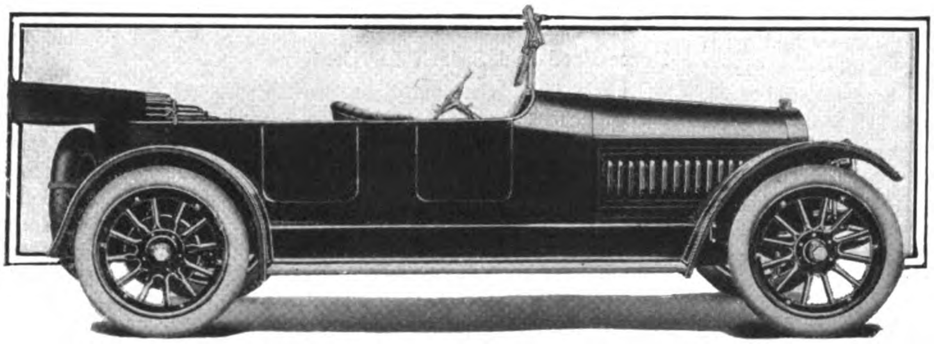
The particular job shown in the illustration is the milling of the seat and port edges of an engine valve. The method of mounting the milling machine is also clearly shown in the illustration. It is secured by means of bolts passing through longitudinal slots in the base. By the same arrangements the machine can be mounted vertically as well as horizontally.

One of the advantageous features of the milling machine is that the spindle stands clear of the base, rendering the work exceptionally accessible. The longitudinal travel of which the instrument is capable is 12 inches and the cross travel, 6 inches. There is a range of vertical of 6 inches. In place of the automatic adjustment generally used on the larger milling machines, hand adjustment is provided for by the longitudinal and cross travels. This is in keeping with the idea of rendering the machine as light as possible as it does away with the weight and complication necessary with the automatic adjustment.

Some of the purposes for which this milling machine may be used are the milling of engine and pump valve seats, port edges, key seating shafts, facing pads on large frames, etc. By manipulation it can also be made to perform other tasks, even drilling. A special attachment with V-shaped seats can be supplied for mounting the machine on shafts for key seating.

The driving power on the instrument is supplied by a .25-horsepower Westinghouse electric motor running at 1,725 revolutions per minute. The machine is manufactured by the Pedrick Tool & Machine Co., Philadelphia, Pa.

Pilot 55 Horsepower Six for $1,885



Pilot 55 horsepower model selling for $1,885

Fitted with Two and Five-Passenger Bodies— Two Other Models with 60 and 75 Horsepower Motors

THREE sixes make up the 1915 line of the Pilot Motor Car Co., Richmond, Ind. One of these, the 55, is an entirely new addition and takes the place of the four manufactured for the 1914 season, the other two, the 75 and 60, are continuations of the product of the present season.

The new six, which is the Pilot leader for the 1915 season, follows the latest dictates in six-cylinder design. Built on a chassis of 126 inches wheelbase, and fully equipped, it sells for $1,885 in two- and five-passenger bodies and for $100 additional in the seven-passenger. It is a big, roomy car of ample carrying capacity, 34 by 4-inch tires, has the popular 3.5 by 5.25 motor and cantilever springs.

Like all other Pilot cars the power plant is a product of the Teetor-Hartley Motor Co. of Hagerstown, Ind. The makers place a rating of 55 horsepower on this motor as measured on a torsion dynamometer. It is a T-head design with the cylinders cast in a block. Although the intake and exhaust manifolds are cast separately and are placed on opposite sides of the cylinders a very simple exterior has been maintained, as the valves and their operating mechanism have been inclosed by long cover plates.

Three-Ring Pistons

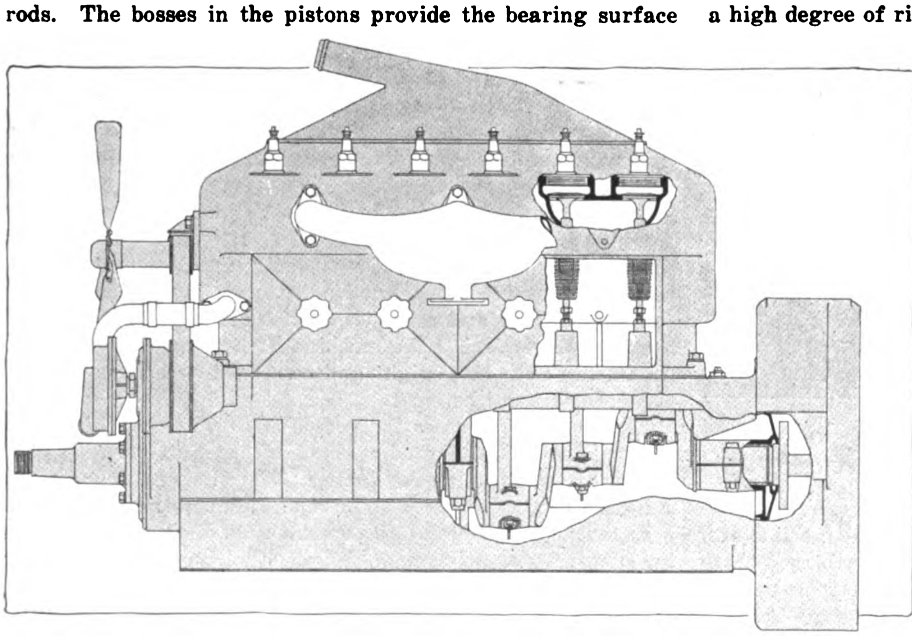
Three eccentric rings are fitted to the cast-iron pistons. These rings are ground on the piston as well as on the cylinder side to assure a minimum gas leakage. The piston pins are of chrome-nickel steel and are secured in the connecting-rods. The bosses in the pistons provide the bearing surface and the makers claim that a distinct advantage is gained in this, owing to the higher percentage of bearing surface as compared to the practice of fixing the pins in the boss.

The connecting-rods are of the standard I-beam section, drop-forged from carbon steel. In the Teetor motors the same grade of steel is used in the connecting-rods as in the crankshafts. The diameter of the bearing at the lower end of the connecting-rod is 1.875 inch and the length 2.25. Following the best practice, the bolts holding the connecting-rod bearing caps in place are of nickel steel. These bolts must take all the strain of the drive once in every revolution and manufacturers are almost without exception using alloy steel at this point.

Three Main Bearings

Three large main bearings lined with die-cast, nickel babbitt support the crankshaft. The front bearing is 2 inches in diameter and 3 inches long; center, 2.5 by 1 11-16; rear 2 by 3.5. All six crankpins are of course of equal diameter, this dimension being 1.875 inches. The main bearings are supported by the upper half of the aluminum crankcase so that the bottom pan of the motor can be removed without disturbing the bearing adjustments.

Helical timing gears are used. These are inclosed in an oil-tight compartment at the front end of the crankcase. On the Teetor motors the camshafts are not a drop-forging. Instead a special alloy is used which, the makers claim, possesses a high degree of rigidity, thus meeting the prime requirement of a camshaft. Die-cast nickel-babbitt bearings, the same material as used for the crankshaft bearings, are used for the camshafts. These bearings are three in number and of generous size. In fact the whole valve mechanism is of ample proportions. The valves themselves are 2.25 inches in diameter and have a lift of 5-16 inch. The push rod guides are 2.5 inches long.

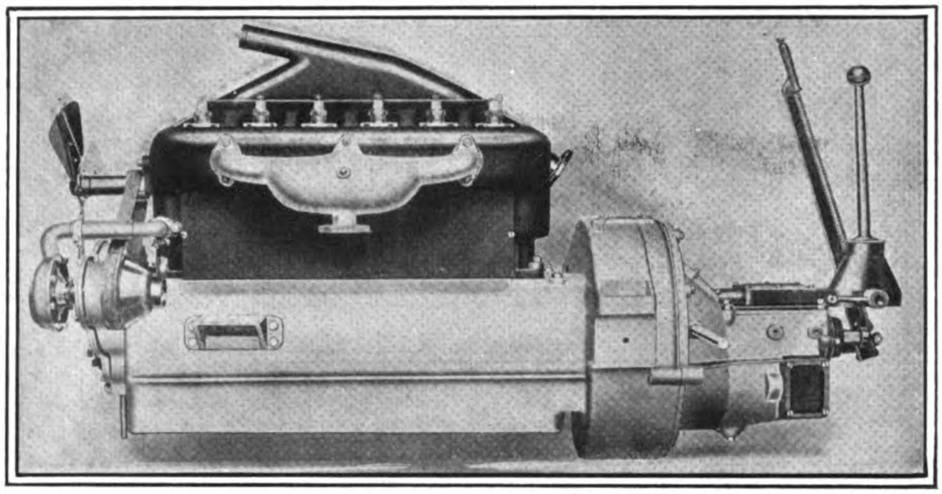


Pilot motor showing mounting of the pump at the front and the valve mechanism and crankshaft construction

Patented Splash Lubrication

Lubrication is by a patented splash arrangement. Two overflow oil basins into which the connecting-rods dip are fastened in the lower half of the crankcase. In the bottoms of these two oil troughs there are drilled holes which are of sufficient size to admit a definite quantity of oil. As the lubricant is circulated by the connecting-rods, it is replaced by the oil supply which is furnished through the oil holes. The faster the motor runs, the faster the oil is pumped to the splash troughs and an increase is given in direct ratio to the speed. The overflow from the bowls, as in all circulating splash systems, finds its way back to the reservoir in the bottom of the crankcase. A large oil gauge is placed close to the breather pipe.

A centrifugal water pump circulates the cooling water through a cooling system that has been carefully designed to be adequate as regards jacketing space. The radiator is a Mayo square-tube. The water pump has one feature that makes it of unusual interest in that it has but one packing gland instead of two. This reduces by 50 per cent. the chances of leakage at this point. The water chamber at the top of the motor is larger than usual as will be noted from a side view of the engine. It resembles very much a water header for a thermo-syphon system.



Unit power plant used in the Pilot 55. A Teetor 3.5 by 5.25-inch motor is employed

In equipping the cars electrically for this season the magneto has been dropped and in its place a combined lighting and ignition generator of Westinghouse manufacture has been substituted. The cranking motor is a flywheel installation and is also a Westinghouse. The lighting and ignition generator is mounted on the left side of the motor on a platform so arranged that the drive is taken from the pump shaft. A rather ingenious method of balancing the pump and generator drive has been made use of. Referring to the side view of the engine it will be seen that the water pump is mounted forward of the timing gear case. In this way the water pump shaft does not have to pass through the pump housing and the use of the single stuffing box as previously mentioned results. A further advantage is that the load on the bearing is equalized in a longitudinal direction.

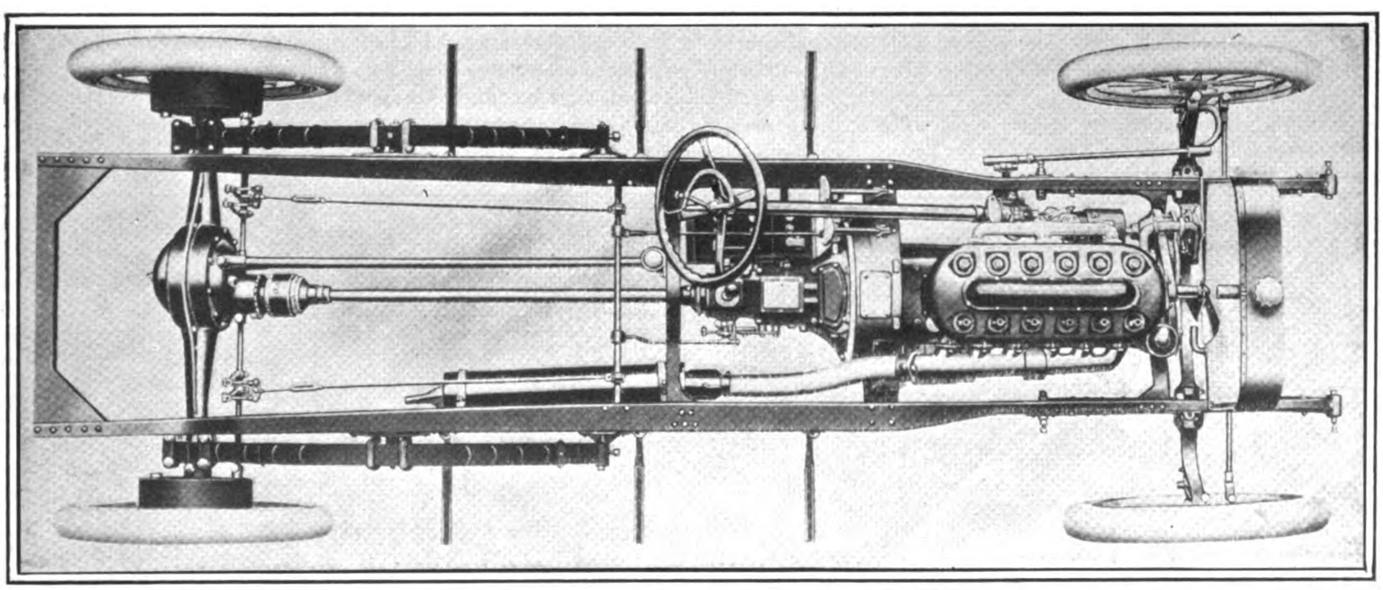
Gravity Feed to Carbureter

A gravity feed gasoline system is used. The tank has a capacity of 19 gallons and is located under the front seat. The angle in the tube leading from the tank to the carbureter is 15 degrees. This means that up to an angle of 15 degrees the last drop in the tank would pass through the system. The more gasoline there is in the tank in such a system, the greater the angle at which it will feed, but with this angle, with a pint of gasoline in the tank the flow would be as good as with the full 19 gallons up to an angle of 15 degrees. A feature in the economy of this car is the design of intake manifold. This is an aluminum casting so arranged as to give a balanced feed to all cylinders. It is provided with a gas chamber which will be noted in the side view of the motor.

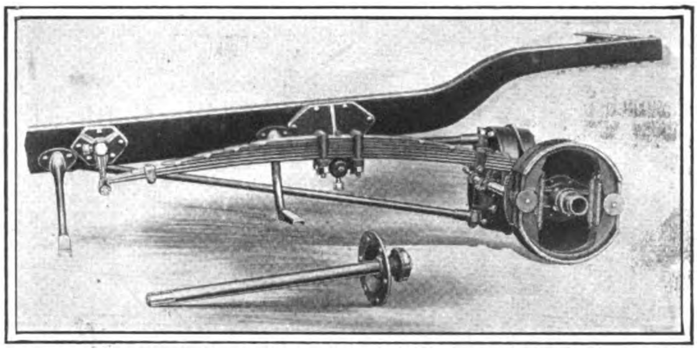
The clutch and gearbox are contained in a unit housing which is bolted against the rear face of the crankcase forming a unit power plant. Both the clutch and gearset are products of the Warner Gear Co. of Muncie, Ind. The clutch is a wide leather-faced cone with engaging springs and provided with a ball thrust to take the load of the engaging spring off the crankshaft of the motor. The gearset provides three forward speeds and is provided with gears of chrome vanadium steel.

The drive shaft is fitted with a universal joint at each end. The units on the drive from the gearbox through the rear axle are all of 90 horsepower capacity. The heavy construction is carried even to the housing of the rear axle which is of 7-32 inch pressed steel. This is unusually heavy as it is common practice on many cars of sturdy design to use 5-32 inch material here. The axle is floating and is a special Pilot design manufactured in the Hess shops.

Nickel steel gears and chrome-nickel steel shaft are used in the differential. The shafts are 1.5 inches in diameter and the rear wheel bearings have a guaranteed load capacity of 7,800 pounds. This is exceptionally heavy construc-



Pilot 55, six chassis showing mounting of motor and drive mechanism. Note connection of torque member and cantilever rear springs



Cantilever spring suspension and torsion bar arrangement on the Pilot 55

tion as the makers claim a weight of but 3,150 pounds for the entire car, fully equipped.

A double set of internal expanding brakes act on drums bolted to the 34-inch artillery wood wheels. The tires are 34 by 4 all around.

The frame construction is of particular interest in the Pilot car because, as in the rear axle, especially strong materials have been used. The frame stock is 7-32 inch thick and the channel webs are 5 inches deep. The flanges are 3.5 inches in width with reinforced front ends and at the rear is braced against racking with heavy gusset plates. Ample provision of strength has been made against the three causes of frame downfall; racking, crystallization and sagging.

The cantilever rear spring used in the new six is an innovation for the Pilot concern. Previous products of this company have been fitted with semi-elliptics. The springs used in all the Pilot line though are distinct in that use is made of the imported English Sheffield steel.

The other two sixes have larger motors than that in the car just described. On the 75 there is a 4.5 by 6 Teetor power plant with T-head cylinders. This car has many of the general features of design that are incorporated in the little six. It has the cone clutch, Warner gearbox, and the same type of drive. The rear axle, however, is a Timken and the units are larger to accommodate the more powerful motor and the longer wheelbase of 132 inches. The tires on the 75 are 37 by 4.5, both front and rear. Center control is used on this car, but the purchaser has his choice between left or right drive. The price of this car fully equipped in either two, four, five, six or seven-passenger body types is $2,885. The colors are optional although plain blue, brewster green, brewster green with ivory panel or violet with ivory panel are standard.

The Pilot 60, known as the Empress model, has also the T-head block Teetor motor. In this instance the bore is 4 and the stroke 6 inches. It is built in seven-passenger and roadster bodies and fully equipped sells for $2,585.

This model is essentially the same as the 75, being mounted on the same chassis. The axle is smaller in the 60 but is of Timken manufacture and the radiator which is a Mayo the same as in the larger car has a .5-inch shallower core than is necessary with the larger engine. A choice of left or right drive is offered in this car also. The Empress model as well as the 75 has undergone a change in the electrical equipment for this season being now fitted with the Westinghouse two-unit system in which the generator performs the function of ignition as well as lighting.

Marr Car, Weighing 600 Pounds, Has Sliding Gears and Shaft Drive

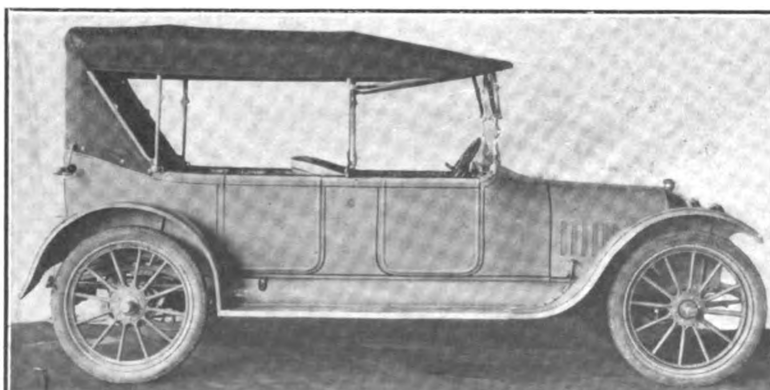
As an example of the refinement and finish to which the building of a small car can be carried, the little machine which Walter S. Marr, engineer of the Buick Motor Co., has made after his own ideas and for his own personal use is noteworthy. Although the Marr car was not built with the specific idea of manufacturing it for the public, if it were placed upon the market it would no doubt meet with ready sale. Its total weight is about 600 pounds.

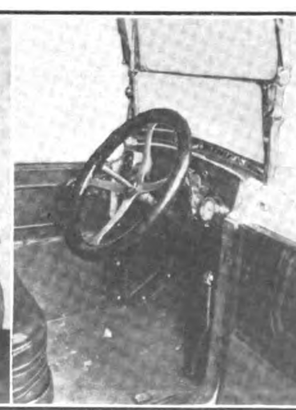
The little car has a 36-inch tread, and 100-inch wheelbase. Its motor a four-cylinder water-cooled type 2 3-4 by 4 inches. The car is in every way up to standard in design, and has a sliding gearset and shaft drive back to a regulation type of rear axle with differential. The frame is of channel section pressed steel and springing is well taken care of by long semi-elliptics front and rear. Even the front axle is in accord with standard practice, for it is a small I-beam drop-forging with the usual form of yokes to carry the steering spindles.

Its body, an attractive little affair, is arranged for tandem seating. The cowl slopes into the bonnet and this meets the pointed radiator in unbroken lines. The radiator is finished in German silver. Finished in buff with brown leather upholstering to match, this little car would soon become the envy of many if it were on the streets of our cities, its price would be prohibitive unless made in large quantities, for it has every appointment that any machine can boast of.

Deep Turkish cushions are fitted, and the driver's compartment is roomy and comfortable. One special feature is the adjustable steering wheel which may be raised or lowered on its spindle to meet the requirements of the driver.

A speedometer and clock together with the spark and throttle levers are placed on the leather-covered instrument board, and at night they are lighted by an electric dash lamp. The control levers are at the right. Due to the narrow width of the car, the steering wheel is in the center.





Left—Side view of two-passenger tandem-seating car. Note top. Right—Driver's compartment and front view

Present Time Is Opportune for Increasing South American Trade

But We Must Go About Developing It Calmly and Sensibly, Prominent Speakers Tell Merchants' Association

NEW YORK CITY, Oct. 16—Nearly 1,000 business men assembled at the Hotel Astor on Wednesday at the call of the Members' Council of the Merchants' Assn. to consider the problem of extending our trade in South America. Many foreign consuls-general and representatives of the South American republics were present. The speakers were: W. S. Kies, manager of the foreign trade department of the National City Bank, which is establishing branches in the financial centers of South America; John R. Fowler, second vice-president of W. R. Grace & Co., and Charles M. Pepper, government expert on South American trade.

One of the most interesting addresses was that of Mr. Fowler on the present situation in South America. A brief digest of this follows:

"We commonly hear South America referred to as 'that country down there,' with no appreciation of the fact that it is really a great big continent, comprising quite apart from its three European colonies, ten distinct Nations, nearly all of very large area and no two of which are quite alike climatically, commercially or financially.

"Before the present war broke out, nearly all of South America was suffering from business depression and, of all the grand divisions of the world, apart from Europe itself, this sudden upheaval has struck South America the hardest blow and left those countries just bewildered. For they have always depended upon European money for government loans, public works, railway construction, industrial developments and all such enterprises.

Financial Troubles

"If we briefly review the countries, as before the war, we find that Brazil was already in a precarious financial situation, but expected relief from a large foreign loan which will not now come off. Her Amazon district is in a desperate condition from the low price of rubber. As to coffee, its market price has recently declined 30 per cent. to 40 per cent. and, moreover, she is temporarily without Europe as a taker of about 40 per cent. of her crop.

"Both Colombia and Venezuela suffer correspondingly in coffee, for which Hamburg formed a very important market.

"Argentine was in a critical commercial shape. She depends upon Europe as the main buyer of her great grain crops and also of her big wool clip.

"The great staple of Chile is nitrate of soda, of which article she produces about 3,000,000 tons annually. Of this Europe takes about 2,000,000 tons, so Chile has temporarily lost her market for two-thirds of the article, and this fact has quite demoralized that industry. Her copper industry is also afflicted.

"Peru is also a big producer of copper and suffers accordingly. She is helped by the big rise in sugar, but on the other hand, suffers from the fall in cotton.

"The principal export from Ecuador is cocoa, which has fallen about 33 1-3 per cent. in price, and is temporarily without Europe as a buyer.

Buying Power Crippled

"We must realize that the buying power of these South American countries has now been terribly crippled and will remain so for much time to come. Furthermore, all European export to South America is by no means shut off.

"In seeking trade relations, we usually overlook that barter is a good principle, and that hitherto our own Tariff might well be considered as 'in restraint of foreign trade.' Formerly, we tried to exclude everything that we absolutely had not to obtain abroad, but our new Tariff bill is something like an invitation to 'trade both ways,' and a sign that we are prepared to do more bartering.

"The present, therefore, is a particularly opportune time to develop our trade with South America; but we must go at it sensibly, earnestly and not hysterically.

"It is European capital that has always stimulated those countries, but if American capital can assist them in their present financial dilemmas our trade will be helped immensely, for it is money that keeps trade alive. And American money would naturally get us business where European capital has formed the habit of demanding a preference for European goods. Can we now help South America financially?

"Another circumstance, this time of a happier nature than war, is the compliment felt by the three leading South American nations upon being invited to join us in discussion of the International question of Latin America. And the elevation to the rank of Embassies of our diplomatic intercourse with Argentine, Brazil and Chile, is a new dignity offered by us to those countries, which is profoundly appreciated by them.

Liberal Credits

"We are often reproached on the score of niggardly credits to South American customers, but the fact is that our exporting merchants are really very liberal in credits to South America, much more so than our home merchants would concede to domestic trade. In spite of all we hear to the contrary, this affair of South American credit is just about the same whether the goods are from Germany, England or from the United States. For the worthy South American trader gets about the same facilities for payment, in one or another form, whether he buys from the United States or from Europe.

"The manufacturer properly wants cash to keep his business going, and it is the exporter who has to finance the foreign customer.

"It is always the unworthy customer that howls the loudest when the cautious merchant will not grant him dangerous terms; and this statement holds good whether the customer be in New York or Chicago, or Buenos Aires.

Shipping Facilities Good

"Perhaps it will surprise many to learn that our trade with South America is relatively as well served with shipping facilities as are the principal ports of Europe or Asia or Africa. In recent years, from New York alone, we have averaged fully three steamers weekly with general cargo to the River Plate ports, about semi-weekly to Brazil, and weekly to the West Coast by way of Magellan. In addition, the nearby countries have frequent service and the West Coast has had three lines connecting with us at Panama.

"And the ocean rates to ports 4,000 to 6,000 miles distant have been little, if any, more than we have to pay in domestic trade to ports only 600 or 800 miles away."

The AUTOMOBILE

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Demonstrations

DEALERS selling gasoline and electric trucks are still undecided as to whether it pays to demonstrate or not, in spite of the much valuable information that has been made public on this point. One large maker recently announced that when giving free demonstrations it made but one sale out of eighty-one demonstrations. Under a régime of charging for demonstrations it sold trucks to 87 per cent. of those to whom demonstrations were made. Under a régime of no demonstrations its business continued and made good increases.

Why should it be necessary to demonstrate a known quantity? We do not ask for demonstrations of new machines that we put in our factories or garages. When we buy them we expect that they will do certain work, otherwise we would not buy them.

Why should a central station company purchasing an electric truck ask for a demonstration, when its business is so closely allied with electric motors and batteries, the only two factors that might possibly give trouble in an electric machine. These same people do not buy electric generators on any principle of competitive demonstration, yet when it comes to buying a truck they expect, in fact, request, competitive demonstrations. They expect to get free demonstrations.

The $500 Electric

THE continued agitation from many quarters for a cheap electric passenger vehicle, one retailing in the zone of $500 or $700, does for the time being seem a conception but very little of a reality.

Practically every effort to date to produce such a vehicle has ended in signal failure, and those devotees of the electric, who have been refraining from purchasing until the $500 vehicle appeared, had better purchase if they want to derive any benefit during the next few years from the electric vehicle.

As to whether such a vehicle is a possibility of the semi-distant future is a matter of grave conjecture as there are so many apparently insurmountable obstacles to its achievement today as to make it a question of doubt as to whether such a vehicle will ever be built to meet the requirement of the public.

There are, in reality, two factors that render such a vehicle impossible today. First: It is practically impossible to build such a machine and make it meet the requirements of the people. An electric selling at $500 is not an impossibility to build but its radius of mileage on one battery charge would be limited to 25 or 30 miles and its speed would not exceed 15 miles. At the present time such a vehicle will not meet the requirements of our fastidious people. They want more mileage and they want more speed. Our cities today are too large in area for such a vehicle.

Electric manufacturers are apparently united in the one opinion that the public of today does not want such a vehicle, in fact, they say they have canvassed the makers of electric current in the leading cities, and that the majority of them would not make use of such a machine. Today the public is asking for increased mileage radius per battery charge, the radius of 50 or 60 not being enough, many asking for 85 and 100 miles per charge.

This demand for greater radius is not that such a mileage is used in the majority of trips, but the users want a feeling of confidence, a feeling that in the worst weather, when he needs his machine most, that he will have ample current and power to get him over his route and on schedule.

Quantity production has been the great secret of price reduction in the gasoline car field, and the doubting Thomases are asking why cannot similar reductions be accomplished in the electric. It may be possible, but at present the demand for such a vehicle does not seem large enough to warrant the investment that would be necessary to manufacture it on such a scale.

In the meantime gossip, and a few pioneering efforts, have set a high mark for the electric manufacturers to aim at; and, if it is true, that the existing electric of today with its large radius per charge, its long wheelbase, its reserve power and its luxurious equipment and furnishings can perform practically 98 per cent. of the work that the gasoline car does, it is only natural that the electric manufacturers push to the limit their present product which has been developed to meet the demands of the public.

Advocate Michigan Law for All States

Committee on Uniform Automobile Regulation Considers Statute at Present Void Most Suitable for Adoption

WASHINGTON, D. C., Oct. 17—One of the big subjects to be discussed by the delegates to the conference of commissioners on uniform state laws, now in session here, is a uniform motor car law, which has been prepared by a special committee. The committee has adopted the statute in force in Michigan as the basis for the model law it proposes that the conference shall indorse and recommend to the legislatures to pass in all the states.

It is a lengthy bill and provides for the registration, identification, regulation and taxation of motor vehicles operated upon the public highways and of the operators of such vehicles. Some features of it are the furnishing of registration lists to county clerks; re-registration annually; changing of color of number plate annually; special registration by manufacturers and dealers; exemption of non-resident owners other than corporations; registration of chauffeurs and wearing of chauffeur's badge; unregistered chauffeurs not permitted to drive; certifying convictions of violation of law, etc.

The report of the committee on the proposed uniform law is in part as follows:

The reason for adopting the statute of another state as the basis of a uniform law loses some of its force from the fact that this Michigan statute was held to be unconstitutional by the supreme court of that state in March, 1914, which decision is reported in Vernor against Secretary of State, 146 N. W., 338.

However, upon inspection of this decision it will be found that there is no fault in the body of the act, but its invalidity was placed upon the ground that under the constitution of Michigan the title of a statute must clearly indicate the purpose of law, which the title to this act failed to do, it providing only for "registration, identification and regulation of motor cars" under the police power of the state, when it was, in fact, a taxation measure under the taxing power of the state. However, this defect of the statute is remedied by broadening the title to cover the subject matter of the law, which your committee has done in the proposed bill, so that it may meet the requirements of the constitutions of the several states which have provisions similar to that of Michigan.

Michigan Will Re-Adopt Law

That the Michigan statute will be re-adopted by that state, with perhaps some slight modifications, is the opinion of the chairman of this committee, who is a resident of Michigan, and the tentative action taken by this conference may be of benefit to the legislatures of the several states, including the state of Michigan, who may be called upon to act in the adoption or amendment of motor car statutes in the coming year.

While we have presented the Michigan act in its entirety, we are not in favor of the adoption of all of its provisions and have placed footnotes to some of its sections, indicating our view in relation thereto.

Bankers Recognize Automobile Industry

RICHMOND, VA., Oct. 17—Worthy recognition of the automobile industry was furnished at the annual meeting of the American Bankers' Assn. here recently in an address by William Livingstone, president of the Dime Savings Bank of Detroit, on "Twelve Years of Continued Progress—the True Status of the Automobile Industry" in which for the first time at one of these bankers' gatherings there were favorable words for the automobile, its builders and users.

There were more than 2,000 bankers from practically every state at the meeting in Richmond. Alfred Reeves, General Manager of the National Automobile Chamber of Commerce, was also present to supply any facts and figures that might be required.

Mr. Livingstone showed that there were more than 435,000 cars sold during the year ending June 30, and that even in depressed times there had been continued buying of cars, supplying proof that they are a growing necessity of our modern civilization. Bankers had fostered a growing industry through co-operation with manufacturers and dealers and he explained in detail the method of making and marketing cars. Not alone did he furnish figures for the past but he indicated the future fields for the motor car and the possibility of increasing the sales both here and abroad.

Among the interesting figures brought out by the Detroit banker was the fact that there are 1,400,000 cars in use in this country, with an approximate figure of 450,000 cars as a production for the next 12 months to be sold by 15,500 automobile dealers. He said there were 13,630 garages; 1,280 repair shops and 680 supply houses. There are 450 listed manufacturers of motor vehicles, including 170 making gasoline pleasure cars; 245, gasoline commercial cars; seventy-seven, light cars; twenty-seven, motor fire apparatus; eighteen, electric pleasure cars; twenty-four, electric commercial vehicles.

Willys-Overland Business Breaks Records

TOLEDO, O., Oct. 21—*Special Telegram*—To show that the war is not affecting the automobile business to the extent some people claim, the Willys-Overland Co. reports that the week ending October 17 was biggest in its history, 1,400 cars valued at more than $1,300,000 being shipped, exclusive of trucks, etc.

October 15 unfilled orders for cars for $4,500,000 were on hand, one-third increase over the corresponding day last year.

Since the start of the fiscal year in July 11,400 cars have been shipped up to October 15, or 40 per cent. more than the corresponding period last year and 500 per cent. increase over 2 years ago.

Average daily shipments are 250 cars, men being employed and in some departments work is kept up 24 hours.

Since July 1 sales abroad are 75 per cent. of what they were in the same period a year ago, while average daily shipments to foreign countries represent in value $10,000.

Sales Good at N. Y. Electrical Show

NEW YORK CITY, Oct. 20—Not only has the present electrical show held at Grand Central Palace been more of a success than was anticipated, considering present financial conditions, but it has actually been the cause of more sales than any previous show. This is the consensus of opinion as expressed by the exhibitors of electric automobiles, and accessories. More people have attended the show, more interest has been shown in the displays than heretofore, more prospects have been obtained, and more sales actually closed.

As an example, one concern sold eleven electric pleasure cars. Strange to say, the war was given as a reason for practically all of these sales. It was stated that most of these machines were bought by the ultra-rich, those who were accustomed to drive the largest cars and employ the most expensive chauffeurs. Financial stringency forced those people to economize with the result that the chauffeurs were discharged, the big cars sold and electrics purchased, the need for chauffeurs not being so urgent in the operation of electrics.

Vanderbilt and Grand Prize Cups Offered

NEW YORK CITY, Oct. 19—The Motor Cups Holding Assn. has granted permission to the Panama-Pacific officials to put up both the cups for the Vanderbilt and Grand Prize races on February 22 and March 7, respectively. Up to the present time no official sanction has been given by the A. A. A. or the A. C. A., but it is expected that now, that the Motor Cups Holding Assn. has given its permission to hang up both cups, both sanctions will be forthcoming.

According to present plans the Vanderbilt race will be for automobiles of 600-inch piston displacement, or less, the minimum weight to be 1,600 pounds. The distance to be covered will be 300 miles. Cash prizes have been offered in addition to the cup. The winner will receive $3,000; second, $2,000; third, $1,500; fourth, $1,000, and fifth, $500.

The Grand Prize distance is 400 miles. Cash prizes will also be awarded in addition to the cup, donated by the Automobile Club of America. The winner will receive $3,000; second, $2,000; $1,000 to third, $1,000 to fourth and $500 to fifth.

The entry fee covering both races is $250. Entries close at midnight, February 10, 1915.

Barney Oldfield has expressed his desire to enter both races. He will drive a Stutz. Up to the present time no official entry has been made.

Exports for Fiscal Year Total $40,000,000

Remarkable Decrease in August Following Outbreak of War Exports Falling to 451 Cars

WASHINGTON, D. C., Oct. 19—At the request of many American motor car manufacturers the bureau of statistics, Department of Commerce, today made public figures showing the distribution of American automobiles, both pleasure and commercial, together with parts, during the fiscal year ended June 30, 1914. In that period outward shipments, including automobiles, engines, tires, parts, etc., reached the high record total of $40,000,000. It is noted, however, that a remarkable decrease occurred in August following the outbreak of war in Europe, exports in that month having fallen to 451 automobiles and motor trucks, compared with 2,004 in August of last year.

The following statement contains a complete record of the exports of motor trucks and passenger vehicles in the year ended June 30, 1914:

	Commercial Motor Vehicles		Passenger Automobiles		†Parts
	Number	Value	Number	Value	Value
Exported to					
Europe	249	$248,716	13,108	$10,168,218	$1,830,560
England	203	189,099	6,992	5,615,487	1,282,388
Germany	24	18,462	1,411	1,040,787	213,351
France	2	5,070	1,427	919,060	179,351
Russia	2	5,322	926	898,458	14,079
Sweden	1	900	324	253,588	6,140
Italy	1	1,229	342	241,466	50,580
Austria-Hungary	3	7,455	314	190,199	5,198
Denmark	..	..	263	176,947	8,664
Belgium	..	..	244	139,681	20,978
Norway	2	3,852	145	118,338	1,893
Netherlands	1	1,452	141	117,131	7,634
Finland	..	..	106	83,835	2,931
Portugal	8	12,075	59	65,545	2,357
Spain	..	..	83	64,758	6,266
Scotland	..	..	25	46,948	23,269
Switzerland	...	..	79	56,838	1,069
Other Europe	2	3,800	227	139,152	4,412
North America	298	558,413	5,190	6,280,042	3,847,616
Canada	247	474,724	4,377	5,445,052	3,663,879
Cuba	19	33,500	297	254,428	48,217
Mexico	12	17,509	155	239,166	41,508
Central Am. Reps.	13	17,814	118	123,155	28,390
British W. Indies.	4	11,250	140	133,935	44,411
French W. Indies.	..	..	65	48,377	8,099
Other North Am.	3	3,616	38	35,929	13,112
South America	79	130,811	1,906	1,808,401	296,306
Argentina	48	65,225	940	963,586	92,633
Brazil	13	20,449	299	264,992	84,602
Chile	2	10,743	195	160,194	22,405
Uruguay	1	865	183	167,269	21,401
Venezuela	12	28,228	126	102,073	36,286
Colombia	..	..	79	69,620	19,970
Peru	3	5,301	36	31,362	5,982
Ecuador	..	..	21	21,229	6,324
Bolivia	..	..	4	12,764	1,209
British Guiana	..	..	16	11,364	4,583
Dutch Guiana	..	..	7	3,948	911
Asia	30	55,658	1,408	1,206,031	144,017
India	7	12,091	437	379,954	47,923
Straits Settlements	7	14,381	262	216,659	25,100
Dutch E. Indies	7	14,232	290	208,722	15,368
China	7	12,700	144	143,619	5,825
Japan	1	900	96	101,195	35,637
British E. Indies	..	..	82	73,175	4,099
Siam	..	..	37	26,219	4,905
Aden	..	..	28	20,990	1,676
Hongkong	..	..	11	13,043	626
Russia	..	..	12	14,998	..
Turkey	1	1,354	7	5,662	67
Chosen (Korea)	..	..	2	1,795	2,791
Oceania	113	171,407	4,833	4,338,977	334,956
Australia & Tas'ia.	32	37,378	3,099	2,615,896	202,363
New Zealand	39	61,599	1,065	974,708	53,644
Philippine Islands.	38	64,805	614	697,175	69,933
French Oceania	4	7,625	46	45,184	7,560
British Possessions	..	..	9	6,014	1,060
German Oceania	..	..	..	..	396
Africa	15	16,606	1,861	1,591,294	170,777
British S. Africa.	12	11,539	1,618	1,437,883	157,264
British S. Africa	12	11,539	1,618	1,437,883	157,246
British W. Africa.	1	1,260	32	18,319	5,743
French Africa	..	..	19	17,273	200
German Africa	..	..	19	14,136	999
Morocco	..	..	63	29,297	166
Portuguese	1	2,604	24	21,563	1,585
Egypt	..	..	22	11,437	130
Canary Islands	1	1,203	15	6,956	1,505
Grand total	784	$1,181,611	28,306	$25,392,963	$6,624,232
Shipped to Hawaii.	*..	*..	701	841,458	85,813
Shipped to P. Rico.	*..	*..	291	320,680	70,025
Shipped to Alaska	*..	*..	54	60,930	7,505

*Automobiles of all kinds included under "passenger."

†Exclusive of tires and engines.

Note—Under all other Europe are included: Greece, 1 commercial, $1,800; 25 passenger, $28,256; Turkey, 1 commercial, $2,000; 35 passenger, $21,052; also the following passenger automobiles: Azores and Madeira, 20, $10,771; Bulgaria, 43, $21,679; Gibraltar, 64, $33,030; Iceland, 5, $2,488; Malta, etc., 1, $422; Roumania, 28, $17,018; Servia, 4, $2,843; and Ireland, 2, $1,598. Under other North America, Newfoundland, 1 commercial, $1,221; 5 other, $2,761; Dutch West Indies, 1 commercial, $595; 13 other, $9,605; Santo Domingo, 1 commercial, $1,800; 11 others, $15,195; and a total of 9 passenger cars valued at $8,368 to British Honduras, Haiti and the Danish West Indies.

Market Reports for the Week

Market prices this week were generally lower, especially in the metals markets. Extreme dullness continues for refined copper and the tone of the market is easier, yet with scarcely enough business to indicate the exact position of prices. Electrolytic, though coming down $0.00 1-5, remained constant at $0.11 3-20 per pound, from Thursday on. Antimony is active and strong at $0.10 1-2. Tin had a fluctuating week of it, with a drop of $0.25 per 100 pounds. Only moderate buying is reported, and that by domestic consumers. Lead was quiet but steadier. The oils and lubricants markets were more or less steady, with a few drops in prices. Linseed oil came down to $0.47 at a drop of $0.02 while cyanide potash dropped to $0.25 per pound at a loss of $0.03. Cottonseed oil closed at $5.10 a barrel, or $0.18 below the opening price. Fine Up-River Para rose to $0.66 at a gain of $0.02. A fair demand is reported for crude rubber and the market was firmer in tone, especially for Brazilian, supplies of which are reported to have diminished recently.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.10½	.10½	.10½	.10½	.10½	.10½	......
Beams & Channels, 100 lbs	1.26	1.26	1.26	1.26	1.26	1.26	......
Bessemer Steel, ton	19.50	19.50	19.50	19.50	19.50	19.50	......
Copper, Elec., lb	.11 7/20	.11 3/10	.11 3/20	.11 3/20	.11 3/20	.11 3/20	—.00⅕
Copper, Lake, lb	.11½	.11½	.11⅝	.11⅝	.11⅝	.11⅝	+.00⅛
Cottonseed Oil, bbl.	5.28	5.15	5.15	5.15	5.15	5.10	—.18
Cyanide Potash, lb.	.28	.28	.28	.28	.28	.25	—.30
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.92	.92	.92	.92	.92	.92	......
Lead, 100 lbs	3.50	3.50	3.50	3.50	3.50	3.50	......
Linseed Oil	.49	.49	.49	.49	.49	.47	—.02
Open-Hearth Steel, ton	19.50	19.50	19.50	19.50	19.50	19.50	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para	.64	.64	.64	.64	.64	.66	+.02
Silk, raw, Ital	..	4.40	..	..	4.30	..	—.10
Silk, raw, Japan	..	3.38	..	..	3.15	..	—.23
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb	29.25	28.50	28.50	28.75	28.75	29.00	—.25
Tire Scrap	.05	.05	.05	.05	.05	.05	......

Clayton Trust Bill Becomes a Law

WASHINGTON, D. C., Oct. 16—President Wilson signed the Clayton Trust Bill Thursday, Oct. 15. Two sections affect merchandising interests. One prohibits discrimination in price between purchasers when such discrimination tends to lessen competition or create monopoly. This section, however, permits grade, quality and quantity discriminations and permits price differences due to difference in selling or transportation costs. In the same community discrimination is permitted if made in good faith to meet competition. The seller is also permitted to select his own customers or dealers, when not in restraint of trade.

Another section prohibits the selling, leasing or fixing the price on any manufactured article on condition that the buyer or lessee shall not use or deal in a rival product. Interlocking commercial directorates are forbidden and no director, after the act has been in effect two years, shall be a director in two or more corporations any one of which has stock, surplus and undivided profits of more than $1,000,000.

Directors in offending corporations may be fined $5,000 or imprisoned.

Claims Infringement on Tire Cover Patent

NEW YORK CITY, Oct. 19—The Allen Auto Specialty Co., New York City, filed suit this week in New York against E. G. Baker, charging infringement of the Benjamin Nathan tire cover patent No. 799,662. Baker, who is located in the United States Rubber building, is a representative of the Gilbert Mfg. Co., New Haven, Conn., a tire cover maker.

Packard Production Passes 25,000 Mark

3,612 Vehicles Built in Company's Fiscal Year—Complete Balance Sheet

DETROIT, MICH., Oct. 15—With the ending of the fiscal year of the Packard Motor Car Co., August 31, 1914, another event took place in the concern's history. It was the passing of the 25,000 mark as far as the production of Packard motor cars and vehicles is concerned, for on that day exactly 25,028 Packards of all kinds had been built, during the 11 years the veteran company has been in the business.

Less cars were made during the business year just ended, all told, 3,612, which is 382 below the Packard record production of the previous 12 months. The Packard production, year by year since it started manufacturing was as follows:

1903-4—192	1907-8—1,470.	1911-12—3,617.
1904-5—481.	1908-9—2,669.	1912-13—3,994.
1905-6—768.	1909-10—3,990.	1913-14—3,612.
1906-7—1,188.	1910-11—3,047.	

Referring to an increase in the common stock a year ago the report says:

"At the annual meeting of the company a year ago, an increase in the common capital stock from $5,000,000.00 to $8,000,000.00 and of the preferred capital stock from $5,000,000.00 to $8,000,000.00 was authorized by the stockholders. This increase in authorized capital stock was made by reason of contemplated steps, some of which, on account of the generally depressed condition of American industry, have been postponed or abandoned, at least for the present, and we have been able to provide funds for our necessities, such as additional machinery, shop charges, experimental model development, etc., in the ordinary course of the business of the company, in preference to the payment of dividends on the common stock.

"So therefore no additional issue of the increased preferred stock thus authorized at the last annual meeting has been made. None of the increased common stock authorized has been sold except to a small extent, actually only $65,300.00, which the stockholders to whom the offering was necessarily made according to law had a perfect right to and did avail themselves of their privilege to subscribe for at par. All the other stockholders of the company, at the request of the managing officers, refrained from subscribing to this common stock, leaving it a treasury asset and available for the future wants of the company in the discretion of the directors.

"The directors, however, did feel that the common shareholders had a right to have represented in common stock in their possession a reasonable part of the surplus accumulated in past years, which on August 31, 1913, amounted to $3,006,256.22, and therefore in October, 1913, they distributed to the common shareholders $2,000,000 of the common capital stock from the $3,000,000 of common capital stock provided at the annual meeting last year, and thus decreased the accumulated surplus to that extent."

The annual statement, given in brief in THE AUTOMOBILE last week, shows the total receipts for the fiscal year ending August 31, 1914, to be $14,295,238.25, as against total disbursements of $11,832,773.80, leaving cash on hand on that date $2,462,464.25. The complete balance sheet follows:

ASSETS

PLANT: AT COST LESS DEPRECIATION—		
Real Estate—at cost	$285,864.21	
Buildings	2,140,259.05	
Machinery	1,094,754.36	
Equipment—Boilers, Engines, Generators, Motors, Elevators, Shafting, Etc.	979,774.39	
Fixtures, including Office Furniture	307,475.94	
Tools	672,011.95	
Construction work in progress	16,881.81	
Development, drawings, patterns, models, etc.	342,438.58	
Rights, Privileges, Franchises and Inventions	1,001.00	
Total Plant—At Cost less Depreciation		$5,840,461.29
Investment in Branch Selling Companies		1,515,288.87
INVESTMENTS—		
Bonds and Other Short Time Securities	$238,462.50	
Stock—Kardo Company	10.000.00	
Total Investments		248,462.50
Stock Option Contracts with Employes		201,950.00
INVENTORIES—		
Raw Material, Work in Process and Finished Vehicles		6,394,864.56
CURRENT ASSETS—		
Cash	$2,462,464.45	
Vehicles in Transit to Dealers, Covered by Draft	278,309.26	
Vehicles in Transit to Branches and Accounts of Branches, not due	263,146.11	
Accounts Receivable	138,196.16	
Bills Receivable, Dealers	55,893.61	
Bills Receivable, Branches	467,500.00	
Total Current Assets		$3,665,509.59
Expenses Paid in Advance		97,083.81
Total		$17,963,620.62

LIABILITIES

CAPITAL STOCK—AUTHORIZED AND ISSUED—		
Common—		
At beginning of year, 50,000 shares of $100.00 each	$5,000,000.00	
Authorized October 16th, 1913, to be Distributed to Common Stockholders 20,000 shares at $100.00 each	2,000,000.00	
Issued to and Paid for at par by Stockholders, 653 shares of $100.00 each	65,300.00	
A total outstanding of 70,653 shares of $100.00 each		$7,065,300.00
Leaving in the Treasnry, 9,347 shares of $100.00 each	$934,700.00	
A total Authorized Issue of 80,000 shares of $100.00 each	8,000,000.00	
Preferred—		
7% Cumulative at beginning of year, 50,000 shares of $100.00 each	$5,000,000.00	5,000,000.00
Authorized October 16th, 1913, and now in hands of Treasurer, 30,000 shares of $100.00 each	$3,000,000.00	
A Total Authorized Issue of 80,000 shares of $100.00 each	8,000,000.00	
Five per cent Gold Debenture Notes—Due December 1st, 1916		3,000.000.00
Accounts Payable—		
Invoices, Accrued Pay Roll, Vouchers not due, Deposits on Vehicles, Orders, etc.		886,780.98
Reserves for General Purposes		213,719.22
Surplus—		
As at August 31st, 1914, after deducting Depreciation of Plant Assets and Paying all Expenses of the Business and Interest on Debenture Notes, or Setting Aside Proper Reserves to Cover Same, and after Paying the Regular Dividends on Preferred Stock and a Special Distribution of Common Stock of the Company		1,797,820.42
		$17,963,620.62

Voiturette Creditors Approve $100,000 Offer

DETROIT, MICH., Oct. 20—At a meeting of the creditors of the bankrupt American Voiturette Co., they approved of the offer of $100,000 cash which has been made by the Samuel L. Winternitz Co., Chicago, for all the property excepting real estate, accounts, notes and cash. The receiver, the Detroit Trust Co., has petitioned Judge Tuttle, of the United States District Court, to allow the sale to take place.

According to reports, it is the intention of the Winternitz company to continue the manufacture of the Car-Nation and Keeton cars.

Chalfant Is Secretary of Electric Makers

NEW YORK CITY, Oct. 21—E. P. Chalfant has been appointed secretary of the Electric Automobile Manufacturers Assn., an organization of makers of electric passenger vehicles. Mr. Chalfant will open a general office in Chicago and devote his entire efforts to the interest of this organization which has been in existence for several years. At present the membership includes such manufacturers as Anderson, Baker, Ohio, Rauch & Lang, Waverley and Woods. It is expected that the membership will soon be more than doubled.

Mr. Chalfant is well known to the automobile industry in that he was general manager of the Assn. of Licensed Automobile Manufacturers 1908-1909. He was general sales manager for the Packard company during the next 2 years and from that company went to the Thomas Motor Car Co.

E. V. A. A. Elects Officers and Directors

PHILADELPHIA, PA., Oct. 21—The annual election of officers for the Electric Vehicle Assn. of America was held in this city today at the completion of the Fifth Annual Convention of the Association. The officers elected were: President, J. F. Gilchrist, Chicago; vice-president, Walter H. Johnson, Philadelphia; treasurer, H. M. Edwards, New York. Four new directors were elected as follows: F. W. Smith, New York; C. Blizard, Philadelphia; E. P. Chalfant, Chicago; and J. H. McGraw, New York. Of these officers, practically all are representatives of central station interests except Charles Blizard, of the Electric Storage Battery Co., and Mr. McGraw, the New York publisher.

175 Cars on View at Pittsburgh Show

First Fall Display Opens —75 Accessory Exhibitors —Good Business Done

PITTSBURGH, PA., Oct. 20—The ninth annual show of the Automobile Dealers' Assn. of Pittsburgh, Inc., is on at the Motor Square Garden, East End, this week. This is the first fall exhibition of automobiles in this city. More cars are being shown than ever before in this city and fully 175 individual cars are on display. There are also seventy-five displays of automobile accessories. Limousines and other inclosed types predomniate.

The exhibits in general emphasize the predominance of electric equipment for starting and lighting, the popularity of the six cylinder car, the appearance of the first American eight-cylinder car, the increasing number of makes using wire wheels, the big gains in safety appliances, the using of demountable rims on all cars and the prevalence of the left hand drive. About four-fifths of the cars are gasoline propelled. The show occupies about 30,000 square feet of space and exhibits are estimated at over $1,000,000.

The show is in charge of Ray P. McAllister and Earl Kiser. Sales of new models were nearly or quite as large as last year and in second-hand cars a better business was done.

Boston to Have Another Electric Show

BOSTON, MASS., Oct. 17—Boston is to have another Salon at which electric cars exclusively will be displayed. Plans have been completed for a 5 days' show at the Copley Plaza Hotel beginning November 2nd and ending the 6th. Already space has been alloted to fourteen different makes, and applications are pending from ten or twelve more. This will make it a larger electric show than the first one which was held at the same place a year ago.

Non-Members Apply for Show Space

NEW YORK CITY, Oct. 19—The National Automobile Chamber of Commerce, Inc., has on hand many applications to exhibit at the New York and Chicago shows, from accessory companies, which are not members of the accessory organization. There are eighty-five applications from such concerns for the New York show and fifty-six for the Chicago show. Additional applications are being received every day, and it is expected that allotments of space to these exhibitors will be made in a week or 10 days.

To Form the Associated Garages of America

CHICAGO, ILL., Oct. 19—A call has been issued by the Garage Owners' Assn. of Illinois for a convention to be held in this city during the automobile show in January, on the 27th and 28th, for the purpose of forming an organization on broad national lines. The name suggested for the new body is the Associated Garages of America.

The national convention will tread on the heels of the Illinois State Convention. The latter is called for January 26.

Seven New Members for M. & A. M.

NEW YORK CITY, Oct. 19—At a recent meeting of the Board of Directors of the Motor and Accessory Manufacturers, the following named concerns were elected to membership:

The Bearings Co. of America, manufacturer of ball bearings, universal joints, etc., Lancaster, Pa.; the Bock Bearing Co., manufacturer of Bock taper roller bearings, Phillips avenue and Michigan Central Railroad, Toledo, O.; Dreadnaught Tire & Rubber Co., manufacturer of automobile pneumatic tires, Munsey Building, Baltimore, Md.; Golde-Patent Mfg. Co., manufacturer of automobile tops, windshields, and other supplies for automobiles and carriage trade, 509-515 West Fifty-sixth street, New York City; L. P. Halladay Co., manufacturer of shock absorbers, bumpers, ignition devices and small specialty, Streator, Ill.; Robert H. Hassler, manufacturer of shock absorbers, West Tenth and Canal streets, Indianapolis, Ind., and Sloan & Chace Mfg. Co., manufacturer of a device combining air cranking and compressing to be sold by The Motor-Compressor Co., corner Sixth avenue and Thirteenth street, Newark, N. J.

Wilson Co. Announces New Truck

DETROIT, MICH., Oct. 19—The J. C. Wilson Co., long identified with the vehicle business of the city, and since the inception of the automobile, being principally associated with the automobile painting and trimming field, has made public the details of its 1 1-2-ton motor truck which has been in the process of experimentation and development for several months. The price is set at $1,800.

Construction of the first lot of trucks is now under way at the plant at Cass and Adams streets which is to be given over to this branch of the concern's business, the painting and trimming business being carried on at the Fifteenth street and Warren avenue plant, as heretofore.

The motor is a four-cylinder Continental, 4 1-8 by 5 1-4, of L-head type, and with cylinders cast in block. It is suspended in the chassis at three points. It drives back through a 1 3-4-inch tubular shaft to the gearset bolted to the jackshaft. Substantial gears having a face width of 1 inch are used in the gearset, and afford three selective speeds.

The design is conventional throughout with the exception that there are no brakes placed on the jackshaft, both service and emergency sets being located on the rear wheels. By eliminating jackshaft brakes, any strain on the jackshaft and chains, due to stopping, is cut out.

Metropolitan S. A. E. to Meet Oct. 29

NEW YORK CITY, Oct. 21—The Metropolitan Section of the Society of Automobile Engineers will meet on October 29 at the Automobile Club of America, where Professor W. C. Marshall will present a paper on Dr. A. Riedler's work and his book on "The Scientific Determination of the Merits of Automobiles." Prominent engineers will give their opinions.

Find Lozier Assets $4,912,717.97

DETROIT, MICH., Oct. 19—The inventory taken by the Detroit Trust Co., receiver for the Lozier Motor Co., shows assets valued at $4,912,717.97 which are appraised at $2,069,-718.50 on the basis of a "going concern," while under "liquidating" circumstances the value would be $1,366,584.46. In this last named value the real estate, buildings, power house machinery and equipment of the plant in Detroit and the one in Plattsburg, N. Y., is not taken into consideration.

The total value of the liabilities is placed at $6,709,141.88 more than half of which, $3,494,700 is capital stock, $2,602,-668.11 unsecured claims, $241,054.17 secured liabilities and $370,736.63 contingent liabilities.

With the completion of the inventory of the Lozier Motor Co., by the receiver, the Detroit Trust Co., the results will be submitted to Judge Tuttle, of the United States District Court, who will decide upon the future course to be taken.

Prominent men in the automobile business were among the appraisers selected by the receiver to help it in making the inventory. Among these men were Henry M. Leland, president and general manager of the Cadillac Motor Car Co.; C. A. Pfeffer, treasurer of the Chalmers Motor Co.; G. H. Kleinert, factory manager of the Chevrolet Motor Co.; Richard E. Baus, assistant production manager of the Studebaker Corpn.

Receiver for Premier Motor Mfg. Co.

INDIANAPOLIS, IND., Oct. 19—A number of creditors of the Premier Motor Mfg. Co., Indianapolis, Ind., filed a petition in the United States court on Saturday, October 7, asking that a receiver be appointed and that the company be adjudged bankrupt. In the absence of Judge Albert B. Anderson, the matter was referred to Albert Rabb, referee in bankruptcy, who set November 2 as the time when the Premier company should appear and show cause why the action asked for, should not be taken. On Saturday Mr. Rabb appointed Frank E. Smith, formerly of the American Motors Co., receiver.

The petition is signed by three companies with small claims. They allege the company is insolvent and that while insolvent it preferred certain creditors.

In the Marion County Circuit Court Friday, October 15, Judge Charles Remster appointed the Fletcher Savings and Trust Co. and F. Barnickol, treasurer of the company, receivers for the Premier company on a suit brought by one company which claims there is due to it $1,691.75 for merchandise and that the Premier company is in danger of insolvency and that creditors are threatening to bring action.

The court authorized the receiver to borrow $10,000 and to continue the business for 10 days. At the expiration of that time, the court will determine what further action shall be taken toward continuing the business.

In the complaint, it is alleged that the Premier company has a total indebtedness of about $400,000, that there is outstanding $320,000 in preferred stock and $100,000 of common stock. It is further alleged that the book assets, which are in excess of actual value, are insufficient to discharge liabilities to the stockholders; that there is much indebtedness past due and no present means of discharging or caring for any part of this indebtedness.

The plaintiff asks that the receiver be authorized to complete cars under process of construction and to sell these and all completed cars on hand as soon as a reasonable price can be obtained for them.

In November, 1913, the capital stock of the Premier company was increased from $1,250,000 to $1,750,000, at which time a number of creditors were tendered new preferred stock in lieu of cash in settlement of their claims. The following week, a number of new men entered the directorate of the company, making the personnel of the board as follows: F. Barnickol, C. O. Baxter, A. L. Reeves, Clarence Stanley, H. O. Smith, Timanus J. Wilson and G. A. Weidely.

Firestone Convention Closes—Big Success

AKRON, O., Oct. 19—Over 250 representatives of the Firestone Tire & Rubber Co., this city, attended the sales conventions of that company on October 14 and 15. The attendance was so large that the conferences could not be held in the old Convention Hall, it being necessary to hold them in one of the partially finished additions to the Firestone factory.

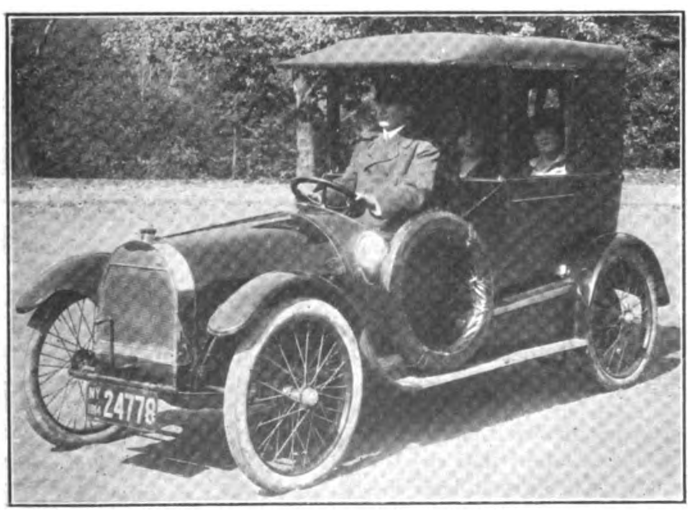
The company, at their recent annual meeting, announced a 78 per cent. increase in output over the previous fiscal year. All departments have been crowded to more than capacity in order to take care of this additional business and the new additions, now nearing completion, will add a total of 96,800 square feet to its floorspace.

The convention officially closed with the banquet at the Portage Hotel, but many of those in attendance remained until Saturday.

Twombly Taxicab Sells for $600

NEW YORK CITY, Oct. 21—Taxicab transportation at the rate of 20 cents per mile is promised by the Twombly Car Corp., Nutley, N. J., which has announced a taxicab to sell for $600. It is stated that within a few months a fleet of these vehicles will be operating in New York, the charge for the first mile being 25 cents and for each additional quarter, 5 cents. It is to carry two people. According to the terms of the contract, the purchaser of one of these cabs cannot charge more than 25 cents per mile.

The body is a landaulette type with the roof extending well over the driver's seat, the driver being located directly in the center of the vehicle. The wheelbase is 100 inches and the tread 44. The car weighs only 1,400 pounds. The motor is an L-head design with four cylinders 2.75 by 4 inches, and rated at 12 horsepower. It is water-cooled and lubricated by a combination splash and force-feed system. A three-speed sliding gearset is located on the rear axle; and drive from the motor is accomplished by means of a chain located on the left.



Twombly taxicab which buyers must operate at 25 cents per mile

900-Mile Race Planned—El Paso to San Diego

If Sanctioned, Contest Will Be Held in January or February

NEW YORK CITY, Oct. 16—Application for a sanction to hold a 900-mile Panama-California Exposition road race between El Paso, Tex., and San Diego, Cal., has been made to the Contest Board of the American Automobile Assn.

The San Diego Automobile Racing Assn., which guarantees to furnish a $10,000 purse for the contest, filed the application. It is planned to have the race start in El Paso some time during January or February.

This will be the longest automobile race ever run, barring the round-the-world race won by the Thomas car, and exceeds in distance the Paris-to-Berlin and to Madrid contests.

With the San Diego race added to the Grand Prize, Vanderbilt, Panama-Pacific, Los Angeles-Phoenix, El Paso-Phoenix and the Corona cup contests, the Pacific Coast will this year be the Mecca of automobile racing.

Classification of R-C-H Creditors Confirmed

DETROIT, MICH., Oct. 17—In the bankruptcy court an order was signed yesterday confirming the proposed classification of creditors of the defunct R-C-H Corp., as submitted by the trustee, the Security Trust Co.

According to this decision creditors with claims aggregating $1,365,610.01, who had signed an extension agreement October 25, 1912, will receive nothing whatever on their claims as the debts arising after that date will not be paid.

Referee in Bankruptcy Lee E. Joslyn has called a meeting of creditors for November 4, at which time a dividend of from 10 to 20 per cent. will be declared on the claims which accrued after October 25, 1912, and which amount to $275,773.72. The Trust company is preparing to disburse from $60,000 to $70,000 for these dividends.

Under the schedule submitted by the trustee as confirmed by the court, the deposits of agents aggregating $76,560.45 will be treated only as general claims and will receive about 10 per cent. in dividends.

Certain creditors who have filed objections to the classification will have their claims determined at a later date.

It is estimated that those creditors who sold goods to the defunct corporation after the extension agreement will receive about 65 per cent. of their claims.

The thousand creditors affected by the bankruptcy court order may appeal from this order any time up to October 31, 1914.

Disco Enters Electric Starter Field

DETROIT, MICH., Oct. 18—With a capital stock of $60,000 and an entirely new organization, the Disco Electric Starter Co., has just been organized succeeding the American Electric Starter Co., which itself had absorbed the old Disco company. The new concern's incorporators are Jacob and Henry J. Dornbus, of Grand Rapids, Mich., and Charles J. Carpenter of this city, while the officers are Jay Johnson, president; Charles J. Carpenter, vice-president and T. D. Murton, secretary-treasurer. Mansell Haskett, who has been with both of the former concerns is general manager of the new works. The company will manufacture a new electric starter at its plant on Jefferson avenue and Leib street.

Petition Filed Against Overman Co.

NEW YORK CITY, Oct. 20—A petition in bankruptcy was filed against the Overman Tire Co., Inc., with salesrooms at 1853 Broadway and factory at 250 West Fifty-fourth street by four creditors.

The company is a Delaware corporation incorporated in February, 1913, with a capital stock of $3,000,000. E. R. Perkins is president.

Judge Mayer appointed B. W. B. Brown receiver under a bond of $5,000 and authorized him to carry on business for 10 days. The attorneys for the creditors state that the liabilities are between $60,000 and $70,000 and assets are over $60,000.

A note for a large amount is about to mature and the company could not meet it.

New England — The Realm of the Automobile Tourist

(*Continued from page* 749)

eighty over a year ago. Pennsylvania held up well, Kentucky dropped five and Tennessee gained four. The figures follow:

Border Line Group

	1912	1913	1914
New York	209	220	300
Pennsylvania	78	80	81
West Virginia	0	1	0
Kentucky	4	9	4
Tennessee	6	5	9
Totals	297	315	394

The Far West group now has seven states to four a year ago, Arizona, Colorado and Oklahoma coming in. But there was a decline despite this fact, and it shows a loss of nine, as follows:

Far West Group

	1912	1913	1914
Texas	8	10	9
Kansas	1	9	4
Nebraska	4	3	0
California	7	4	1
Arizona	0	0	1
Colorado	2	0	1
Oklahoma	0	0	1
Totals	22	26	17

The foreign group shows a gain of seven, with Germany and Portugal being added this year to the list, an encouraging showing. Here are the figures:

Foreign Group

	1912	1913	1914
Canada	2	3	7
Puerto Rico	2	4	3
England	0	1	1
Germany	0	0	1
Portugal	0	0	1
Cuba	1	1	3
Honolulu	1	0	0
Brazil	1	0	0
Totals	7	9	16

Here are the recapitulated figures:

Totals for All Groups

	1912	1913	1914
New England	102	105	148
Atlantic Coast	101	143	150
Middle West	142	146	154
Border Line	297	315	394
Far West	22	26	17
Foreign	7	9	16
Totals	671	744	879

Places Represented

	1912	1913	1914
Number of States	30*	32*	34*
Foreign Countries	5	4	6
Totals	35	36	40

*Includes District of Columbia.

Electric Vehicle Convention Opens—European Development

(*Continued from page* 755)

mail work and early in 1914 thirty 2.5-ton Electro-Daimler wagons.

Paris Refuse Disposal

Paris has what is said to be the most elaborate system of household waste disposal in existence. About 2,600 tons are handled per day or 900,000 tons per annum. Before motor vehicles came into use 730 carts, 1,500 horses and 3,000 men were required to handle the work.

This spring a modern system of far-reaching effect was inaugurated. This contemplates the use of electric trucks and five large consuming plants as a substitute for horse wagon methods and the flooding of the Seine flats with the waste material. Two of the incinerators have been built; one at Ivry-Port and one at St. Ouen. Forty-eight electric carts are used at the former plant and forty at the latter.

Future Is Bright

The carts are charged in two garages built by the city of Paris in the immediate vicinity of the incinerators. They are at present owned and operated by a stock company which is paid a certain price per cart kilometer, the city of Paris having the right to purchase the carts outright in 4 or 5 years at an agreed price.

While the war must invariably hamper industry in many lands, I should say that, discounting the war, **the outlook for the electric vehicle in Europe is decidedly brighter than at any time in the last decade.** I have not gone into the development or use of vehicles in Spain, Switzerland or Italy. There are some electrics used even in Russia. Last spring plans were under way to build 1,200 light weight passenger electrics at one plant in England, an encouraging sign. The war will undoubtedly retard immediate construction of all types of electrics, but the conflict may help the cause of the storage battery vehicle in all the countries where horses and gasoline vehicles have been commandeered.

French Automobile Regulations Are Growing Stricter

(*Continued from page* 751)

ers were decidedly annoyed at this action on the part of the heads of the French and English tire industry and expressed their dissatisfaction so forcibly that at the end of a couple of weeks the English company resumed business on the original basis. The curious feature of the situation is that both these companies took advantage of the patriotic wave, announcing 'Business as Usual,' 'Follow the Flag,' 'Stand by the Old Country,' 'Support British and French industries,' etc.

"Practically our entire stock of tires, both at the factory and at the Paris stores, was requisitioned by the Government. These tires were left in our hands, but could not be sold to the public, the army having the right to call for them at a moment's notice and pay for them according to a pre-established tariff, which is practically the price paid by dealers. There was no interruption in the production of band tires for trucks, but practically all we produced was taken up by the army. The strict regulations under which we have existed for a couple of months have been somewhat relaxed of late. We have been able to begin, on a small scale, the production of pneumatic tires and also to offer some of our stock to the public. It is expected that within a few days arrangements will be completed whereby we can export to England, thereby supplying the European countries not involved in the war. We have continued to do a certain amount of business with those parts of France not occupied by the armies, but the difficulty here has been the lack of shipping facilities. We have never experienced any difficulties with regard to the supplies of raw rubber and fabric."

Although Mr. Lumsden is optimistic regarding the future, he has to admit that the Goodrich company, in common with others, will have to bear losses.

Factory Miscellany

WILLARD Battery Co.'s New Plant—The Willard Storage Battery Co., Cleveland, O., manufacturer of the LBA battery, states that ground for its new plant was broken on September 24, and that the work of construction will be pushed forward as rapidly as conditions will permit. Ten acres of ground was purchased on East 131st street, occupying numbers from 256 to 294. The plant will contain 6 acres of floor space, leaving ample land for further expansion. Ten buildings will comprise the plant under existing plans. All buildings will be of brick, of the latest approved and most up-to-date construction and equipped with sprinkler system throughout. The various buildings will be entirely separate, sufficiently isolated from each other to insure adequate protection from fire and to furnish the maximum of light and air. The offices of the company will be housed in a handsome administration building two stories in height. The accounting, cost and purchasing departments, with necessary private offices, will be located on the first floor. The second floor will be devoted to a series of private offices for executives and heads of departments, with ample provision for order and filing departments, drafting room, etc. In a separate building dining rooms will be provided and equipped for the use of office and factory employees, and noonday lunches will be furnished at nominal cost. Throughout the plant especial care will be given to sanitation and adequate up-to-date equipment of bath rooms, dressing rooms, lockers, etc., will be installed. A feature of the plant will be a complete hospital for the care of employees, which will be under the supervision of a physician regularly employed by the company. It is the intention of the company to have the administration and several other buildings under roof before snow flies, so that they may be ready for occupancy as soon as practical in the early spring. A switch track from the Belt Line Railway, which communicates with all railroads entering Cleveland, will extend the entire length of the plot in close proximity to the end of each building. On this switch there will be ample space for twenty-five freight cars, and suitable shipping and receiving platforms will be built.

Chester Rubber to Enlarge—The Chester Rubber Tire & Tube Co., Chester, W. Va., has purchased additional ground and will enlarge its plant.

Benford Co.'s Plant—Plans are being prepared for a factory, 40 by 110 feet, for the Benford Mfg. Co., Mount Vernon, N. Y., manufacturer of spark plugs.

Goodyear Subsidiary Building—The Killingly Mfg. Co., Williamsville, Conn., a subsidiary of the Goodyear Tire & Rubber Co., Akron, O., will build a factory which will be used for making cotton duck for automobile tires.

$100 for a Name—The W. H. McIntyre Co., Auburn, Ind., manufacturer of Imp cars, is offering $100 to the person who suggests the best name for its two new models, of two-passenger and four-passenger design, electrically started and lighted and listing between $400 and $600.

Standard Truck's New Plant—The Standard Motor Truck Co., of Warren, O., has purchased a portion of the plant of the Day-Ward Co. on North Park street, Warren, O., which is being remodeled for occupancy after November 1.

To Manufacture Enamel—The Won Kote Enamel Co. has been organized by Paul Fuchs, F. J. Wirtz and F. Ed. Spooner, with headquarters at 903 Free Press Building, Detroit, Mich., and a manufacturing plant in Ravenswood, Ill.

Tire Co. in Harrison—The Auto Tire & Thread Co. has leased a factory building at Cross and Fifth streets, Harrison, N. J., formerly occupied by the Greenfield Engine Co., and will establish a plant for the manufacture of its specialties.

Ware Plant in St. Paul—A plant for the manufacture of Ware motor trucks will be erected in St. Paul, Minn., by J. L. Ware, president of the company. The structure will be 200 by 90, reinforced steel and concrete construction, to cost $40,000.

Saxon Making Foreign Shipments—During the first 10 days of this month Saxon Motor Co., Detroit, Mich., has shipped cars to South America, British Guiana, the Philippines and Canada, and has received several inquiries from dealers in other countries.

Monroe Co. Acquires Wheel Plant—The Monroe Motor Co., Flint, Mich., has been incorporated with $250,000 capital stock to manufacture automobiles. R. F. Monroe, U. C. Durant and A. B. C. Hardy are among the incorporators. It has acquired the plant of the Imperial Wheel Co.

Henderson Plant and Parts Sold—Samuel L. Winternitz & Co., auctioneers of Chicago, on October 14 sold at public auction the plant, finished cars, material, parts and accessories, machinery, equipment and fixtures of the defunct Henderson Motor Car Co., Indianapolis. The sale was conducted in piece-meal.

Ahlberg Co. Opens Factory—The Ahlberg Bearing Co. has opened a factory and office in Los Angeles, Cal. This company specializes in regrinding annular ball bearings. J. W. West, formerly of Chicago, who has made his home in Los Angeles during the past year, will be associated with the company.

Oxford Plant Closed—The plant of the Oxford Motor Cars & Foundries, Ltd., Maisonneuve, Montreal, Que., has closed down for the present on account of the present war and the financial stringency. The company expects to resume business next spring. The Oxford 1915 models will be identical with the present ones.

Sub-Casing Plant Sold—The Fisher Mfg. Co., makers of the Fisher rim-grip sub-casing, has sold its entire Los Angeles plant and manufacturing rights to the Western Auto Sub Casing Co. The new company is headed by a group of capitalists of Seattle, Wash. M. S. Williams is the president of the new concern; A. T. Griffin, vice-president, and H. S. Nettleton, secretary and treasurer.

Page Windshield Co. Will Increase Force—The Page Woven Wire Fence Co., Adrian, Mich., which makes a specialty of windshields for Ford cars is now making from 300 to 400 a day and will soon have a total force of 150 men in its factory. In addition to the Ford windshields others are also manufactured.

Shaw Motor's New Plant—The Shaw Motor Co., Chicago, Ill., has decided to establish its plant in Sauk City, Wis., and has plans for a factory which will cost between $30,000 and $40,000 with machine and tool equipment. The building will be 60 by 108 feet in size, one story high, of fireproof construction, and equipped for the production of multiple cylinder gasoline engines.

May Buy G. M.'s Clyde Plant—Representatives from the East Palestine Tire & Rubber Co., East Palestine, O., recently visited the abandoned plant of the General Motors Company at Clyde, O., with a view of purchasing the plant and equipping it as a tire factory to be operated as a branch of the East Palestine concern. It is said that in case the purchase is made the plant will have a capacity of 500 tires daily.

Takes Over Michigan Spring Business—The General Spring & Wire Co., Detroit, Mich., has taken over the business of the Michigan Spring & Wire Co., 932 Mack avenue. The new company, which has a capital stock of $10,000, will make a specialty of wire springs for automobiles. J. H. Clark is president of the new concern; August Peterson, vice-president; C. L. Clark, secretary, and J. N. Reid, treasurer.

Williams Co.'s Plant in Vista—A. D. Williams, president of the Williams Tire Co., Glassport, Pa., announced recently that his company had acquired 10 acres of land on the Caleb Hamilton farm in Vista, 6 miles above McKeesport, on the Baltimore & Ohio Railroad. Work will begin within a few weeks on a new plant for the manufacture of tires, tubing and other rubber articles. The plant is expected to begin operation in the spring and will employ about 500 men and boys. The capital stock of the company has been increased from $5,000 to $300,000, with $60,000 of the new issue subscribed for, according to Mr. Williams.

Morton Truck's Big Order—The Morton Truck & Tractor Co., Harrisburg, Pa., according to an announcement of one of its officials, has just closed a contract with E. B. Van Atta & Co., of New York City, for 100 trucks of different sizes to be delivered within a year. The order totals about $300,000. Another order has been placed with a Buenos Ayres company for a large number of tractors, to be delivered from ten to twenty-five a month. The company recently purchased the new building of the Model Typewriter Co., on Nineteenth street, and is occupying this property. It is a three-story brick structure. The officers of the company are: S. F. Dunkle, president; J. V. Kuntze, vice-president; John Campbell, treasurer, and Walter Morton, secretary and manager.

The Week in  the Industry

Motor Men in New Roles

FARR Resigns from Knox—H. G. Farr has resigned as chief engineer of the Knox Motors Co., Springfield, Mass., and will open an office in that city as consulting engineer. Mr. Farr was a pioneer of the industry, having, in conjunction with Harry A. Knox, designed one of the first successful gasoline cars in America. He has been with the Knox company since it started.

Atkinson White Sales Manager—Robert Atkinson has been named sales manager of the Seattle, Wash., branch of the White Co., Cleveland, O.

Clapp Sales Manager—C. J. Clapp has been appointed sales manager of the Paige-Toledo Co., Toledo, O., distributer in northwestern Ohio for the Paige cars.

Bump Studebaker Manager—F. R. Bump has succeeded Hanson Robinson as manager of the Studebaker agency in New York City. Mr. Robinson recently resigned.

Denvir Joins Federal Truck—J. P. Denvir has resigned from the Gibney Tire Co., New York City, and has been appointed assistant sales manager of the Federal Motor Truck Co., also of that city.

Hane Goes to Portland—J. P. Hane, who has been connected with the Cadillac agency in Los Angeles, Cal., and in Boston, Mass., has gone to Portland, Me., to act as sales manager for the Cadillac agency.

Rand Manager—C. D. Rand, of the Simplex-Mercer Pacific Coast agency, has been appointed San Francisco branch manager for that company, and takes the position from which Bert Latham has recently resigned.

Howe Goes to Providence—F. E. W. Howe, for some years with Alvan T. Fuller in Boston selling Packard cars, has been promoted to be manager of the Providence agency for that make, which is controlled by Mr. Fuller.

Heintz Republic Tire Manager—C. W. Heintz, for the past 5 years connected with the sales department here of the Republic Rubber Co., was appointed manager of the Buffalo, N. Y., branch, B. F. Morris having resigned.

White District Sales Agent—An office with temporary salesrooms has been opened in the Murray Building, Grand Rapids, Mich., by the Wayne Auto Supply Co., Detroit. N. A. White has been appointed district sales agent.

Fisher Acting Secretary—Paul Fisher, of St. Louis, Mo., is at present acting as secretary of the St. Louis Automobile Manufacturers and Dealers' Assn., a position he will formally take next spring when Capt. R. E. Lee's term expires.

Wollaver Makes a Change—H. B. Wollaver, formerly connected with the sales department of the Chalmers and Stearns-Knight agencies, has been made manager of the service department of the Henley-Kimball Co., agent for the Hudson in Boston, Mass.

Boland Manager Jackson Branch—A factory branch has been opened in Council Bluffs, Ia., by the Jackson Automobile Co., Jackson, Mich. T. J. Boland, formerly with the Pioneer Implement Co. in this city, is manager of the branch, which will look after the business in certain sections cf Iowa, Nebraska and South Dakota.

Brownlee Purchases New Interests—The Weaver-Brownlee Co., Cleveland, O., succeeds the Weaver-Twelvetree Co., H. J. Twelvetree's interests having been purchased by J. A. Brownlee, who has been connected with the Philadelphia Pierce-Arrow agency for a number of years. He will have charge of all Pierce-Arrow pleasure car business, and becomes vice-president of this company.

Garage and Dealers' Field

Empire in Boston—The Empire Motor Sales Co. has established its own branch in Boston, Mass., securing salesrooms at 1002 Boylston street, near Massachusetts avenue.

Automobile Street Cars in Pendleton—The first real automobile street cars to be placed in service in Oregon have been installed at Pendleton, Ore., by the Pendleton Auto Street Car Co. G. K. Parker is at the head of this new transportation company. The cars have a seating capacity of forty people each.

Champion House Warming—About seventy automobile engineers and purchasing agents from Detroit and other automobile manufacturing companies were the guests at a house warming of the Champion Spark Plug Co., Toledo, O., October 10, to celebrate the recent amalgamation of the company with the Jeffery-Dewitt Co., Detroit.

New Departure Distributers—The New Departure Mfg. Co., Bristol, Conn., is establishing new distribution centers. The following additional distribution houses were established this past week: The Ahlberg Bearing Co., 325 West Pico street, Los Angeles, Cal.; The Chapin Co., Calgary, Alta., Canada; The Western Rubber & Supply Co., San Francisco, Cal.

The Automobile Calendar

Oct. 17-23	Los Angeles, Cal., Show, Shrine Auditorium.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 17-Nov. 1	Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn's Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 23-24	Peoria, Ill., Illinois State Assn. of Garage Owners; Semi-Annual Convention.
Oct. 27	Indianapolis, Ind., Good Roads Day, Lincoln Highway.
Oct. 28	New York City, Commercial Tercentenary Celebration.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov. 2-6	Boston, Mass., Salon, Copley Plaza Hotel.
Nov. 3	Long Island A. C. Century Run.
Nov. 7-8-9	Los Angeles, Cal., Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 8-9	El Paso, Tex., El Paso-Phoenix Road Race, El Paso Auto Club.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 12	Phoenix, Ariz., Track Race, Maricopa Auto Club.
Nov. 17-18-19	Harrisburg, Pa., Second Conference of Pa. Industrial Welfare and Efficiency, State Capitol.
Nov. 26	Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4	New York City, Annual Meeting of the American Society of Mechanical Engineers.
Dec. 12-19	Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Show.
Jan. 11-16	Buffalo, N. Y., Show, Broadway Auditorium, Automobile Club of America.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb.	Portland, Ore., Show, Portland Auto. Trade Assn.
Feb. 15-20	Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27	Syracuse, N. Y., Show, Syracuse Auto. Dealers' Assn.; H. T. Gardner, Mgr.
Mar. 6-13	Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn. Boston Commercial Motor Veh. Assn.
Mar. 7	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 9-15	Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

Accessories for the Automobilist

ATTACHO Lamp — A trouble lamp which can be operated from any lighting circuit and fitted with a clamp which allows the lamp to be attached to any place convenient to the work, is manufactured by R. S. Mueller, 423 High avenue, S. E., Cleveland, O. It is shown in Fig. 1 attached to the top of a table. The jaw of the clamp has a 2⅛-inch opening. In addition there is a hook on the end of the clamp so that the lamp may be hung to anything suitable. The lamp may be swung through an arc of 180 degrees, as shown, and the shade may be rotated as desired so that the light may be directed just where it is wanted.

The use of an 8-candle power lamp is recommended. Twenty feet of cord are furnished. The price complete is $3 and without cord and plug $2. The postage is prepaid in either case.

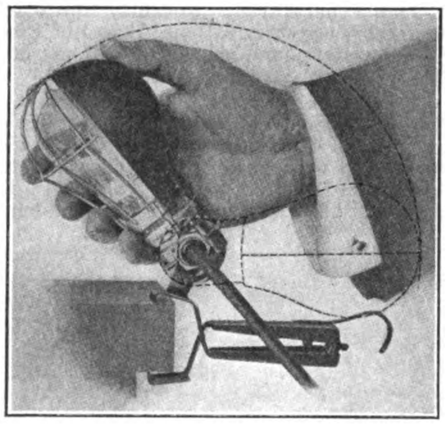


Fig. 1—Attacho trouble lamp

Stevens Pressure Gauge—A new type of pressure gauge for tires is announced by the Stevens Supply and Mfg. Co., Chicago, this new gauge being adjustable so as to make corrections for changes in spring tension. This gives the gauge the feature of reading accurately throughout its life, provided the tension of the spring is altered when required. Another feature is that the reading is not lost after the gauge is removed from the tire, allowing the pressure gauge to be used in the dark and then carried to a light to be read. The gauge with its end cap removed is shown in Fig. 2. The small part protruding pushes down the tire valve stem. The Stevens sells for $2.25.

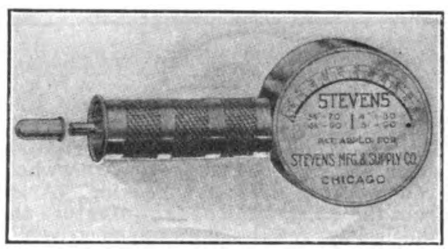


Fig. 2—Stevens tire pressure gauge

Breeze Two-Fuel Adapter — Claiming that the ordinary motor will give better results if a mixture of kerosene and gasoline is used instead of gasoline alone the Breeze Carbureter Co., Newark, N. J., is offering a device for controlling the flow of the two fuels to the vaporizing device. By the use of this system, which is controlled from the dash, either gasoline or kerosene or a mixture of the two in various proportions may be fed to the carbureter, or no fuel at all may be fed, allowing the motor to suck air. The last named feature is valuable when descending hills, in which event the motor may be made to act as a brake and cooled by the frequent changes of air. The Breeze device consists of a two-way valve, as shown in Fig. 3, and a regulating device on the dash controlling the valve openings by a wire. With this system it is possible to start the engine on gasoline and then, after sufficient heat has been generated and the motor can accommodate the heavier fuel, the kerosene is switched on, or part kerosene and part gasoline used. The entire outfit sells for $5.

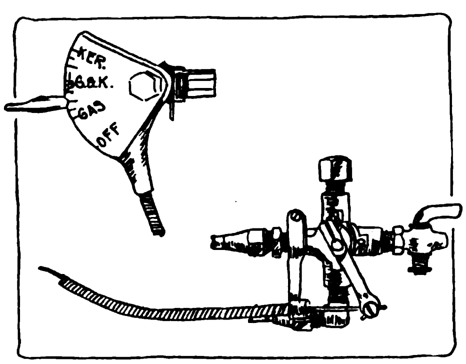


Fig. 3—Breeze two-fuel adapter

Weaver Garage Press—Garagemen will be interested in the Weaver press, which has a capacity of 20 tons, and performs such work as straightening shafts, pressing wheels on shafts, compressing springs, straightening frames, etc. This press is manufactured by the Weaver Manufacturing Co., Springfield, Ill., and is made of jointless channel steel. For light work, the 15-inch wheel, shown in Fig. 4 is sufficient to provide quick action, but for heavy work, a lever arrangement is provided which affords a leverage of about 1,500 to 1 and enables the maximum pressure of 20 tons to be exerted. The press sells for $48 complete with lever attachment.

Hupp-Yeats Worm Axle—The new Hupp-Yeats Electric Car Co., Detroit, Mich., has recently brought out a worm-driven axle for the cars of this make already in the hands of owners.

The application of the motor to rear axle housing has been worked out so that it is identical with the old construction; that is to say, the motor suspension is the same.

The motor shaft is attached to the worm shaft by a short coupling, and the motor head is bolted to the flange on the worm housing by the studs in present use on the motor head.

The new axle comes painted, with motor coupling ready to be applied to end of motor shaft and end of worm shaft, and with holes accurately drilled in worm housing to take the motor studs attached to motor end plate. The axle will be identical with axles in service with the exception that it will have a smaller housing to house the worm gear. The mechanical difficulties to make axles interchangeable have all been worked out so nicely that the new axle will go under the car in place of the old without any special adjustments and can be quickly and easily applied by the most ordinary mechanic or garage man.

The price of the new axle, taking old axle in exchange and delivered free of transportation charge at Detroit, is $200 net cash f.o.b. Detroit. This includes the motor shaft and worm shaft coupling.

Forest City Combination Holder—Another accessory for Ford cars, in the shape of a license pad and starting crank holder, is announced by the Forest City Electric Co., Cleveland, O. The holder is applied to the front of the car under the shackle bolt nuts. It serves to hold the starting crank handle in an upright position and also forms a support for the license plate. It sells for $1.

New Ford Coils—The Ford Motor Co. now is supplying new coil equipment for model T cars built previous to 1914. The new coils have tungsten instead of platinum points, and are claimed to retain their adjustment for a longer period. The Ford company claims more satisfactory service can be obtained with the new

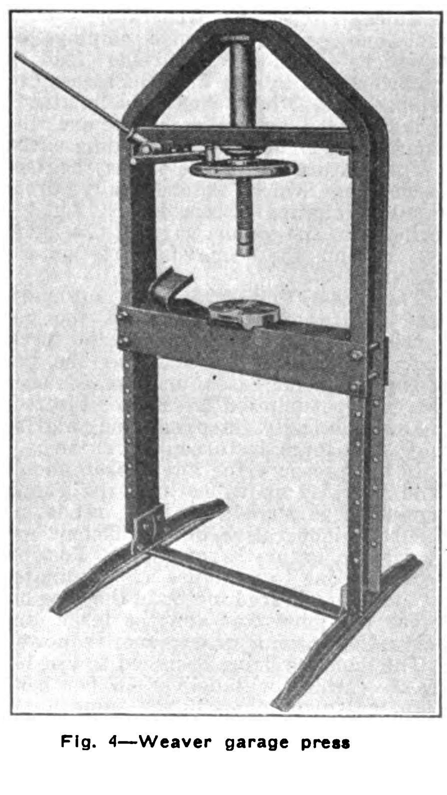


Fig. 4—Weaver garage press

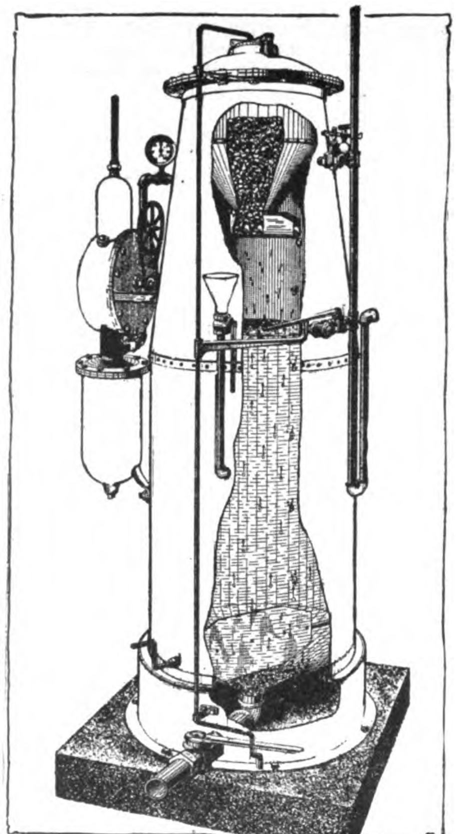


Fig. 5—Vulcan acetylene generator

coils than with the older ones. The price is $10 if the old coils are returned.

Edison Electric Vehicle Lamp—The Edison Lamp Works of the General Electric Co. has added a new Mazda tail lamp to its line of electric vehicle lamps. The new lamp is of 8 watts, 24 to 90 volts of the regular concentrated filament construction. It is of 1¼-inch diameter with a maximum over all length of 2¼ inches. It is fitted with either double or single contact bayonet candelabra base to operate in the standard tail light.

Vulcan Acetylene Generator—An acetylene generator which employs an ingenious method of carbide feed is manufactured by the Vulcan Process Co., Minneapolis, Minn., and Cincinnati, O. It is designed especially for the exacting demands of an autogenous welding outfit.

The feature of the device is the feed mechanism which automatically drops small briquettes of carbide ⅜ by 1¼ inches into the water, varying the quantity to suit the demands made on the gas supply.

The motor that drives this automatic feed utilizes the buoyancy of the gas passing from the generator to the torch, thus the feed is increased as the gas consumption increases, or lessened when the gas consumption lessens, or the feed is automatically stopped and started when the torch is turned off or on.

If the pressure for any reason should tend to raise above normal, the gas is conducted through a by-pass, rendering the feed inoperative until sufficient gas is used to lower the pressure. Possible accidents due to puncture are eliminated by locating the feed motor in the pipe between the generator and the torch, and using the passing gas as motive power.

The machine being designed to use 1¼ by ⅜ carbide will deliver 15 per cent. more acetylene than if the same quantity of screenings of carbide was used and better gas results from the carbide falling deep into the water before complete decomposition ensues, securing cooler generation under higher temperature than is possible with screenings which has a tendency to decompose near the surface, causing failure to give the gas the benefit of rising through a considerable volume of water, whereby it is washed and cooled.

The carbide chamber and feed mechanism are removable, thus opening the machine for complete inspection. The entire generator is protected by patents against careless manipulation by a locking device which prevents removing the cap for refilling or opening any valves, without following a definite safe routine.

This generator was recently approved and passed by the National Board of Fire Underwriters, and therefore will not increase insurance rate, it is stated.

New Cameron Wire Wheel for Fords—The Cameron Wire Wheel Co., Detroit, is making a new detachable Ford wire wheel, by use of which it is possible to make a change of tires on the road in 30 seconds, it is claimed. The wheel is held

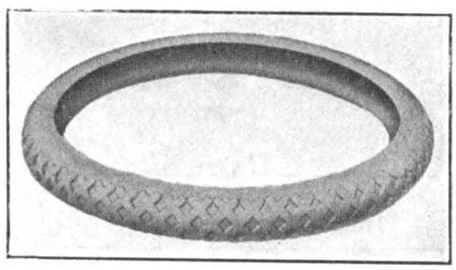


Fig. 6—Mohawk retread band

in place by an outside locking nut that can be removed with an ordinary wrench. Driving is done by large taper studs which are designed to prevent the wheel from wearing loose or squeaking. Aside from the quick tire changing feature the wheels improve the car's appearance. A set of five wheels and four inner hubs, complete with bearings, brake drums and nickeled hub caps, costs $35.

Thermoplax for Radiator Caps—A black composition known as Thermoplax is being marketed by the Cutler-Hammer Co., Milwaukee, as suitable material for radiator caps. It is said the material will withstand a temperature range from 30 to 600 degrees F. The substance is easily molded into shape around a metal insert.

Mohawk Retread Band—A semi-cured, endless band of rubber with a non-skid surface designed to be vulcanized over tires calling for retreading is announced by the Mohawk Rubber Co., Akron, O. This band cannot be applied except by vulcanization and requires the same heaters and tools that are necessary in applying a plain retread. The band is made in the following sizes: 30 by 3½, 32 by 3½, 32 by 4, 34 by 4, 34 by 4½ and 35 by 5, which takes care of practically all the standard diameters in use for in nearly every case one size, if stretched, will do for many. The band is cured in a mold and shaped so that it wraps closely to the tire carcass. The inside of the band has upon it a layer of pure gum which gives the vulcanizing cement a firm hold. The band is shown in Fig. 6.

Alemite Drill Stand—The Stromberg Motor Devices Co., 64 East Twenty-fifth street, Chicago, Ill., is distributing a handy device for holding tools. It consists of a die casting, Fig. 7, containing two circles of holes in which the drills are carried. The device is made in two sizes, both of which sell for $2. One is designed for drills 1 to 60 and the other for drills from 1/16 to ½ inch by sixty-fourths.

It is claimed that this drill stand will save much time and money wherever drills are used to any extent. The time spent in locating a drill from among a dozen small tools on a bench—or in finding the drill desired from an ordinary drill block or stand, or in walking back and forth from machine to bench to change drills—will soon pay for the drill stand.

The handle of the stand makes it easily portable and the drills are always accessible—a twist of the hand turns the stand until the number of the desired drill is brought to view.

Under each drill is the drill number in large, black figures and below these are the sizes of the drills in decimals. The drill stand is not only a container for these tools, but is also a gauge as well. The holes are so accurate that only the proper drill will fit.

S. & B. Tube—The S. & B. Mfg. Co., Worcester, Mass., is marketing the S. & B. tube, an ingenious device for carrying the operator's license and registration certificate. It comprises a compact, hollow cylinder, about the same length and weight as an ordinary key, and it is attached to the key ring. The capacity of the tube is such that it will accommodate the license or certificate, which is rolled up.

The device will appeal to motorists who frequently change their clothes and who might neglect to place their certificates in the new apparel. Being attached to the key ring, it is pointed out that one is less liable to forget it when changing. The S. & B. tube retails for 25 cents.

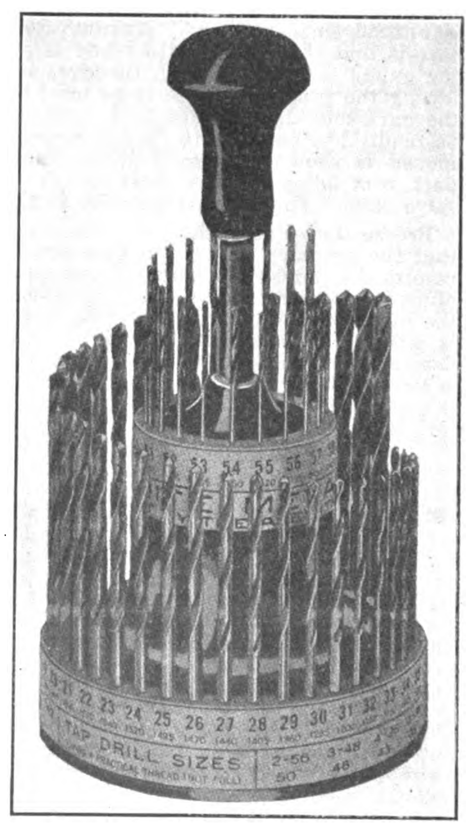


Fig. 7—Alemite drill stand, which is handy for carrying drills about the shop, etc.

The AUTOMOBILE

United States Has 1,735,369 Cars

Registration to October 1 Shows Gain of 203,503 Over Statistics Up to July

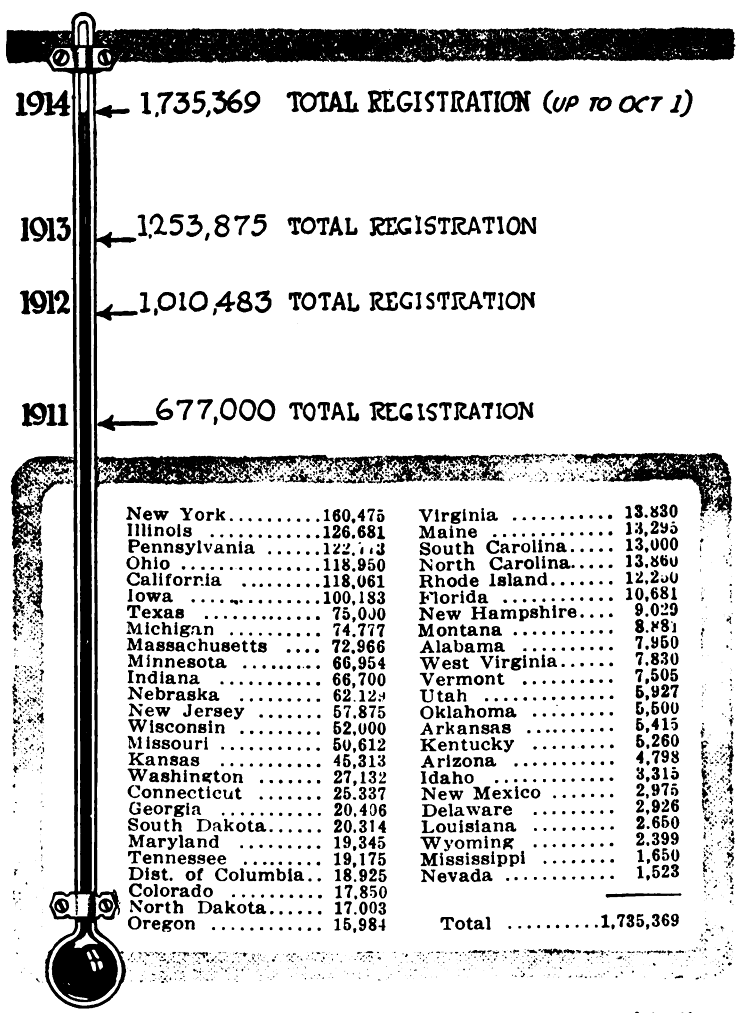
By Donald McLeod Lay

BEARING out the indications of the early part of the year automobile registrations for 1914 bid fair to eclipse all previous records, for the registration officials of the various states report increases in every instance save one, the total registration on October 1 being 1,735,369 after all duplicate registrations have been deducted.

These figures of course include both gasoline and electric vehicles as well as a large number of steam machines. In arriving at the total given all cases of duplicate registration due to the registration of non-residents in the various states and the re-registration of cars upon transfer of ownership are subtracted. Without allowing for this duplication the grand total of registrations is 1,758,253, the non-resident registration in the country totaling 7,332 while the re-registrations amount to 15,552, a total of 22,844.

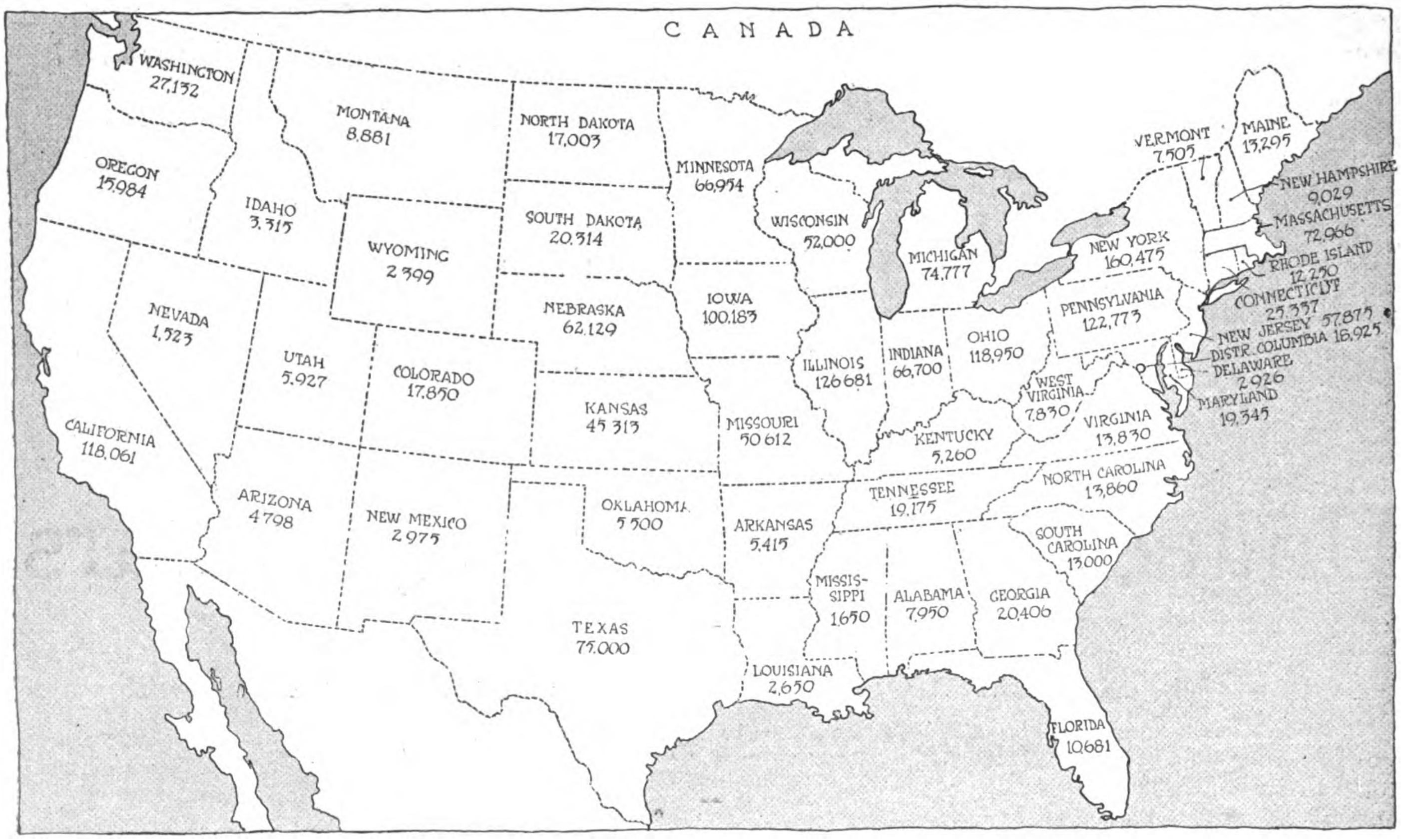
On January 1, 1914, allowing for duplicate registrations, there were 1,253,875 cars and trucks in use in the United States. By July 1 there had been an increase of 294,485 over this figure, the total being 1,548,350. The increase in registration from July 1 to October 1 is 203,503, or practically two-thirds as much as the gain for the entire 6 months preceding July 1. It is evident that in spite of the talk of hard times and the effect of the European war upon business, the people of the United States are buying cars in great numbers just as they have been for the past decade. In fact the automobile industry has become one of the most important as well as one of the most spectacular in the country, so much so in fact that it formed the subject of a widely quoted address by William Livingstone, President of the Dime Savings Bank, Detroit, at the Annual Convention of the American Bankers' Assn. held at Richmond, Va., October 15.

The present standing of



New York	160,475	Virginia	13,830
Illinois	126,681	Maine	13,295
Pennsylvania	122,[illegible]	South Carolina	13,000
Ohio	118,950	North Carolina	13,860
California	118,061	Rhode Island	12,2[illegible]0
Iowa	100,183	Florida	10,681
Texas	75,000	New Hampshire	9,029
Michigan	74,777	Montana	8,881
Massachusetts	72,966	Alabama	7,950
Minnesota	66,954	West Virginia	7,830
Indiana	66,700	Vermont	7,505
Nebraska	62,129	Utah	5,927
New Jersey	57,875	Oklahoma	5,500
Wisconsin	52,000	Arkansas	5,415
Missouri	50,612	Kentucky	5,260
Kansas	45,313	Arizona	4,798
Washington	27,132	Idaho	3,315
Connecticut	25,337	New Mexico	2,975
Georgia	20,406	Delaware	2,926
South Dakota	20,314	Louisiana	2,650
Maryland	19,345	Wyoming	2,399
Tennessee	19,175	Mississippi	1,650
Dist. of Columbia	18,925	Nevada	1,523
Colorado	17,850		
North Dakota	17,003		
Oregon	15,984	Total	1,735,369

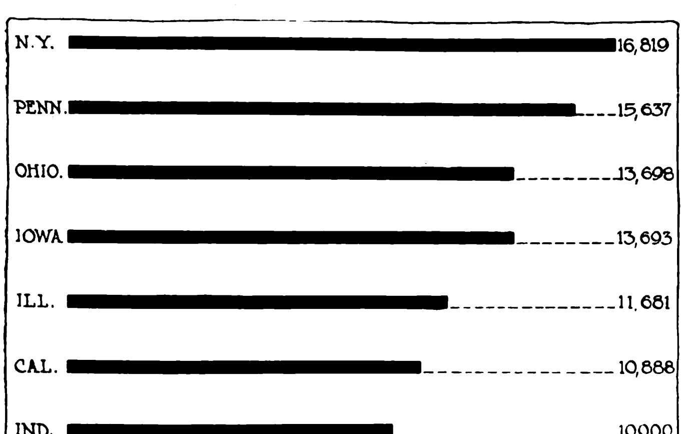
Registration to October 1, 1914, allowing for duplicate registration



Map showing actual registration of automobiles and motor trucks up to October 1, 1914, excluding duplicate registration

the states in respect to automobiles and motor trucks registered can be seen by referring to the tabulation on page 787 where they are arranged in order of magnitude of registration. It is greatly to be regretted that so few states have systematic, businesslike methods of keeping their registration records, as the failure to do so renders it impossible to tell the number of vehicles of various types and classes. The table on page 789 is an actual illustration of this, showing how few registration officials are really able to tell how many gasoline, electric and steam passenger cars and how many trucks there are in the state.

New York has taken a big leap forward in registration during the 3 months from July 1 to October 1, its total now being 160,475 after all duplicate registrations have been allowed for. This represents a gain of 16,819. Illinois is still in second place with 126,681, a gain of 11,681 for the 3 months. Third place is held by Pennsylvania with 122,773 or 15,637 more than on July 1. California has been ousted from fourth place by Ohio which now has 118,950 or 13,698



Seven states showed increases of 10,000 or over cars and trucks in the 3 months from July 1 to October 1

more than at the last showing. California's gain is 10,888 giving that state a total of 118,061. Iowa shows the phenomenal gain of 13,693, its registration being 100,183. Texas, Michigan, Massachusetts, Minnesota, Indiana, Nebraska and New Jersey retain their positions in order just as in July, their registrations ranging from 75,000 down to 57,875. Wisconsin has passed Missouri with a registration of 52,000 to Missouri's 50,612. The rest of the states are all below 50,000 ranging from Kansas with 45,313 down to Nevada with 1,523.

Many Changes Below 50,000

The order of the states with registrations below 50,000 is greatly changed since July 1, Washington having passed Connecticut with 27,132 as compared with the Nutmeg State's 25,337. South Dakota has passed Maryland, Tennessee and Colorado and farther down the list many other changes are to be seen.

There are five states with registrations between 50,000 and 20,000, these being Kansas, Washington, Connecticut, Georgia and South Dakota. The number between 20,000 and 10,000 comprises over twice as many states, the twelve being Maryland, Tennessee, District of Columbia, Colorado, North Dakota, Oregon, Virginia, Maine, South Carolina, North Carolina, Rhode Island and Florida. There are nine states with registrations between 10,000 and 5,000, these being New Hampshire, Montana, Alabama, West Virginia, Vermont, Utah, Oklahoma, Arkansas and Kentucky. The balance, comprising Arizona, Idaho, New Mexico, Delaware, Louisiana, Wyoming, Mississippi and Nevada, have less than 5,000 cars and trucks each.

Order of Gains Made

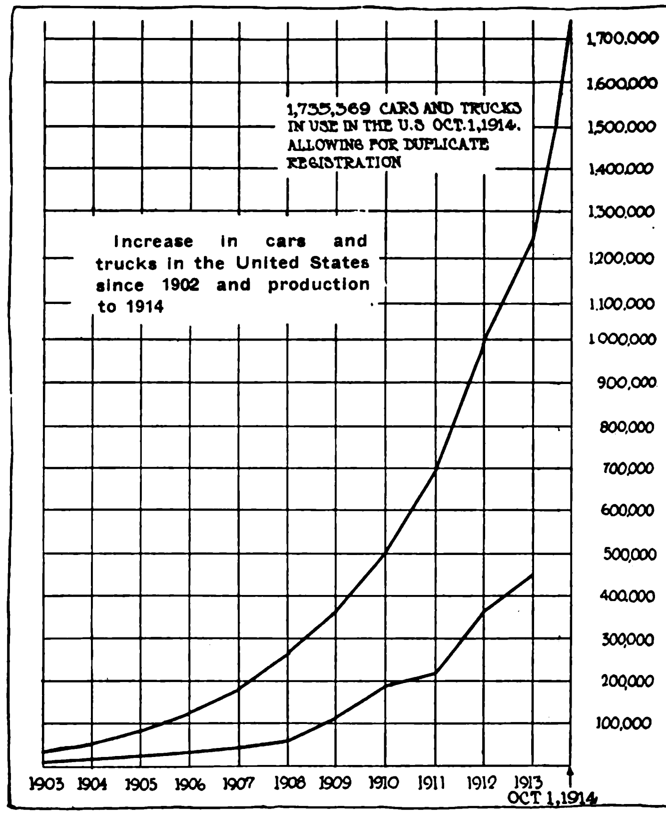
The order of standing in regard to the number of cars and trucks gained by each of the seven states leading in this respect is illustrated in the chart at the left of this page. New York leads with an increase of 16,819 with Pennsylvania second, its gain being 15,637. Ohio is third with an increase

of 13,698 and Iowa fourth with 13,693. Illinois shows 11,681 more registrations than on July 1 giving it fifth place while California with 10,888 takes precedence over Indiana with 10,000. The other states showing gains of over 5,000 registrations for the 3 months are not illustrated but stand as follows. Michigan is eighth with 9,260, Massachusetts, ninth with 9,129, and Missouri tenth with 7,889. New Jersey has 7,568, Wisconsin 7,000, Washington 6,496, Nebraska 6,140, Montana 5,700, Kansas 5,424 and Texas 5,000.

The Law Situation

One welcome improvement in the automobile law situation is the prospective adoption of an automobile law requiring registration of automobiles and trucks by Louisiana. This is one of the few states which has not as yet had a law requiring state registration. South Carolina and Texas are other states where registration is local. The District of Columbia, Florida and Texas require registration but once in contrast to the yearly registration required by the other states, excepting Minnesota, which provides for the registration of its motor vehicles once every 3 years. The Michigan and Mississippi laws are still under the ban of the courts, having been held unconstitutional some time ago. It is considered likely that the Michigan statute will be amended and re-adopted.

In the twenty-one states where statistics were available on the subject there were a total of 310,377 chauffeurs registered. There are six states in which the registration of chauffeurs is not required. The total of the fees received for the first 9 months of 1914 is $8,817,654.



Automobile Registration in Each State in the Union up to October 1, 1914, with Duplicate Registrations

State or Territory	Total Registration	New Registration	Registration up to July 1, 1914	Gasoline Passenger Cars in Use	Gasoline Commercial Cars in Use	Electric Passenger Cars in Use	Electric Commercial Cars in Use	Non-Resident Registration*	Re-Registered**	Chauffeurs Registered	Total Fees	Remarks
Alabama	8050	450	7,500	7,700	250	150	None	None	100	750	$153 000	
Arizona	4 863	570	4,293	4,577	228	16	None	Very few	65	1,090	2,398	
Arkansas	5,490	795	4,695	***	***	***	***	***	75	300	55,200	
California	118,061	10,888	107,173	***	***	***	***	***	***	16,855	72,688	
Colorado	18,200	1,700	16,500	***	***	***	***	50	300	2,200	66,625	
Connecticut	27,230	2,700	24,530	24,235	2,659	420	220	1,000	893	35,631	394,211	
Delaware	2,972	364	2,608	***	***	***	***	***	46	***	35,000	
Dist. of Col.†††	18,925	1,461	17,464	***	***	***	***	***	***	24,140	16,662	Perennial reg.
Florida	10,681	603	10,078	***	***	***	***	***	***	***	***	Perennial reg.
Georgia	20,516	484	19,000	20,000	16	500	None	10	100	None	103,080	
Idaho	3,315	727	2,588	***	***	***	***	***	***	***	***	
Illinois	126,681	11,681	115,000	***	***	***	***	***	***	14,548	651,101	
Indiana	67,000	10,000	57,000	62,000	2,500	1,200	800	***	300	5,062	426,998	
Iowa	102,250	13,693	88,557	***	***	***	***	***	2,067	***	254,217	
Kansas	45,313	5,424	39,889	***	***	***	***	***	***	***	241,177	
Kentucky††	5,260	....	6,376	***	***	***	***	***	***	1,317	21,249	New law
Louisiana†	2,650	150	2,500	***	***	***	***	***	***	***	***	Law not yet adopted
Maine	14,219	1,519	12,700	14,091	626	5	2	400	524	18,096	***	
Maryland	19,345	1,097	18,248	17,554	1,691	175	100	***	***	***	***	
Massachusetts	73,846	9,129	64,717	65,116	7,059	923	748	880	***	23,366	894,845	
Michigan	74,777	9,260	65,517	***	***	***	***	***	***	***	221,319	Law invalid
Minnesota	66,954	4,954	62,000	***	***	***	***	***	***	***	***	Triennial reg.
Mississippi†	1,650	150	1,500	***	***	***	***	***	***	***	***	
Missouri	54,032	7,889	46,143	***	***	***	***	None	3,420	6,202	228,813	
Montana	8,881	5,700	3,181	***	***	***	***	***	***	850	***	
Nebraska	62,129	6,140	55,989	***	***	***	***	***	***	***	***	
Nevada	1,523	258	1,265	1,454	69	***	None	***	***	***	***	
New Hampshire	10,189	1,423	8,766	9,766	238	60	20	1,160	***	***	34,119	
New Jersey	59,817	7,568	51,849	***	***	***	***	***	1,942	66,490	784,343	
New Mexico	2,975	539	2,436	***	***	***	***	***	***	***	***	
New York	162,713	16,819	145,894	146,179	1,6534	***	***	2,238	***	62,828	1,484,098	
North Carolina	14,110	2,510	11,600	13,610	500	***	***	250	***	***	85,868	
North Dakota	17,129	2,034	15,095	17,097	17	15	None	6	120	None	54,558	
Ohio	118,950	13,698	105,000	118,763	***	187	***	***	***	***	674,002	
Oklahoma	5,500	1,500	4,000	5,325	25	150	***	***	***	None	***	
Oregon	15,984	1,355	14,629	14,472	1,337	80	38	***	***	***	76,360	
Pennsylvania	128,553	15,637	112,916	112,000	3,500	10,371	2,682	1,100	4,680	26,635	1,160,258	
Rhode Island	12,250	1,250	11,000	11,000	1,250	***	***	***	***	***	***	
South Carolina	13,000	43	12,957	***	***	***	***	***	***	***	***	Local reg.
South Dakota	20,799	4,799	16,200	***	***	***	***	***	485	***	***	
Tennessee	19,175	1,893	17,282	***	***	***	***	***	***	***	***	
Texas	75,000	5,000	70,000	***	***	***	***	***	***	***	***	Local and perennial reg.
Utah	6,032	636	5,396	5,764	149	119	***	5	100	35	4,070	
Vermont	8,073	1,292	6,781	7,859	205	4	5	233	335	2,457	142,397	
Virginia	13,830	2,188	11,642	***	***	***	***	***	***	182	14,815	
Washington	27,132	6,496	20,636	***	***	***	***	None	***	None	54,264	
West Virginia	7,830	1,672	6,158	***	***	***	***	None	***	1,243	137,924	
Wisconsin	52,000	7,000	45,000	***	***	***	***	***	***	None	260,000	
Wyoming	2,399	365	2,034	***	***	***	***	***	***	None	11,995	
Total	1,758,253	203,503	1,554,282	678,562	388,530	14,375	4,615	7,332	15,552	310,277	$8,817,654	

NOTE.—3,250 steam passenger cars and 275 steam trucks are included among the gasoline machines. *The number of cars registered belonging to residents of another state. **Number of cars re-registered owing to changes of ownership, etc. ***Not listed separately by registration officials. †Estimated on basis of population with reference to location and sectional registration. ††New law makes registration figures low. †††Figures are high as many re-registrations are included.

Foreign Trade Is Not Foreign Selling But Barter

Other Countries Also Have Products to Market, Speakers Tell Manufacturers' Export Assn.—Investment Needed and Sane Methods—South America Bankrupt—Wants Money, Not Goods

SEVERAL thoughts upon which little emphasis has been laid to date in the movement for the development of our foreign trade were brought out at the fifth annual convention of the American Manufacturers' Export Assn., which was held at the Hotel Biltmore, New York City, last Thursday. One of the most important of these, which it would seem has been overlooked almost entirely, is that the development of our foreign commerce means, not foreign selling, but barter or exchange; that is, we cannot expect to ship our products to foreign countries and expect cash in return. These countries also have products which they must market.

South America Bankrupt

One of the speakers called attention to the fact that the South American countries are practically bankrupt and want our money, not our goods, while the point was also brought out that the investment of American capital in foreign fields is an indispensable adjunct to our commercial development abroad. Another excellent thought was that business is business the world over; that is, our business men, manufacturers and merchants should proceed about foreign business exactly as they do in transactions at home. Sane methods are needed, because foreign business is the same as domestic, only more difficult.

Merchant Marine Needed

That we need a merchant marine and that the Government should aid American shipbuilding by every means in its power and that officials should help our merchants instead of criticising them were sentiments dwelt upon by several of the speakers. An interesting fact brought out in one of the papers was that the United States has no class of men definitely trained for foreign work. In European countries men make this their vocation and are trained for it, learning foreign languages, currency systems and other things especially serviceable in this work. Two points were emphasized, the men must be adventurous and should not be held down to inadequate expense requirements, nor should they be harrassed by petty bookkeeping in this respect.

A strong hint was made in one of the papers that unless foreign trade is developed by the Government and our merchants, the domestic situation, instead of improving will soon become worse as the country becomes overstocked with native products. No that there are inadequate transportation facilities, for there are plenty of ships to be had, but exporters often hesitate to send out a laden ship in the fear of seizure by belligerent warships.

In all the agitation for extended export trade an important factor which has apparently been entirely neglected is the opening of the Panama Canal which has brought New York, Boston, Philadelphia and the rest of the Atlantic seaboard much closer to the ports of Hong Kong, Shanghai, Melbourne, Sydney, etc. In other words, we, and not Europe, are at the geographical and commercial center of the world.

James A. Farrell, president of the United States Steel Corp., said in part:

"Among the current economic fallacies is that with the present elimination of several of the manufacturing countries of Europe as sources of supply, the neutral consuming markets of the world must look to the United States for their requirements.

Neutrals May Need Help

"Bankers have learned that credit is an international commodity, and producers, whether engaged in farming or manufacturing, are now conscious of the fact that it requires an exchange of commodities between countries to maintain equilibrium of gold exchange. It is apparent that even a neutral nation cannot materially profit when a world-wide contraction exists of the mechanism of credit and the cost of foreign exchange. The problems at present confronting the export and import trade of the United States are largely due to the inability of the foreign buyers to finance transactions on a credit basis, due to straightened financial conditions in many export markets.

"At present there is no lack of shipping facilities, as there are more ships than cargoes to all parts of the world. Our trade is not halted through lack of transportation, but we should analyze this apparent security. The greater part of our oversea commerce is still being carried in foreign ships, and is, therefore, vulnerable to the hazards of war. Up to the present seventy-seven foreign-built vessels, aggregating 275,000 tons, have been transferred to American register, a comparatively small number when it is considered that upward of 2,500,000 of foreign flag tonnage is owned by Americans; but many more vessels would doubtless be transferred to the American flag if prudent revision of our navigation laws were made.

The Federal Reserve Act

"The Federal reserve act has been described as designed to make credit available to every man with energy and assets, and it is to be hoped that this will be true of the foreign aspect of our banking also. It remains to be seen how far the Federal Reserve Board will permit national banks, with their definite domestic responsibilities, to engage, through their foreign branches, in the diversified enterprises by which European banks, organized solely for foreign business, seek to aid the foreign trade of their nations.

"Except for the early dislocation of trade caused by the outbreak of hostilities, Great Britain has, despite the war, continued her foreign trade with little interruption, largely because of the effective emergency measures promptly adopted by the British Government; whereas, we seem to be in an unfortunate position, in that the Federal reserve system, which promises so much for the future, has not as yet been established. Nevertheless, it should be impressed upon our bankers, as well as upon our merchants and manufacturers, that, unless some steps are taken to insure uninterrupted continuance and development of our foreign trade, there will be an unfavorable effect upon our domestic situation.

"Many countries are now turning to the United States for funds. Future opportunities in foreign markets for our manufactures may be seriously lessened unless investment develops."

Herbert R. Eldredge, vice-president of

the National City Bank, said that it is not at all probable that we will have an American merchant marine worthy of the name for many years and only when Congress passes an act placing our ships on an equality in both the cost of operation and the cost of construction with those of our foreign competitors. He told of the plans of the National City Bank to establish branches in South America, and asserted that while these branches would undoubtedly help our exporters in the future efforts to gain trade in those markets, the bank officials realized that they had many obstacles and probably some losses and inconveniences to suffer at the outset. Mr. Eldredge warmly praised the Federal reserve act for its probable beneficial effect upon the development of our foreign commerce, but declared that it must be further amended before it completes its basic task of enabling our bankers to overcome many of the obstacles in the path for many years.

Alba B. Johnson, newly elected president of the association, touched upon the necessity for some form of Government aid for our shipbuilding industry, subsidies or bounties, or otherwise, by which we may hope to meet and overcome the handicap which the foreign shipbuilder and operator now holds of being capable to build and operate ships at a cost of from 40 to 50 and in some instances as much as 60 per cent. below the cost to our American interests.

Defends Our Exporters

William Harris Douglass, of the export commission house of Arkell & Douglass, strongly defended the manufacturers against the many criticisms directed at them during recent years, and more particularly since the war in Europe began, for their alleged lack of efficiency in their efforts to gain greater portions of the world's foreign commerce.

"We have heard more rot about South American trade from every conceivable source," Mr. Douglass asserted, "in the last 60 days than 50 years of trading can hope to overcome. The truth about South America is that she is now bankrupt. I was talking with a prominent banking and trade leader from Brazil only a few days ago, and he very frankly told me that all that South America wants from us just now is our money. I asked him if they did not want our goods, and he said, 'No.' What they want more than our goods is money and plenty of time to pay.

"We must go slowly with South America. Things must be made better down there if our bankers could bring themselves to the point of advancing between $250,000,000 and $500,000,000 to the Latin-American countries, for which they might very easily take over as security national bonds which are backed by the wonderful national and natural resources of the nations down there.

"I resent the criticism heaped upon the American manufacturers for their past efforts in developing export trade. We have done our best, and I resent the criticism simply because we have not seized in a moment the entire export trade of the world. I have traveled the path of progress made by our manufacturers in blazing the way for our expanding foreign commerce for 32 years, during which time, despite the fact that very little help has been given by the Government, we have succeeded in planting a very solid foundation.

Win Trade Despite Handicaps

"It is only 15 years ago that our first steamer went to South America. What are our transportation facilities today and what has the Government done to foster those facilities? Not one passenger boat, but miserable tramp steamers with which to carry our goods to those lands to the south of us. I don't see any prospect of changing that condition. England, on the other hand, has long years ago established freight and passenger lines to every colony she possessed. Let us put the blame where it rests—on the United States Government.

"The Federal Government should not only say that we now have the authority under the law to establish the long-needed foreign branch banks with which we might be able to finance our own obligations and collect our own debts from South America in the course of trading with those countries, but it should make the banks in this country establish the needed branches and if they won't the Government should take some action itself to establish such banking facilities. We also want a real international policy which will insure to us a reasonable open door to every nation of the globe."

Sane Methods Needed

Edward Ewing Pratt, the newly appointed chief of the Bureau of Foreign and Domestic Commerce, Washington, D. C., in an address on The Foreign Trade Situation, made a plea for sane business methods on the part of our exporters in going after increased trade in foreign fields. Mr. Pratt declared that if our manufacturers and exporters will only put into force in foreign fields the same methods as they have been using for years so successfully in the domestic fields they will realize the greatest benefits from their efforts.

"The only difference in essentials between foreign trade and domestic trade is that the foreign proposition is a little more difficult. We are confronted with a great opportunity. The belligerent countries of Europe, which have supplied 42.2 per cent. of the world's exports are not prepared to continue to do so. Yes, it is time to call for caution, but it is always time for that, for caution is one element in business policy. We must not be over-cautious, however.

"Let us get clearly in mind that 'foreign trade' is not 'foreign selling.' Foreign trade is trade, it is exchange. We cannot always sell, we must buy. This is particularly true of our trade with South America. Nor can we afford to make the mistake of supposing that the military orders from Europe indicate any real or permanent demand for American goods. Foreign trade is not a temporary situation, it is a permanent matter.

"Do you realize that the Panama Canal has brought New York, Boston, Philadelphia and the rest of the Atlantic seaboard much closer to the ports of Hong Kong, Shanghai, Melbourne, Sidney, etc., than London, Liverpool and Hamburg now are? In other words, those cities once had the advantage of distance, we have it today. The inference must be clear, we and not Europe are at the geographical and commercial center of the world. The world is our market. Let's get into it."

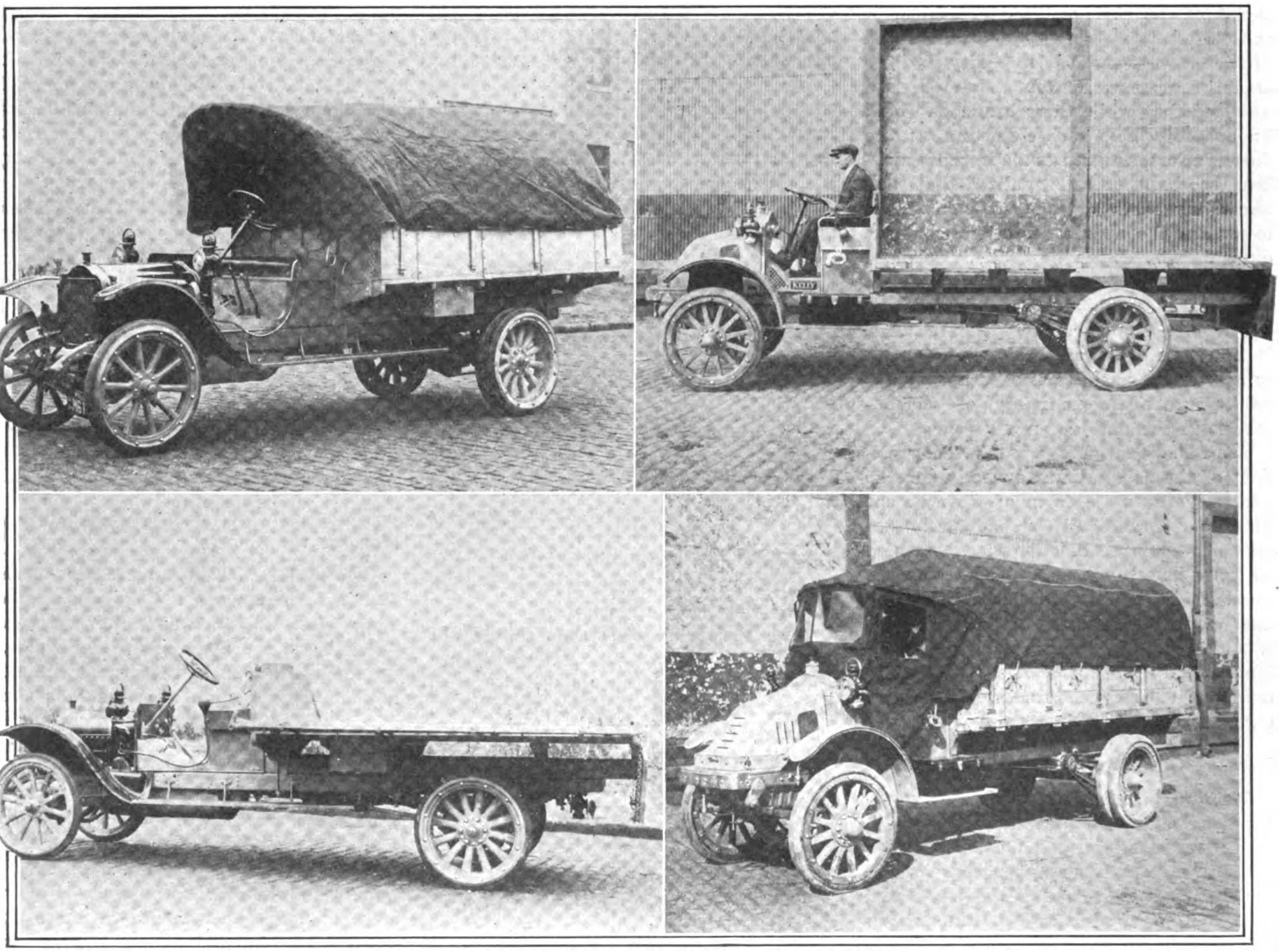
Men for the Work

George H. Richards, manager of the foreign department of the Remington Typewriter Co., in a forcible paper on: "The Personal Factor in Foreign Sales," dwelt at length upon the urgent demand and need for an adequate and efficient force of young American men, who might be capable of going into foreign markets of the world as selling representatives of our exporters.

"The personal factor in invading new markets has thus far not been emphasized," Mr. Richards said. "It is the human and sociological as opposed to abstract commercialism. If we narrow it down it becomes largely a matter of obtaining the proper men, especially young men, in the United States to undertake the work necessary to get our goods from our factories into the hands of our customers in the fields we seek to enter. The fact is that the United States never has had and has not today a class of young men from which to draw for foreign service similar to that to be found among our international competitors. The demand, however, is urgent. The promising candidate must be a man with much the spirit of the pioneer. He must be adventurous. He must be practically footloose. Duty must supersede all other considerations."

Mr. Richards urged that our exporters in selecting such foreign sales agents should not be parsimonious in allowing them sufficient money to cover elaborate social expenses as well as strictly business expenditures. The manufacturers, he added, must realize that traveling abroad is an expensive proposition, the agent's mission being ambassadorial, and his expenses are in proportion.

American Trucks to Play Part in War



Some of the 2-ton truck types purchased by the belligerent European nations. At the upper left is shown a White fitted with tarpaulin top, while below it is the same model with flat open body. At the upper right is a Kelly-Springfield with the same flat type of body and at the lower right is another Kelly-Springfield equipped with tarpaulin top

NEW YORK CITY, Oct. 28—Although reports have been prolific concerning large sales of motor trucks to the belligerent countries of Europe, sales have not aggregated one-third the amount reported. Rumors of concerns in America having orders for 9,000 trucks have been afloat for some time, but to date not more than 3,000 have actually been sold, in fact the total falls a little below this figure. This is a great export business, particularly for a line that has not figured prominently in the export column.

France Buys 1,740

One of the greatest sales was that made to the French government by five concerns, namely, White, Packard, Kelly, Pierce, and Jeffery, a total of 1,740 trucks, all of which have to be delivered by the first of the year. Of this total the sales were divided as follows: White 600; Packard, 450; Kelly 340; Pierce-Arrow 300; and Jeffery 50. These are practically all 2-ton types with the exception of Jeffery which are 1 1-2-ton. The Packard group is divided between 2- and 3-ton models.

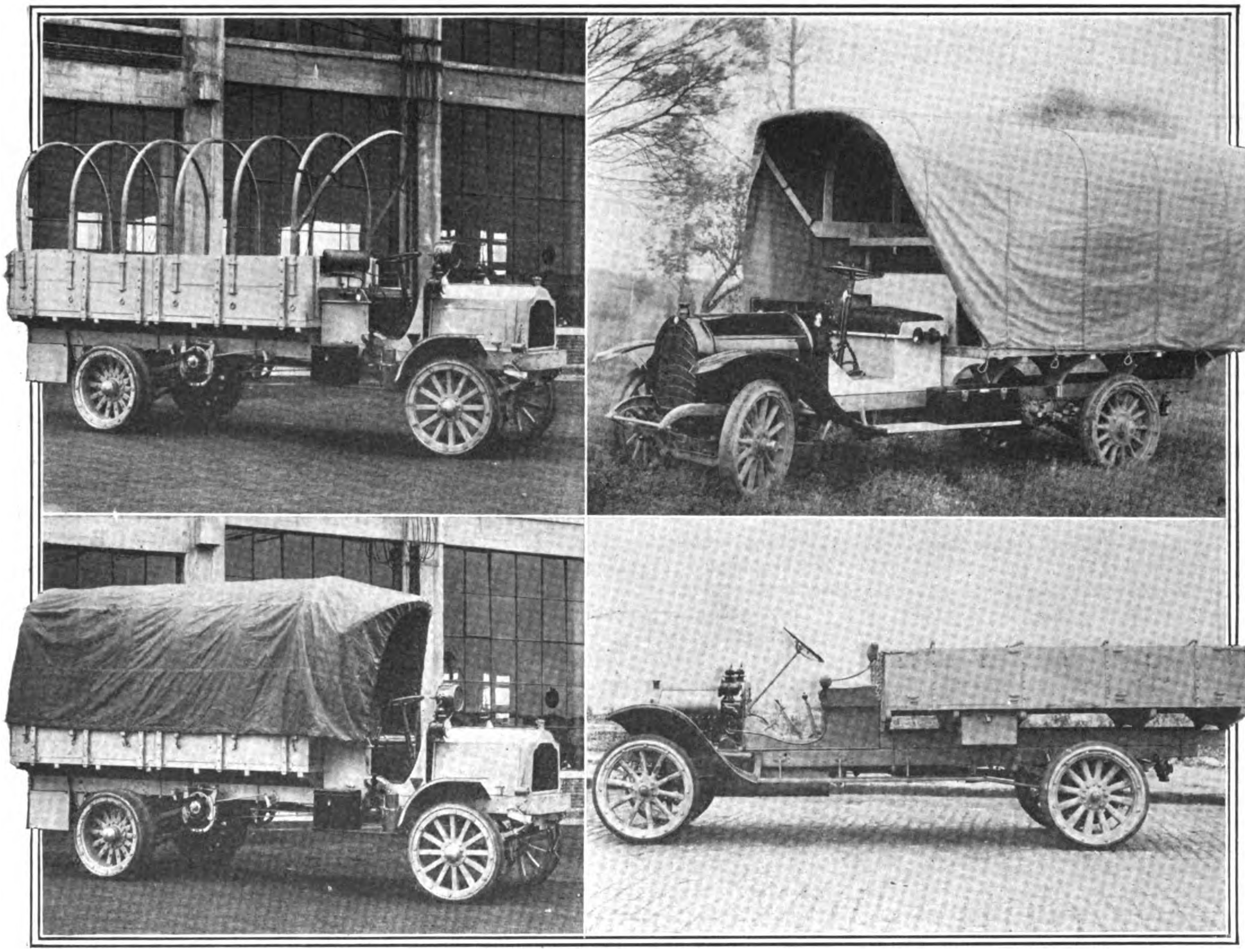
The illustrations on these pages show the conventional types of army body that has been fitted on all of these vehicles. These bodies are good examples of flexibility in that the two sides and tail-board are hinged to swing downwards. The sides are provided with chains to hold them in a horizontal position to make loading and unloading easy.

These bodies can either be used with or without the tarpaulin top. As shown in the Packard illustration these tops are supported by a series of removable metal bows roughly semi-circle in shape and fitting into brackets in the sides of the body. Over these bows the tarpaulin is stretched and secured giving an appearance not unlike the Prairie Schooner of by-gone days.

The Russian Body

The bodies on the White are what are known as the Russian design including the latest improvements. The platform of the body is not horizontal but standing in the rear of the vehicle and looking towards it the floor bows down in the center giving it an arc shape instead of a flat one. This is done in order that the loads carried press toward the center thus avoiding any tendency for loads to tumble off at the sides. On the other bodies the standard French army wagon job is fitted. These have the flat load platform and the hinged

—Several Shipments Already Made



The Packard shown at the upper left gives an idea of the body construction used with the tarpaulin top, the view just below showing the tarpaulin mounted. At the upper right is one of the Jeffery trucks fitted with a tarpaulin top of design similar to that employed on the other vehicle. At the lower right is a White with open box body

sides and tail-board, together with the metal bows for the tarpaulins.

On the Whites, which are the regular 2-ton model, with motor 3 3-4 by 5 1-8, the wheelbase is 145 1-2 inches and tires are 3 1-2-inch solids all around with duals in rear. The load-carrying platform measures 9 feet 6 inches long and 6 feet wide.

The Jeffery's are the standard 1 1-2-ton chassis with 110-inch wheelbase and block motor with cylinders 3 3-4 by 5 1-4. On the other models the standard chassis equipment regularly used is employed.

Other Sales

In addition to these French sales there have been several other shipments to belligerent and non-belligerent countries. Packard sold 198 to the Russian government, these being of 2-, 3- and 5-ton capacities. The Garford company disposed of approximately 142 to the same source and White sold some. Kissel has been making sales to the Greek government, totalling, according to reports, 100 vehicles. The Knox company has sold some few tractors to Greece.

There was a shipment of approximately 150 motor vehicles with the first Canadian contingent, and these included such makes as, Kelly, White, Packard, Peerless, Autocar, Jeffery and Russell. Many other sales have been reported but it is impossible at this time to definitely confirm them.

Many to Study Car Construction in Milwaukee

MILWAUKEE, WIS., Oct. 26—Hundreds of Milwaukee business men of standing have enrolled in the new course in motor car operation and repair established by the university extension division of the University of Wisconsin at the Milwaukee branch. The course is in charge of LeRoy Roberts, Cornell, '07, and is based, it is stated, on the fact that practically all of the accidents nowadays are caused by the ignorance of owners relative to caring for and driving their cars. Motor troubles uncared for and road laws neglected probably are the two greatest causes of accidents, and the new course, consisting of fifteen evening sessions during the coming winter will not only include instruction in repair and care of the car, but in road laws and driving.

"Seeing Ourselves As Others See Us"

English Engineers Analyze Their Industry in War Atmosphere and Make Recommendations—More Research Needed—Germany Has Led in This Work—Opportunity for America to Supply Raw Materials That Belgium Has Supplied

LONDON, ENG., Oct. 15—That it takes a war to stir up the Britisher patriotically, as well as industrially, is well illustrated by the activity of the Institution of Automobile Engineers, the British automobile engineering organization, as was shown by a recent meeting, when L. H. Pomeroy, a member of the council, presented a lengthy paper entitled, "Automobile Engineering in the War."

Mr. Pomeroy talks with characteristic John Bull frankness in his analysis of the automobile industry as brought about by the present war, condemning the policy of British manufacturers in one sentence and praising the policy of German and Belgian makers in the next.

Germany's Research Work

In speaking of the necessity for systematic research work in the automobile industry, he pays Germany a compliment when he says, "For anything like a systematic series of experiments on the automobile, its efficiency and effectiveness, we have to turn to Germany."

In another sentence he deplores certain inefficiencies in the British manufacturer and shows to what an extent Britain has had to draw on Continental countries for raw materials and parts for assembling.

Compliments Belgium

He pays a compliment to Belgium when, referring to a recent visit of the members of the Institution of Automobile Engineers to Belgian factories in which stampings were manufactured, he says: "Those who participated in the official visit to Belgium cannot fail to have been impressed with the scientific methods of stamping seen there, and, further, the unremitting care with which the product is checked, the elaborate research work which has directed the choice of the material used for the various purposes, its heat treatment, and the investigation of its physical and chemical characteristics."

Mr. Pomeroy brings out many facts which show the possibility of American concerns profiting by the fact that several of the Continental sources of supply have been practically eliminated because of the war. In this connection he says: "There are few in this country who produce a motor vehicle entirely from raw material. Quite 50 per cent. of the material is wholly or partly furnished by firms who specialize in the various lines of manufacture, such as pressed steel frames, radiators, wheels, springs, carbureters, ball bearings, tires, magnetos, bevel and worm gears, etc."

There are many of these parts that the English maker has to secure from abroad, particularly steel castings for truck wheels and other forms of such castings.

Free Research Department

In a very cosmopolitan manner Mr. Pomeroy suggests that a great opportunity presents itself for the English maker to resurrect himself in not a few regards an endeavor to produce on a price basis that will enable him to compete with Germany, Belgium and France. He believes that what is most needed is a committee of scientific experts to consider the question of conducting researches for manufacturers, free of charge, so far as these researches are of general interest and benefit.

Mr. Pomeroy's address in part follows:

The Address

Before considering the broad essentials to economical production, it is well to remember that this country has an enviable reputation for producing high-quality goods of all kinds. It is, in fact, in the position of a tradesman who has built up a business by supplying a first-class article at a moderate price, and in so doing has created a goodwill far too valuable to be thrown away by the emulation of any get-rich-quick methods which are not based upon the intrinsic lasting qualities and general honesty of the article supplied. Great Britain, in spite of foreign claims, is a land of culture, and because of this, demands a certain exclusiveness of product which is against quantity production on anything like the American scale.

To Follow Natural Lines

For this reason the author thinks that the automobile industry must be content to develop upon the natural lines it has followed here since its inception.

Its commercial importance must be based upon a definite superiority of design and execution attained through a constant attitude of healthy discontentedness with things as they are. It is this mental attitude which has maintained certain of our industries, notably steel making and ship building, at a level above competition, and if steadfastly followed out will raise the automobile industry to the same level.

There are in this country few firms, if any, who produce a motor vehicle completely and entirely from raw material. Quite 50 per cent. of the material composing a motor car is supplied wholly or partly finished by firms who specialize in the various lines concerned.

FOR INSTANCE, PRESSED STEEL FRAMES, RADIATORS, WHEELS, SPRINGS, CARBURETERS, BALL BEARINGS, TIRES, MAGNETOS, SPARKING PLUGS, BEVEL AND WORM GEARS, DETAIL FITTINGS SUCH AS INSTRUMENTS, GREASE CUPS, UNIONS, AND IN SOME CASES IMPORTANT UNITS SUCH AS ENGINES, GEAR BOXES, AXLES, ETC., ARE AMONG THE PARTS BOUGHT IN A FINISHED CONDITION READY FOR ASSEMBLING.

The real raw material of the chassis maker is made up of bar steel, stampings, malleable steel, iron, aluminum, bronze and brass castings, tubing, etc. A large part of the trade in the above commodities has been in the hands of Germany and foreign trade rivals, and it is of interest to discuss the principles underlying the successful production of some of the many individual items which are of supreme importance in motor car manufacture. After all, the basis of production is an ample supply of raw material and an ample choice of the sources of such supply. The elimination of Continental sources of supply has brought home to many of us how dependent we were upon them, and, further, how poorly some of our British suppliers compare with those on the Continent. The comparison is still more unfavorable to the British supplier when considered in the light of quality for price.

English Products

To come to articles directly within the compass of the British suppliers, the author would exemplify the following:

Light stampings of alloy and mild steel for parts subject to shock and alternating stress in which correct heat treatment is a sine quâ non.

Heavy stampings, such as back axle casings, front axles, flywheels, crankshafts, brake drums, tapered steel tubes.

Steel castings, particularly road wheels for commercial vehicles, back axle casings and other large castings where very thin sections are desired.

Pressed steel parts, such as brake drums, back axle casings, frames, torque members, step irons, etc.

High-tension steel tubes and thin plates.

Electrical insulating materials suitable for moulded forms, and departing from chassis requirements a little, the author would mention the demand for machine tools for special purposes.

In discussing the difficulties arising from obtaining parts such as those mentioned, the author is speaking from the point of view of a chassis manufacturer, who is anxious to obtain adequate supplies. It is obvious that there will be an influx into the ranks of material suppliers during the next year or two of firms whose previous experience has been outside the automobile industry, and it is to these who are unfamiliar with the very exacting requirements of the said industry that many of these remarks are addressed. To commence with stampings. One of the first difficulties that arises is a financial one, namely, that of payment for dies; this often forms a heavy item of expenditure, which prevents the adoption of stampings, and it would seem a poor policy on the part of stampers to emphasize this charge, as they so often do. Stamping or drop forging is an old industry in this country, but there seems to be room for considerable improvement in the methods of stamping.

There are many stampings which we cannot obtain here. Those members who participated in the official visit to Belgium in the summer cannot fail to have been impressed with the scientific methods of stamping seen there, and, further, the unremitting care with which the product is checked, the elaborate research work which has directed the choice of the material used for various purposes, its heat treatment, and the investigation of its physical and chemical characteristics. The number of firms in Great Britain so equipped is relatively small and usually confined to departments.

Criticize English Stamping

THE CHIEF COMPLAINTS AGAINST BRITISH STAMPERS IS, FIRST, A LACK OF KNOWLEDGE OF THE PHYSICAL CHARACTERISTICS OF THE MATERIAL THEY ARE STAMPING; SECOND, THE TENDENCY TO DISPENSE WITH PRELIMINARY HAND FORGING OF PARTS LIKE CONNECTING RODS, AND TO OVERHEAT THE METAL TO OBTAIN EASY WORKING AND QUICK PRODUCTION; THIRD, A LACK OF APPRECIATION OF HOW CLOSELY TO ITS DESIRED SHAPE A STAMPING CAN BE MADE, AND CONSEQUENT NON-UNIFORMITY OF PRODUCT; AND FOURTH, A COMPLETE DISREGARD, IN ALL BUT A VERY FEW FIRMS, OF THE MANIFEST ADVANTAGES OF HEAT TREATMENT AFTER STAMPING IN ALL CASES, AND ITS ABSOLUTE NECESSITY IN MANY.

Poor Heat Treatment

Last, but far from least, in the general consideration of the desirable qualities of stampings, is that of correct heat treatment. In this connection British firms are deplorably behind those on the Continent. The virtues of heat treatment have been as widely published as any information on a technical subject could be. The enormous increase of resistance to impact and fatigue through it must be known to the stamping trade if only from the demands of automobile manufacturers, and even now very little is done. The stamper will say he *can* heat treat if you require; he will not say that he *will* whether you ask for it or not.

There is a field which has been much less exploited than this and which is equally important, namely, heavy stampings, such as fly wheels, large hubs, back axle casings, and the like. In many cases these are now made as castings, and are, as such, perfectly satisfactory from the designer's point of view. But there are other points of view than that of the designer. The present epoch is that of the automatic machine tool, and for its successful use consistency of material is a *sine quâ non.* Until the makers of castings approach this ideal to a greater degree than they do at present, the qualities of stampings in respect of easy machining and consistency of texture make them an easy first for popularity among works managers whose susceptibility to irritation when an expensive forming tool or special tap is fractured through an occasional hard casting is well known. The large quantities which allow of the successful application of automatic machines are those which justify the expenditure on dies. The fact remains, however, that if all castings could be relied upon for uniformity of softness they would hold the field, first because of the fact that they can be made in intricate forms, secondly that the amount of material to be removed for a given object is usually less. For instance, a hub made as a stamping will weigh twice as much as a corresponding casting, and the difference in weight has to be removed by machining. It does not seem impossible to one who is not an expert in stamping problems to hope that by a suitable series of dies much thinner sections of metal could be stamped than are at present produced.

Need Steel Castings

When the field for the supply of malleable iron and steel castings is surveyed we again become painfully aware of our deficiencies. The modern steel casting is an electric furnace product, and these furnaces were first exploited on the Continent owing to the abundance of cheap electricity, and the solution of the metallurgical problems involved.

IT IS TO-DAY A MATTER OF DIFFICULTY TO OBTAIN STEEL CASTINGS SUITABLE FOR AUTOMOBILE WORK IN THIS COUNTRY, REGARDLESS ALTOGETHER OF PRICE. IN PARTICULAR STEEL ROAD WHEELS ARE PRACTICALLY UNOBTAINABLE.

The production of a cast wheel in any metal is a matter of difficulty owing to the contraction stresses induced by unequal cooling, and the difficulty is probably greater in casting soft steel than in any other metal. Yet these difficulties have been met and completely overcome abroad with consequent loss of business to this country and its paralysis in this respect at the moment.

The same remarks apply to back axle castings, brake drums, etc.

The author can remember no instance when discussing steel castings that hard things were not said of them. Such firms as make successful steel castings are mainly engaged on very heavy work. It is probably again due to the fact that the automobile has been beneath the notice of our leading works until a year or two ago that more progress has not been made.

THERE IS A BIG HEALTHY MARKET FOR GOOD STEEL CASTINGS THAT SHALL BE SOUND, SOFT AND EASILY MACHINED, THE LAST TWO QUALITIES NOT BEING IDENTICAL.

Again, we are up against the bugbear of minimum thickness. The author has tried to get castings of exhaust manifolds 1-8 inch in thickness and failed. He then put the thickness up to 3-16 inch, and got sound castings; but, unfortunately, upon sawing them up he found the thickness to vary from 3-16 inch to 5-16 inch, mostly the latter. The importance of the subject is more far-reaching than is at first imagined, and the expenditure of a lot of time and money on the production of very thin castings, say down to 3-32 inch thick, would be well rewarded.

Finish of Castings

The external finish of steel castings is also another weak spot. This may not sound important, but it is one of the things that, other things being equal, decide the destination of contracts. Malleable iron certainly scores in this respect. When dealing with steel and malleable castings from the same pattern the two metals are quite easily identified. The chief complaints in regard to malleable castings are occasional hard batches and perpetual delay in delivery. It is necessary to be a prophet to deal with malleable iron successfully. Its physical characteristics are, however, very good. There seems no reason why it should not be a good material for road wheels and compete with steel castings all around.

In considering the possibilities of trade expansion due to the elimination of foreign competition, cylinder castings, ball bearings and electrical apparatus come to mind. The first two are already in a healthy state, and the equals of anything turned out anywhere, but electrical apparatus, insulating material, high tension cable and sparking plugs, to say nothing of the magneto, are all open to criticism.

The author has passed a high-tension current through a piece of red fiber alleged insulating material 18 inches long; he has cut the insulating material off the outside of high-tension cable with more ease than a garden hose could be cut; he has experimented with countless brands of sparking plugs that pre-ignited in less than three minutes in an engine running at 2,000 revolutions per minute, and in his opinion the state of affairs is bad in which such materials can be offered for sale, much less used. The British manufacturer of these articles can gain infinitely by delivering the real goods, and now is the time for him to get going. It is idle to talk of foreign competition when that competition is allowed to become a monopoly.

Research Work Needed

For anything like a systematic series of experiments on the automobile, its efficiency and effectiveness, we have to turn to Germany. Such scientific work as has been done here on engines has only been done by men of undisputed authority in the world of physical science, but out of touch with the industry, working on obsolete engines and obtaining results of about as much practical use as the Technical College tests of its steam engine.

We want information not for its use in teaching students to measure accurately, though that is of first importance, but for the suggestion of improvements and for indicating departures in design that shall place the British industry at the head of the world's automobile producers.

The author would suggest that a committee be formed consisting of scientific experts and practical men to consider the question of conducting researches for manufacturers free of charge, so far as these researches are of general interest and benefit.

Economy in Research

If to it be added a series of experiments co-relating the heat discharge of a radiator with the velocity of cooling water through the tubes and the air velocity past them, we should have data for fixing radiator sizes which would be of great commercial value. From experiments made by the author he is satisfied that a radiator of about one-third the size of that now ordinarily fitted would be capable of properly cooling the engine. But before this can be done with safetv. it is necessary to have experimental data covering all likely conditions in use. An ordinary honeycomb radiator for, say, a 183-cubic inch engine costs roughly $50. If the radiator surface could be halved the price would fall at least 25 per cent. On an output of 1,000 chassis per year this is a saving of $12,500. Yet no one seems to have the resources and enterprise to try and make that saving. The author thinks that this sufficiently illustrates his point that research should be directed towards the saving of money.

Still dealing with matters relating to the engine, the carbureter comes to mind. The claims of carbureter makers are monotonous in their uniformity of suggested perfection. The author feels sure that well-directed research into the effect of varying shapes of induction pipes, of the application of heat at the right spots and of true vaporization would result in the establishment of fundamental data to which carbureter makers could add their various mechanical devices at their own sweet will.

The bearing pressures and speeds of ordinary engineering practice are already exceeded in many gasoline engines, but there is every indication that still further reduction in size is possible, due to the rapidly rotating and reciprocating nature of the load in automobile engines.

Gearbox Research

Turning to the chassis, our opportunities increase. The author is informed on good authority that the Mercedes Grand Prix racer this year used a fourteen-tooth bevel pinion in the rear axle drive. If this can be done in the back axle, it can be done in the gearbox. A fourteen-tooth pinion is usually looked upon as a mechanical compromise owing to interference, unless the involute angle is very steep. But if a fourteen-tooth pinion can be made to run quietly without introducing other ill effects an important practical result follows. In a pleasure car, for instance, the relation between the fourth and the first speed is usually about 4:1, *i.e.*, a car geared to 3:1 on top is usually about 12:1 on first. Using a 14-tooth first reduction pinion the wheel gearing with it would have twenty-eight teeth, and at the other end of the box the ratio would be reversed, giving the 4:1 reduction; this refers to boxes with direct drive on top. If six-pitch teeth be used, this means a shaft center distance of 3 1-2 inches, which is decidedly less than current practice.

Compared with 4 1-2-inch centers, we have a saving in a four-speed box of forty-eight teeth per box, and a consequent considerable saving in weight due to smaller diameter stampings and reduced external dimensions of the whole gear-box. The only point which needs settling is whether a fourteen-tooth pinion can be made to run quietly.

It is an axiom that no design is good which cannot survive a liberal dose of bad workmanship. On this criterion gear-box design is bad indeed. The author knows of no manufacturer who is not troubled with the noise made by gear-boxes, and further, there seems no easy method of obtaining silence combined with durability.

If an engine be considered whose torque is constant up to, say, 5,000 revolutions per minute, and giving, say, 100 horsepower at that speed, driving a rear axle with a gear loss varying as the square of the speed, the available horsepower transmitted to the back axle would be, if the gear loss at 1,000 revolutions per minute were 10 per cent.:

at 1,000 revs. per minute....	20	—	2	= 18
2,000 " " "	40	—	8	= 32
3,000 " " "	60	—	18	= 42
4,000 " " "	80	—	32	= 48
5,000 " " "	100	—	50	= 50

These figures are, of course, extremes, and chosen to illustrate the point under discussion. For years automobile engineers have considered an automobile as a machine whose efficiency curve is a straight line. If this is not the case, and there is ample evidence to refute it, there is the important and far-reaching consequence mentioned which may materially affect the trend of design. The few instances chosen to indicate the possibilities of properly directed research work only approach the fringe of the subject.

All this may appear visionary, but it is the means whereby Germany has become the commercial rival she was, and will be again when the disturbance caused by the war has passed away. If Germany can then produce better articles than those made by any other country she will sell them, and if these next few years are allowed to pass without a strenuous effort on the part of our industries to place themselves in a position in which we can compete on equal terms, our opportunity will have been wasted.

From the pure design point of view the commercial vehicle has not yet attained much more than the stage of reasonable reliability, regardless of weight, engine power possibilities and economy. But there are signs that the commercial chassis designers are taking an interest in these latter, and in these directions the pleasure chassis manufacturers' experience should stand in good stead.

The battle for the high efficiency commercial chassis will doubtless follow on the lines of that in the pleasure-car industry, and the author can see no reason why the result should not be the same.

Already many firms are building both commercial and pleasure vehicles, and this policy will probably become more widespread during the immediate future while the industry as a whole is steadying itself. But sooner or later the *status quo ante bellum* will be restored, and it will be interesting to see how the automobile industry has used its opportunity.

Largest Crane Mounted on Peerless Chassis

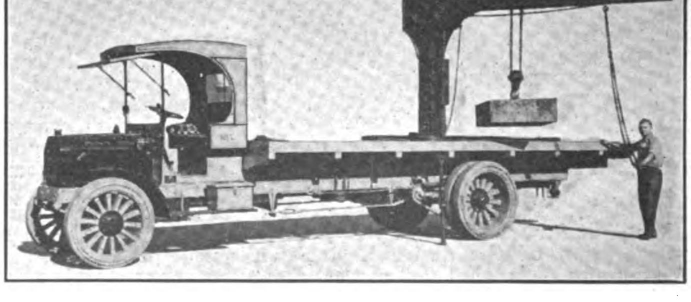
A TRAFFIC problem in the garbage department of the city of Detroit has been met by the use of a special Peerless 6-ton truck equipped with the largest crane that ever has been installed upon a motor truck. This crane will lift 2 1-2 tons onto the truck. Most crane experts have heretofore contended that a 1-ton crane was the largest that any truck could carry.

The garbage of the city of Detroit is carried on open coal cars to the plants of the Detroit Reduction Co. outside of the city. There are only a few substations at which the cars can be loaded for property owners in the vicinity object very strenuously to them and in many cases have forced the abandonment of newly opened stations.

This makes a long haul to the substation unavoidable. It was found impracticable to use motor trucks for the actual collections of garbage because the great frequency of the stops made it require as long a time to load a ton of garbage upon the truck as upon a wagon. Yet when horse wagons were used exclusively the long haul with the empty or fully loaded wagon would often take from two to three hours. The wagons in many cases were able to make only one trip a day.

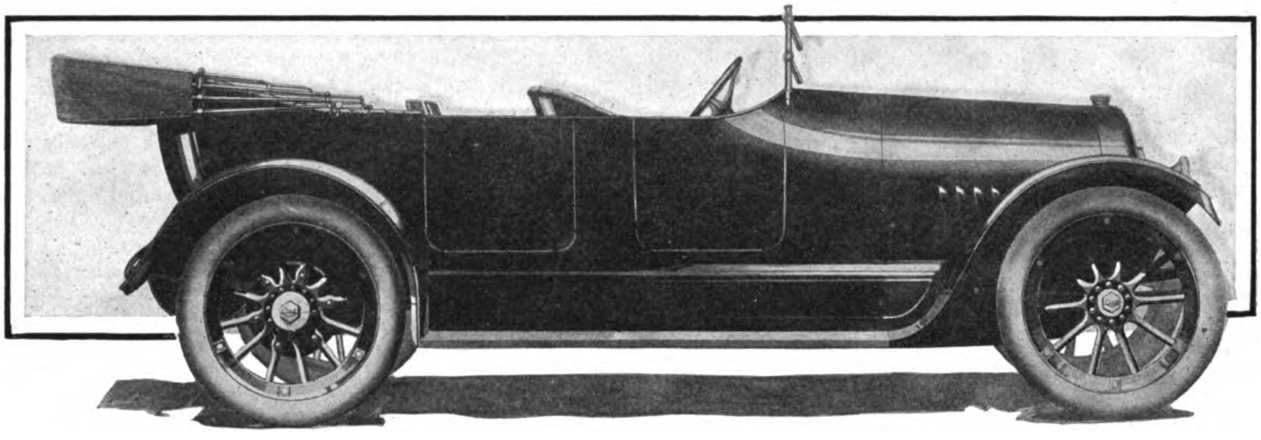
Jack Knight, superintendent of the Garbage and Street Cleaning Department solved this problem by the purchase of the special Peerless 6-ton truck. Garbage wagons from the different sections of the city are met on the way to the substation and their 2-ton loads are lifted off onto the truck by the crane. An empty box is hoisted from the truck to the wagon to be refilled. One wagon now collects two loads in the time that was formerly required to collect one.

In the case of the breakdown of a garbage wagon on the streets the truck picks up the load and removes it at once avoiding the very undesirable condition created when it has to be shoveled from one wagon to another.



6-ton Peerless truck fitted with crane for Detroit Garbage Department

New Four-Cylinder Cole for $1,485



Four-cylinder Cole touring car listing at $1,485 with 29-horsepower motor and streamline body

A FOUR-CYLINDER Cole listing at $1,485, or nearly $200 less than any previous four-cylinder made by the Cole Motor Car Co., Indianapolis, Ind., is one more example of the greater attention that is being given to fours of a medium size for next season.

This model uses the Northway unit motor, clutch and gearbox, the motor having cylinders 4.25 by 5.25 with an A. L. A. M. rating of 29 horsepower and a piston displacement of 297.8 cubic inches. The chassis with a 120-inch wheelbase carries a seven-passenger body with complete equipment including Delco lighting, starting and ignition system, Stewart vacuum-gravity gasoline feed, Stromberg carbureter with hot air connection to a jacket on the manifold, motor-driven tire pump, electric horn, speedometer set flush in instrument board, automatic, full-ventilating rain-vision windshield, and other features such as quickly-detachable top curtains, etc. Helical gears are used in the Timken rear axle and Firestone demountable rims are regular equipment.

Averaged Over 24 Miles per Gallon

This is the car that in a recent official test under A. A. A. sanction at the Indianapolis speedway traveled over 24 1-8 miles to a gallon of gasoline with the car carrying full equipment and seven passengers. It showed 53 miles per ton of weight on a gallon of gasoline, which is equivalent to carrying 1 ton of weight 53 miles on 1 gallon of gasoline.

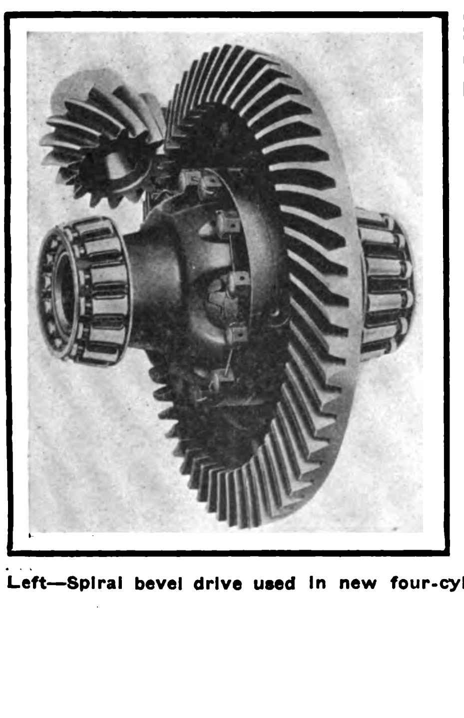
Besides this without any adjustments it showed consistent running for a half-hour non-stop test at a fixed speed of 55.63 miles per hour.

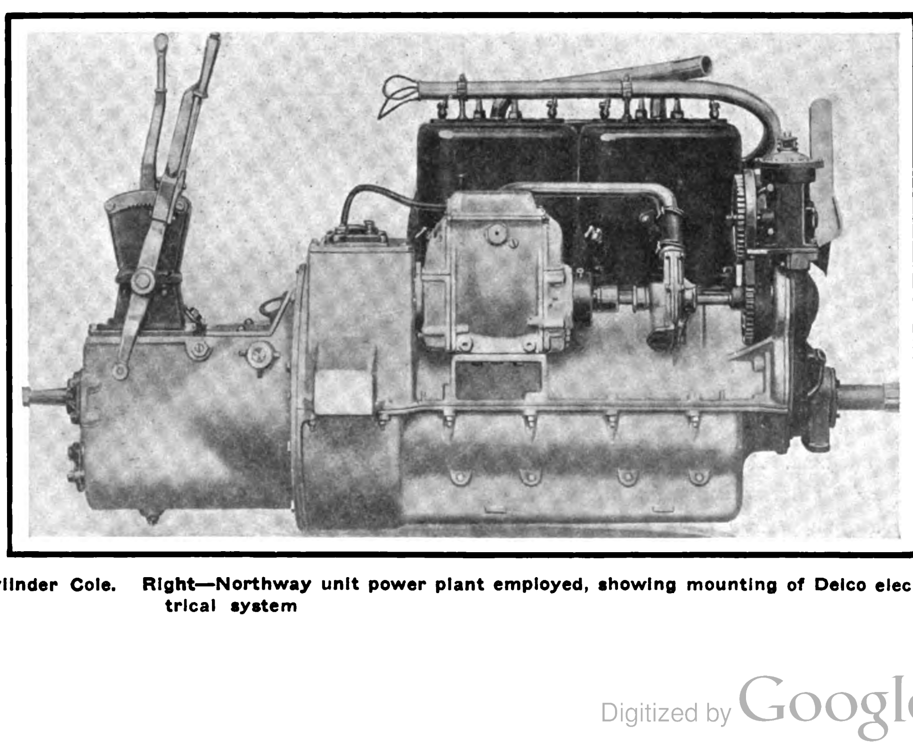
Streamline Body—Folding Auxiliary Seats

The body is a stream-line design, having neither rise nor drop in the cowl. The radiator, hood and body are blended into one another by having all the lines of the radiator diverged into the body. The front seats are of the individual type with a 7.5-inch aisle between. There are four doors, all operative, and exceptionally wide, 22 inches in front and 24 inches in tonneau. Folding auxiliary seats with disappearing irons are regular equipment.

With the aisleway between the front seats the operation of raising or lowering the one-man top is simple. Drop forged steel standards for carrying the one-man top are used. The top is manufactured throughout to be right when up.

A leather-faced cone clutch forms the connecting link between the motor and the gearset. The aluminum cone is





Left—Spiral bevel drive used in new four-cylinder Cole. Right—Northway unit power plant employed, showing mounting of Delco electrical system

14 7-8 inches in diameter and 2 1-2 inches wide, with an 11-degree face angle. The clutch hub bearing is of the annular ball type, and a ball thrust bearing is provided for the throw-out mechanism. Six coiled springs hold the clutch in engagement. A brake is provided on the clutch.

The shafts of the transmission are made of chrome-nickel steel, and are mounted on annular ball bearings. A roller bearing is used where the sliding gearshaft floats in the clutch shaft extension. The gears are all of .75-inch face; forged from chrome-nickel steel. Both the main shaft and jackshaft are 1 1-2 inches in diameter. The jackshaft is only 6 5-8 inches long between bearings.

A Spicer universal joint is used at each end of the drive shaft which is 1 3-8 inches in diameter. The rear axle is Timken with helical pinion drive. The gears and shaft are forgings of chrome-nickel steel. The driving gears are of 4 1-2 pitch, with stub teeth, and have 1 3-8-inch face. The driving pinion is supported by two roller bearings on a 1 1-2-inch shaft. The pinion shaft is of chrome-nickel steel. The drive shafts have six-jawed clutches on their outer ends which mesh with jaws in the steel hubs.

The internal and external brake drums are 15 1-2 inches in diameter by 2 1-2 inches wide and are faced with autobestine, an asbestos fabric.

The semi-elliptic front springs are 37 1-4 inches long, 2 inches wide, and the spring's eyes are bushed with phosphor bronze. The three-quarter rears, 50 1-4 inches long. Firestone demountable rims are fitted as standard equipment.

The Gemmer steering gear is mounted on the left side, and an 18-inch corrugated wheel is used. The steering gear itself is the worm-and-full-gear type.

The double drop frame, which has a section 4 1-6 inches high is extended to the rear of the body to form a support for the gasoline tank. The 7 1-4-inch kick-up in the frame over the rear axle allows a wide spring action.

Besides this model the company continues its six at $1,865 and a big six at $2,465.

To Re-Open Van Dyke Bankruptcy Case

DETROIT, MICH., Oct. 27—The bankruptcy case of the Van Dyke Motor Car Co., which was closed in December, 1912, will be re-opened, permission having been granted by Judge Tuttle, of the United States Circuit Court. The Columbus Bolt Works, Columbus, one of the creditors, petitioned the court, claiming that about 200 stockholders or other persons which had subscribed for stock in the Van Dyke company never paid in their capital stock, which, it is claimed, represents a sum of about $200,000. The court now decided to re-open the case upon seeing the list submitted by the Columbus Bolt Works and which shows that the stock was sold at from $6.66 to $9.00 a share although the par value had been set at $10 a share in the articles of association. The Columbus company claims that the stockholders should be compelled to pay the amounts above those actually paid for the stock, also the amounts subscribed but not paid in, as these sums constitute a part of the estate and as such should be distributed among the creditors.

New Cowles Patent on Motor Support

WASHINGTON, D. C., Oct. 23—Another Cowles patent of seeming importance in that it covers the flexible support of the motor to a cross-frame member has been issued and assigned to the Packard Motor Car Co. This patent, which is No. 1,112,678, was applied for by Edward P. Cowles of Sparta, Mich., September 6, 1901. It has as its object a flexible connection of the motor to the frame and has five claims. Claims 4 and 5 are particularly noticeable as they specify two rigid and one flexible supports of the motor to the frame. They read as follows.

Two Important Claims

4.—In a motor vehicle, the combination of a motor supporting frame comprising sidebars, a crossbar connected to said frame, a motor, supporting arms or brackets, extending laterally from the motor, means connecting said arms to said frames, and means connecting said motor to said crossbar, one of said means being flexible and permitting relative movement of the motor and adjacent parts of the frame and the other of said means being rigid and tending to limit the extent of said movements.

5.—In a motor vehicle, the combination of a motor supporting frame comprising sidebars, a motor having laterally extended supporting arms or brackets, means connecting said arms to said sidebars whereby the motor is supported thereon, a crossbar adjacent one end of said motor and connected at both ends to said frame, and means connecting said motor to said crossbar at the middle portion of the crossbar.

Curing Newly-Made Tires in Federal Plant

¶ The process of curing, so often referred to by the rubber experts, is clearly shown in the accompanying illustration taken at the Milwaukee plant of the Federal Rubber Mfg. Co. About a dozen newly made tires, tightly wrapped in canvas tape, and compressed under hydraulic power into steel cases, are placed in one compartment. The lid fits closely over the vat, so as to keep it airtight, and live steam is shot into the space around the tires. The steam softens the tires until they conform to the shape of the steel molds in which they are encased. After three and a half hours' immersion in the steam, the tires are taken out, cooled, and wrapped for shipment to the purchaser or dealer.

Curing tires at the plant of the Federal Rubber Mfg. Co., Milwaukee, Wis.

Branch Banks for South America

To Secure Credit Information, Aid Manufacturers and Exporters, Etc.—Patient Effort Will Develop Opportunity

ONE of the most interesting addresses made at the meeting called by the Merchants' Association at the Hotel Astor, New York City, recently for the purpose of discussing South American trade was that by William F. Kies,* head of the foreign trade department of the National City Bank. Following is a brief digest of his paper:

Credit Information Needed

"A detriment to the development of foreign trade everywhere and in South America particularly, has been the lack of reliable credit information. It may be very easy to sell goods but it is sometimes more difficult to get your pay for them. Credit is vitally necessary to the growth of trade. No business man objects to giving credit if he knows his creditor is honest and will pay him when the bill is due. Banks are more and more relied upon to furnish opinions as to the financial responsibility of business firms. It is, of course, of particular importance when your goods are to be shipped thousands of miles away to know that the man to whom you are consigning them is worthy of credit. Probably Latin-American countries are the most difficult in which to obtain credit information. The Latin-American is sensitive and with him usually credit is a point of honor. He resents inquiry for the examination of his books and rarely gives a statement. The collection of credit information, therefore, in South American countries will require the exercise of diplomacy and tact.

The compilation of complete credit files will necessarily take a long time. Capable credit men have been sent to Buenos Aires and the work of collecting credit information will be begun at once. As fast as credit files are compiled, duplicates will be sent to this country so that information concerning the standing of Argentine merchants will be available here without the necessary delay. Special credit investigations can be made whenever needed. The credit bureau is being built up for the benefit of American exporters and importers, and the information which will be collected may be had upon request.

Personal Touch Important

As the field was studied it was seen that a trained commercial representative, devoting his entire time to the promotion of American interests might do invaluable work in the upbuilding of our South American trade. Such a man would provide the personal representation so much needed. It has been arranged to have such a commercial man to make it with each branch. His duty will be to study closely local markets in an endeavor to develop trade opportunities for American merchants. He will form a close personal acquaintance with local business men and in Spanish speaking countries the value of a personal acquaintance cannot be over-estimated. He will endeavor to interest local merchants in American goods. Whenever a real trade opportunity arises he will cable to New York and the various lines interested will be notified by special letter. He will be in a position to make special investigation for firms desirous of ascertaining whether a market exists for their product. He will be able to ascertain the style and character of the goods in demand in the market, how they are packed, the price at which sold and all facts necessary to enable the manufacturer here to determine the possibility of his being able to compete in the market.

In order that the general information may be properly disseminated there will be issued from time to time a publication to be known as *The Americas* devoted to the upbuilding of trade between the two countries. Trade bulletins and letters will also be used in keeping our people informed of trade opportunities and financial and economic conditions in South America.

Present Conditions Favorable

Present conditions are favorable for the ultimate commercial success of this country in South America; but we must not enter into this big trade movement with the idea of getting immediate large results. Argentine and Brazil have been through a long period of depression. Brazil owing to the failure of the negotiations for her $100,000,000 loan with English interests is in financial straits. The value of the milreis, the monetary standard, has depreciated 20 per cent. and there will be great difficulty in the marketing of the large coffee crop while the market for her tobacco is closed.

Argentina for the present and immediate future has probably the best prospects of any South American country. A picture of her immediate financial prospects and her possible purchasing power may be drawn from the following statistical review just received by cable:

Of the total corn crop there still remain 110,230,000 bushels unsold. Present price, 52 cents per bushel.

The estimated surplus of wheat over domestic requirements is placed at 24,046,000 bushels, with the market price $1.16 per bushel.

There still remain 6,613,800 bushels of linseed for export, the market price being $1.19.

The entire old crop of wool has been disposed of and the shearing of the new crop begun. A normal crop of 310,000 weighing 880 pounds is expected which, at the average price of 19 1-3 cents per pound, would bring $52,650,400.

The price of cattle to producers has increased in the past few months from $46.80 to $76.57 per head, production for the present year being estimated at 1,500,000 head. The entire output will be marketed advantageously. The hide market is stagnant at the present time with a quantity of hides accumulating in the interior. The quantity this year for export is about $3,000,000.

The growing crops so far as reported are in good condition. The immediate prospects for Argentina are therefore good and she should recover more rapidly than any other South American nation from the effects of the European war.

Other South American countries will have difficulty in marketing their products. Chile's nitrate, like our cotton, presents a serious problem. Likewise the copper of Peru and the tin of Bolivia. But the ultimate prosperity of all these countries is not in doubt. Their natural resources are almost inexhaustible, and they will have to be a source of supply for raw materials of all kinds.

Patient Effort Required

While the situation at present is filled with difficulties and conditions at the very moment seem unpropitious, nevertheless it would seem the commercial interests of this country are confronted with a great opportunity.

*Editor's Note—The National City Bank, of which Mr. Kies is the head of the Foreign Trade Department, has set aside $1,000,000 for the establishment of a branch at Buenos Aires and also at Rio de Janeiro, the Federal Reserve Board having authorized their establishment. The staff for the Buenos Aires branch has been selected and is on its way. The branch will be in operation early next month. The staff for Rio de Janeiro is nearly organized and the branch will be in operation before the first of the year. The operations of these branches are expected to make New York the money market for South America, at least to the extent that American bills shall be paid in dollars on New York and not in pounds sterling on London.

ABILITY to wear is the criterion that many foreigners use in the selection of a motor truck. Will it wear? This is the question they endeavor to solve. Parts must wear, and have they provision for adjustment? Can you adjust the bushings of the steering gear when they wear? It is cheaper to adjust than to replace. It is much quicker and in either war or industry the economy of time is a vital factor in truck operation.

So adjustment and accessibility become real factors in truck work. So Europe considers it, and as Europe is the big buyer today, it is quite necessary that these matters be conspicuous. But adjustability and accessibility are not important solely because Europe thinks so. Our own conditions demand them. Our industries demand such; and should our nation make large purchases of trucks for war purposes or determine on some form of truck subsidy system these factors would be equally important.—Editorial in THE AUTOMOBILE, *October* 8, 1914.

WEAR

The Necessity for Balance Among Wearing Parts in Cars and Trucks

The Real Strength of Truck Is That of Weakest Part

By John W. Watson
Member Society Automobile Engineers,
President of the American Bronze Co.

BERWYN, PA.—Editor THE AUTOMOBILE:—The problem of every man or concern operating motor vehicles, whether for the delivery of goods or for the transportation of passengers, is to keep these vehicles on the road where they earn money and out of the shop where they cost money.

To have a fleet of six trucks or six taxicabs and average but five of them on the road and one of them in the shop is certainly not very encouraging to the man having invested his money in these six vehicles for business purposes.

The One Evil

Why is it that these cars must be laid up for overhauling? The answer is found in the one big word wear. If there was never any wear there would be mighty few interruptions to continuous service. The occasional breaking of some part would be all that could then interrupt service and entail expense.

Wear, though, we will always have. Between any two moving parts there is always friction and friction causes wear to a degree dependent upon the quality of the metals in contact with one another.

Where Found

The bulk of parts in the makeup of any motor vehicle are in no way subjected to wear, there being no movement between these parts and the parts to which they are bolted. Let us analyze and see what parts *are* subjected to wear in motor vehicles. As the writer analyzes a motor vehicle its wear-subjected parts may be classified under four headings. Gears, Ball and Roller Bearings, Plain Bearings (split and therefore adjustable for wear), Bushings (solid and therefore non-adjustable for wear).

Let us now analyze a little further and see how these wear-subjected parts balance up with one another. If they all lasted for the same length of time, the car would not have to be laid up for an overhauling until all of these parts were down and out. This would be a long time indeed and any such car would prove a wonderfully profitable investment.

It so happens, though, that these four classes of wear-subjected parts, in many cars at least, come *nowhere near* balancing one another in length of service given. Let us separately analyze the wear-resisting qualities and the average life of the parts under each of these headings.

First let us take up the gears. There are motor gears, pump gears, steering gears, transmission gears, bevel gears, differential gears, etc. Present day science in the alloying of steels and in the heat treatment of steels combined with present day accuracy in the cutting of gear teeth renders these gear parts practically immune from wear. And even after years of servie when the gear teeth may have shown a little wear, there is no lost motion between the driving and the driven gear so long as the power is on. When the power is on, the gear teeth are just as snugly up against one another after wear has taken place as they are when the gears were new. If gears were the only parts which necessitated the overhauling of a car there would be few cars indeed requiring overhauling.

Bearing Wear Small

Now let us take up the ball and roller bearings. These bearings, because of the very fact that they run with so little friction and therefore show so little wear, are used in motor cars wherever construction will permit. The reason ball and roller bearings run with so little friction and show so little wear is because this type of bearing gives a rolling and not a sliding action. Present day ball and roller bearings give such long and satisfactory service that the average car owner never even finds out where they are located. Breakage, due to a defective ball, a defective roller or a defective race is practically the only circumstance which will send a car to the shop for the renewal of these parts. And defects in ball and roller bearings in these days are rare indeed.

Bushings That Wear

Now we come to the heading of split, and therefore adjustable, plain bearings. These plain split bearings, in most cars of present design, are found only on the main motor crankshaft. There are the three or more main crankshaft bearings and the four or six crankpin bearings. These bearings after a year or 2 of service show wear, but by simply dropping the oil case under the motor and removing a shim or two between the two halves of the worn bearings this wear is quickly taken up and the bearings are then ready to give another year or 2 of perfect service. This work does not involve the dismantling of any of the other parts of the car and is done at very little cost in a very short time by any average mechanic. It takes many years of hard service to wear these bearings down to the point where their renewal is made necessary.

Non-Adjustable Bushings

Now we come to the last of the four headings of wear-subjected parts. This heading covers the solid non-adjustable bushings. These bushings are found here, there and everywhere, throughout the whole car. There are the wristpin bushings, camshaft bushings, magneto and pump shaft bushings, idler gear bushings, oil pump bushings, valve plunger guides, steering gear bushings, front axle steering knuckle bushings, clutch bushings, two or three bushings in the transmission, universal joint bushings, differential pinion bushings, etc.

When new, these bushings are purposely fitted snugly to their respective shafts. These bushings *must* be snug in order to hold these shafts in their correct alignment. We have a sliding and not a rolling contact in these bushings and we therefore have friction and this friction means wear. We have the same kind of friction that we have on the main crankshaft bearings, but these bushings, unlike the main crankshaft bearings, are not split and wear on them therefore can in no way be taken up. When the bushings have worn down even as little as 2 or 3 thousandths inch, less than the thickness of this page, their period of usefulness is over and their renewal is demanded.

These solid non-adjustable bushings therefore are the parts which are sadly out of balance with the other three classes of wear-subjected parts. All of the other parts are still giving perfect service and are therefore just as good as new, and yet the car must be taken out of service, put in the shop and torn to pieces for the renewal of those bushings which have worn to the point where their renewal is demanded.

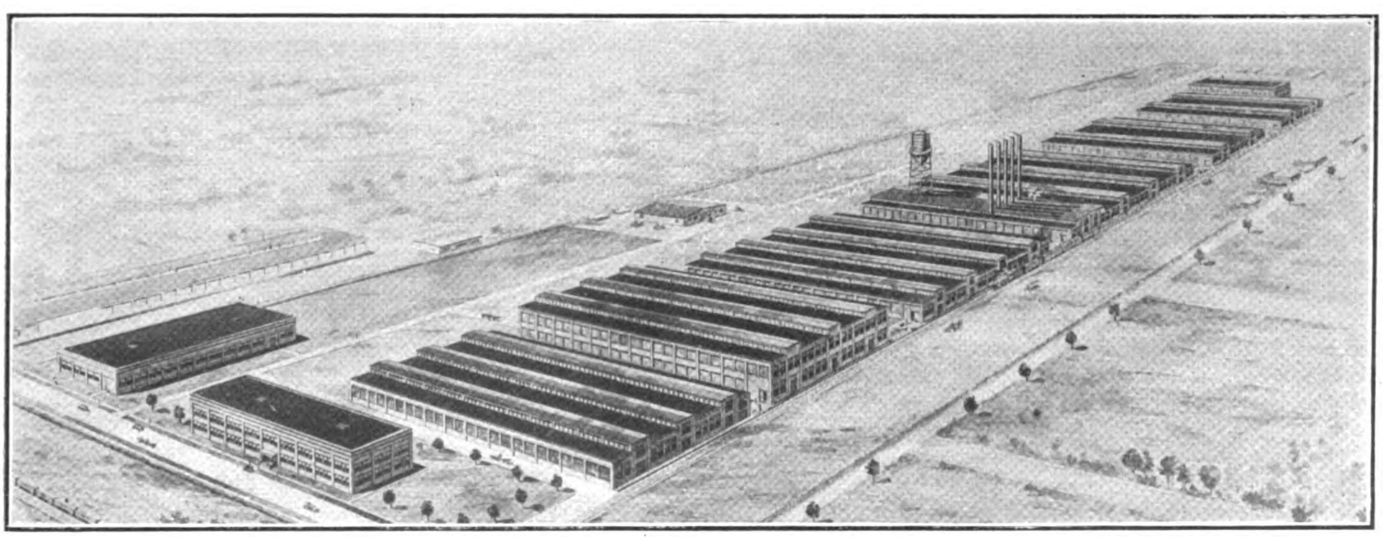
And it isn't as if all of the solid bushings wore down to this point at the same time and thus make it possible to renew them all at one tearing down. It often happens, because of lack of uniformity in bushing materials, that even bushings subjected to the same duty will not give the same length of service. In hundreds and hundreds of cases it happens that one piston pin bushing will be worn to the point of producing a bad knock before the other three piston pin bushings have shown any wear at all. And it takes just as much time and costs practically the same amount of money to renew this one bushing as it would to renew all four of them. To renew any one or more of these solid non-adjustable bushings generally means the dismantling of some entire unit—the motor, the gearset, the rear axle or some one of the several other units.

How important it is then that bushing material should be right and should be uniformly right. Inferior bushings will spell disaster to the otherwise finest of motor vehicles and superior bushings will make balanced and economical service givers out of otherwise medium grade vehicles.

The Maker's Duty

In view of the foregoing analysis as to what groups of parts are subjected to wear and then as to which of these groups will logically show first wear and require first renewal, it is clearly seen wherein lies a manufacturer's open road to vastly lessen the up-keep cost of his cars and to thus greatly increase their value. And purchasers of motor vehicles are wise who insist upon learning all that is to be learned about materials for these bushing duties and about the bushing materials which are used in the various makes of cars which are being demonstrated to them.

It is important that a car demonstrate its ability to carry the load and negotiate the hill, but it is also vastly important that the car will *continue* to carry the load and negotiate the hill. In the manufacture or purchase of a commercial vehicle it is well to always keep in mind that the value of this vehicle lies in its being on the road where it earns money and out of the shop where it costs money.—JOHN W. WATSON, President, American Bronze Co.



¶ The new plant of the Willard Storage Battery Co., Cleveland, O., when completed, will contain 6 acres of floorspace, leaving ample land for further expansion. Ten buildings will comprise the plant. All buildings will be of brick, of the latest approved and most up-to-date construction and equipped with sprinkler system throughout. The various buildings will be entirely separate, sufficiently isolated from each other to insure adequate protection from fire, and to furnish the maximum of light and air. The plant was described in THE AUTOMOBILE for October 22. Both factories, the old one at present occupied, and portions of the new plant as fast as completed, will be operated in conjunction, to afford ample production facilities for the heavy business of the early months of 1915.

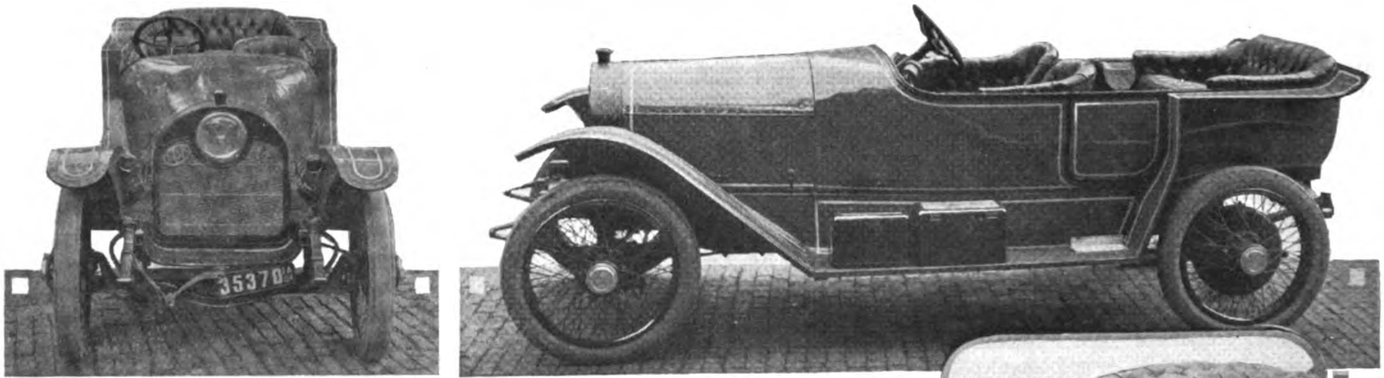


Fig. 1—Three views of car built by Iowa man. The motor has a bore of 5 1/8 inches

The Rostrum

Claims Owner's Statements of Yearly Mileage Are Generally Exaggerated

EDITOR THE AUTOMOBILE:—What is the maximum mileage per year for a private machine? That question and discussions arising from it have been of singular interest to me for the greater part of the 14 years I have been associated with automobiles.

The talk one hears in garages, factories, repair shops, etc., leads the novice to have as little respect for 10,000 or 20,000 miles, as he should have for 1,000.

Fifteen to 20,000 miles in the 3 or 4 summer months is a common boast of the majority of tourists you meet, and it is very, very seldom that I find a man that really has any idea of how far a car can actually travel in a series of consecutive days, driven constantly.

A short time ago a certain manufacturer of high-grade cars issued a guaranteed statement that five of his machines had in 5 years traveled an *average* of 200,000 miles *per car*, or 40,000 miles per year per car for 5 consecutive years! And I suppose a large number of people read and believed this statement. As a matter of fact such a performance is an absolute physical impossibility, it simply could not have been accomplished. Let us consider for a moment what the above figures would mean. In the localities given by the manufacturer in question the year around weather is about that of the suburbs of New York City, if anything a little more severe.

Now if a man used his car *every day that he could* and allowed 2 weeks, stretched out throughout the 52 weeks of each year for overhauling and painting, a most conservative time, if the car is on the jump continually, we find that the weather would permit him on, an average to run 300 days each year. This means that EVERY DAY he must run 133 1-3 miles, not letting up ONE DAY HE CAN OPERATE in 5 years. If he does not go out one rainy day he must do 266 2-3 miles the next, and so on. Just reason it out a minute or two and one will see how absurd such a statement is.

The man that says he does 15,000 or so miles in 3 months is just that much more off on his reckoning.

For the fellow who has just bought a car or who is going to buy one, or has driven for some time and wonders about the great mileage others make, it may be of interest to know that the actual mileage of an automobile, driven by a chauffeur, and given hard usage, is very seldom over 9,000 to 10,000 miles a year, whereas a privately driven car does well if it makes 6,000 to 7,000 miles in the same time. Actual average of all cars is just under 4,000 miles a year.

The above figures are arrived at after observing hundreds of cars, in many localities, and owned by people of widely different habits, for several years past.

Don't let anyone be discouraged because he cannot really make a 40,000-mile-a-year average as Smith does, because he does not.

It will really be of benefit to the automobile industry when we all learn just what 10,000 hard fought miles over our highways really means. Car mileage per year per car is an abused topic.

New Rochelle, N. Y. GEORGE C. CANNON.

Unique Car Built by Iowan

Editor THE AUTOMOBILE:—The car pictured shown in Fig. 1 was built by Hal R. Wells of Des Moines, director of the River-to-River Road and holder of the cross-Iowa speed record which he made last November in a Spaulding car. The mechanical features follow the lines of the best practice, the motor being a four-cylinder, L type, 5 1-8-inch bore. The Hele-Shaw clutch, Warner transmission of four speeds forward, and the Timken axles are used. The unique features are in the general lines of the car, the greatest width being in the center of the car and the streamlines are following out in the construction of the rear as well as the front. The width is taken care of by an 8-inch space between the two front seats, the entrance being made through two doors centrally located. Another distinguishing feature is in the arrangement of the lights. The headlight is in the center of the radiator giving the appearance of a modern Cyclops and the sidelights are a part of the inside guard for the front fenders. No lights project from any part of the car.

Des Moines. B. N. MILLS.

How Flywheels Are Fastened

Editor THE AUTOMOBILE:—1—What is the best way to fasten a flywheel permanently, which has become loose on the shaft?

2—I am using battery ignition, for a single-cylinder Cadillac, consisting of eight dry cells and a Splitdorf spark coil.

The contact points in the vibrator cause trouble. They seem to fuse and leave the contact surface so uneven that it will make the motor miss. By smoothing the points every other day there is no trouble, but this constant filing wears out the points in a short while. Is there any cause for this trouble that can be remedied?

Christine, N. D. LEWIS U. IVERSON, M.D.

—1—From your second question we take it that the loose flywheel is on a single-cylinder Cadillac. If this is so the only remedy is a new crankshaft because the flywheel on this model is attached to the crankshaft simply by pressing it in place.

This construction is unusual, as the flywheel is ordinarily fastened to the crankshaft either by keying, or bolting it to a flange on the crankshaft. In the former case the loose flywheel may be tightened by forcing the key solidly in place and then drawing up on the nut that bears against the flywheel hub. If the keyway is worn it may be necessary to make a new one slightly larger and fit a larger key.

If the flywheel is bolted to a flange, all that there is to do is to tighten the bolts. The latter method of fastening is probably best.

2—You should not use more than six cells with this coil. The trouble that you are having with the vibrator points is undoubtedly due to using eight cells, this number of cells gives too great a voltage and causes an excessive flow of current which fuses the points. There is also a danger of burning out the coil.

Bus Bodies Made by Body Makers

Editor THE AUTOMOBILE:—Can you give us the address of some one who manufactures a hotel bus which carries from eight to ten passengers? Give name of a manufacturer who makes the chassis and one who makes the body?

Salisbury, N. C. H. A. R.

—Any manufacturer of truck bodies should be able to make a suitable body for you. We know of no concern that makes a specialty of this work. You can buy a chassis to meet your requirements and then have a body built on to it according to your own ideas.

A few concerns making truck bodies are:

Borbein Auto Co., 2109 N. Ninth street, St. Louis, Mo.
Highland Body Mfg. Co., Elmwood place, Cincinnati, O.
Peters Wagon & Auto Works, Baltimore, Md.
Collins Vehicle Woodwork Co., 3900 Chouteau avenue, St. Louis, Mo.
Cooling Carriage Co., 402 French street, Wilmington, Del.

Description of Piping on Cadillac Eight

Editor THE AUTOMOBILE:—Will you please explain and show by diagram, if possible, how the piping is arranged on the eight-cylinder Cadillac? It would seem to me that there would be some difficulty in arranging the different pipes so that they do not interfere with each other.

Norwalk, Conn. E. J. V.

—A diagram of the piping is shown in a simple manner in Fig. 2. The intake piping is short and simple, the carbureter being placed directly between the cylinder blocks and short pipes from it connecting with each set of four cylinders. Two separate exhaust pipes are used so that there will be no danger of interference. The water piping is also very simple and direct. There is a separate pump for each cylinder block, as shown, and the inlet and outlet connections to and from the radiator are short pieces of hose. Gasoline piping is standard, the tank being located at the rear of the chassis and the fuel being forced to the carbureter through air pressure supplied by a small pump.

Origin of the Word Automobile

Editor THE AUTOMOBILE:—We have been unable to ascertain after considerable inquiry the original cause for the use of the word automobile, and how it originally became connected with the vehicle we know by that name today. Can you tell us?

Memphis, Tenn. THOS. H. SMART.

1—The word Automobile comes from two words; one Greek and the other Latin. The two words are auto and mobile. The former is derived from the Greek autos, meaning self and the latter from the Latin mobilis, adverb, movable. This is originally derived from the Latin verb, moveo, movero, movi, motus, meaning to move. We are unable to say who first suggested this word as the name for self-propelled vehicles.

High-Compression Motor More Powerful

Editor THE AUTOMOBILE:—1—What is the difference between a low and high compression engine?

2—How can I change a low-compression motor to a high compression one?

Canton, N. Y. A. W. E.

—1—The terms low and high used in this sense are, of course, purely relative. A motor with 40 pounds compression might, however, represent one limit and one with 100 pounds the other limit. Fifty to 60 pounds compression is the average.

The low-compression motor gives smooth running, it is easy to crank and the stresses in it are not large, but it is not so economical nor so powerful as the high compression design. The latter is more liable to overheat and to knock.

2—The compression may be raised by several methods. It is hardly advisable to make this change because your motor has been designed for a certain compression and if you raise it, say 10 pounds, you will submit the cylinders to a greater strain than they were designed for; the pressures on the cylinder walls will be greater and the wear on the bearings more. If your motor is not giving the power you should find out what is the matter with it rather than raise the compression.

Probably the best method is to rivet a plate to the top of

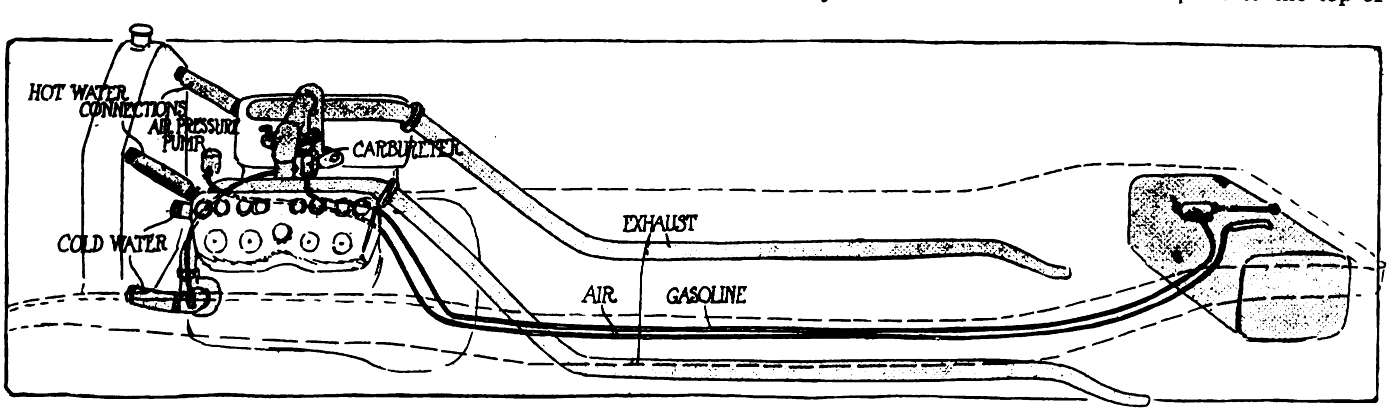


Fig. 2—Diagram showing the piping on the Cadillac eight-cylinder car

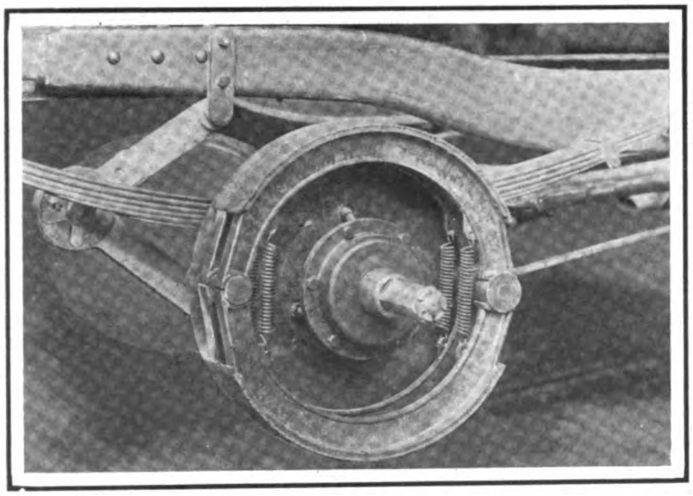


Fig. 3—Illustration showing the construction of dual expanding brakes

the piston or the cylinder, whichever is more convenient. Placing the plate on the piston adds weight to the reciprocating masses while if it is attached to the cylinder head there is danger of interference with the flow of the gases in and out. In either case, be sure that there is clearance enough between the piston and the cylinder to allow the plate to be put into place. If the plate is attached to the piston it should be made of aluminum for the sake of lightness.

Lengthening the connecting-rods or increasing the crankshaft throws will also increase the compression. But neither of these methods are as simple or as cheap as the first one suggested.

Motor Vibration Reduced by Weighing Parts

Editor THE AUTOMOBILE:—I am planning to overhaul my car this winter and as it vibrates greatly at speeds above 20 miles per hour I would like to know if there is any way of reducing it?

Elyria, O. SUBSCRIBER.

—This is largely a question of bringing the reciprocating parts to the same weight. Remove the pistons and the connecting-rods. Weigh all the pistons with the wristpins, and remove metal from the heavier ones until they are all exactly the same weight. Do the same with the connecting-rods.

Advantages of Dual Expanding Brakes

Editor THE AUTOMOBILE:—I note that some cars have both sets of brakes placed inside the rear wheel drums, and that both sets are expanding instead of having contracting bands on the outside and expanding bands on the inside. Will you please illustrate this construction and explain its advantages?

Norfolk, Va. J. A. BARNES.

—Fig. 3 shows how the double expanding brake construction is applied to the Stutz. The two sets are identical and both are operated by cams. The main advantage of this construction is that both sets of brakes are protected from dust, dirt, mud and oil.

Missing Caused by Cold or Dirt

Editor THE AUTOMOBILE:—Can you please tell me what the trouble is with an R. C. H. car which acts as follows: It will run perfectly for a mile or longer, then go badly. Going up grades, or fast on the level, it acts worst. It will either backfire, skip or choke up, with the carbureter adjusted the best that any of the automobile experts here can do. It has a new Model B Stromberg carbureter, new Never-leak rings and new plugs, also new points on the timer. The motor will run until it gets so bad that it will die with the clutch out. Then if I get out and crank the machine, it will go perfectly until speeded up or long grade is made. It acted about the same with the old carbureter. When it is working right it has good power.

Lowville, N. Y. CHAS. A. RUMBLE.

—There are two possibilities. If you have no hot air attachment on this carbureter, the poor running may be due to condensation of the fuel in the intake pipe. If this is so you should buy a hot air connection. It is a simple matter to install it.

It may also be that there is dirt in the fuel line. When this dirt gets under the float valve it causes flooding of the carbureter and missing, and may stop the motor, and at other times some of the dirt may obstruct the passage of the fuel in the pipe or up through the spray nozzle, giving a weak mixture and producing back fires.

Steel Disk Clutch Coefficient .07

Editor THE AUTOMOBILE:—1—What is the coefficient of friction between the polished steel disks of a well-lubricated multiple-disk clutch? I have accepted same to be 0.036.

2—Does the experience gained from automobile clutches verify this figure?

Waynesboro, Pa. G. A. ANDERSON, M. E.

—1—The coefficient of friction depends on the conditions of the surfaces, the viscosity of the lubricant and the pressure between the disks and therefore it is difficult to give a figure for the coefficient or friction. Probably .07 is a good average value, however.

2—The coefficient of .036 might be found to obtain in certain cases.

Spaulding Car Has Bed

Editor THE AUTOMOBILE:—Will you please advise me if you know of any automobile that is made with the backs of the front seats adjustable so they can be laid back flat. The idea would be to have the seats laid back and make a place to sleep. A man told me he had a car of this kind, but whether it was made to order or purchased from stock, I do not know.

Garyville, La. C. M. WEEKS.

—A National runabout fitted with such a body built to order was described and illustrated in the August 6, 1914 issue page 275. The Spaulding touring car, made by the Spaulding Mfg. Co., Grinnell, Ia., also is made with a body similar to the one you suggest. This was described in the July 16, 1914 issue, page 125.

Leather Strips Prevent Body Squeaks

Editor THE AUTOMOBILE:—Would it be a good plan to put between the bolted on parts of an automobile some material that would help to eliminate the everlasting squeak that is almost always present? Do you know of anything that would be good to use for this purpose?

Augusta, Maine. GEO. E. GAY.

—If you are referring to body squeaks these may be eliminated by placing leather or lead strips between the parts that are causing the noise. There is no objection to the use of these strips except that it is a certain amount of trouble to apply them.

Wants Starter for Buick

Editor THE AUTOMOBILE:—I have a 1913 Model-25 Buick, and would like to have you recommend a starter which could be installed on this car at a reasonable price, and which would give satisfaction.

Nashville, Tenn. K. C. HARDCASTLE.

—Below is a list of starters taken from the *Automobile Trade Directory*, one of which you might use. All types are included because you have not given very definite information as to the kind you want.

Compressed Air

Auto Air Appliance Co., Annapolis, Md.
Crescent Co., Detroit, Mich.
Gemmer-Detroit Starter Co., Dime Bank Bldg., Detroit, Mich.
Ham-Meix Mfg. Co., West Eleventh street, Indianapolis, Ind.
Janney Steinmetz & Co., Philadelphia, Pa.
Kellogg Mfg. Co., 3 Circle street, Rochester, N. Y.
Lipman Mfg. Co., 211 Pleasant street, Beloit, Wis.
Manzel Bros. Co., 320 Babcock street, Buffalo, N. Y.
Thurber Rotary Starter Co., Detroit, Mich.

Electric

Adams Bagnall Electric Co., Cleveland, O.
Apple Electric Co., Newark, N. J.
Dayton Engineering Laboratories Co., Dayton, O.
Dyneto Electric Co., Syracuse, N. Y.
Electric Auto Lite Co., Toledo, O.
Emerson Electric Mfg. Co., 2024 Washington avenue, St. Louis, Mo.
Fisher Electrical Works, Detroit, Mich.
Gray & Davis, Boston, Mass.
Hartford Suspension Co., Jersey City, N. J.
North East Electric Co., Rochester, N. Y.
Remy Electric Co., Anderson, Ind.
Rushmore Dynamo Works, Plainfield, N. J.
R. C. Wells Mfg. Co., Station A, Fond du Lac, Wis.
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

Hand

Automatic Appliance Co., 162 Columbus avenue, Boston, Mass.
Bremer Wilson Mfg. Co., 1421 Michigan avenue, Chicago, Ill.
Knapp Bros. Starter & Equipment Co., 24th and Central avenues, Minneapolis, Minn.
National Motor Device Co., 3901 Ellis avenue, Chicago, Ill.
Perfection Auto Starter Co., 1551 Broadway, Denver, Colo.
Sanbo Starter Co., Bennett, Iowa.

Spring

American Ever Ready Co., 316 Hudson street, New York City.
Automatic Devices Co., Galesburg, Ill.
Elder Mfg. Co., 2305 N. Illinois street, Indianapolis, Ind.
Gardner Engine Starter Co., 1451 Michigan avenue, Chicago, Ill.
Modern Auto Starter Co., 2127 Indiana avenue, Chicago, Ill.
J. W. Tudor, 35 Congress street, Boston, Mass.

Quantity of Acetylene to Drive Ford

Editor THE AUTOMOBILE:—1—Regarding using acetylene gas from Prest-O-Lite tanks or carbide generator to run a Ford in an emergency, for cold weather starting would it take more or less than the two headlights use?

2—Would it damage the engine to turn it on full force?

3—How far would a cubic foot of gas run a Ford?

Danforth, Me. H. H. LANE.

—1—Much more gas would actually be required for running the motor but in the course of a week or month probably the total consumption of acetylene by the lights would be greater.

2—It would hardly damage the motor but it might give too rich a mixture for combustion.

3—Approximately 600 feet with throttle wide open. This is figured as follows: A cubic foot of gas requires 2.5 feet of pure oxygen according to the chemical equation, acetylene, 2 C_2H_2 + oxygen, 5 O_2 = water, 2 H_2O + carbon dioxide, 4 CO_2. In other words five volumes of oxygen are required for every two of acetylene and since oxygen comprises approximately one-fifth of the air, twenty-five volumes of air are required for every two of acetylene, that is, for every cubic foot of acetylene 12.5 cubic feet of air are required. In other words 12.5 plus 1 cubic foot of gas must be taken into the cylinders. If the cylinders of the Ford took in full charges each time, the motor would consume 176.7 cubic inches or .102 cubic feet every two revolutions or 13.5 cubic feet of mixture would rotate the motor 265 revolutions. With a gear ratio of 3.64 to 1 this would correspond to 72.8 revolutions of the rear wheels. Since the wheels are 30 inches in diameter, in one revolution they will traverse a distance of 94.5 inches or approximately 8 feet and this multiplied by 72.8 gives 584 or nearly 600 feet. This figure is based on the assumption that the throttle is wide open: with the throttle only partly open the car would be driven much farther.

How to Adjust Matheson Steering

Editor THE AUTOMOBILE:—Will you please explain the adjustments on the steering gear used on the Matheson Silent Six?

Toronto, Ont. A. B. KEYS.

—Fig. 4 illustrates this steering gear. The principal adjustment is that which compensates for wear in the worm and sector. This is provided for by means of an eccentric bushing which is securely locked by a small headpin which engages notches milled in the head of the bushing. By removing the clamping bolts of these pins and removing the pins the thickness of the heads so as to clear the head of the bushing, the bushing may be turned around so as to move the sector either into or away from the worm, giving the adjustment for wear. The adjustment of the column vertically can be made by loosening the clamping bolt A on the collar B and by screwing this collar up or down the ball bearings may be adjusted.

The motion of the wheels is limited by two set screws C, which are adjustable stops for the steering gear and thus limit the motion of the front wheels.

Average Tire Mileage, 5,199 Miles

Editor THE AUTOMOBILE:—Have you any information at hand regarding the life of pneumatic tires, both shoes and tubes?

Mt. Vernon, N. Y. E. H. C.

—According to an extensive test made by W. A. Weygandt, Akron, O., an account of which is given in the October issue of the Automobile Trade Directory, the average mileage per set is 5,199. The average number of casings replaced for any and all causes is three-fourths of one for each set of tires used. The average life of an inner tube is found to be 8,543 miles. Ten different makes of tires were investigated, the number of sets of each make varying from forty-three to three, the total number of sets being 145. The highest mileage by any one make was 6,221 while the lowest was 2,816.

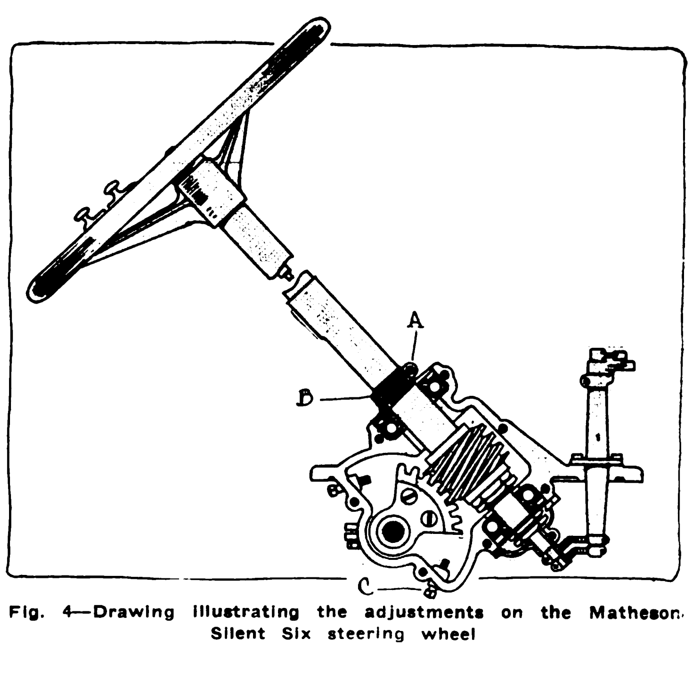
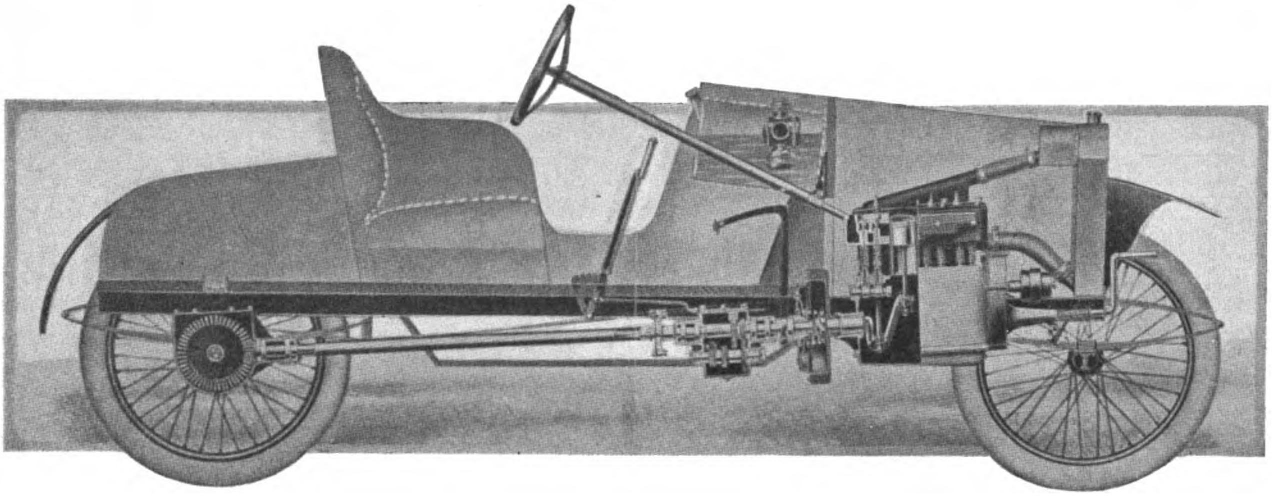


Fig. 4—Drawing illustrating the adjustments on the Matheson Silent Six steering wheel

Four-Cylinder Argo $295—Has Shaft Drive



Four-cylinder Argo, showing power plant, two-speed sliding gearset, shaft drive and fuel tank in dash

IN bringing out the Argo car, Benjamin Briscoe and his associates in the Argo Motor Co., Inc., Jackson, Mich., have undoubtedly reached a very low price level, the machine being offered at $295. It is equipped with a four-cylinder, water-cooled motor, has shaft drive and a sliding gearset. The total weight is given at 750 pounds, the wheelbase is 90 inches and tread 44 inches. Cars are now being produced at the plant in the Michigan city, and it is expected to soon get under way at a good rate.

Motor Characteristics

The motor 2 15-16 by 4, is of the L-head type having cylinders and crankcase cast in one block. Access to the crankshaft bearings is through the plate at the bottom of the case. Three-point suspension is used.

The car drives from the left, and spark and throttle levers are on the steering column. With gearshift in the center, and with a single pedal to operate the clutch and braking system, the operation of the car is made very simple. The brake drums are 8 inches in diameter.

Wire wheels are fitted, and they carry 28-inch tires. Only one body type is fitted, that being the open-sided roadster which gives comfortable accommodation for two passengers, the seat measuring 24 by 42 inches, and there being 38 inches of leg room.

Gasoline consumption is low, figuring to from 35 to 40 miles per gallon, it is said. Speeds anywhere from 5 to 40 miles an hour are attainable on level ground, while the car can negotiate a 10 per cent. grade on high gear.

Top and windshield are supplied at an additional cost of $20.

The motor, which has a horsepower of from 8 to 12, is a good example of the development which has come in the last year or so in the making of the small four-cylinder type. The moving parts, valves, camshaft, crankshaft, pistons and connecting-rods are all designed along the same lines as larger motors.

In order to combat vibration, to insure against excessive wear and to allow of high piston speeds, the reciprocating parts have been made light in weight, the total for piston, rings, wristpin, connecting-rod, bolts and bearings being less than 2 pounds, it is claimed.

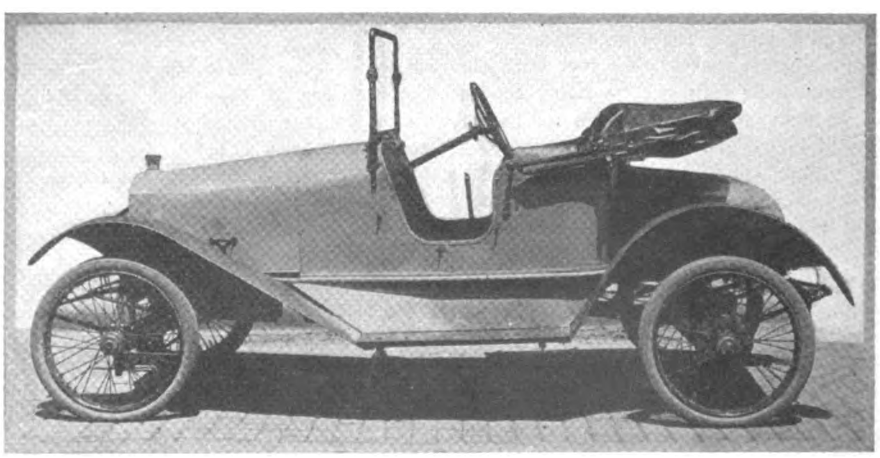
The valves on the right have a diameter of 1 3-16 inches. They are interchangeable, have adjustable push rods, and tappets bearing on the cams. The crankshaft, of carbon steel, works in two main bearings. The front one measures 1 3-16 inches diameter by 1 5-8 inches length, and the rear is 1 3-8 by 2 inches. Drop forged connecting-rods are 9 inches long and have two-bolt strap ends and connect to the pistons by 1-2-inch steel pins. Camshaft diameter is 1 inch.

The motor uses Atwater-Kent ignition apparatus, gets its gasoline by gravity feed from a 6-gallon tank under the cowl, is cooled by thermo-syphon in connection with a honeycomb radiator, and is lubricated by a self-contained, constant-level system in which the rod ends splash oil to the bearing surfaces and the level is maintained by a cam-operated plunger pump. The oil reservoir capacity is 6 quarts.

The motor is not of the unit power plant type, the gearset being placed amidships and hung from the frame. Consequently, the flywheel is not housed in, and in it is placed the internal cone type of clutch which is leather faced.

The sliding gearset provides two forward speeds, and reverse. The control lever is in the center.

Back of the gearbox, the propeller shaft is fitted with a universal joint, after which it enters a torsion tube attaching at its rear end to the rear axle housing. This tube takes the drive. The rear axle is semi-floating and has bevel drive with a ratio of 4 to 1, the gears being of chrome vanadium steel and shafts carried on ball bearings. Elliptic springs are used front and rear.



Side view of Argo, showing wire wheels, left drive and center control

The Engineering Digest

Slidable Camshafts—In This Case Arranged for Compression Relief Only

AMONG the more obvious means for securing reserve speed and power for a motor intended to be operated normally at a maximum of, say, 1,000 revolutions per minute, an arrangement for having the camshaft slidable and the cams formed so as to produce different valve-timing at different motor speeds is frequently contemplated, although some unsolved problems with regard to the shaping of the cams and tappet rollers are involved, as well as new dispositions for bringing the gear speeds into harmony with the desired vehicle speeds in each case and with the enlarged range of useful motor speeds. As against these difficulties, the advantages to be gained by a practicable consummation of the plan seem sufficiently important—in the way of reduced motor dimensions, improved fuel economy and efficiency at all speeds and reduced wear or deterioration of the motor speed selected as normal—to make designers pay considerable attention to the problem, and sooner or later motors may therefore be looked for to appear which may be operated with full volumetric efficiency and suitable valve-timing at any speed between 600 and 2,500 revolutions, for example. The fact that slidable camshafts are also employed, as by Saurer and the Panhard firm, in order to utilize the motor for braking purposes on long declivities, and for facilitating motor-starting by relieving the compression, renders the question of the most suitable mechanical means for sliding the camshaft only so much more actual, and on these grounds there is presented herewith the construction used for this purpose in Drayson motors, which are among the very few made especially for commercial vehicles in England.

These motors are made in a variety of models having 1, 2, 4 or 6 cylinders, and the illustration of the camshaft mechanism, in Fig. 1, refers to the 25-horsepower, 4-cylinder model with 4 1-8 by 4 1-2 inch bore and stroke. The object of the construction is solely to afford means for compression relief by lifting the exhaust valve slightly during the compression stroke. The *Automobile Engineer* of October 8 describes this mechanism as follows: "A large inverted tooth chain sprocket is mounted in a bearing housed in the crankcase, the camshaft carrying a long key which is made a sliding fit inside the sprocket and the sleeve attached thereto. On the other end of the shaft the bearing is capped, and a spring tends to keep the shaft pressed permanently forward, where the normal cam profile is in operation. The limit of movement imparted to the shaft by the spring is set by a collar on the shaft abutting against a ball thrust-bearing which is just discernible in the drawing, being shown in solid black at the back of the sprocket bearing. A very simple lever with a hand control is mounted outside the crankcase, the short end of the lever bearing directly upon the camshaft, so that by pulling the hand stirrup the compression release is brought into operation."

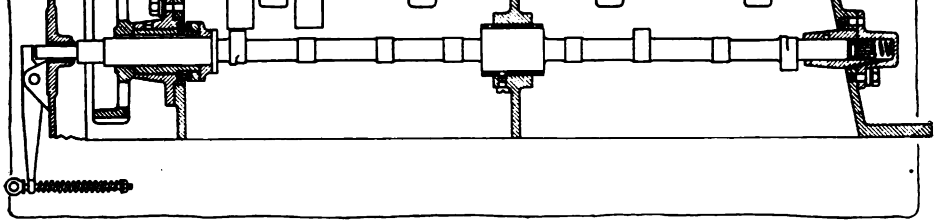


Fig. 1—Construction for sliding the camshaft in Drayson commercial vehicle motors

Decarburization of Steel Heated in Alkaline Salt Baths

IN a paper to the Iron and Steel Institute the well-known metallurgist A. M. Portevin of Paris describes the experiments by which he has ascertained that high-carbon steels suffer a considerable loss of carbon in their surface layers if they are heated in baths of molten alkaline salts, as is now common practice for the hardening operation in the case of gears and other delicate parts which should be heated very evenly in order to avoid distortion in the subsequent quenching bath of oil or water. The great rapidity with which the heating may be effected by this practice has also extended its adoption on purely economical grounds. The baths to which Portevin refers are in some instances composed of chloride of potash only, in others of chloride of potash and chloride of sodium with small admixtures of soda and ferrocyanide of potash, and in still another series of tests simple cyanide of potash is used instead of the ferrocyanide and 3 per cent. of cyanate of potash is added. In no case is the use of salts of barium mentioned.

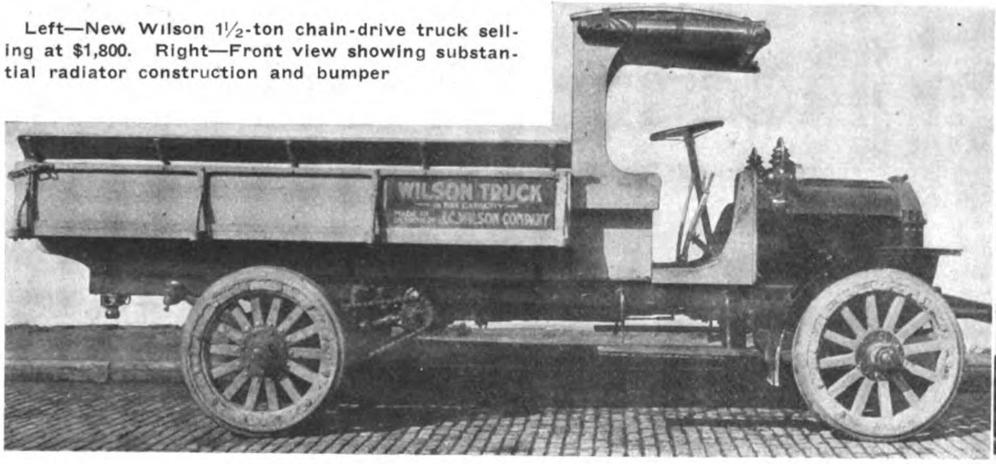
It was shown, for example, that a steel containing 1.46 per cent. of carbon came down to a carbon content of 0.9 at the surface by a 15 minute immersion in the bath, to 0.4 in two hours and to 0.2 in 5 hours; similarly that a 0.78 per cent. carbon steel came to a carbon content of only 0.5 per cent. in 15 minutes and that the decarburized layer after that length of time in the bath was from 0.1 to 0.2 of 1 millimeter thick.

On the other hand, if carbon-free Lancashire iron was immersed in the bath together with the steel, the iron absorbed carbon from the bath to a considerable extent. This was not the case, however, when cyanate of potash was added.

The depth of carburization and decarburization as well as the comparative carbon contents of the different layers were in all instances determined under the microscope from hardened, polished and etched samples.

Hardening in Cyanide of Potash

A RECIPE, probably borrowed from American practice, is given in *Werkstattstechnik* of August 15 as follows: To produce in a convenient manner a tough and hard surface on small cast-iron machine parts [perhaps the author refers to malleable iron parts—Ed.] which are subject to wear, such as small pinions and cams, they are heated to dark red and quenched in a saturated water solution of cyanide of potash which is maintained at a temperature as near boiling as possible. This is done most handily by placing the solution in an iron jar at the fire in which the pieces are heated.



Left—New Wilson 1½-ton chain-drive truck selling at $1,800. Right—Front view showing substantial radiator construction and bumper

Accessibility and Simplicity Features of New Wilson Truck

Four-Cylinder Block Motor Used in 1 1-2 Ton Truck for $1,800—Combined Gearset and Jackshaft

THE J. C. Wilson Co., Detroit, Mich., long identified with the automobile industry in body-painting and trimming branches, has entered the motor truck field with a 1 1-2-ton truck listed at $1,800. This is an assembled truck including Continental block type motor, Covert combined gearset and jackshaft together with other standard parts. The truck is made with a wheelbase of 130 inches, has left drive, with center control, the motor is carried under a conventional hood with a radiator in front, and the driver occupying the same relative position as in a touring car, a cab with side and front curtains being furnished as part of the regular equipment. Final drive is by chain. The body is so located that the rear axle is almost under the middle of the load-carrying platform.

Accessibility and Simplicity

In designing this truck accessibility and simplicity had been the two factors kept in mind, and although the truck is an assembled product, it incorporates a number of special designs in the mounting of the different parts, such as motor and gearset. The most interesting of these is that of the gearset, which is a three-speed selective type, having the gearbox bolting to the differential housing on the jackshaft. It may really be regarded as a three-point suspension in that none of the strains due to frame weaving or inequality are transferred to these parts. Instead of rigidly mounting the outer ends of the jackshaft to the frame, ball-and-socket joints are used, which relieve the constructional strains. These two mountings, together with the unique suspension of the front end of the gearbox to a combination torque member and support make up the three-point arrangement.

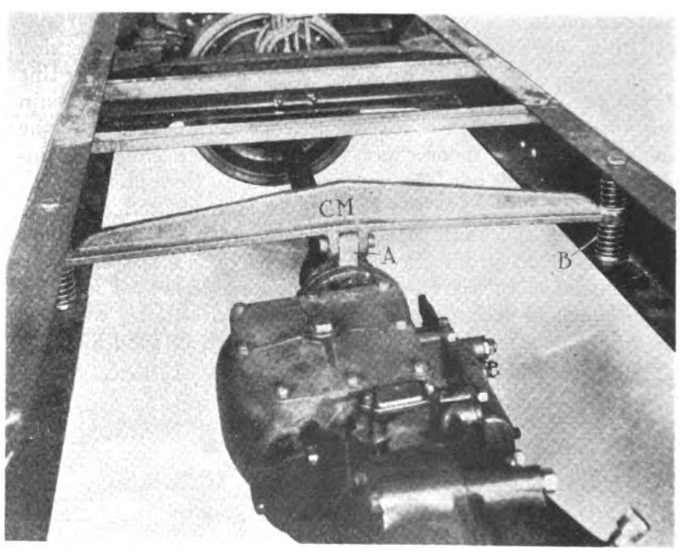
Eliminating Shocks to Jackshaft and Gears

The front gearset support is illustrated. A cross member suspends the transmission unit at its center by means of a pin connection, while the ends of this cross-piece are carried in spring buffers in the frame. Thus vibrations, driving shocks tending to twisting and road jars are not transmitted to the jackshaft or gears. By removing the pin making the connection between the gearbox and the cross-piece, the entire unit may be swung downward after the drive shaft is disconnected. This makes adjustment or inspection a simple matter.

Another place where frame weaving would cause binding has been cared for. This is the cross-shaft which serves to throw out the clutch. The ends of this shaft are carried in sockets which allow longitudinal turning of the shaft, while the sockets themselves are vertically hinged to the frame. Motion in either direction is possible, therefore, and binding cannot take place.

Both Brakes on Rear Wheels

Another commendatory feature is the elimination of brakes on the jackshaft, both emergency and service sets being placed to act on the rear wheels. This takes any brak-



Wilson 1½-ton truck, showing unique mounting of front end of gearset. The cross member C M holds it up in position through connection A. This member is supported at either end in the frame through the spring buffers B. Thus, the vibration and road shocks are not transmitted to the gearset and jackshaft. By removing the pin at B and disconnecting the propeller shaft, the entire gearbox and jackshaft may be swung downward for inspection or adjustment ing strain off the jackshaft or chains when stopping. Large size drums 14 by 2 1-2 inches are used.

Three-Point Suspension

The motor, a Continental block-cast type, 4 1-8 by 5 1-4 is suspended at three points in a rather unusual way. Integral crankcase arms are not employed, there being separate cross pieces front and rear. These rest upon brackets attached to the frame side members, and at each point of attachment there is a single bolt going through cross member and bracket. Therefore, in order to lift the motor from the frame after the drive is disconnected it is only necessary to take out the four cross arm holding bolts. With this method of attachment to the frame, three-point support is attained by hanging the front center of the motor to the center of the front cross piece, while it is suspended from the rear member by a bolt at either side of the crankcase.

Three-Bearing Crankshaft

The motor has three-bearing crankshaft and camshaft, drives the latter by gears at the front as well as the magneto and pump shaft on the right. Valves are on the left and their stems and springs are completely inclosed by plates.

Cooling includes a substantially-mounted centrifugal pump, the bearing for which is cast as a part of the crankcase rather than having the pump assembly bolting to the crankcase. This makes the pump more rigid and is a preventive of leakage due to absence of vibration. The radiator, has the tanks bolted to the shell, while the core is of tubular type. The whole is mounted on springs which relieve it of vibration.

Constant-Level Splash Lubrication

Motor lubrication is by a constant-level splash system whereby the splash troughs are kept at a given level by an oil pump getting its supply from a reservoir. Ignition by high-tension magneto is also used.

The Wilson truck employs a cone clutch, back of which the drive is conveyed to the jackshaft through a tubular propeller shaft having an external diameter of 1 3-4 inches. This tubular construction is not new to automobile construction and is just coming into vogue for truck work. Aside from its lightness, such a shaft tends to reduce whipping to the minimum. Two spicer joints are fitted, one just back of the clutch and the other ahead of the gearset. The gears have a face width of 1 inch.

Solid Tires Used

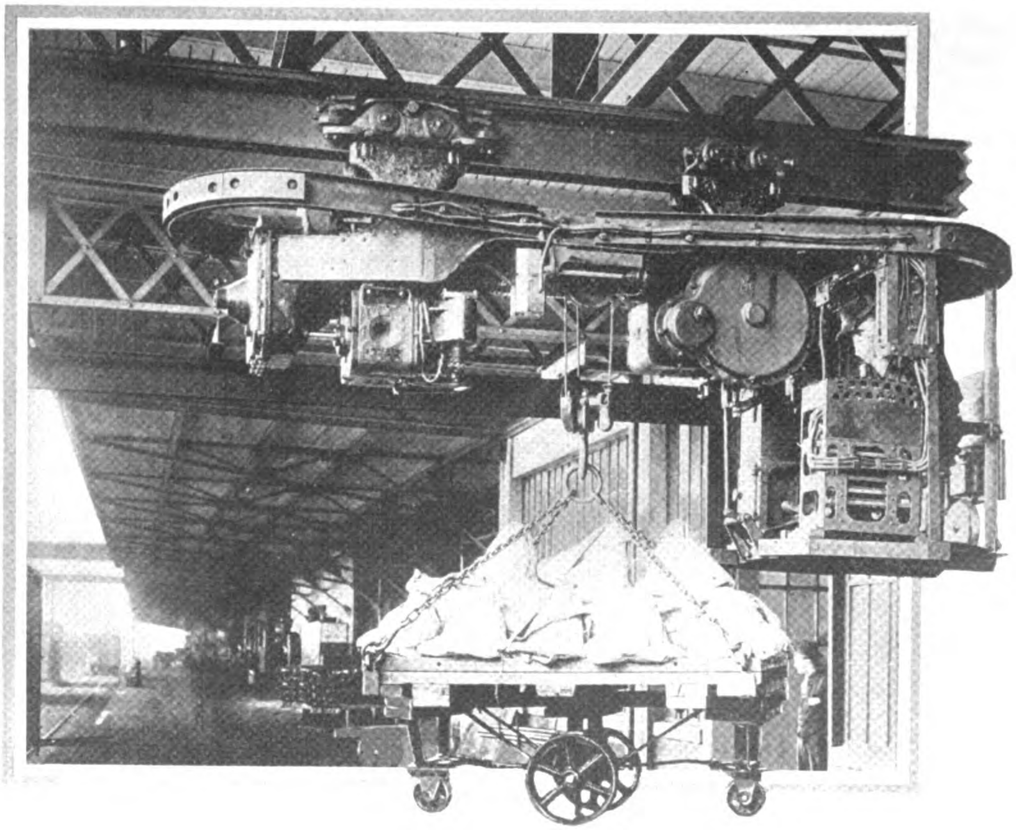
The running gear is exceedingly substantial and incorporates an I-beam front axle which has wheel spindles measuring 2 inches in diameter at the inner bearing and tapering to 1 7-8 inch at the outer; a dead rear axle having a section 2 3-4 by 1 3-4 inches with spindle dimensions at bearings 1-8 inch larger in diameter than in the front axle; artillery type wood wheels with twelve 2-inch square spokes in front, and fourteen 2 1-4 inch square in the rear. The tires are solids, the 37 by 3 1-2-inch size being used in front and 37 by 5 in the rear.

Self-Lubricating Springs Used

The frame is strongly made and braced, gusset plates assisting the cross members. The channel is 5 1-2 inches deep with a 2 1-2-inch flange, the stock being 3-16 inch. Spring suspension is by full shackled half elliptics which are made by the Detroit Steel Products Co. These have indentations in the leaves which are filled with lubricant on assembly, making them practically self lubricating. This feature together with the large number of thin leaves should make for utmost resiliency, a desirable point. The springs measure 42 by 2 1-4 front and 50 by 2 1-2 rear.

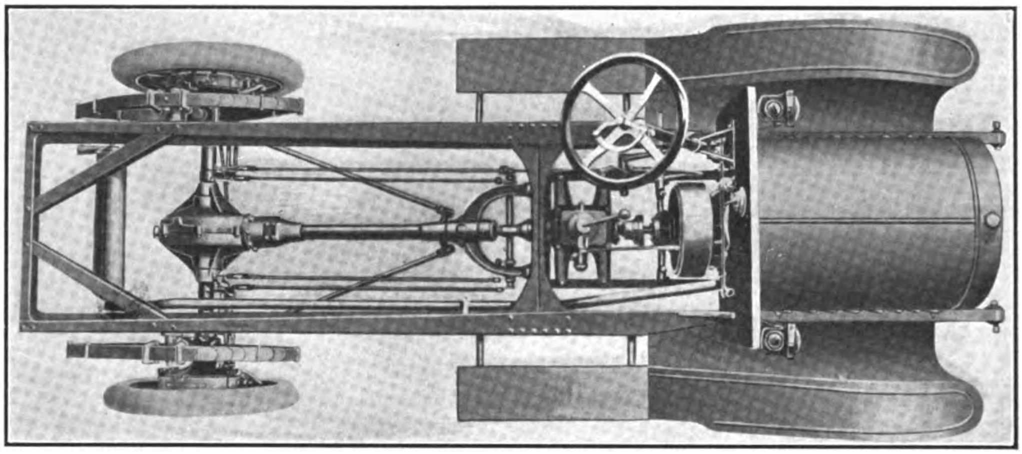
Monorail Conveyors Save Time and Labor Moving Heavy Loads in Dodge Plant

¶ The illustration at the right shows one of the Monorail conveyors employed in the factory of Dodge Brothers, Detroit, Mich. These Monorail cars run on overhead tracks, quickly and easily moving heavily loaded trucks from distant sections of the factory to the loading platform where their burdens are packed for shipment. Each of these cars does the work of from ten to twenty men. The method of operation is readily seen from the illustration, while the figure of the workman in the right hand lower corner gives an idea of the dimensions of the conveyor and its load.



G. M. C. 1,500-Pound Chassis for $1,090

Is Gasoline Type—Driver's Seat and Full Road Equipment, But No Body—With Express Body $1,215



Plan view of new G. M. C. 1,500-pound gasoline truck chassis which sells without body for $1,090

THE General Motors Truck Co., Pontiac, Mich., is now offering a 1,500-pound gasoline truck chassis for $1,090. This is without body of any kind but includes driver's seat, and full road equipment. It is also offered with flare board express body 45 by 98 inches inside for $1,215. In addition to the capacity rating of 1,500 pounds which refers to the load only, a body allowance of 750 pounds is permissible on the chassis. The complete chassis weight without body is given at 2,360 pounds.

The truck is an example of good truck engineering for the class of service which such a vehicle would naturally be called upon to perform, and its parts are amply heavy for such work. From the power plant, the power goes back through an inclosed propeller shaft to the rear axle, there being no jackshaft construction.

Four-Cylinder Block Motor

The engine is a four-cylinder, block-cast, L-head design having cylinder dimensions of 3.5 by 5 which has an S. A. E. horsepower rating of 19.6. It is capable of propelling the truck under load at speeds up to 20 miles per hour and is specially built for its heavy duty work. The power plant is three-point suspended and is located under a hood in front of the seat.

The motor is conventionally designed throughout and its working parts are constructed of excellent materials. The three-bearing crankshaft is a drop-forged nickel steel part and its bearings are of bronze-backed babbitt as are also the connecting-rod bearings. Camshaft and connecting-rods are also drop forgings, while pistons are gray iron castings fitted with three rings and having a length of 3 3-4 inches. The piston pins are hardened and ground and work in bronze connecting-rod bushings, they being fixed to the pistons. Helical timing gears drive the camshaft and magneto and pump in the regular way. The valves are of 1 11-16 inch diameter and all of the valve mechanism is completely inclosed.

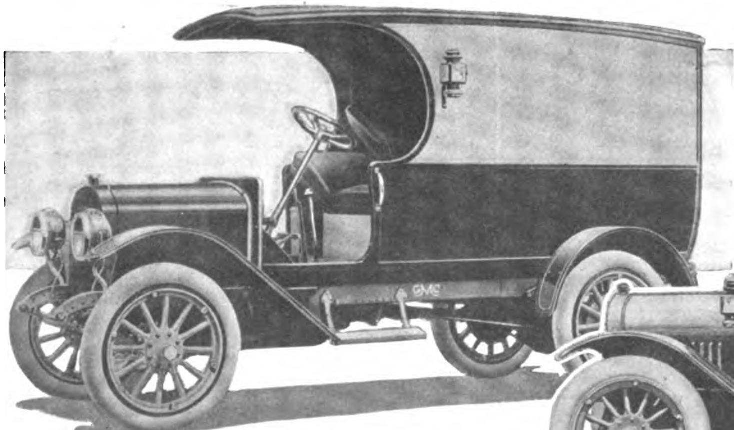
The oiling system incorporates a combination force feed and constant level splash arrangement whereby a plunger pump driven by an eccentric on the camshaft supplies oil to the timing gears. The oil drains back to the constant level splash pans under the connecting-rods for lubricating by splash the pistons, connecting-rods, crankshaft and camshaft bearings.

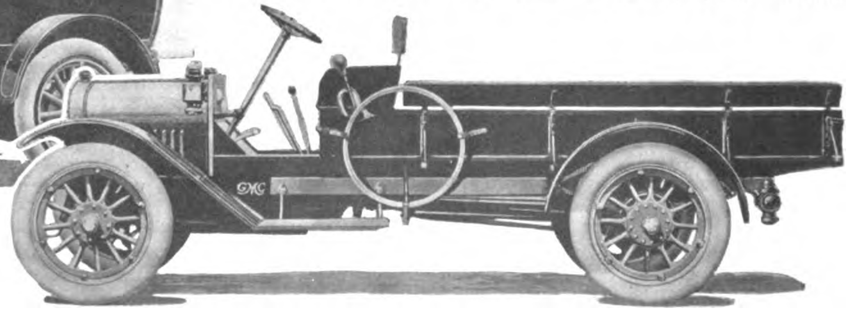
A substantial tubular radiator specially designed for truck service is the main cooling agent, being aided by the centrifugal pump and the ball bearing, belt-driven fan. The ignition system is of the single type with jump spark.

Back of the motor, the power is transferred to the rear through a cone clutch acting in the uninclosed flywheel. The clutch is leather-faced and has spring inserts to effect gradual engagement. Between the clutch and the gearset which is located amidships on the end of the motor subframe, there is a universal joint which is an advantage for transmission efficiency.

Three-Speed Gearbox

The gearset, with its levers directly over it for center, control is of the three speed selective type. The gears are of heat-treated nickel steel while the shafts are of a high carbon steel carried on ball bearings. Back of the gearbox, the propeller shaft enters a torsion





Above—New G. M. C. delivery type on 1,500-pound gasoline truck chassis
Right—Flare board express body type

tube fitted with a yoked front end hinging to the frame cross member. There is another universal between the torque tube and the gearbox. Radius rods run from the outer ends of the rear axle housing to the front end of the torsioin tube, giving a strong construction.

The rear axle to which the tube bolts through flange construction is of the three-quarter floating type with fixed drive shafts of heat-treated nickel steel. Brakes are in the rear wheel drums, external contracting and internal expanding.

The steering is on the left, operating by means of a screw and nut mechanism of irreversible type. The wheel gives ample leverage with its diameter of 17 inches.

The frame is substantially built of open-hearth pressed steel with strong bracing. The center cross-member widens at the side rails to give a good riveting surface, while at the rear the cross-member is braced by pieces running diagonally across the corners.

Springing, ever important in a truck, is very resilient in this new GMC and should tend to lessen depreciation due to vibration and jarring. The rear springs are elliptic mounted on swivel hangers outside the side members of the frame. They measure 40 by 2 inches and each half has eight leaves. The front half elliptics are 36 1-2 by 2 inches.

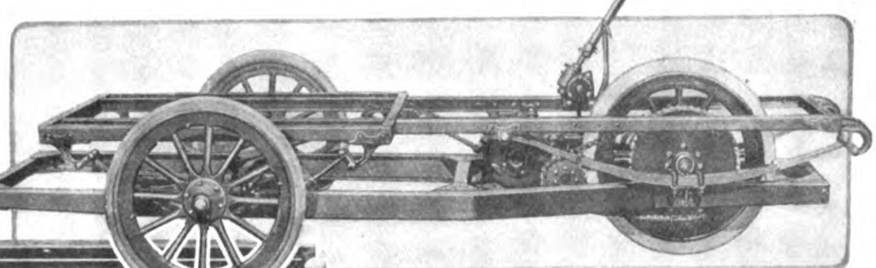
Pneumatic Tires All Around

As another factor for reducing vibration and also because of the fact that the truck is of the moderately high-speed type, the tires are of pneumatic type, front and rear, size 35 by 5. They are mounted on demountable rims which are almost a necessity when the time element in delivery work is considered.

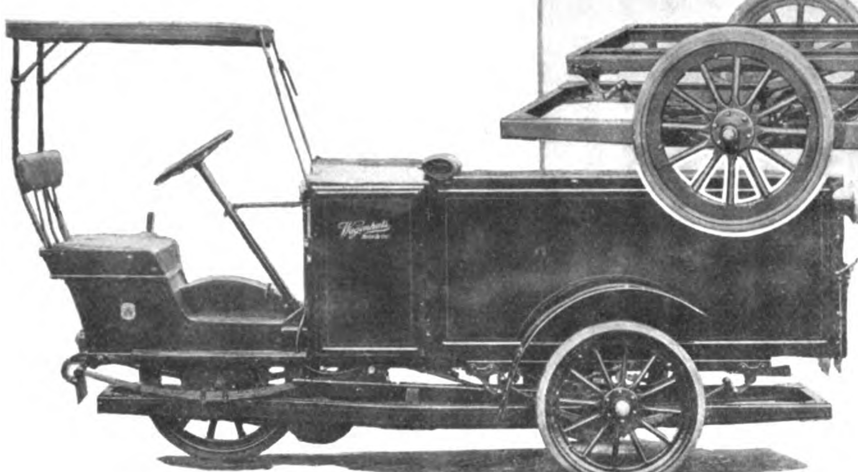
The gasoline tank, located under the driver's seat, has a capacity of 13 gallons.

The wheelbase of the new GMC is 122 inches, while a tread of 56 inches is employed front and rear.

Wagenhals Electric Delivery Car Is Three-Wheel Type



Above—Side view of chassis used in Wagenhals three-wheel light electric delivery car



Left—Electric delivery car with body mounted

AFTER much experimentation, the Wagenhals Motor Co., Detroit, has brought out a three-wheeled light electric delivery car similar in appearance to the gasoline machines of its make. The car has a rated capacity of from 500 to 800 pounds, weighs complete, 1,650 pounds and is to sell for the low figure of $575.

The frame construction used on the new car is the same in design as that on the gasoline type, there being a main frame which carries the axles and drive parts and a sprung subframe to which the body attaches. The two wheels are at the front and turn on spindles to take care of the steering, while the third wheel which does the driving is placed at the rear between the frame rails. This construction is patented.

The electric motor used is a General Electric type, rated at 24 volts and having a speed of 1,600 revolutions per minute. It is placed with its armature shaft transverse and connects through a spur gear to another shaft parallel to the armature shaft. At the other end of this jackshaft there is a sprocket which drives through a 1-inch pitch roller chain to the larger sprocket attached to the driving wheel. The reduction between the motor and jackshaft is 4 to 1 and between jackshaft and rear wheel 2.5 to 1, so that the total reduction between motor and wheel is 10 to 1. Simplicity is gained by the use of one driving wheel as no differential is required.

The battery is small, there being fourteen cells of thirteen plates per cell. The main reason for this small battery equipment is to lower weight. It is intended that two sets of cells be used with each car, one being left on charge all the time while the other is engaged in active service. This is very feasible, due to the extreme ease with which the cells may be slipped in or out.

The battery, however, is good for from 25 to 35 miles per charge, the average speed of the car being 12 miles an hour.

The controller and switches are also very accessible under the drive seat. The controller handle is at the left of the seat and operates a drum type of controller which gives four speeds ahead and two reverse. The steering gear is of the worm and gear type, irreversible. Speedometer, ammeter and voltmeter are placed on the dash.

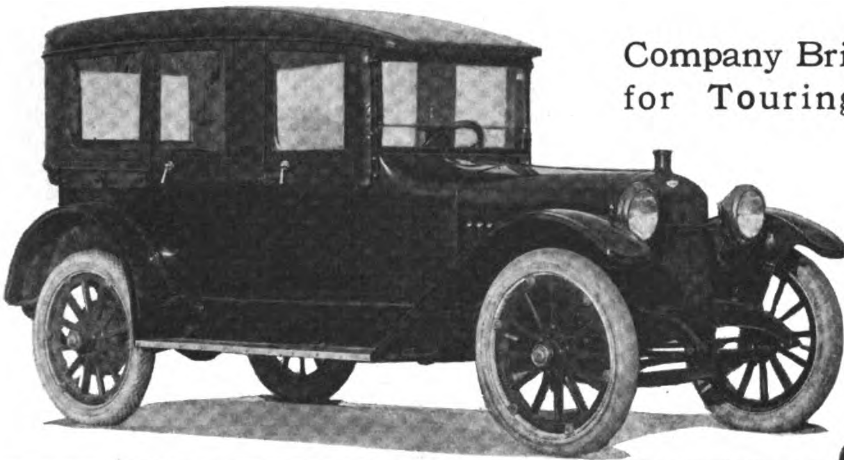
The front wheels carry 28 by 2-inch solid motor tires, while the rear is 30 by 2 1-2, also a solid. Due to the short wheelbase of the car—67 inches—it can be turned in a short space of 24 feet. This makes the car very desirable for traffic maneuvering. Tread is 56 inches.

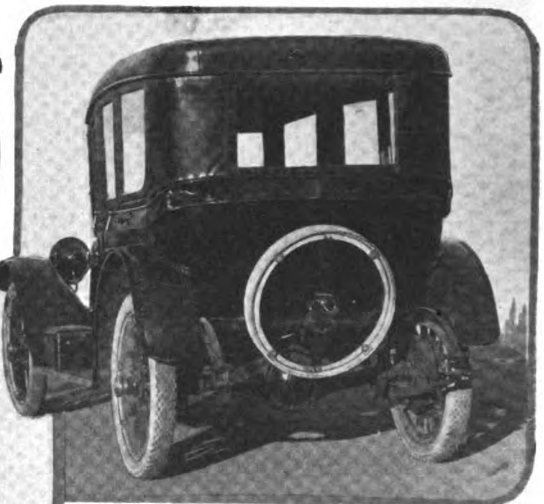
Open or closed bodies are optional. The frame is of wood, but sheet steel covers it. The inside dimensions of the loading space are 70 inches length, 35 inches width and 29 inches height. The open body is furnished with a tarpaulin cover, while a railing runs around the top of the closed job.

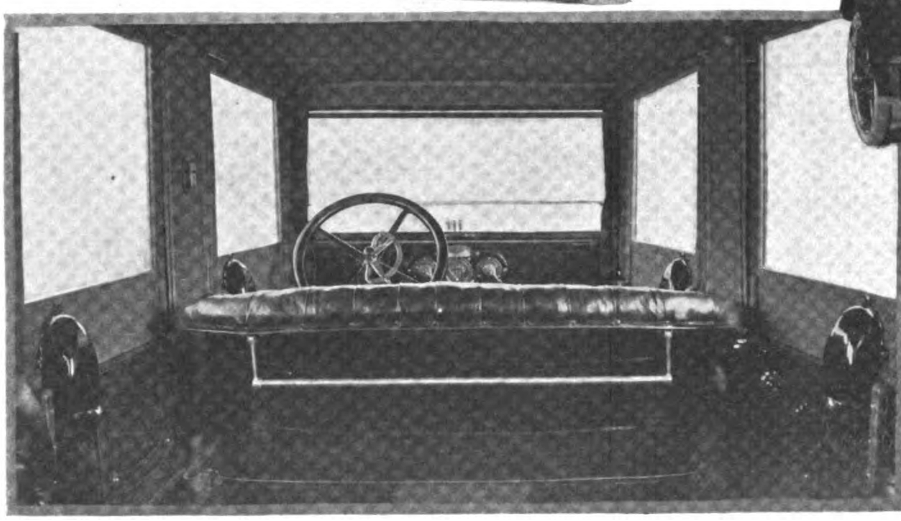
A canopy top is placed over the driver's seat, while side curtains and windshield are also provided. The equipment includes electric lamps and electric horn.

Sedan and Coupé Tops for Hupmobiles

Company Brings Out Removable Types for Touring Cars and Roadsters







Upper left—Hupmobile touring car for 1915 fitted with removable sedan top costing $165

Above—Rear view of touring car fitted with sedan top. Note neat fit

Left—Interior of sedan. The pieces on the doors house the latch levers for the outside handles

REALIZING the demand from a great many automobile owners for tops which will convert their open cars into watertight and storm proof inclosed vehicles for winter driving, the Hupp Motor Car Co., Detroit, has evidenced its progressiveness by bringing out removable sedan and coupé tops for attachment to standard Hupmobile touring cars and roadsters.

These tops, when in place, really convert the open models into closed cars in every sense of the word as will be seen by a glance at the illustrations. The cost is nominal, the coupé top being procurable for $125 and the sedan for $165.

Attachment Is Simple

These tops have been designed so that their attachment is a comparatively simple matter. It is said that two men can easily put one in place. Six points of attachment to the body are provided in the sedan top. The regular folding top irons are pressed into service and iron pieces fixed to the removable top bolt to them. As the touring car has a one-man open top which supports only at the rear and at the windshield, there is, of course, no intermediate side iron on either side of the body, so another form of screw attachment fixes to the body just back of the front doors. A screwdriver and monkey wrench are the only tools required.

In order that the doors in the top will move with the body doors, iron cleats attached to the hinged door sections of the top screw into the body doors, making a rigid construction, moving as a unit when the doors are opened. The latches of the body doors are within the body, so that some means of opening them from outside must be employed. This is accomplished by providing exterior handles in the top doors which run down to the body door latch handles and turn them when the outside handles are turned. The levers taking care of this are housed within the black metal pieces seen at each door in the interior views.

Watertight and Dustproof

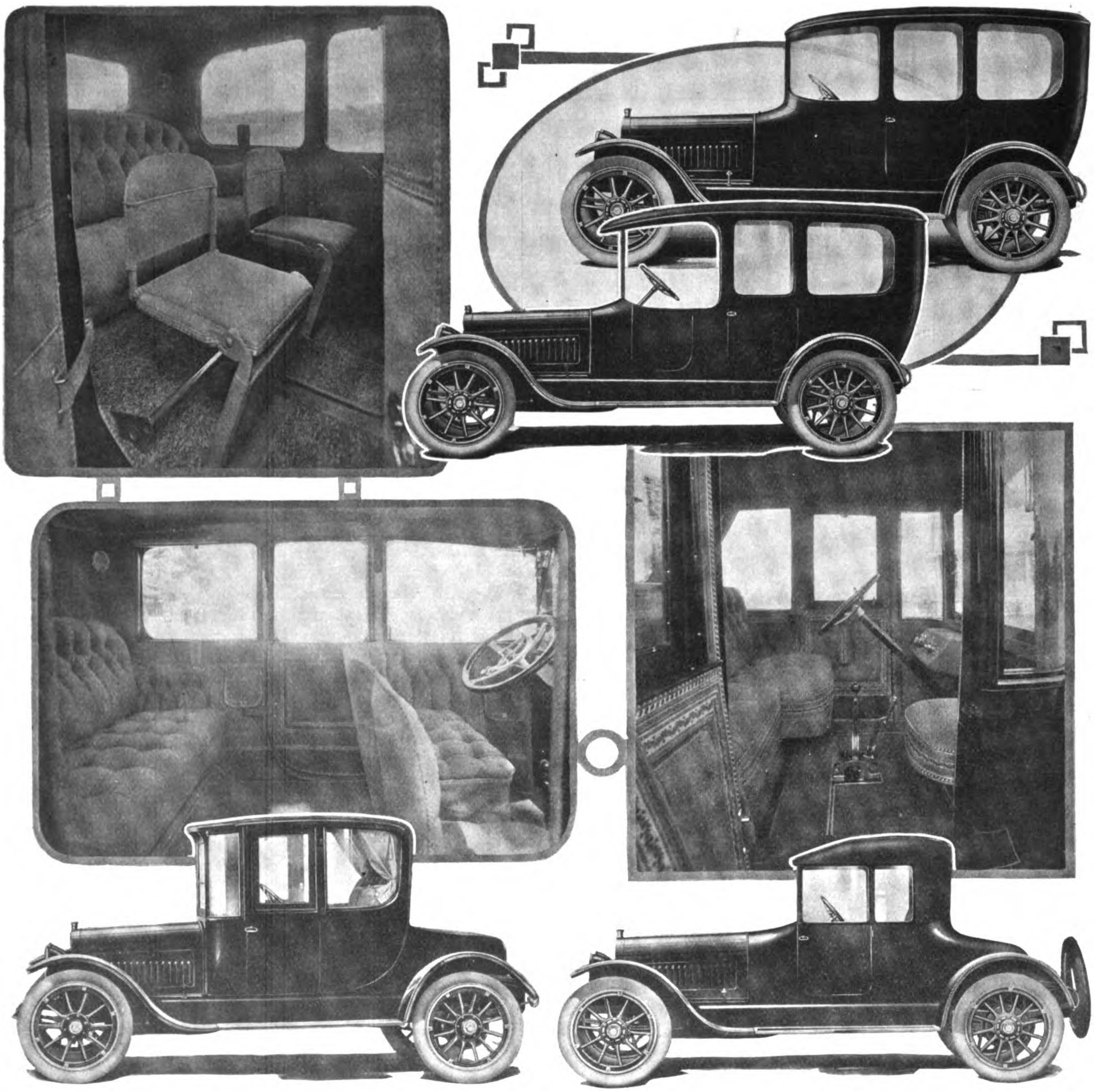
The Hupp company is particularly proud of the way in which the top is built to fit around the windshield so as to render it absolutely watertight and dustproof and to give all the warmth and cosiness of a limousine or coupé built permanently as such.

The equipment of these tops is complete in all details. There is an electric dome light controlled by a switch at the driver's left hand; windows are of coach glass and in the rear compartment of the sedan and in the coupé are adjustable for ventilation. The interior is lined with a fawn-colored material just as many a limousine is finished. In the sedan top, there is a window in each door, and one back of the rear door on either side besides the large rear window. The coupé top has two windows in each side and a rear one also.

These tops are constructed of aluminum and wood fastened with the forged iron supports to insure freedom from rattle.

The weight of the sedan top is 150 pounds and of the coupé 85 pounds, so it is evident that very little is added to the car weight by them.

Chandler Has Four New Closed Bodies



New Chandler body types. The cars illustrated are: Top, sedan; below it, limousine; bottom left, coupé; and bottom right, cabriolet. The interior view at the upper left shows the extra seats in the limousine. At the middle left is the interior of the sedan and at the right interior of the coupé, snowing the seating arrangement for three passengers. Note the rounded glass in the front

CLEVELAND, O., Oct. 24—The Chandler Motor Car Co. is delivering to its dealers throughout the country the new closed body types brought out this year for the first time. The new bodies consist of a cabriolet listed at $1,950, a coupé at $2,200 and a sedan and limousine costing $2,750 each. All these bodies are interchangeable on the standard six-cylinder Chandler chassis and weigh only 100 to 175 pounds more than the ordinary touring body. Aluminum and pressed steel are the materials used in their construction.

With the exception of the cabriolet the bodies are upholstered in gray cloth and Bedford lace and trimming, the cabriolet being finished in hand buffed upholstered leather.

The cabriolet is a three-passenger car, the driver's seat being 18 inches wide with a seat alongside 26 inches in width placed just a little back of the front seat. The coupé is also a three-passenger.

The seat arrangement of the limousine is novel, seven-passengers facing forward with two extra seats having backs when folded into position. By another arrangement these extra seats can be adjusted so that two of the passengers in the tonneau face rearward.

The sedan is a five-passenger model of the owner-driver type. The sedan and limousine rear seats are 47 inches wide and seat three passengers.

One of the features of these bodies is their light weight, the cabriolet weighing 2,950 pounds, the coupé 3,050, the sedan 3,125 and the limousine 3,200. Equipment is very complete on all types.

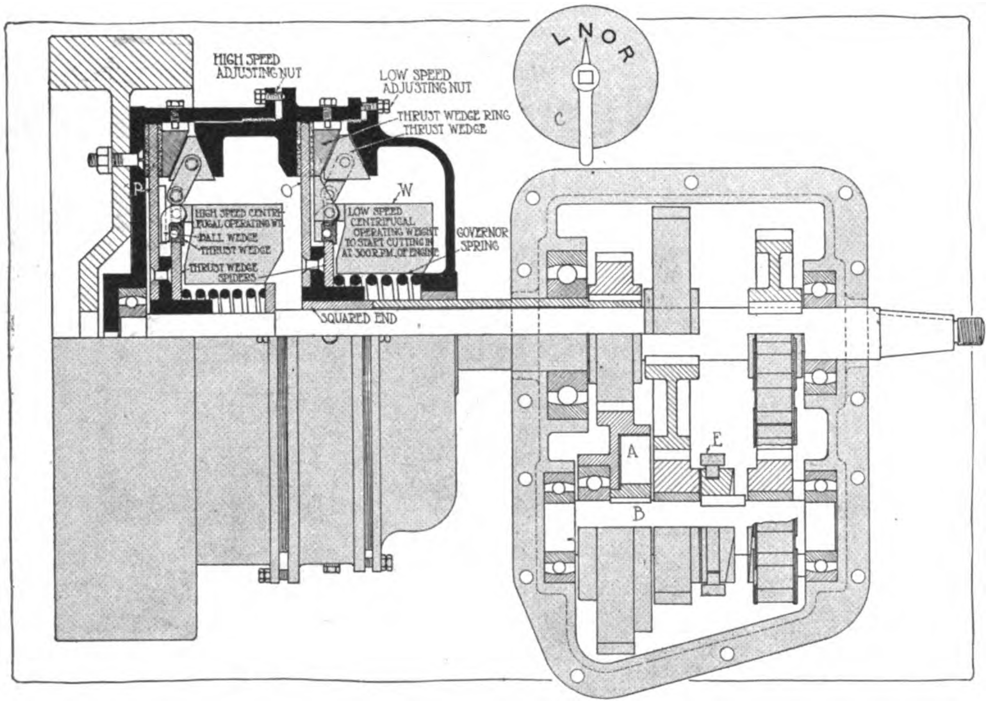


Fig. 1—Sectional view showing operating mechanism of the Zeitler automatic gearbox

Zeitler Gearbox Makes Automatic Changes

Centrifugal Force Employed To Shift Gears From Low to High Speed

AN automatic transmission has been designed by R. S. Zeitler in which manual shifting of gears is intended to be eliminated, the gear reduction of the car being determined by the speed at which it is traveling.

If this gearset works successfully and you are traveling along a level road and suddenly attempt to climb a steep hill, the moment the car slackens in speed to a definite point the gears would shift, giving the reduction which would enable the car to climb the hill without laboring. This is accomplished by centrifugal shifting arrangements.

Each given speed exerts a different amount of centrifugal force on a series of weights mounted in the shifting mechanism. The instant that the speed slackens or increases to such a point that the force exerted on these weights reaches a certain definite point the gears are changed. The gearbox consists, as shown in the accompanying drawings, of multiple single clutches in connection with mutiple sets of gears combined so as to give the desired results. The clutches are the parts that are operated by centrifugal force.

With this gearbox the engine starts without load and at a pre-determined speed of the engine, say at 300 revolutions per minute, the weights would impart a sufficient force to cause a series of thrust wedges to rise against their retaining springs, forcing the disks and friction rings together thus driving the low-speed gears.

Two Separate Shafts

The low gears cause the main shaft to revolve. This shaft in turn rotates the high or next set of clutch weights and, as the car gains speed, the second set of clutches speed up and as they overcome their spring resistance drive the direct shaft, automatically releasing the low gears. As the high speed clutches start to drive, the pinion on that shaft exerts a force on its gear which is on the secondary shaft, driving it faster than it is driven by the low clutches; and, through a slip gear the low set of gears are released in proportion to the amount of engagement of the high clutches. This permits the secondary shaft to move faster than the slip gear is driven. When the car or driveshaft is slowed down to a point where it is necessary to use the low gears, they automatically come into action by means of the slip gear. The low gear clutch is in at the same time as the high clutch.

Referring to the drawings, Fig. 1 gives a sectional view through the shifting mechanism and the gearbox. As the engine starts, the flywheel and the housing, which is shown bolted to it, are carried around with the crankshaft. As the speed increases the weights W rise and the thrust wedge acts against the thrust wedge ring until at a given point, which may be 300 revolutions per minute, the resistance of the governor spring is overcome and the low speed shaft indicated in Fig. 2 commences to be driven through the clutch O. As the speed increases the high speed centrifugal operating weight begins to lift against the high speed governor spring, inserting the wedge against the high speed thrust wedge ring and forcing into engagement the disk clutch P which operates the high speed shaft.

The slip gear consists of an ordinary gear, carried loosely upon the secondary shaft. It is indicated at B, Fig. 1. Part of the interior is so made that a disk can be rotated inside the gear. This disk is keyed to the secondary shaft and has slots cut in it as shown in Fig. 2. In the slots are pawls P. When the driving member, the outside carrying the gear teeth, is rotated by the pinion, the pawls rise and grip the inner surface of the gear as shown at A, Fig. 2. The harder the pull the more the grip as the pawls tend to assume a vertical position, giving a wedge effect. When the secondary shaft is rotated more rapidly than the pinion the pawls are free to lag, but when the reverse is the case, the pawls grip the gear. By this method the gears are always in mesh and the inventor claims that intermediate gears are unnecessary.

May Be Locked in Speed

A small plate is provided for the dash or steering wheel which holds a lever arranged to lock the gearbox in either low, neutral or reverse position. This is accomplished through a dog clutch E, Fig. 1. The length of the gearbox and shifting mechanism on an engine, using a 17-inch flywheel is 21 7-16 inches from the face of the flywheel to the rear end of the gearbox. This is for a two-speed transmission.

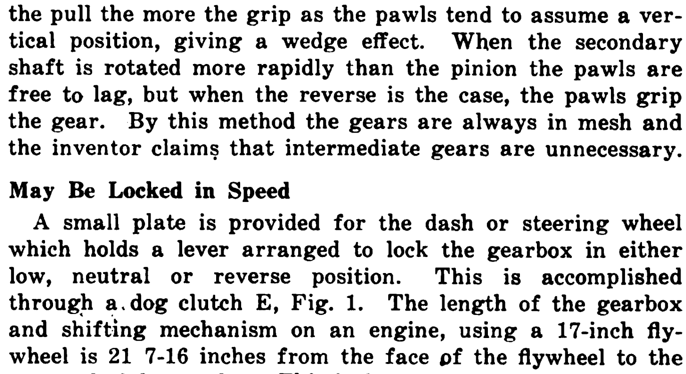


Fig. 2—Clutch engaging mechanism and slip gear with pawls

New Body Styles for White

Chassis Carries Many Improvements—New Starter Position —Wheelbases Longer—All Bodies Lower—New Clutch Brake—Column Control for Lights, Etc.—Other Refinements

MAKING its six-cylinder car only for customers but continuing its two four-cylinder models with an array of chassis improvements and an entire new line of bodies is the passenger car program of the White Co., Cleveland, O., for next year. The prices of the four-cylinder models are slightly higher than for 1914, a fact due to the entirely new line of bodies, embracing a host of de luxe feature coupled with many additions in the line of chassis equipment. The model 30, a five-passenger touring car with complete equipment lists at $2,700 and the model 45 lists at $3,800. There is no list on the six, as it will be made according to custom orders only.

Bodies All Lower

Not since it introduced its gasoline cars has this company carried out such a general line of improvements in the chassis, not to mention the entire new body designs. All models have had the wheelbases lengthened so as to better carry out the streamline body ideals. The bodies are all approximately 3.5 inches lower, in fact the frames are this distance nearer to the road level than heretofore. To do this the clearance has still been retained at 10 inches.

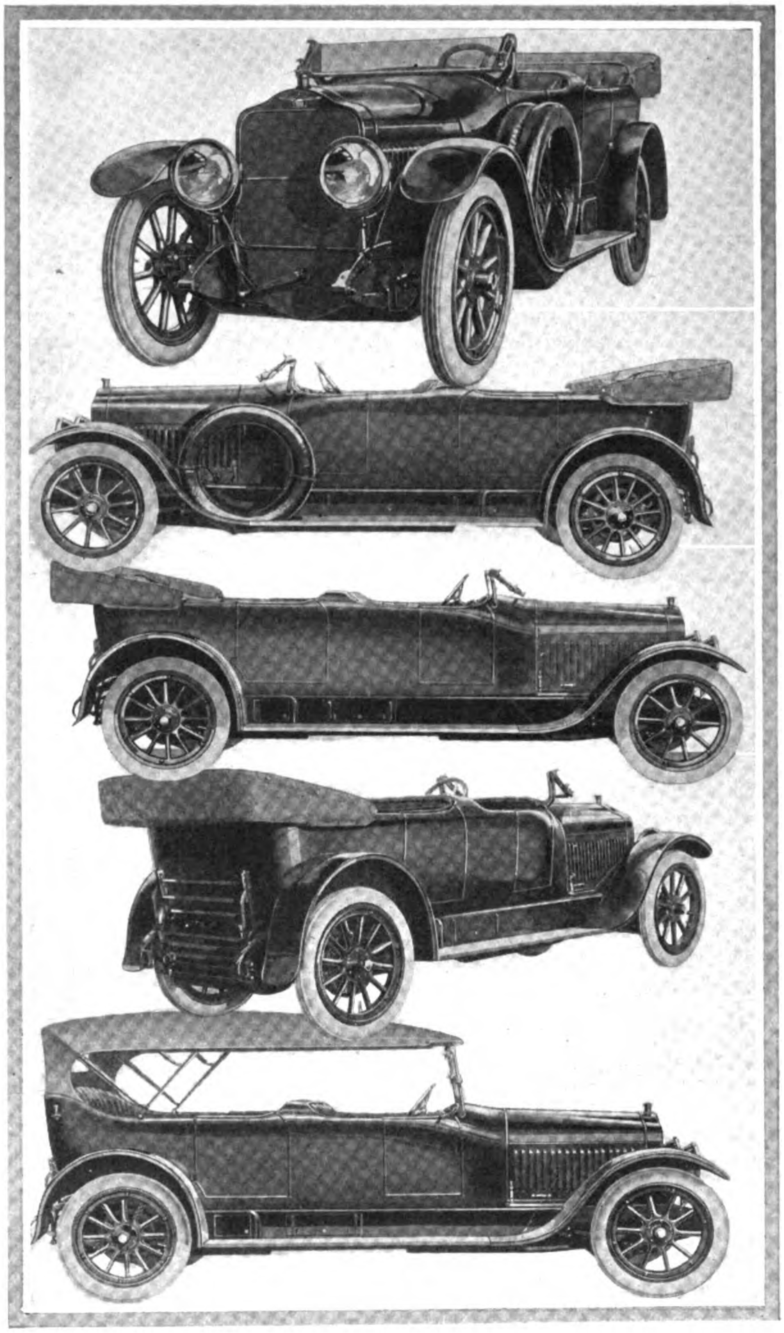
While the general chassis characteristics such as block motors, disk clutches, four-speed gearsets, etc., have been retained without alterations in their major details not a few alterations appear in connections with the parts used with them. For example, the Entz combined motor-generator has been removed from the side of the engine and is located at the right in rear of the gearbox where it is driven by silent chain from the flywheel and a propeller shaft with universal joints.

The gravity and pressure gasoline feed systems of this season have both been abandoned in favor of the Stewart vacuum-gravity system, the gasoline tanks now being carried at the rear, and the carbureters raised high on the side of the motors where they are most accessible and where the intake manifolds are restricted to short elbows.

Control on Steering Column

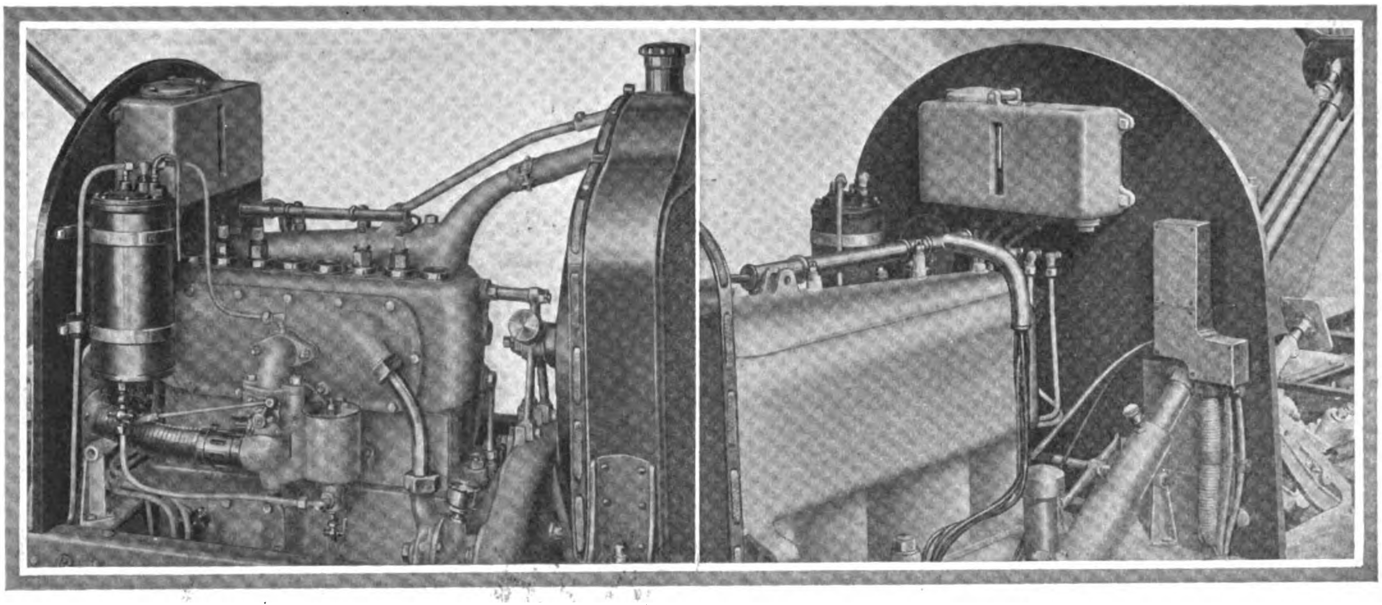
On the steering column below the wheel are mounted all of the lighting, starting and ignition controls, all conveniently grouped on opposite ends of a drum-shaped switch, with the light buttons on one end and starter and ignition control on the opposite end.

Many other minor chassis improvements have been introduced: First comes the use of a new form of clutch brake, described later, and this is followed by an improvement in the clutch release. The radius rods are altered, an equalizer is inserted in the service brake connection, etc.



THE 1915 WHITE STREAMLINE BODIES

At the top is a three-quarter front view of the White model 45 with its streamline body. The radiator is higher than heretofore; the hood is much larger and flares to the cowl. There is not a straight line in the body sides. In the lower illustrations is shown the center cowl back of the front seats. A new form of baggage rack is used in rear. The one-man top adopted for the first time is designed in conformity with the body curves. The windshield is tilted back more than 2 inches



Right and left side of White motor. The Stewart vacuum-gravity gasoline feed tank is seen on the dash. The carbureter is higher. On the dash is the rectangular-shaped oil tank and above the steering column is the junction box for the wiring

On the model 45, the large four, as well as on the six the front axle is dropped between the steering knuckles and the spring seatings in order to lower the frame. The frame is dropped 4.5 inches in front of the rear axle and the rear springs are mounted under the axle. The frames in all models are under 25 inches from the ground.

New Style Bodies

The new line of bodies is most complete embracing practically every design of open and closed lines. In all the hood is immeasurably larger than heretofore so that if you sight a line from the top of the radiator over the top of the cowl, over the back of the front seats and over the rear of the tonneau it would be nearly straight, this line in reality rising very slightly to the back of the tonneau. There is not a straight line in the body side; it is a curve from front to rear with the widest part of the body immediately in rear of the front seats, gradually narrowing fore and aft.

This curve-line effect is further accentuated by the double cowl, namely a cowl constituting the dash and another back of the front seat, this being the first example of a stock American body in which this center cowl is used. Custom-made jobs have used this second cowl which was introduced over a year ago in Europe, but it has not been adopted as a stock body job.

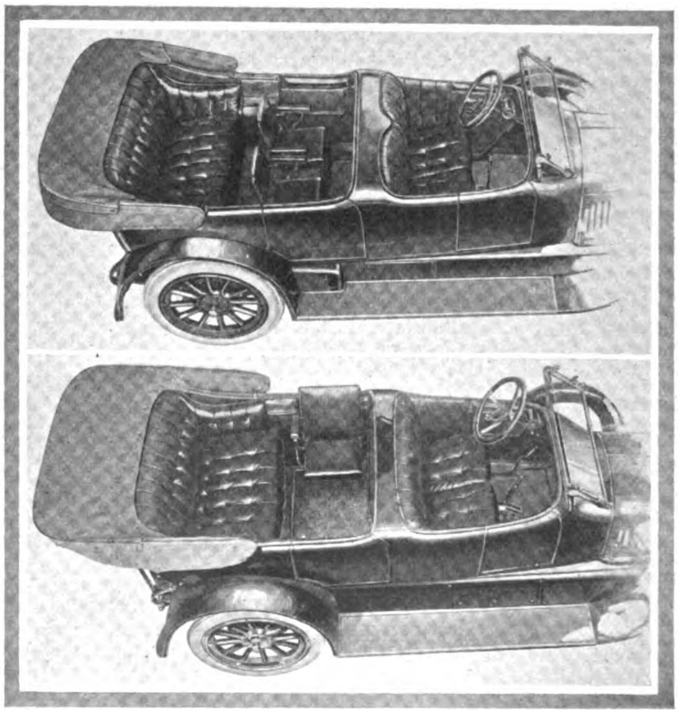
Flare in Hood

Heretofore the White hood has been the same size at the radiator as at the dash, but not so now; it has a pronounced flare. The curve of the cowl is a continuation of that in the hood, namely, in that this cowl curve instead of rising abruptly and being concave is convex so that it leads the eye back to the slightly convex curve of the center cowl, and this in turn leads the eye to the curve or line at the back of the tonneau. Thus do the body curves not lead the eye away from the body, as is so often the case, but rather lead the eye into the body at a point nearer the rear.

Considering a cross section of the body of a touring car taken immediately in rear of the front seats, the body is narrower at the top of the sides than at the floor. To this construction the expression tumble-in has been applied by several European makers. The designer has introduced this additional body curve in order to carry out the streamline effect and at the same time it gives a wide seat and gives the impression of the passengers sitting in the body, scarcely an evidence of the seat formation appearing above the body lines.

All bodies are considerably lower than heretofore, due to dropping the rear end of the frame 4 inches on the large four model 45 and also on the six, whereas on the small four or model 30 this has not been done. On these two models the three-quarter rear springs are now mounted under the axle instead of over it. The forward end of the chassis, by a new design of front axle, is heavily dropped between the steering knuckle and the spring seating, the drop here being so great that in order to give the front end of the crankcase clearance the center of the axle curves slightly forward. The net result is that the frame is less than 25 inches from the ground and yet the mud apron clearance is 10 inches.

Still further has this low streamline effect been accomplished in all models by the lengthening of the wheelbase in all models, thus in the 30 it has been increased from 110 to 115 inches; in the 45 from 124 to 132 3-4; and in the six from 132 to 140 3-4.



On top is shown the seating arrangement in the seven-passenger body and at the bottom the auxiliary seat in White model 30

Several other factors enter into the general body makeup to carry out the conception of the designer. The steering posts are tilted at an angle of 37 instead of 45 degrees and on the runabouts the rake is still further increased to 33 degrees.

The low glass windshield rests directly on the cowl, no filler board being used, and it tilts backwards 2 1-4 inches.

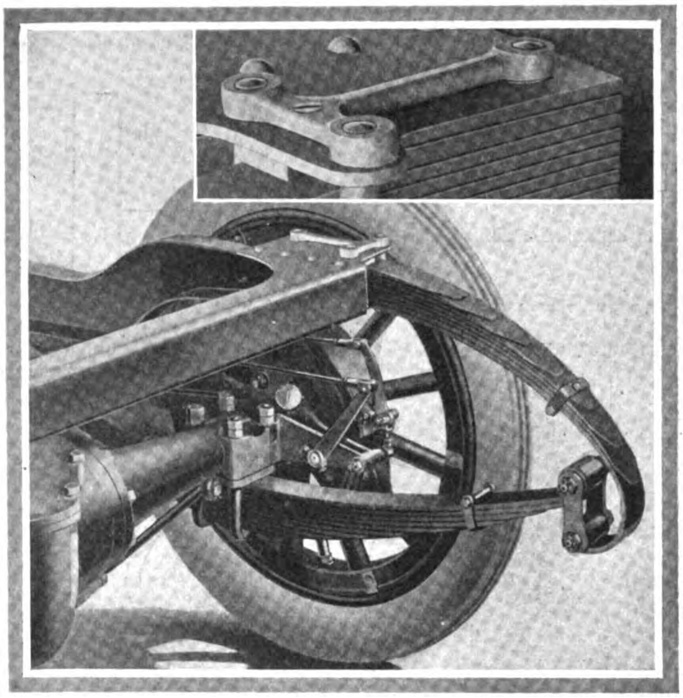
The one-man top equipment, used for the first time, sits inside the body instead of outside of it and its top line is a curve which conforms with the body proportions.

Front and rear fenders are crowned, an innovation with this company, the amount of arch being 2.5 inches for a fender width of 13 inches on the larger models.

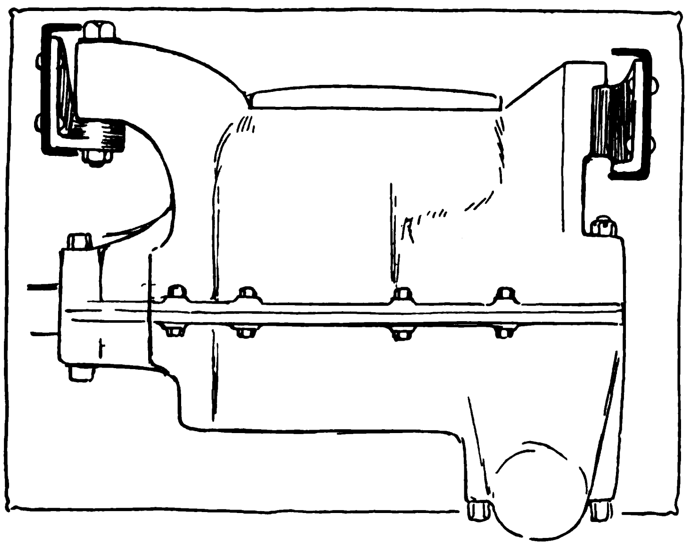
Internally this new line of bodies is replete with improvements, some of which perhaps can be placed in the column of innovations. The upholstery is tufted in parallel ridges in contrast with the diamond pattern; front and rear seat cushions rest on the floor and both are slightly tilted for comfort. To accomplish this the gasoline tank on all models is at the rear and the tool boxes are on either side of the chassis within the apron extending from the frame to the inner edge of the running board, with access to them through small doors.

Low Auxiliary Seats

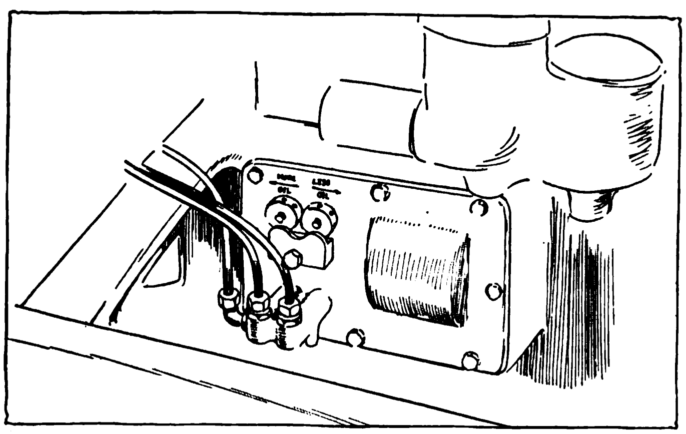
The folding tonneau seats are sunk into the floor 2 3-4 inches so that the passengers on them are on the same level as those on the rear seats instead of being higher. These seats fold forward and rest vertically in a compartment in rear of the front seats. When open, in the sitting position, they are locked by a spring catch. On model 30, a five-passenger car, an extra detachable seat is furnished which allows the passenger sitting sidewise, and this seat folds into a compartment back of the front seats.



On White models 45 and six the three-quarter rear spring is now under the axle and on top the spring attaches to the frame by bolts which can be removed from the under side so as to allow of removing the spring without interfering with the body



Showing support fore and aft of White gearbox on brackets in the frame cross members so that the over-all length of the box will allow of its being lifted directly out or dropped



On the outside of the White crankcase are oil adjustments for the pump. The adjustments are round nuts, which can be turned by a punch for adjustments

No Upholstery above Parapets

Several additional body details deserve noting such as no upholstery appearing above the body lines; in the rear is a new design of trunk rack which can be opened or closed by one movement, either a pull or push; and this rack is supported by the gasoline tank protecting guard, a spring catch holding the rack locked in the closed position. Two spare tires can be carried in the left running board where they are countersunk in the running board and front fender; and beneath the center cowl on the 45 and the six are two package compartments with a clock mounted flush between them. Below these compartments is the space to receive the auxiliary seats.

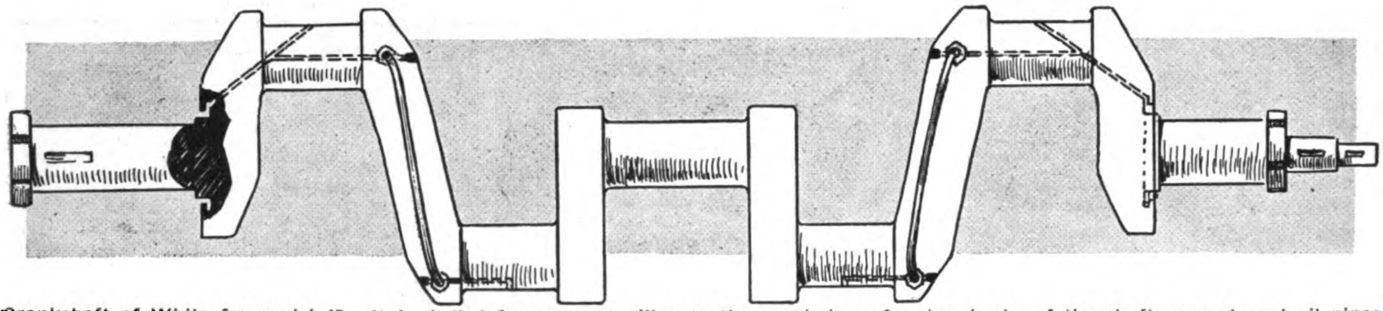
Lastly the staid black has been ruled out of the category of color options furnished as stock, and now the purchaser can take his choice of White special maroon, White special grey, Cleveland grey, Brewster green and Cobalt blue.

Motor Backbone Unaltered

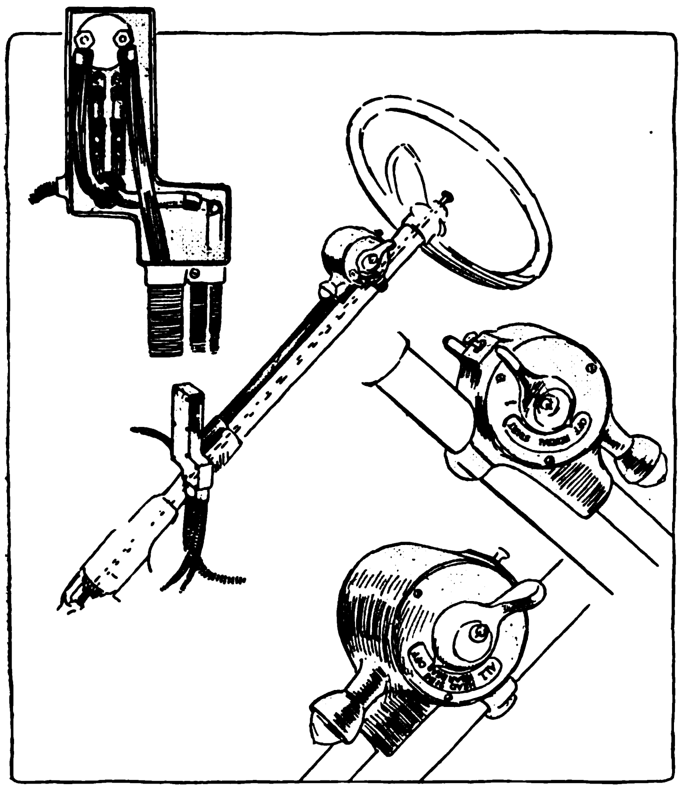
The motors remain practically the same, excepting that many changes have been made in their components. Moving the Entz motor-generator to the rear has advantages. This unit is now driven by silent chain from the flywheel and thence by short shaft with universal joints. In its present position it is immediately ahead of the battery, swung in a cradle from cross members of the frame.

Accessibility Improved

In this new position it leaves the motor more accessible, adds somewhat to the cooling of the motors in that there is less restriction to the air currents and it also takes its drive off the timing gears. It is geared 2.6 to 1 with the crankshaft and the motor-generator unit is 20 pounds lighter than this year. By changing its winding somewhat it has been given



Crankshaft of White for model 45. It is drilled for pressure oiling to the crankpins. On the cheeks of the shaft are external oil pipes leading from the main bearings to the crankpins



Control parts on steering post of 1915 White cars

different electrical characteristics so that it begins charging at a car speed of 7 miles per hour and its maximum charging rate is reduced practically one-third, to avoid overcharging at continuous sustained speeds. There are no current regulating parts inserted between this motor-generator and the battery excepting a small dash indicator to show when it is charging or discharging.

21-Volt Lamps

Twenty-one volt lamps are used throughout in the car, that is for the two headlights, tail, dash and small lights in the headlights. These headlight bulbs are now in multiple, rather than in series so that now if one burns out the opposite one does not go out. The double wire system is used. Wiring in general in the car has been vastly improved, all wires are carried in metal conduits and on the forward side of the dash; immediately above where the steering column pierces it is a junction box containing the fuses.

The oil reservoir has been removed from the engine base and is now a separate compartment on the forward face of the dash below the bonnet. The plunger type of pump remains incorporated within the crankcase at the right rear with external adjustments. The oil is fed to the crankshaft bearings and thence through the drilled crankshaft to the crankpin bearings. Instead of conducting the oil through the long cheeks of the crankshaft between the first and second and third and fourth crankpins use is made of external oil pipes which arc outward in order that centrifugal force will be utilized to the greatest extent. A splash level is maintained within the case.

Installing the Stewart vacuum-gravity gasoline feed system brings the fuel to the special vertical tank on the front face of the dash at the right where it is warmed by the motor. From this tank the fuel feeds by gravity. The White carbureter has been generally improved. Using the Stewart gravity system allows of carrying the carbureter higher than formerly. It is now well up on the side of the engine, with a most abbreviated elbow serving as a manifold. This carbureter designed along Claudel-Hobson lines, is without moving parts or springs of any nature.

Arc Clutch Brake

The new form of clutch brake, to prevent clutch spinning when shifting gears is an arc-shaped brake with a fabric facing bearing on a small drum on the clutch shaft. One end of the arc band is hinged to the frame and the other has a linkage with a short arm on the clutch operating shaft.

Another clutch improvement is in the disengaging collar which is now a cone-shaped member against which bear two rollers carried in the bracket on the cross shaft, the rollers being at an angle to bear directly on the cone referred to. Grease cups are provided.

The radius rod construction has been changed and instead of the forward end of these rods attaching to a part of the spring bracket they now have a ball-and-socket connection with a bracket attached to the under side of the frame. They are longer than heretofore and their attachment at the rear to the axle on the 45 and the six is altered, due to the underhung springs. Here the axle pad is extended forward and inwards forming a ball ending which enters the socket in the radius rod, a connection similar to that employed in steering connections.

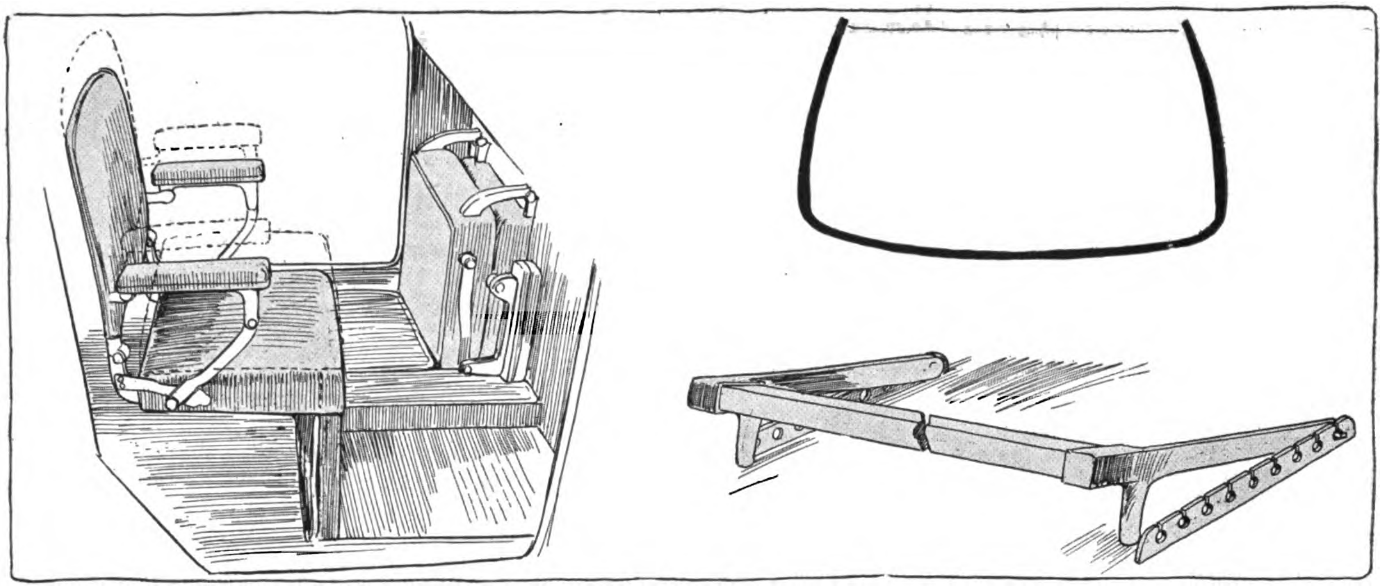
Column Control

In the new system of control parts mounted on the steering column there is on one end a short handle controlling the starter, with three positions, start, neutral and off and on the opposite end a similar handle controlling the various lights and having a position at one end for all the lights being on and an opposite position for all off, with intermediate positions for lights as needed. A Yale lock is in combination with each handle. The under side of this switch cylinder carries a small light which shows on the dash oil gauge and speedometer.

Braking has been improved in that there is now an equalizer in the service brake connections as well as in the emergency ones, heretofore the emergency set being only so provided.

Accessible Springs

An improvement in connection with the rear spring attachment on the 45 and six is that where the spring attaches to the frame there is an extension of the frame cross mem-



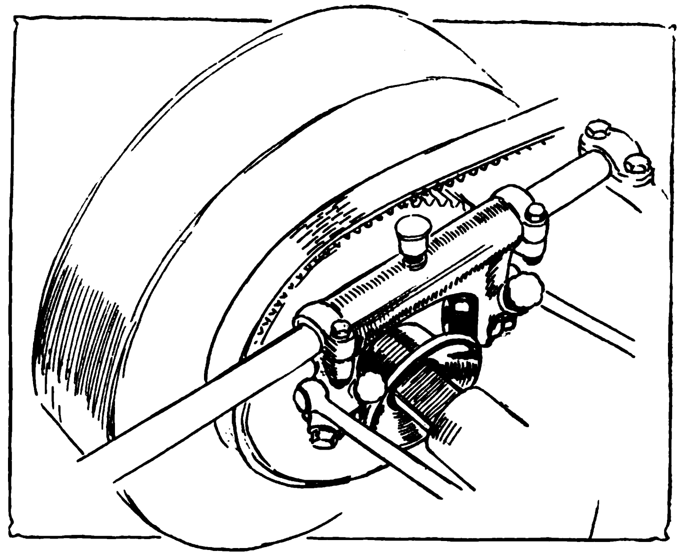
Auxiliary tonneau seats in White, showing them countersunk into floor, and also how they fold into position. On top is cross-section of White body in rear of front seat and underneath adjustable foot rest for tonneau of all models

ber under which the spring fits. The clip bolts thread into this plate and have not nuts on their upper ends, so that now the spring can be removed without having to raise the body to get at the nuts on the clips.

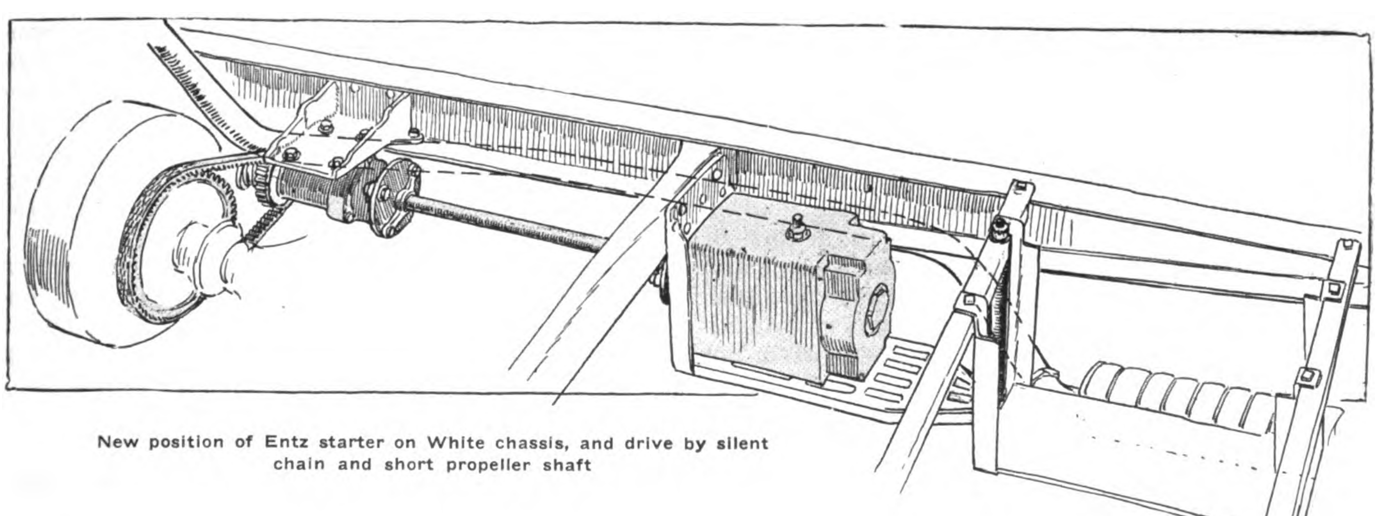
The single ignition system used since its adoption of the gasoline motor is continued, the magneto alone being relied upon. It is entirely separate from the starting and lighting system.

On model 30 are 32 by 4-inch tires in contrast with 34 inches sizes for 1914.

Motor sizes remain as formerly and are: On model 30 they are 3 3-4 by 5 1-8; on model 45 they are 4.25 by 6 3-8; and on the six they are 4.25 by 5.75. The L-type block casting with integral intake, exhaust and water manifolds is continued; valve operating parts are inclosed and the general motor characteristics unaltered excepting as already referred to. The four-speed gearbox, mounted as a separate unit amidship is continued. On model 30 direct is on third with fourth gear a stepped-up indirect. On the other two models fourth is direct. Drive from the gearbox is through a propeller shaft with two universal joints to the White design of axle carrying its two sets of brakes one internal, the other external. Steering is on the left on all models with the gearshift lever in the center for right hand operation and the emergency brake lever at the left for left hand operation. The ball end on the gearshift lever which was standard for 1914 has been discontinued.



White clutch, showing cone-shaped release collar. Another clutch improvement is a new form of clutch brake adopted to prevent the clutch spinning when the driver is shifting gears. The new brake is arc-shaped and is provided with a fabric facing bearing on a small drum on the clutch shaft. One end of the arc band is hinged to the frame and the other has a linkage with a short arm on the clutch-operating shaft. Note the silent chain drive for the Entz motor generator



New position of Entz starter on White chassis, and drive by silent chain and short propeller shaft

The AUTOMOBILE

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Profits of War

TO this date the American automobile industry is profiting substantially by the European war, careful estimates placing the sale of American motor trucks to belligerent and non-belligerent countries at close to the 3,000 mark. France has been the biggest buyer, taking considerably more than 50 per cent. of this output, and Russia, England, Greece and some other European nations have been making purchases. Those American builders are profiting most who were best ready to take care of immediate shipments, and who were further able to guarantee quick deliveries on large quantities of vehicles.

It is not ethical to refer to business that is thrust into your hand due to the misfortunes of others and no thought of boasting is included herein; but the fact remains that America has had placed squarely in her lap the greatest opportunity in history of demonstrating her wares in the eyes of Europe and the entire world. Heretofore Europe has looked with more or less misgiving on our motor trucks, considering them quite too heavy and falling short in not a few other respects. The necessity brought on by the war is bringing American trucks side by side with those of Europe and the stamina of them will be watched with particular interest during the next 6 months.

America has for years boasted that her passenger cars were built to stand up on rough American roads, facing daily conditions that might test to the death not a few of the European cars. The same has been said about our trucks. The time of test has arrived. It is no silk-stocking test, but the test supreme. If American trucks make good it will be the greatest advertisement that the motor industry in this country has ever received and one which will mean more to the development of that industry than anything heretofore accomplished.

Wear

SOME weeks ago attention was directed through these columns to the vital points in truck construction that foreign buyers took into consideration in making purchases for war purposes.

At that time it was outlined that the ability of the truck to withstand wear was looked upon as one of the cardinal, if not the primary consideration. The truck that would not wear was not considered. Some trucks were passed up because their weight was such that it in itself imposed a needless load on the vehicle, a load which was doing its part to wear out the truck rather than it being worn out by a useful load.

The old story of the chain being as strong as its weakest link is most applicable to this aspect of wear in motor trucks, whether such trucks are intended for war purposes or not. The real strength of the truck is that of its weakest part. Further, the standard of wear in the truck is that of the part that will wear first. It is a poorly balanced truck that has parts placed in one part of it that will wear for 10 years or longer and to put other parts in that will need replacing in 3 months or 6 months at the longest. The truck must be balanced, in a word, the weakest link idea should permeate every part of the vehicle.

In the zone of war activities the truck that for any reason whatsoever drops out of the convoy is a most distressing factor. It is sufficiently bad to have a truck which you are using in your business incapacitated for a day. When it stops you can secure others to do its work or hire horses. In war it is different. The vehicle in the convoy that falls out is generally lost. It is pulled to the roadside, more often into the ditch, in order that the road be left open for the remainder of the convoy and the other arms of the service. If the part worn or broken can be adjusted or replaced in a short period of time there is hope that the vehicle can be saved, but otherwise it becomes one of the many unrepaired and finally abandoned.

Wear, or the ability to wear, is a most important factor in truck life. It is also very important that where parts are subjected to great stresses and wear that adequate provisions be made for the adjustment of them. It is an error in design where such adjustments are overlooked. It is an equal error if accessibility is not a prime consideration in connection with parts subjected to great wear, or in danger of being broken.

Claims $700 Electric Impossible at Present

Animated Discussion of Field for Low-Priced Vehicles Marks Close of E. V. A. A. Convention—Session a Success

PHILADELPHIA, PA., Oct. 24—The closing of the Fifth Annual Convention of the Electric Vehicle Assn. of America was animated by the discussion between electric vehicle manufacturers and central station interests on the possibility of the low-priced electric, namely, a passenger vehicle selling at from $500 to $700 and manufactured in large quantities.

T. L. Jones, a representative of the central station interests in Brooklyn, opened the question in his address when he asked, what was being done to distribute information on electric vehicles throughout the country. "The passenger electric vehicle is too high priced," began Mr. Jones. "The only reason why central station companies are not using such vehicles is the high initial cost. In Detroit every central station salesman uses a gasoline car. If the electric vehicle manufacturers will go to the central station people with a $700 electric car they will get enough orders to make its manufacture possible. Today the electric passenger vehicle is for the luxurious classes. According to the registrations of July 1, 1914, 80 per cent. of the gasoline passenger cars had a selling price under $2,000, whereas 85 per cent. of the passenger electrics sold in excess of this price."

Mr. Jones contended that the sale of electric vehicles must be pushed by those people who profit by the sales, and the four people who profit by the sales are the manufacturers of cars, the manufacturers of batteries, the manufacturers of such accessories as motors, tires, etc., and lastly the central station or electric power producing companies.

Lack of Mileage a Drawback

Mr. Jones believes that the lack of mileage is a drawback to the present extended sale of the electric passenger vehicle. "The maker who says he has a 120-mile car," continued Mr. Jones, "has not such a vehicle. He may have it on a glass road and at a certain temperature, but not under normal traveling conditions. Real facts will be more effective than glaring statements."

Continuing Mr. Jones criticised the battery people on the ground that during the last 2 years there has been little progress made in chemical research, although there has been much progress made in the mechanical details of the battery. He spoke of the work the central station interests are doing in Brooklyn by distributing cards to electric truck makers, which enables them to stop at other depots for a boosting charge and secure same at the regular rate. In Brooklyn they are working to have decorative lamp-posts fitted with charging plugs so that the scope of the electrics can be thereby increased.

The gauntlet hurled into the ring on the $700 electric was immediately taken up by George H. Kelly, of the Baker Motor Vehicle Co., Cleveland, who, voicing the views of a part of the electric vehicle manufacturers, contended that it is practically impossible to build a $700 passenger electric vehicle at the present moment. Mr. Kelly believes there is no demand for such a low-priced vehicle at the present time, but rather that the demand is for a good-looking car with a mileage radius from 70 to 80 for battery charge. With a $700 electric this radius would be approximately 30 miles, and the average speed of the vehicle lower than at present.

Concerning the possibility of central stations buying cheap electrics in large quantities, Mr. Kelly cited an experiment made some years ago in which a canvass was made of practically 1,700 different central station people as to the market for an electric to sell at $1,200 and which would have a good mileage radius as well as an adequate speed. There were not enough prospects coming from the central station people to warrant the necessary expenditure for the production of such a vehicle.

"The low-priced electric," Mr. Kelly went on to state, "is yet in the future, and its coming depends on the 6,000 different central stations in the country. If they can get together and place sufficient orders so that such vehicles can be manufactured on a quantity basis, it will be possible to produce such a car, and not until then."

The discussion pro and con on the $700 electric was continued for some time, in fact it was the major discussion of the convention.

"A further cost in the electric car," said Mr. Kelly, "is the mechanical work that must be looked after and which is not a factor in the low-priced gasoline car. A loss of 1 horsepower in a gasoline car is almost a negligible factor, but is a big factor in an electric. Because of this the cheap electric must be a well-built vehicle eliminating friction losses in order to conserve electric current.

"Two big arguments for electric vehicles are long life and low cost of upkeep, and these cannot be secured with cheap construction. After all, first cost is not the biggest factor, particularly if you are going to pay one-half the original cost for fuel to operate the car with during the first 20,000 miles."

According to J. C. Bartlett, a Philadelphia dealer and garageman who handles electrics, there is not any demand for the cheap electric and it cannot be manufactured and marketed for $700. He referred to certain movements in the electric passenger field some years ago where efforts were made to market vehicles much under the present prices, and that these practically ended in failure. The public demands a luxurious type of car with power and mileage.

S.A.E. Standards Committee Meets Nov. 17-19

NEW YORK CITY, Oct. 27—The Standards Committee of the Society of Automobile Engineers will hold a 3-day convention in this city, November 17-19. The meeting will be held in the offices of the association.

Reports of the divisions will be submitted and considered at the meeting which will probably be attended by the entire membership of the Committee, consisting of 142 members.

A brief outline of the work and plans of the different divisions was given in THE AUTOMOBILE for October 1.

King Has Eight-Cylinder Car Under $1,500

NEW YORK CITY, Oct. 26—The King Motor Car Co., Detroit, Mich., has announced that it will build an eight-cylinder car for 1915, to sell at something less than $1,500 complete, as a five-passenger vehicle. It will have a conventional type of eight-cylinder V-motor, with an S. A. E. rating of between 40 and 45 horsepower, and with a wheelbase of 113 inches.

It was known some months ago that the King company, as well as several other concerns, was deeply interested in the eight-cylinder movement, and had purchased a well-known make of car using this type of motor. The company is prepared to guarantee deliveries on this model after December 30. Its present four-cylinder car will be continued as a regular stock model.

Owen To Develop Weidely Motor

INDIANAPOLIS, IND., Oct. 27—Frank E. Smith, receiver for the Premier Motor Mfg. Co. has been authorized by the U. S. Court to borrow $10,000 to carry on the business under the present receivership and the court has further confirmed the contract which Receiver Smith has made with R. M. Owen, New York City, George A. Weidely, Premier engineer, and H. O. Smith of the Premier company, by which Mr. Owen agrees to spend whatever money is necessary for further experimental work in developing the Weidely motor which the Premier company has been marketing this year. A further part of this contract is that the receiver is to deliver to Messrs. Owen, Weidely and Smith, the patterns and core boxes, of the motor. Still further, according to the contract, the receiver sells certain parts of the motor to these three people and the receiver and his successors in return have the right to use the motor in its present or perfected form.

R. M. Owen, president of the R. M. Owen Co., New York City, and also a stockholder in the Entz Motor Corp., New York City, controls the Entz electric transmission, and it has been known that he has, during the past summer, been developing this transmission and chassis fitted with the Weidely motor.

CHICAGO, ILL., Oct. 24—The Stewart-Warner Speedometer Corp., has declared the regular quarterly dividends of 1 3-4 per cent. on the preferred and of 1 1-2 per cent. on the common stocks, both payable November 2. The books closed October 24 and re-open November 2.

Harroun Made Chief

Heads Maxwell Engineers—Redden Leaves Sales Force—Rubber Brisk in London—Monarch Lowers Price

DETROIT, MICH., Oct. 27—Ray Harroun, the racing driver, who designed and built the Maxwell cars which made such a good showing in this year's races, has been made Chief Engineer of the Maxwell Motor Co. The Maxwell engineering department has heretofore been jointly headed by R. E. Benner and Wm. Kelley, the latter having had much to do with the design of the motors. Benner has severed his connection with the company, while Kelley continues as assistant to Harroun. During the last few years Harroun has been active in carburetion, having designed the Harroun kerosene carbureter with which one of the Maxwell racers is equipped.

Another Maxwell change is the resignation of C. F. Redden as general sales manager. C. E. Stebbins, former assistant sales manager, has succeeded him.

DETROIT, MICH., Oct. 26—The Maxwell Motor Co., this city, will have six zones, instead of four, as heretofore. Each zone, or division of territory, will have its own supervisor and one publicity supervisor. The zone supervisors are the direct medium between factory and dealer, while under the supervisor are the district salesmen, acting as his lieutenants.

Good Demand for Rubber in London Market

LONDON, ENGLAND, Oct. 17—It is expected that the price of rubber will be fully maintained at over 50 cents a pound for at least the next 6 months. The requirements of the Allied Armies are sufficient to absorb nearly the whole of the plantation rubber production for that period.

Before long the French and British military authorities will need to refit tires on most of the 250,000 motor transport vehicles said to be in use, and there is also a big demand for waterproof ground sheets for the troops, rubber boots, etc.

At the commencement of the war, Germany made great efforts to secure additional supplies of rubber, but the commodity was declared contraband of war by the British Government, and Great Britain practically controls the plantation rubber industry while the Brazilian shipments of wild rubber are very small at present, owing to the commercial depression in that country.

Monarch Six for 1915 Sells at $1,250

DETROIT, MICH., Oct. 27—The Monarch Motor Car Co. will manufacture a six-cylinder car for 1915 which is on the same lines as the 1914 product but at a lower price. The 1915 car will sell at $1,250 or $150 less than in 1914.

U. S. L. Committee Has 55% of Preferred

BUFFALO, N. Y., Oct. 27—The protective committee of the United States Light and Heating Co. announces that it now has on deposit approximately $1,400,000 par value of the $2,500,000 preferred stock outstanding, which is equal to about 55 per cent. of the issue and expects that within a short time additional deposits will bring the amount up to 75 per cent. So far about $3,500,000 par value of the $14,000,000 common stock outstanding has been deposited, this amount being about 25 per cent. of the junior issue. It is expected that the committee will begin to work out a plan of reorganization and an announcement of some kind on this plan can be expected in the near future.

Voiturette Receiver Not to Sell Cars Separately

DETROIT, MICH., Oct. 26—In THE AUTOMOBILE for October 15, page 738, it was stated in the news item concerning the bankrupt American Voiturette Co., that the 375 finished and unfinished Car-Nation cars will be offered for sale at a uniform price of $250, while the Keeton cars will be offered at $1,000. This information was rather misleading as it was a tentative figure proposed in case there should be a sacrifice sale of the whole lot of cars to one purchaser. It never was the intention of the receiver, the Detroit Trust Co., to have the cars sold individually to the public.

DETROIT, MICH., Oct. 26—A hearing has been set for November 9 in the United States District Court, when Judge Tuttle will decide whether the offer of $100,000 cash made by the Samuel L. Winternitz Co., Chicago, for the property of the American Voiturette Co., exclusive of the real estate, accounts, notes and cash, should be accepted. All creditors should attend the hearing.

De Laski & Thropp Co. Wins Patent Suit

TRENTON, N. J., Oct. 27—The de Laski & Thropp Circular Woven Tire Co., Trenton, N. J., was awarded the decision in the U. S. District Court here last week in its suit against the William R. Thropp & Sons Co., of Trenton. The decision sustains the validity of certain of the claims of United States patent No. 1,011,450, dated December 12, 1911, which covers the tire wrapping machine put out by this company and holds the machines manufactured by the defendant to be infringements.

Attorneys for William R. Thropp & Sons Co. state that an appeal will be filed at once.

New Crow Touring Car Sells at $745

ELKHART, IND., Oct. 26—The Crow Motor Car Co., Elkhart, Ind., has recently completed a five-passenger, 20 horsepower touring car to be sold with full electrical equipment at a list price of not to exceed $745.

This latest addition will be known as the Crow Elk-Hart, Jr. This car has streamline body, oval-front radiator, full-floating rear axle, three-speed selective transmission, dry-plate multiple disk clutch, center control, Gray & Davis electric generator and starter, electric lights and dimmer, 30-inch wheels, 3 1-2-inch tires, 101-inch wheelbase, drop-forged front axle, U-shaped doors and three-point suspension for the motor. The crankcase, water manifolds and gearbox are of aluminum.

The car is finished in navy blue with nickel trimming. It will have excellent upholstering, tilted seats, mohair top, Stewart speedometer and the gasoline tank will be built in the cowl with filler cap under the hood. The clear vision ventilating windshield is an integral part of the body, preventing it from working loose. The back of the front seat will be leather covered. With full equipment this new model weighs 1,575 pounds.

ST. LOUIS, MO., Oct. 24—A bill was passed in the Municipal Assembly here this week giving doctors the right-of-way on public streets with their automobiles and permits them to pass any procession or assemblage in the streets. Previously the fire department equipment, ambulances, U. S. mail wagons, police patrols and street railway repair wagons were the only ones favored by the right-of-way law.

Mirrors on All Motor Trucks in N. J.

NEWARK, N. J., Oct. 27—Beginning with January 1, 1915, all motor trucks in New Jersey must be fitted with mirrors enabling the drivers to see the road back of the truck. The rule was made necessary by the protected position of the driver, who is unable to see behind and to realize when another vehicle passes from the rear.

Crown Co. Officials Indicted for Mail Fraud

LOUISVILLE, KY., Oct. 25—C. H. Lambert, and his son A. B. Lambert, have been indicted in the Federal Court here, being charged with using the United States mail to defraud, the action being in connection with the Crown Motor Car Co., which has recently been succeeded by the Hercules Motor Car Co., with the former concern of which the Lamberts were officers. Yesterday, they made cash bonds of $4,000 each.

The indictments returned at the last term of the Federal Court charged the Lamberts with organizing an automobile company and selling agencies over the country on a basis of $100 deposit each. The Crown company had sold about 400 of those agencies but had not manufactured more than twelve or fifteen cars. Of the 400 agencies so purchased, 100 stopped payment on their checks. Agents were secured for territory in Minnesota, Pennsylvania, Oklahoma, Kansas, Nebraska, Ohio, and other states. For the $100 each agent was given exclusive territory, and also one share of 5 per cent. stock. The deposits were to be returned in credits of $25 each on the first four cars purchased, the indictments charge. Attached to the indictments are letters which show that the dealers were afterwards required to deposit from $50 to $100 as advance freight.

The relationship between the Crown Motor Car Co. and the Hercules Motor Car Co. was as follows: The Crown company was organized in March, 1913, under the laws of South Dakota, with an organized capital of $500,000 and with B. F. Lambert, president; A. B. Lambert, vice-president, and C. H. Lambert, secretary and treasurer. The place of business was 131 North Third street, Louisville. In April, 1914, the Hercules Motor Car Co. was organized under the laws of South Dakota, with an authorized capital stock of $1,500,000, of which $500,000 was to be preferred stock. Its officers were C. H. Lambert, president; B. F. Lambert, vice-president, and A. B. Lambert, secretary and treasurer. The Hercules company took over all the assets and assumed all the liabilities of the Crown company. The plant and machinery of the Crown company were taken over for a reasonable amount.

The Hercules company invited 300 agents of the Crown company to transfer their contracts to the newly formed Hercules company, which over 200 of them did. Twelve or fifteen Crown models were delivered, and most of the remaining agents, those who had neither received cars nor transferred their accounts, received their money back.

It was after April of this year that several of the dealers who had made the original deposits of $100 and subsequent deposits of $100 for freight, began to complain to the postal authorities. A number of them appeared before the Federal Grand Jury here 2 weeks ago, the result being the indictments on eleven counts under Section 215 of the Penal Code. Each count charges that the Lamberts devised a scheme and artifices to defraud some particular man by fraudulently organizing themselves under the name of the Crown Motor Car Co., etc., etc.

I. C. Soper, auditor of the Hercules company, and also a stockholder, states that the company never refused a single demand for the return of the deposit money and that this money is at present being held and will be returned if cars are not delivered. He says the Hercules company has $10,000 or $12,000 which the Crown company received in deposits and that the dealers who put it up could get it back for the asking. To date the company has only turned out about 100 cars, but expects to turn out thirty-five more within the next 10 days.

Business Conditions in Italy Are Tranquil

New York City, Oct. 26—The R. I. V. Co., manufacturer of ball bearings, has received information from its factory in Officine de Villar Perosa, Italy. The information states that there is nothing to fear in that country. As to delay in shipping there is nothing to cause any apprehension as long as Italy is keeping its neutrality. Referring to the talk of the disturbing conditions of that country, no weight should be given it. Business is going on as usual. The R. I. V. Co. is receiving an average of one large shipment a week.

Schrader Opens London Office and Factory

New York City, Oct. 26—A. Schrader's Son, manufacturer of tire valves and tire pressure gauges, will establish a London office and factory. The branch will be at 14-16 Dorset place, London, and will be in charge of W. H. Cole. The machinery and entire equipment has already been shipped and the factory is expected to be in full operation before the end of the month.

Action Expected Shortly on Ferry Charges

New York City, Oct. 26—To secure official action on the claim that automobiles are discriminated against in connection with ferry charges, the Traffic Department of the National Automobile Chamber of Commerce announces that the matter will be taken up again within another week or so, in conjunction with other automobile associations and the Merchants' Assn. of New York.

When this subject was discussed before Dock Commissioner Smith in July, representatives of the manufacturers, dealers and users of trucks showed that discrimination exists on practically all municipal ferries and railroads, in the rates charged on self-propelling vehicles as compared with horse-drawn vehicles. The railroads asked for time in which to give the matter consideration, check over their schedules and submit new tariffs for consideration. It was expected that this could be done within 60 days. Some delays were encountered, but the automobile and trucking interests are now hopeful of having the matter determined within a short time.

Stromberg-Equipped Jeffery Makes 28.7 M. P. G.

Chicago, Ill., Oct. 27—*Special Telegram*—Under the auspices of the Technical Committee of the Chicago Automobile Club, with Chairman F. E. Edwards in charge and assisted by Harry A. Tarantous of *Motor Age*, a Chesterfield Jeffery six, equipped with a Stromberg carbureter, today covered 28.7 miles on 1 gallon of Red Crown gasoline of 57.5 degrees at 47.5 Fahrenheit, the trip being made over the Chicago boulevards. The car and passengers weighed 4,100 pounds, and the ton mileage was 58.8 ton-miles.

It was a cold day, the temperature being 42 degrees. The speed was from 18 to 22 miles per hour and the clutch was not disengaged during the trip except when necessary because of a stop in the traffic. Following the fuel test and without changing the carbureter adjustments, the car was driven from a standing start to 30 miles per hour in 12 4-5 seconds. Still without change in the carbureter adjustment, the car was driven at 4 miles per hour on high gear and was speeded up to 44 miles per hour. Road conditions would not permit of greater speed. The test finished with a climb up Hubbard's hill. Going through the gears, the car attained a speed of 15 miles an hour in high at the top. Crossing the starting line at 11 miles an hour in high gear the Jeffery was going at 18 miles an hour at the top of the hill.

The test was conducted for the Stromberg Devices Company and the carbureter used was a model H B 1. A Stewart speedometer was used.

Federal Truck to Share Profits with Employes

Detroit, Mich., Oct. 26—The Federal Motor Truck Co., Detroit, will install a profit-sharing plan on January 1, 1915. Every employe was informed that all who were at work on December 31, would receive a share of the profits of the concern. This share was to be equal to 10 per cent. of the worker's yearly salary.

Gasoline Drops ½ Cent in Indianapolis

Indianapolis, Ind., Oct. 26—The market price of gasoline has taken another decline at Indianapolis and is now 11 cents. This is a decline of one-half cent a gallon. Dealers who have contracts obtain gasoline at 1-2 cent a gallon off of market price. There has been a total decline in the market price of 3 cents a gallon since January. The retail price remains unchanged at from 13 to 16 cents a gallon.

Market Reports for the Week

The usual changes occurred in this week's markets. Prices were generally steady, but in many cases where the changes occurred, they fluctuated. Antimony this week is in good demand and as a consequence prices are higher by $0.03. This metal gained on an average 1-2 cent per day. Both Bessemer and open-hearth steels dropped $0.50 per ton. Copper is heavier and lower. The capture of three more ships carrying copper from New York City to Europe, apparently for Germany, has had a depressing effect here. The demand on electrolytic copper was light. Tin had a very fluctuating week, its highest price being $31.75 and its lowest price being $1.25 lower. The American October deliveries of tin are expected to be 2,800 to 3,000 tons. Lead is in fair demand and again stronger. The rubber market was very steady. Fine Up-River Para remained constant at $0.66 while tire scrap, which hardly ever changes in price, remained at $0.05. There were no changes in the oils, lubricants and chemical markets. Cottonseed oil, however, dropped $0.35 a barrel.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.10½	.12	.12½	.13	.13	.13½	+.03
Beams & Channels, 100 lbs.........	1.26	1.26	1.26	1.26	1.26	1.26	......
Besemer Steel, ton	19.50	19.50	19.00	19.00	19.00	19.00	—.50
Copper, Elec., lb..	.11 3/20	.11⅛	.11⅛	.11⅛	.11 8/10	.11¼	+.00 1/10
Copper, Lake, lb..	.11⅛	.11⅜	.11⅝	.11⅛	.11½	.11⅖	+.00 1/20
Cottonseed Oil, bbl.	5.00	4.90	4.80	4.77	4.60	4.65	—.35
Cyanide Potash, lb.	.25	.25	.25	.25	.25	.25	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime...	.92	.92	.91	.91	.90	.90	......
Lead, 100 lbs.....	3.50	3.50	3.50	3.50	3.50	3.50	......
Linseed Oil.......	.47	.47	.47	.47	.47	.47	......
Open-Hearth Steel, ton	19.50	19.50	19.00	19.00	19.00	19.00	—.50
Petroleum, bbl., Kans., crude....	1.45	1.45	1.45	1.45	1.45	1.45	......
Petroleum, bbl., Pa., crude	.55	.55	.55	.55	.55	.55	......
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	......
Rubber, Fine Up-River, Para.....	.66	.66	.66	.66	.66	.66	......
Silk, raw, Ital....	..	4.30	..	..	4.30	4.25	—.05
Silk, raw, Japan...	..	3.30	..	..	3.30	3.28	—.02
Sulphuric Acid, 60 Baume.......	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.......	30.50	31.75	31.75	31.50	31.25	30.75	+.25
Tire Scrap........	.05	.05	.05	.05	.05	.05	......

Records Broken at Galesburg Dirt Track

New Marks Set for 50, 75 and 100 Miles—Mulford Wins Century in 1:32:54.5

GALESBURG, ILL., Oct. 23—New dirt track records for 50, 75 and 100 miles were created yesterday in the century race on the local track, promoted by the Galesburg District Fair Assn. Ralph Mulford in a Duesenberg was the winner, but it was an unexpected victory, made possible by Bob Burman running out of gasoline within 1-4 mile of the finish. Burman in his Peugeot had led the field from the 20-mile post, when DePalma was forced to go into dry dock because of dirt clogging the gasoline line. He had driven carefully and fast and no one questioned his victory. In fact it was something like the 1912 race at Indianapolis when DePalma spreadeagled the field. But in the backstretch of the last lap Burman was seen to slow and at the three-quarter pole he was simply rolling along. Mulford had been trailing all the way and was not more than 1-2 mile behind the pacemaker at any stage. So when Burman faltered he was in an excellent position, shooting by the slowing Peugeot and getting the checkered flag first, 10 seconds ahead of Burman, who had enough momentum to coast home from the three-quarter pole.

Five Cars Allowed to Finish

Five cars were permitted to finish. Tom Alley in a Duesenberg was third; Eddie O'Donnell in another Duesenberg was fourth, and J. D. Callaghan in a Keeton was fifth, while Tidmarsh in the Great Western was still running. Those who had docked at the pits included DePalma in the Mercedes six, Gunning in the Fiat Tornado and Rawlings in a Mercer.

Neither Mulford nor Burman made a stop and there were few cases of tire trouble. If Burman knew he was running out of gasoline he could not stop, for Mulford was barking at his heels all the time. Burman was fooled as to his gasoline, for yesterday he used twice as much as he did in the 100-mile race at Kalamazoo.

At the outset it looked like a keen battle, for DePalma, starting in the second row, took the lead immediately, followed by Burman. The pair raced together for 20 miles, with Mulford trailing. Then DePalma had to slow because of the dirt in the gasoline line and at 27 miles he put up at the pits. Working for 15 minutes, he cleaned out the line, then started again in order that the spectators might have some excitement. He started out to catch Burman and turning miles in :53 and :54 he gave a clever exhibition. The lap in which he caught Burman on the far turn was made in :52, DePalma showing his track cunning by holding the pole in a most sensational manner in his swing into the homestretch. A stop for a tire change followed, then DePalma resumed the race but quit a few miles later, when his fuel line again clogged.

One accident marred the race. In his thirty-first lap Jack Gable in the Burman Special turned partly over going into the last turn, caused by a rear wheel collapsing in the backstretch. Gable escaped with a few bruises, but Fritz Walker, his mechanic, was more severely hurt. Walker was taken to the Galesburg hospital.

The track was in perfect condition. Recent rains helped and so did calcium chloride. The course was almost dustless and stood up under the long grind, being really better at the finish than at the start. The weather, too, was ideal, there being no wind. Because of these conditions, it was no wonder records were broken. The 50-mile mark of 46:32, held by Disbrow, was cut to 45:48 by Burman. The 75-mile record of 1:11:21, held by Burman, was dropped to 1:08:54 3-4 by Burman, while Mulford gets the century mark, his 1:32:54 1-2 beating the 1:34:29 4-5, made by Burman at Kalamazoo. This mark is not yet official, however. The time of the race for each 5 miles was as follows:

DISTANCE	TIME	LEADER	DISTANCE	TIME	LEADER
5	4:26½	DePalma	55	50:23½	Burman
10	9:02	DePalma	60	55:01	Burman
15	13:40	DePalma	65	59:40⅕	Burman
20	18:14	DePalma	70	1:04:15½	Burman
25	22:43½	Burman	75	1:08:54¾	Burman
30	27:17	Burman	80	1:13:41	Burman
35	31:51	Burman	85	1:18:30⅕	Burman
40	36:31⅕	Burman	90	1:23:17	Burman
45	41:09	Burman	95	1:27:57	Burman
50	45:48	Burman	100	1:32:54½	Mulford

The summary of the race was as follows:

CAR	DRIVER	TIME
Duesenberg	Mulford	1:32:54½
Peugeot	Burman	1:33:08½
Duesenberg	Alley	1:33:37
Duesenberg	O'Donnell	1:37:33
Keeton	Callaghan	1:37:41
Great Western	Tidmarsh	Still running
Mercedes	DePalma	Out
Burman Special	Cable	Out
Fiat Tornado	Gunning	Out
Mercer	Rawlings	Out

The success of the race was such that the Galesburg association is planning something bigger for next year. It is proposed to widen the track, hang up at least a $5,000 purse and stage a 200-mile race about June 15, in between Indianapolis and Sioux City. It is suggested that this be an invitation affair, limited to ten or a dozen cars.

DETROIT, MICH., Oct. 24—Since April 1, 1914, the Saxon Motor Co., has shipped 6,200 cars of which many went to foreign lands. June was the Saxon's biggest month, 1,787 cars being shipped, while the biggest day was June 22, when 103 cars were shipped.

Duesenberg Breaks Century Mark on Hamline Track

MINNEAPOLIS, MINN., Oct. 24—Tom Alley in a Duesenberg car today established a new dirt track record for 100 miles at Hamline, under adverse conditions. His time was 1:31:30 as against the official time of 1:40:15 made by De Palma in a Mercedes at Brighton Beach on September 2, 1914. He averaged a little over 65 miles an hour. The others who finished were as follows: Mulford, O'Donnell and De Palma.

The race was a Class D, non-stock, free-for-all, flying start and the prizes were as follows, first, $1,000; second, $750; third, $500; fourth, $250; and for breaking the world's record, $1,000.

The race was on a 1-mile dirt track, which was over heavy due to excess of calcium chloride with the addition of rain.

Big Automobile Representation in Tercentenary

NEW YORK CITY, Oct. 28—Over 1,200 motor vehicles, including passenger cars and commercial trucks, were represented in tonight's celebration of New York's 300th business birthday. The Commercial Tercentenary Celebration, commemorating 300 years of chartered commerce in this country, started on Sunday, October 25, when President Wilson opened the religious feature of the celebration in this city. The motor vehicle pageant, which was held tonight, was composed of floats, automobiles and motorcycles, exclusively. The entrants competed for $5,000 worth of prizes, which were offered by the State and $1,000 additional from other sources.

A reception was given to Governor Glynn and Mayor Mitchell at the Automobile Club of America, both of whom rode at the head of the pageant and reviewed it from the Court of Honor at Forty-second street and Fifth avenue.

Two Stutz Cars Entered for Corona

CORONA, CAL., Oct. 21—Charles Klein, driver of the King car at Indianapolis and in the motor race meets of the Northwest this summer, has contracted to pilot the second Stutz entered by Walter M. Brown in the Corona road race which is scheduled to take place on the Circle City course, Thanksgiving Day. The third Stutz driver is to be Barney Oldfield, if he gets through the strenuous Los Angeles-to-Phoenix road race safely and with his car in condition to start at Corona.

Eighteen in Los Angeles-Phoenix Road Race

LOS ANGELES, CAL., Oct. 23—Entries for the seventh annual Los Angeles-Phoenix automobile road race closed yesterday with eighteen cars nominated. The start will be made here on the morning of November 9, with night controls at Needles, Cal., and Prescott, Ariz., and the finish will be at Phoenix, Ariz., on November 11. Two mountain ranges and the Mojave desert must be crossed. The course will be about 700 miles and state highways will be patrolled by the militia. A diamond medal has been offered for the winner.

The list of cars and drivers follows: Paige, Louis Nikrent; Chevrolet, L. R. Lawrence; Unknown, unknown; Simplex, O. Davis; Stutz, Barney Oldfield; KisselKar, D. Anderson; Maxwell, W. Carlson, Jr.; Paige, T. J. Baudet; Metz, unknown; Kincaid Special, J. Greenwood; Metz, unknown; Buick, H. Ellis; De Dietrich, unknown; Stutz, J. Burns; Thomas, H. J. Pink; Cadillac, W. W. Bramlette.

100 Models on Display at Los Angeles

LOS ANGELES, CAL., Oct. 17—The annual Los Angeles automobile show opened at the Shrine auditorium this afternoon with more than 100 new models on display, representing twenty-six agencies. The Los Angeles show is the first of the Western season. There were so many machines on the floor that exhibits were staged in the lobby and in private rooms off from the main show room. Accessory exhibits, representing every branch of the industry, have been placed in the balcony.

The second week of the show is to be given over to the motor truck industry. The automobiles are to be taken off the floor by midnight, Friday, October 23, and the following afternoon the truck show will open.

The attendance on opening day broke all records for automobile shows in Southern California.

Fifty 1915 Models at Madison's Fall Show

MADISON, WIS., Oct. 26—Fifty 1915 models were displayed by Madison, Wis., dealers at the first annual fall automobile show, conducted in connection with Madison's big Fall festival last week. The display occupied a huge tent, there being no building available to house the collection of cars. Among the cars on exhibition were: Buick, Chalmers, Ford, Saxon, Cadillac, Chevrolet, Hudson, White, Studebaker, Premier, KisselKar, Reo, Moline-Knight, Regal, Oakland and Mitchell. As Madison dealers are for the most part large district agents in western Wisconsin, the show attracted sub-dealers as well as retail buyers from a large territory and a splendid business was done. The show will be repeated next fall and will supplant the annual spring show.

Montreal Show To Be Held Jan. 23-30

MONTREAL, Oct. 22—It has been decided by the Show Committee of the Montreal Automobile Trade Assn. to hold a show from January 23 to 30 inclusive and the same will be held in the Allen Line Liverpool Buildings. This year's show will, as above, be spread over one week only with a special commercial section reserved for trucks, etc. The space at the disposal of exhibitors is 60,000 square feet. Last year's show covered 2 weeks, one for pleasure cars and the other devoted to commercial vehicles.

Detroit Garagemen Form Welfare Association

DETROIT, MICH., Oct. 24—Garage Owners of Detroit have organized the Detroit Garage and Station Operators Assn., the object of which is to promote the welfare of all connected and interested in the garage business. F. A. Bean, of the Grosse Point Garage, was elected president; J. J. Towers, of the Canfield Garage, vice-president; A. J. Dorsey, of the Indian Village Garage, secretary and Roy L. Francis, of the Central Oil Co., treasurer.

There are several important measures which the association is now working up, such as a state garage lien law, revision of the insurance rates which now make no differences between a fireproof garage and a woodshed used as garage in an alley; improve the matter of selling gasoline which now leaves only 1 cent profit per gallon; establishment of an employment bureau and a workable credit system. A state convention will be held in Detroit during the local automobile show.

Illinois Garagemen Condemn "Leagues"

PEORIA, ILL., Oct. 24—The ease with which differences between the retail and manufacturing ends of the automobile trade may be adjusted, provided one or both sides are organized, was demonstrated today at the fall convention of the Garage Owners' Assn. of Illinois. The garagemen are well organized, and the Danville members had complained that a salaried salesman of a manufacturer was conducting a cut-price "curbstone" business in that town to the detriment of the dealer-garagemen. The matter was referred to the state association by the Danville garagemen with the result that, after correspondence, the manufacturer recalled the salesman and appointed dealers in the territory. The Danville garagemen-dealers also suggested that any further matter of price-cutting might be adjusted by consultation with the manufacturer.

The seventy-five delegates convened at 2:30 o'clock yesterday afternoon and the convention ended tonight with a banquet and ball in the Jefferson Hotel. About seventy-five delegates and as many more non-delegates were present. A theater party, luncheon, the banquet and ball and a tour of the town were mingled with the business sessions.

Motorists' "leagues," which generally are formed for the purpose of supplying car owners with supplies and accessories at cut rates, were placed under the ban. The garagemen consider that the sale of supplies is a business which belongs to the garageman, and the body went on record against the "leagues" by a resolution.

In their work to benefit themselves by rendering greater service to their clientèle the garagemen considered a plan whereby a certain Chicago manufacturer will sell them supplies at about half their present price. The alliance between the garage and the factory involves an investment by the association members and the restriction of trade to members.

The Illinois association, which has been laboring for a national organization, made its call official by passing a resolution; organization work is now going on in the East and the national meeting will be held in January in Chicago during the automobile show.

Truck Club Discusses War Trucks

NEW YORK CITY, Oct. 27—"The Use of Motor Vehicles in the European War" was the subject of the evening at the regular monthly meeting of the New York section of the Motor Truck Club of America, held on October 21, at the Automobile Club of America. The speaker was John R. Eustis, of *The Evening Mail*, who also showed thirty-six lantern slides depicting the different types of motor vehicles used and the various ways in which they were adapted to the special requirements of military service.

Commenting further on the use of motor vehicles in war, he stated that the English were the first to make use of this means of transportation, having used steam traction trucks in the South African campaign.

The next meeting of the club will be held on November 18 at the Automobile Club of America.

PHILADELPHIA, PA., Oct. 24—C. C. Partin, manager of the division of motor truck research of the Curtis Publishing Co., was the principal speaker of the monthly dinner and business meeting of the Motor Truck Assn., this city, held this week. His address dwelt on the necessity of advertising. In regard to establishing the reputation of a truck, he stated that oftentimes a truck of unknown rating is regarded with suspicion, and should one of this class be installed, there is a constant protest against repair expenditures, it being believed that these could have been avoided with the right kind of machine, whereas a truck of nation-wide repute carries with it the equally well-known fact that such outlays are unavoidable.

Mitchell Finishes 7,500-Mile Sealed-Bonnet Run

PITTSBURGH, PA., Oct. 23—The Mitchell car which started from Chicago, Ill., on September 23, with its bonnet sealed, arrived in this city today, after traveling 7,518.4 miles, its seals still intact. The car touched twenty-three states and Washington, D. C., en route.

Grossman Buys Windshield Cleaner Patent

NEW YORK CITY, Oct. 28—The Emil Grossman Mfg. Co., Inc., Brooklyn, has purchased patent No. 1,112,793 for the Security Windshield cleaner, issued to C. J. Heineman, May 11, 1914, as well as his entire right and interest in the invention.

Lincoln Highway Route Three-Quarters Marked

NEW YORK CITY, Oct. 26—Reports received at the headquarters of the Lincoln Highway Assn., indicate that at least 2,700 miles of the route will be marked by the end of the first year's work on October 31. Indications are that by the spring of 1915 the entire distance of 3,400 miles will be completely marked with at least five markers to the mile.

CHICAGO, ILL., Oct. 28—Mercedes Fritz Walker, mechanic for Jack Gable in the 100-mile race at the Galesburg track last week, died this morning in the Galesburg hospital as a result of injuries received when Gable's car partly overturned in the 31st lap.

DODGE Additions Worth $650,000—Dodge Bros., Detroit, Mich., manufacturers of the "unknown" car, are still expanding their already large plant. A new pressed-steel shop and the doubling of their general offices have been let to the contractors and will mean a total outlay of $650,000. The pressed-steel plant will a four-story building, 400 feet long and 77 feet wide, which will have a total floor area of 130,000 square feet. It will be connected with the new assembling plant through an extension of the latter building by 189 feet. A wing will also be built 89 feet long and 77 feet wide, to connect it with the loading platform, railroad tracks and driveways. The first two stories will be of steel frame and concrete throughout, while the two other stories will be of reinforced concrete. The exterior will be similar in construction and design and color to the other Dodge buildings. The general office and administration building, which now is a two-story structure, 116 feet by 52 feet, will be enlarged to be a four-story building, 320 feet long and 72 feet wide.

New Plant for Detroit—American Auto Trimmings Co., Detroit, Mich., will build a four-story brick and steel manufacturing plant, estimated cost $36,500.

Alpha Seeking Plant Location—The Alpha Mfg. Co., Bucyrus, O., manufacturer of a line of pumps, is seeking a location to establish a plant in that city.

Endurance Tire's New Brunswick Plant—The Endurance Tire & Rubber Co., New York City, will build a factory 80 by 250 feet, one story, of brick construction, at New Brunswick, N. J., to cost $50,000.

Automobile Factory in Spencer—The Spencer Mfg. Co., Spencer, O., has been incorporated with $50,000 capital stock. It is reported that it will erect a plant for manufacturing automobiles.

Homer Co. to Build Trucks—The directors of the Homer Motor Co., Los Angeles, Cal., have set aside $65,000 for the erection of a factory that will have a capacity of twenty-four motor trucks a month.

Top Co. to Build—The Topford Detachable Limousine Co., Hempstead, L. I., N. Y., will establish a plant for the manufacture of detachable automobile bodies and limousine tops, doors, etc., and general automobile accessories. The estimated cost is $50,000. J. A. MacAvoy and W. Hutchinson, Hempstead, L. I., are interested.

Ford's New L. I. Plant—Ground has been broken for a new eight-story building of concrete, steel and brick construction for the Ford Motor Co., at Honeywell street and Jackson avenue, Long Island City, east of and adjoining its present building. The new building will have a frontage on Jackson avenue of 325 feet and will cost about $650,000.

Triple Action Spring Adding—The Triple Action Spring Co., Chicago, Ill., manufacturer of the Johnson shock absorbers, is making big additions to its factory, located in East Twenty-eighth street, near Michigan avenue. The new plant when completed will occupy 29,000 square feet of floor space, which will enable the company to double the output.

Canadian Battery Co. Adds—The Canadian Hart Accumulator Co., St. John, N. B., is erecting a large factory there for the manufacture of storage batteries. The company will manufacture a complete line of sulphuric acid batteries and all types of plates on the same principles as the batteries made in Great Britain. C. W. Knighton is the Canadian manager.

Spring City Foundry Adding—The Spring City Foundry Co., Waukesha, Wis., established about 2 years ago, and now supplying several important motor and automobile interests in the Middle West with cylinder and engine castings, is making plans for the erection of an addition which will double its foundry capacity. The addition will be 60 by 122 feet in size and will be equipped principally for making grey iron castings for automobile cylinders and other cast-iron parts.

Blood Bros. May Move—The Blood Bros. Machine Co. may remove from Kalamazoo to Allegan, Mich. It is not yet decided, but at a meeting between members of the local Board of Trade and other citizens and Vice-President Howard E. Blood, of the Blood concern, it became known that if a site and a building is furnished and if a certain amount of stock of the company taken by local people, that the chances are Allegan will have the automobile concern. The Blood company would keep the Kalamazoo plant for the manufacturing of its universal joints and other parts, while the Cornelian light car would be made in Allegan.

Nyberg May Build in Fort Smith—E. R. Call, of the Nyberg Automobile Mfg. Co., Anderson, Ind., recently stated to the Business Men's Club of Fort Smith, Ark., that his company had expressed a willingness to locate in that city. He also stated that a company had been organized for the taking over of the Nyberg Automobile Mfg. Co. and that company in reorganizing had looked over the situation and decided upon a Southwestern location, Fort Smith being one of the towns picked out. In mentioning the reasons for this location he stated that four-fifths of the cars sold by the company were south of St. Louis and Kansas City. If the company decides to build in Fort Smith, a factory with a floor space of 40,000 square feet, a capacity for 200 skilled mechanics and an output of 1,200 cars a year, will be erected.

The Automobile Calendar

Oct. 17-Nov. 1	Dallas, Tex., Show, State Fair Grounds, Dallas Automobile Dealers' Assn.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov. 2-6	Boston, Mass., Salon, Copley Plaza Hotel.
Nov. 3	Long Island A. C. Century Run.
Nov. 7-8-9	Los Angeles, Cal., Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 8	Philadelphia, Pa., Fletcher Cup Run, Automobile Club of Philadelphia.
Nov. 8-9	El Paso, Tex., El Paso-Phoenix Road Race, El Paso Auto Club.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 12	Phoenix, Ariz., Track Race, Maricopa Auto Club.
Nov. 17-18-19	Harrisburg, Pa., Second Conference of Pa. Industrial Welfare and Efficiency, State Capitol.
Nov. 26	Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4	New York City, Annual Meeting of the American Society of Mechanical Engineers.
Dec. 12-19	Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Show.
Jan. 11-16	Buffalo, N. Y., Show, Broadway Auditorium, Automobile Club of America.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 23-30	Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb	Portland, Ore., Show, Portland Auto. Trade Assn.
Feb. 15-20	Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27	Syracuse, N. Y., Show, Syracuse Auto. Dealers' Assn.; H. T. Gardner, Mgr.
Mar. 6-13	Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 7	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds: Promoter, Panama-Pacific Exposition Co.
Mar. 9-15	Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

The Week in  the Industry

Motor Men in New Roles

McGUIRE Oldsmobile Advertising Manager—C. V. McGuire, until recently in charge of the publicity department of the Lozier Motor Co., Detroit, and previous to that connected with the advertising departments of the Paige-Detroit Motor Car Co. and the United States Tire Co., has been appointed advertising manager of the Olds Motor Works, Lansing, Mich.

Scott Resigns—Emmet Scott has resigned the treasurership of the M. Rumely Co., Laporte, Ind., effective October 31, so he can devote more time to his own affairs.

Quimby Resigns—E. F. Quimby has resigned from the position of secretary and general manager of the Colfax Mfg. Co., South Bend, Ind., and has been succeeded by S. P. Colby.

Coler Resigns from Overland—Ernest Coler has resigned as advertising manager of the Willys-Overland Co., Toledo, O., to take a similar position with the Briscoe Motors Co., Jackson, Mich.

Estep Joins Cheltenham Press—E. Ralph Estep, former advertising manager of the Packard Motor Car Co., Detroit, Mich., has joined the Cheltenham Press, an advertising agency in New York City, in which he now has a stockholding interest.

Hole Promoted—F. H. Hole, manager of the St. Louis branch of the H. E. Wilcox Motor Co., has been promoted to an executive position with the company at Minneapolis. He was succeeded by J. E. Westrich, who has been the company's service agent.

Milwaukee's Former Mayor Manager—S. M. Becker, formerly mayor of Milwaukee, Wis., has taken the position of manager of the electric vehicle department of the Jesse A. Smith Automobile Co., that city, and will handle Milwaukee and the vicinity in behalf of the Detroit electric.

Rand Simplex Branch Manager—C. D. Rand, who was assistant manager under Bert Latham, has just been appointed branch manager of the Simplex Mercer Pacific Coast agency in San Francisco. Mr. Rand has been connected with the agency ever since its establishment in San Francisco.

Horning to Open Consultation Bureau—W. R. Horning. 1408 West Third street, Cleveland, O., will in the near future establish a service station and consultation bureau on all makes of automobile starting and lighting systems. This station will be opened about November 15 at 1020-1030 Chestnut street, that city.

Pelletier and Tripp Form Advertising Co.—The advertising firm of Pelletier-Tripp, Inc., has been formed in Detroit, Mich., by E. LeRoy Pelletier and William Tripp. Headquarters have been secured in the Fine Arts Bldg. The accounts of several of the big automobile manufacturers have been secured by the corporation. Both men are well known in the automobile, parts and accessory industry of the country. Roy Pelletier has successfully handled the advertising of the Ford, Maxwell, Flanders and Lozier companies. William Tripp has been for many years with the advertising department of the Class Journal Co.

Chapin to Be a Benedict—Cards have just been issued for the wedding of R. D. Chapin, president of the Hudson Motor Car Co., Detroit, Mich., to Miss Inez Tiedeman at St. John's Church, Savannah, on November 4. The bride-to-be is the daughter of Mayor Tiedeman, who was a member of the Savannah Automobile Club's race committee during the Grand Prize and Vanderbilt Cup races.

Wallis Resigns from J. I. C.—H. M. Wallis, Jr., secretary and treasurer of the J. I. Case Plow Works, Racine, Wis., for a number of years, has resigned these positions and retired as a director to be able to devote his entire time and attention to the development of the Wallis Tractor Co., which he organized about 18 months ago, and which now is manufacturing Wallis tractors at Cleveland, O. Mr. Wallis' father, H. M. Wallis, Sr., continues as president of the plow company, which at various times has been interested in the motor car industry, principally as state and territorial agent and distributor for pleasure cars.

Recent Changes on Pacific Coast—D. A. Outcault, a member of the Tacoma Speedway Assn., has been elected president of the Tacoma Automobile Club, and E. B. King succeeds Mr. Outcault as vice-president. The organization of the De Vaux Motor Sales Co., a Los Angeles corporation, has been completed with E. J. Bennett as sales manager. The Grant car now has a new home in Seattle with the Grant Motor Agency, which is established in new quarters at 1026 East Pike street. F. W. Blair is manager of the agency, and associated with him is F. W. Venable. A. C. Stevens, for 2½ years with the Winton Motor Car Co. in Seattle, has been appointed manager of the Winton branch in Portland, Ore., succeeding Bert Roberts, and T. A. Crisman, formerly of the Blaine Auto Co., of Iowa, has joined the sales force of the Hodgins-Fosdick Co. in Spokane, Wash.

Garage and Dealers' Field

Jandorf's New Lease—The Jandorf Automobile Co., New York City, has leased the second and third floors in 351-355 West Fifty-second street, that city.

Ford's New Bronx Lease—The Ford Motor Co., Detroit, Mich., has leased the six-story building at 607-609 Bergen avenue, Bronx, New York City. This building is 50 by 100 feet in size.

Saxon Now a Branch—The Saxon Motor Co. has been formed in Boston, Mass., to handle the Saxon cars in that territory as a factory branch, instead of an agency and salesrooms have been secured at 620 Commonwealth avenue, with F. S. Sumner as manager.

Houpt's New Repair Station—Harry S. Houpt, Inc., agent for the Mitchell car, has leased property at the northwest corner of Forty-seventh street and Eleventh avenue, New York City, or 645 to 651 Eleventh avenue, to be used as a storehouse and repair station.

G. M. C. Makes a Move—The Boston branch of the General Motors Truck Co. is now housed in one building, the salesrooms on Boylston street having been discontinued, the offices being moved to the service station at 944 Massachusetts avenue, where everything is under one roof.

Ford to Have Retail Branch—The Ford Motor Co. has leased quarters on Boylston street, Boston, Mass., formerly used by the Alco forces, where it will establish a retail branch to be run in connection with its wholesale distributing plant in Cambridge, Mass.

Assn. Plans Own Garage—The Automobile Owners' Assn., Grand Rapids, Mich., is planning to have a garage, service station, supply and accessories department and vulcanizing station of its own. It is estimated there would be a saving of at least 50 per cent. on automobile supplies alone.

Dayton Wants Fire Apparatus—The announcement is made by City Manager Waite of Dayton, O., that bids for a number of pieces of motor-driven fire apparatus will be advertised for in the near future. The city proposes to purchase a chemical arial truck, a tractor, a service truck and a runabout.

Akron Agencies Under One Roof—Plans have been prepared for the erection of a $75,000 building at the corner of Water and Bowers streets, Akron, O., which will be devoted exclusively to sales agencies for automobiles. It is planned to house many of the agencies of the city in the building. The basement will be used as a workshop and the upper floors for showrooms.

Lincoln Highway Emblem on Motometer—The MotoMeter Co., New York City, maker of the Boyce motometer, was licensed by the Lincoln Highway Assn. to the exclusive right to use the Lincoln highway emblem on radiator heat indicators. No additional charge will be made for motometers supplied with this emblem, but it is understood that for each Lincoln highway motometer sold that company has agreed to contribute a certain amount to the Lincoln highway cause.

Bosch Adds New Stations—The Bosch Magneto Co., New York City, has recently added the following supply stations: Olympia Auto Supply Co., Olympia, Wash.; Max Gottberg Auto Co., Columbus, Neb.; James Auto Co., Ogden, Utah; I. P. Todd, Circleville, O.; G. O. Reynolds, Inc., New Rochelle, N. Y.; Marksheffel Motor Co., Colorado Springs, Col.; Eleventh Avenue Garage, Altoona, Pa.; Graham-Seltzer Co., Peoria, Ill.; North West Garage, Cherokee, Iowa; Union Garage, Lansing, Mich.; Plank & Morgan, Worcester, Mass.; Crater Lake Motor Car Co., Medford, Ore.; T. A. Bryson, Savannah, Ga.; Pendleton Auto Co., Pendleton, Ore.; Clyde Garage, Charleston, S. C.; Milton Garage, Milton, Ore.; Motor Car Supply House, Decatur, Ill., and Triple Star Garage, Kahoka, Mo

Automobile Agencies Recently Established

PASSENGER CARS

New York

New York City	Oldsmobile	Oldsmobile Co. of N. Y.
Olcott Beach	Oldsmobile	W. F. Kruger
Rochester	Oldsmobile	George W. Henner
Schuylerville	Oldsmobile	Ford Garage Co., Inc.
Syracuse	Oldsmobile	Wright Bros.
Troy	Herff-Brooks	East Side Garage
Troy	Oldsmobile	Ilium Garage
Utica	Oldsmobile	Utica Regal Sales Co.
Washingtonville	Oldsmobile	Nicoll's Garage

North Carolina

Asheville	Oldsmobile	D. C. Shaw Motor Co.
Greensboro	Oldsmobile	Guilford Motor Car Co.
Rocky Mount	Oldsmobile	Oldsmobile Sales Co.

Ohio

Akron	Oldsmobile	Middlebury Auto Garage
Alliance	Oldsmobile	George H. Judd
Bristolville	Oldsmobile	Miller & Dilley
Cadiz	Oldsmobile	J. W. Robertson
Cambridge	Oldsmobile	Cambridge Motor & Storage Co.
Canton	Oldsmobile	Canton Buggy Co.
Cincinnati	Herff-Brooks	Herff-Brooks Sales Co.
Cleveland	Oldsmobile	Windermore Euclid Garage
Cleveland	Haynes	Cleveland Motor Sales Co.
Columbus	Inter-State	Twyman Motor Car Co.
Eaton	Saxon	E. C. Wysong
E. Liverpool	Oldsmobile	Lincoln Motor Car Co.
Fremont	Krit	John P. Smola
Fostoria	Herff-Brooks	A. C. Ash & Son
Greenville	Oldsmobile	Central Auto Co.
Huron	Oldsmobile	C. E. Rhinemiller
Kenton	Oldsmobile	Arnett Auto Co.
Lima	Oldsmobile	W. E. Rudy
Logan	Ford	C. R. Lutz
Mansfield	Oldsmobile	Pat Gatton & Son
Marietta	Chalmers	Marietta Motor Car Co.
Marseilles	Saxon	M. R. Emptage
Medina	Oldsmobile	Western Reserve Garage
Newark	Oldsmobile	Fred W. Simpson
Norwalk	Oldsmobile	H. C. Newman
Toledo	Oldsmobile	Bunnell Auto Sales Co.
Woodsfield	Oldsmobile	Troutman Garage
Wooster	Oldsmobile	Warren Garage
Youngstown	Herff-Brooks	Cartercar Sales Co.
Youngstown	Oldsmobile	Youngstown Auto & Repair Co.

Oregon

Pendleton	Oldsmobile	B. F. Trombley
Portland	Oldsmobile	Gerlinger Motor Car Co.

Pennsylvania

Allentown	Oldsmobile	Berwin Auto Co.
Braddock	Oldsmobile	Copeland Garage
Chester	Oldsmobile	The Palace Garage
Columbus	Herff-Brooks	Scholton & Fuller
Easton	Oldsmobile	G. Russell King
Emporium	Oldsmobile	Emporium Machine Co.
Greencastle	Saxon	L. H. Leiter Bros.
Harrisburg	Oldsmobile	East End Automobile Co.
Hazleton	Oldsmobile	Hazleton Motor Service Co.
Houtzdale	Oldsmobile	H. J. Wagner
Lancaster	Oldsmobile	Geo. W. Croswell
Lonsdale	Oldsmobile	Heebner-Felver Motor Co.
Meyersdale	Oldsmobile	Keystone Garage
Norristown	Oldsmobile	Keystone Garage
Oil City	Oldsmobile	C. H. Weaver
Penn Argyl	Oldsmobile	Joel F. Batt
Philadelphia	Oldsmobile	Oldsmobile Co.
Pittsburgh	Oldsmobile	Oldsmobile Co. of Pittsburgh
Pottstown	Oldsmobile	Wm. P. Young & Son
St. Mary's	Franklin	Elk Engineering Works
Sharon	Oldsmobile	Greer Auto Co.
Washington	Oldsmobile	Washington Automobile Co.
W. Newton	Oldsmobile	McKenery & Britton
York	Oldsmobile	J. P. Oden Auto Sales Co.

Rhode Island

Arctic	Oldsmobile	B. F. Tefft, Jr.
Pawtucket	Oldsmobile	James A. Welch
Providence	Herff-Brooks	Jos. A. Pigeon
Woonsocket	Herff-Brooks	Fuller Bros.
Woonsocket	Oldsmobile	H. F. Burdick

South Carolina

Charleston	Oldsmobile	N. B. Paine

Tennessee

Knoxville	Oldsmobile	Cadillac Sales Co.
Nashville	Oldsmobile	Hager Motor Car Co.

Texas

Amarillo	Oldsmobile	Frank W. Hays
El Paso	Oldsmobile	Western Hardware Co.
Marfa	Oldsmobile	D. C. Wease
Pecos	Oldsmobile	Landrum & Lynch
Port Arthur	Saxon	Linn & Smith
Wichita Falls	Oldsmobile	Motor Supply Co.

Utah

Ogden	Oldsmobile	James Automobile Co.
Salt Lake City	Oldsmobile	Randall-Doff Auto Co. Ltd.

Vermont

Brattleboro	Oldsmobile	Mosher & Tucker
Burlington	Oldsmobile	P. T. Donovan
Northfield	Oldsmobile	Cross Bros. Co.

Virginia

Lynchburg	Saxon	Piedmont Motor Co.
Norfolk	Oldsmobile	H. S. Meyers
Parksley	Oldsmobile	Parksley Automobile Co.

Washington

Aberdeen	Oldsmobile	L. A. Poulson
Bellingham	Oldsmobile	A. Burgess
Ellensburg	Oldsmobile	A. M. Wright & W. C. Wescott
Everett	Oldsmobile	L. S. Cannon & S. F. Sherrod
Seattle	Oldsmobile	Gerlinger Motor Car Co.
Tacoma	Oldsmobile	E. H. McClellan

West Virginia

Glen Jean	Herff-Brooks	Robt. Essex

Wisconsin

Brodhead	Herff-Brooks	Fleek & Knozel
Fond Du Lac	Oldsmobile	John D. Giddings
La Crosse	Oldsmobile	Moll-Savage Motor Co.
Madison	Cole	R. A. Warner
Milwaukee	Dodge	Edwards Motor Car Co.
Milwaukee	Oldsmobile	Emil Estberg
Milwaukee	Overland	Geo. W. Browne
Platteville	Saxon	Udelhoven Motor Co.
Prairie du Chien	Saxon	The Harrison Auto Co.
Waukesha	Oldsmobile	R. E. Knowlton

Wyoming

Casper	Oldsmobile	Earl C. Boyle

COMMERCIAL VEHICLES

Pennsylvania

Lancaster	Koehler	J. M. Binkley

Tennessee

Chattanooga	Koehler	Ford Sales Co.
Nashville	Koehler	West H. Morton
Springfield	Koehler	J. D. Traughber

Recent Incorporations in the Automobile Field

Arkansas

ARGENTA—W. F. Brawley Motor Co.; capital, $10,000. Incorporators: W. F. Brawley, John D. Staples and W. R. Deen.

Canada

TORONTO, ONT.—Canadian Simplex Motors; capital, $40,000.

Indiana

INDIANAPOLIS—Higgins-Craig Co.; capital, $20,000; to deal in motor cars. Incorporators: George W. Higgins, J. R. Craig and William R. Higgins.

INDIANAPOLIS—Perfection Spring Wheel Co.; capital, $50,000; to manufacture wheels. Incorporators: Harry Weill, Max Weill and George V. Stein, all of Indianapolis; Austin Cabel and Bret Cabel, both of Washington, Ind.

New York

BROOKLYN—Schroeder-Peters Corp'n.; capital, $20,000; to manufacture engines, motor vehicles, operate a machine shop, etc. Incorporators: Arthur A. Schroeder, 346 Avenue O; Cuyler Heath, 172 Halsey street; Frank R. Greene, 27 Grace court.

HIGHLAND—Howard W. Bloomer, Incorporated; capital, $10,000; motor car business. Incorporators: Howard Bloomer, Highland; Raymond C. Bloomer, 96 Washington street, Poughkeepsie; Charles H. Buys, Jr., Cannon street, Poughkeepsie.

NEW YORK—Economy Parts Co.; capital, $1,000; to manufacture parts for motor cars, motorcycles, etc. Incorporators: George K. Erb, Asbury Park, N. J.; Alan D. Morrow, 220 Broadway; J. Wallace Mahlstadt, 2766 Boulevard, Jersey City, N. J.

NEW YORK—Sole Distributing Co.; capital, $15,000; to conduct a motor car business. Incorporators: Nancy Stamm, 1476 Seabury place, Bronx; Lida S. Davies, 590 W. 172d street; Herman P. Lowenstern, 501 East 140th street.

YONKERS—R. U. Bunker Engineering Co.; capital, $20,000; motor car engineering and designing, motor car parts, etc. Incorporators: Raymond U. Bunker, No. Broadway; David H. Well, Flushing; George O. Elmore, Brick Church, East Orange, N. J.

North Dakota

HEBRON—Hebron Motor Co.; capital, $10,000. Incorporators: Theodore J. Bolke, Charles W. Lorenz and Fred Braun, Jr., all of Hebron.

Ohio

CLEVELAND—Neighbors Motor Co.; capital, $10,000; to deal in motor cars. Incorporators: W. C. Barger, M. T. Flanagan, R. Hall, Robert Jamison and Richard Inglis.

LIMA—Buckeye Machinery Co.; capital, $50,000; to manufacture gas engines and other machinery. Incorporators: Edward E. Weiswander, Calvin Weiswander, Jacob A. Weiswander, George A. Hevrett and Daniel Armentrout.

Oklahoma

BROKEN ARROW—F. O. B. Automobile Co.; capital, $1,000; to deal in motor cars. Incorporators: R. R. Hord, H. C. Hunsecker and L. F. Copeland, all of Broken Arrow.

Tennessee

MEMPHIS—Atlas Machine & Garage Co.; capital, $2,000; to manufacture and sell motor car parts and accessories and operate a garage. Incorporators: H. E. Bridges, J. C. Scott, J. C. Bailey, W. D. Keysey and A. C. Fant.

Virginia

ROANOKE—Overland Roanoke Co.; capital, $4,500; to deal in motor cars. Incorporators: Gordon Lefebre and F. S. Cooper, both of Roanoke, and others.

Washington

BELLINGHAM—Whatcom Auto Co.; capital, $5,000; to deal in motor cars. Incorporators: Perry B. Newkirk, Frank W. Radley and Thomas R. Waters, all of Bellingham.

EVERETT—Mackey Bros.; capital, $2,500; to deal in motor cars. Incorporators: James Mackey, George Mackey and others.

KENNEWICK—Kennewick Auto Co.; capital, $3,000; to deal in motor cars. Incorporators: John A. Penn, William L. Muncey, D. M. Williams, J. E. McKinney and L. H. Marks.

GARAGES AND ACCESSORIES

Alabama

BIRMINGHAM—Universal Service System; capital, $10,000; to conduct a general motor vehicle business. Incorporators: F. J. Bradley, W. C. Nabb and others.

Canada

QUEBEC CITY, ONT.—Safety Tire Co.; capital, $1,000,000.

MONTREAL, QUE.—Higgins & Lee Motor Supplies; capital, $50,000; manufacturers' agents and dealers in motor car supplies. Incorporators: R. S. Higgins and others.

Delaware

WILMINGTON—Storage Battery Locomobile Co.; capital, $50,000; to manufacture and sell storage batteries and electrical machinery. Incorporators: C. B. Bishop, C. J. Jacobs and H. W. Davis, all of Wilmington.

Illinois

CHICAGO—Century Auto Tire & Supply Co.; capital, $10,000; to manufacture and deal in motor car accessories. Incorporators: B. M. Goff, C. A. Wever and B. M. Goff.

CHICAGO—Chicago Auto Equipment Co.; capital, $2,500. Incorporators: Harold M. Behan, Emil Fantana and William H. Dellenback.

Louisiana

SHREVEPORT—Shreveport Overland Co.; capital, $50,000; to conduct a general motor vehicle business.

Michigan

DETROIT—Detroit Enclosed Body Co.; capital, $10,000. Incorporators: Carl A. Zeller, Jr.; Gerald Wright and Grover Farnsworth.

DETROIT—National Motor Appliance Co., capital, $25,000. Incorporators: Sidney B. Winn, Nathan H. Jewett and Howard Streeter.

DETROIT—R. T. W. Auto Accessory Co.; capital, $5,000. James H. Pratt, William H. Lankin and Edward W. Mills.

New York

BROOKLYN—Whipple Garage; capital, $3,000. Incorporators: Edward Appel, 443 East 138th street, New York; John C. Wolff, 27 North Washington street, Jamaica; James E. McKenna, 29 Boerum place.

NEW YORK—Æon Garage Corporation; capital, $500. Incorporators: Sumner Gerard and Nathan A. Smyth, both of 50 Broadway; Lorne A. Scott, 243 West 55th street.

NEW YORK—The 474 West 130th Street Garage; capital, $1,000; to operate a garage. Incorporators: George A. Adams, 149 Church street; Bernard Linn, 456 Washington street; Charles Goldman, 41 Park Row.

NEW YORK—Motor Devices Co.; capital, $30,000; motor car accessories. Incorporators: William A. Allen, Yonkers; Auckland B. Cordner, 1733 Broadway; David Wills, 954 Boulevard, Astoria, L. I.

NEW YORK—Washington Heights Auto Tire Works; capital, $5,000. Incorporators: William J. Buckley and Edward Buckley, both of 1748 Amsterdam avenue; William F. Keyes, 526 West 145th street

Accessories for the Automobilist

Detroit Ball Bearing Universal—A universal of the ball bearing type is shown in Fig. 1. The body of the universal, which is keyed to the gearset, or the bevel pinion shaft, as the case may be, is fitted with four cylindrical grooves. The other member of the universal works in two of these grooves. Friction is largely eliminated because the sliding member is equipped with balls which are attached to a cross-arm.

Several advantages are claimed for this device. In the first place the joint has a smooth exterior; second, it may be easily taken apart by simply unbolting the flange which is keyed to the shaft at one end; third, it will retain its lubrication indefinitely, as there is only one opening to the joint and this is closed by a simple leather sleeve. The joint not only allows a full universal action but also sufficient longitudinal movement so that it acts as a slip joint. It is further claimed that it is cheap to manufacture, almost frictionless and extremely strong. It is made by the Universal Metal Products Co., 518 Woodbridge street, Detroit, Mich.

Electric Safety Signal—To prevent the theft of the car, William Bogler, Hastings, N. Y., has invented an automatic switch which sounds a bell, operates the electric horn or both whenever the starting switch is turned on. This will scare away anyone trying to steal the car. In addition it locks the ignition or electric starting circuit. It is shown in Fig. 2.

The whole apparatus is enclosed in an iron box 2½ by 6 inches, which is made fast to back of dash board under the hood and all that will show is the lock face about 1 inch in front of dash board.

Enclosed in the iron box there is a Yale two-way lock with copper switch blades fastened to the lock bolt, insulated with fiber and connecting with switch points to circuit.

With the key turned to the right, the circuit is closed for running. When one stops his car he throws his switch to off position, turns the kev to the left, removes it from the lock and places it in his pocket, the car is then locked and cannot be run without the key. The lock is pick proof and there are no two keys the same.

Should anyone try to steal the car the first thing he would do would be to throw switch to starting position, since the circuit is open through the right side of lock switch, the car could not be run; but the minute the switch was closed it would make a circuit through the left side of lock switch, connecting with a bell which is also enclosed in the same box, which would sound an alarm.

The bell circuit can also be connected in series with electric horn if desired, which would make a double alarm. This switch can be used with any of the starting systems now in use.

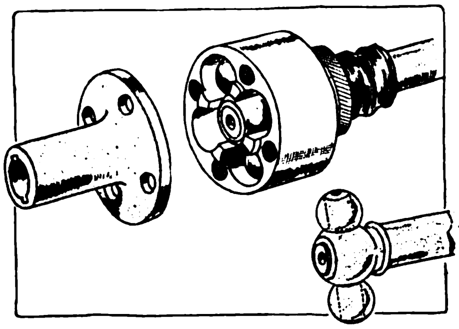

Fig. 1—Detroit ball-bearing universal

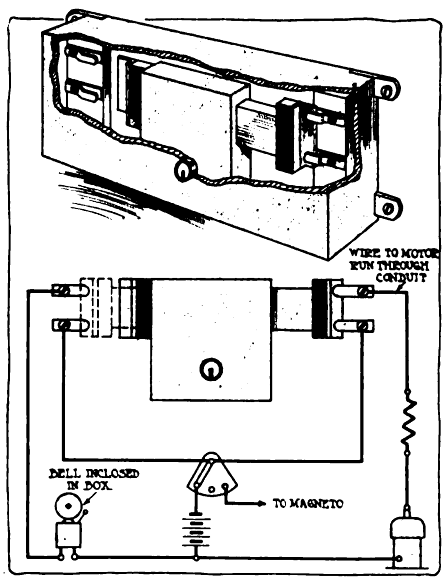

Fig. 2—Electric Safety Signal. Upper view shows the switch and the lower one the connections

Hoggson Joyometer—A device, Fig. 3. for recording the use of motor vehicles, has been patented by S. H. Hoggson, 108 Fulton street, Brooklyn, N. Y. It consists of an eight-day clock movement, which is connected to a printing device which records the divisions of time on a strip of paper tape. Connected with the device is a delicately balanced horizontal pendulum which operates a steel perforating needle that perforates small holes in the paper tape corresponding to the undulations of the car when in motion. When the car is started the recorder begins a series of perforations on the tape, which continues as long as the car runs, and ceases upon the stopping of the car, the perforations being made on the tape at the proper time as indicated by the hands on the clock. The record can be removed at any time or left as long as desired. The inking is done by a special fountain pen roller to which a few drops of ink are added once or twice a year. The recorder uses plain ticker tape and a roll 1.5 inches in diameter is sufficient for a 4 months' record.

The device measures 3.75 by 8.5 inches and weighs about 4 pounds. It may be fastened to any convenient part of the car and, as it is self-contained, it is ready to operate the moment it is attached.

Climax Grease Cup—A grease cup which is designed to operate perfectly under all conditions is shown in Fig. 4. In the first place, it is a simple matter to fill it with grease, merely removing the top cover by turning it to the left a small amount. It will be noted that the cover is held in place by a bayonet locking device which is provided with a split washer to hold it securely in place. Grease cannot pass the plunger, it is stated, because it is made a close fit and is fitted with a cupped leather washer. Ball grips are used to keep the plunger from turning. The cup is made in five sizes and is threaded for ⅛ and ¼-inch standard pipe thread. It is finished in nickel and brass. The prices vary from 25 cents up, the ½-inch brass cup selling for this figure while the nickel-plated one of the same size lists at 30 cents. The 1-inch size costs 45 cents in brass and 50 cents in nickel.

Opco Carbon Remover—The American Oil Products Co., 1426 Seneca street, Buffalo, N. Y., has brought out a carbon remover which will quickly clear away the carbon deposit from the cylinders, it is stated. It is a harmless oil mixture, according to the manufacturer, which penetrates, softens and burns out the carbon. It sells for $1 per quart, this amount be-

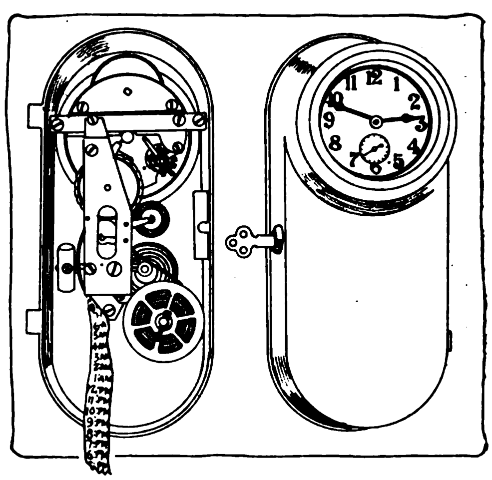

Fig. 3—Hoggson Joyometer for showing when the car is used

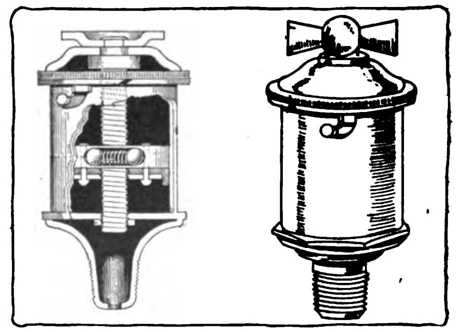

Fig. 4—Climax grease cup with quick detachable top

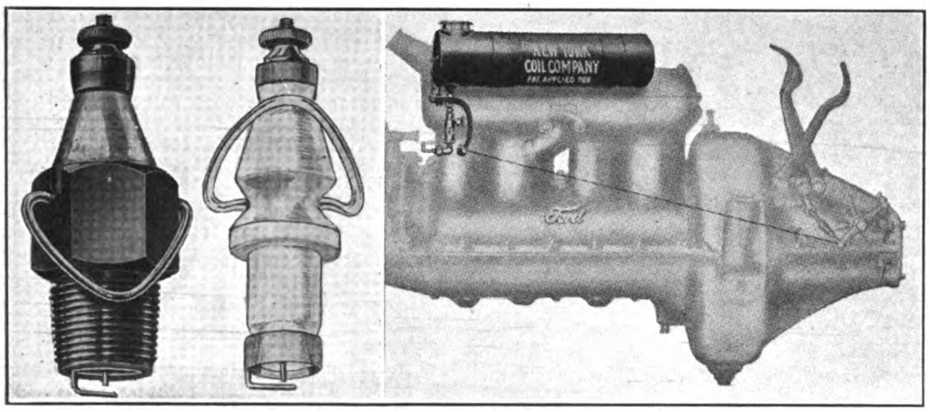

Fig. 5—Left—Bobra quick detachable spark plug. Fig. 6—Right—Ford lubricator made by the New York Coil Co.

ing sufficient for 10 to 15 cleanings.

For ordinary cases the motor is warmed and then about 4 ounces of the remover is put into each cylinder for about 5 minutes, then the motor is started and the carbon is blown out of the exhaust valves. If the motor is badly sooted, the liquid should be left in over night. After the motor is once thoroughly cleaned in this manner it is recommended to put a small amount of the liquid in each week to keep the cylinders clean.

Bobra Spark Plug—A quick detachable spark plug in which the electrode may be removed from the shell of the plug by the simple movement of a wire bail is shown in Fig. 5. It is known as the Bobra and is manufactured by the Bobra Spark Plug Co., Dayton, O. The plug is made in just two pieces, the shell and the insulator. The half-tone illustration shows the plug complete while the dotted line drawing shows the insulator. It will be noted that the two parts of the plug are held together by the eccentric movement of the bail. When the bail is swung up the insulator is rotated a small amount axially when it is free to be lifted out of the shell, the ends of the bail passing up out of the slots in the shell. It is stated that while this fastening is very simple it makes the joint between the two parts perfectly gas-tight.

The advantages claimed for this plug are many. The insulator may be quickly cleaned of deposited carbon or oil, and the points of the electrodes may be instantly inspected and smoothed off. The spark gap may be adjusted by moving the center electrode in or out, but once this adjustment is made there is no possibility of it being accidentally altered by taking the insulator in or out of the shell. Convenient priming of the motor in cold weather is obtained without the use of priming cocks by merely removing the insulator. In this way the plug is of particular advantage to engines such as are used on Ford cars which possess no priming cocks. It is further claimed that manufacturers of automobiles may avoid the expense of priming cocks by fitting these spark plugs.

The Bobra plug is furnished in the three standard sizes, S. A. E., ½-inch standard and metric. The price is $1.

New Lubricator for Fords—A lubricating system, which is designed to work in conjunction with the present system on a Ford car but which has the advantage of maintaining a constant level in the crankcase, is announced by the New York Coil Co., New York. The system

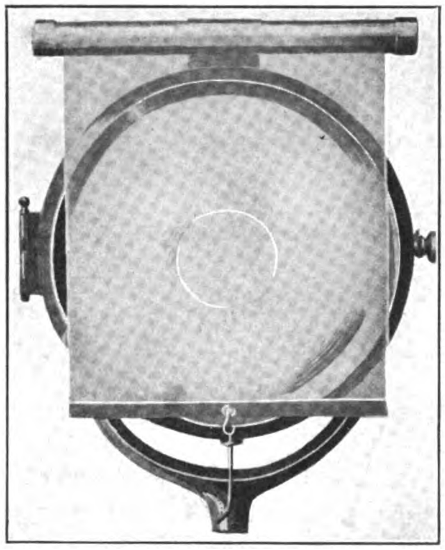

Fig. 6—Safety First headlight shades

operates without the use of gears, belts, rods, etc., and supplies oil to the crankcase at the same rate that it is consumed. The new lubricator consists of a round steel tank 4 inches in diameter and 16 inches long fastened by means of two clamps to the top of the cylinder casting, as shown in Fig. 6. A cock with a long lever is connected by steel wire to the emergency brake.

As it is necessary to apply the emergency brake in order to release the clutch before the operator can leave the car the oiler is automatically stopped, and as the brake must be moved forward to start the car the oiler starts and continues oiling as long as the car is in operation.

A needle valve regulating adjustment is provided, together with a glass sight feed, which is set to deliver oil to the crankcase in the same proportion that oil is consumed by the engine. The regular oiling system performs as usual, but by this attachment the level is kept constant.

A copper tube is supplied with a connection to attach to the oiler; its other end has a fitting adapted to connect to a special hollow bolt, also furnished, which is screwed in place of the bolt that extends through the oil filler spout found on Fords.

The lubricator sells for $10 and it can be installed easily with the use of a wrench in less than half an hour.

Safety First Headlight Shades—For the purpose of toning down the blinding glare of the headlights, Smith Bros., Auburn, N. Y., are marketing a headlight shading device which diffuses the concentrated rays produced by the ordinary headlight lenses.

The device consists of two roll curtains made of translucent fabric which, when down, cover the front of the lamps. When not in use these curtains fold and roll up into suitable cylindrical metal containers attached to the tops of the lamps. Pressing a pedal draws down both shades and locks them in place, and a simple releasing movement allows them to fly back out of the way. The device complete with all fittings costs $10. The construction is such that the parts cannot rattle and are rain and mud proof, it is stated.

Very little light is lost in passing through these shades, the effect being merely to diffuse the rays and not to dim them.

Apex Automatic Electric Tire Pump—A small direct electric driven tire pump, Fig. 7, for the private garage is manufactured by the Apex Electric Mfg. Co., 1410 West Fifty-ninth street, Chicago, Ill. It will inflate a 3 to 3.5-inch tire of ordinary size in 3 to 3.5 minutes.

The cylinders and pistons are accurately ground and lapped together. The piston has two Leak-Proof rings and the bearings are of phosphor bronze and hardened and ground steel. There is an automatic cut-off at the base which shuts off the power the moment the desired air-pressure in the tires is reached. The motor used is a ⅙ horsepower Western Electric. The pump overall measures 13 inches, it is 12.5 inches high and 8 wide. The equipment includes 10 feet of hose and a lamp cord of the same length. The price is $45.

Apex Multiple-Kartridge Electric Soldering Iron—Another device put out by this concern for the automobile trade is an electric soldering iron, known as the Apex Multiple-Kartridge Electric Soldering Iron. It is stated that the electric current keeps the tip at an even temperature. Time is saved because there is none lost in reheating the iron and due to the fact that the tip never scales and therefore no scraping or filing of the tip is required.

The peculiar feature of this iron is the use of different heating elements to give various degrees of heat as are required for different kinds of work. These units are in the form of cartridges and when the temperature is to be changed a new one may quickly be substituted for the one in use.

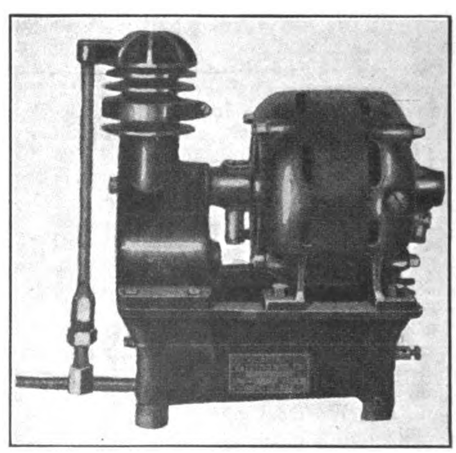

Fig. 7—Apex automatic electric tire pump

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The AUTOMOBILE

Motor Fortune Wheel in War

No French Factories Destroyed—The Ideal War Truck —Medium-Sized Cars Best—The Rotary Motor Passes

By W. F. Bradley

Special Representative of THE AUTOMOBILE *with the Allied Armies in France*

PARIS, Oct. 16—On the day the Paris automobile salon should have been opened in the Grand Palais, this building was officially inaugurated as a hospital for wounded soldiers. The automobile industry was represented by Marquis de Dion, of the De Dion-Bouton Co. Since the war broke out continuous use has been made of the Grand Palais for military purposes. For several weeks it formed an admirable central garage for cars used as a reserve of the headquarters staff. Later it was used as barracks for the marine fusiliers now stationed in Paris, and has finally been fitted up for hospital purposes.

Not a Car Sold

The general situation in France may be summed up in the remark made to me to-day by the sales manager of one of the leading French car manufacturing firms: "Since first of August we have not sold or delivered a single automobile." He explained that they had partially or fully paid for cars in their shops, but customers would not take possession of them. While it was doing no business in touring cars, this firm was meeting overhead charges by doing such work for the government as making bombs, aeroplane arrows, machine-gun fittings, etc.

This factory is typical of scores in France. There are certain cases in which the war has had no prejudicial influence on automobile firms. The names of several firms might be mentioned from whom the entire stock has been requisitioned by the army authorities, payment being made partly in cash and partly in notes payable after the war. With the entire stock gone, the factory has been shut down entirely and all expense arrested.

No Longer a Luxury

This is sufficient to show that the war does not neces-

War Incidents in France

Not a French factory has been destroyed so far.

After the war the demand will be for medium-sized cars.

The close of the war will be the truck makers' opportunity.

Many French factory organizations are still kept intact.

Organization of Belgian accessory firms entirely disrupted.

A motor convoy under fire is in less danger than horse-drawn wagons.

The ideal motor truck for war is one with a 2½ to 3-ton capacity and four-cylinder motor of 3¾ to 4-inch bore.

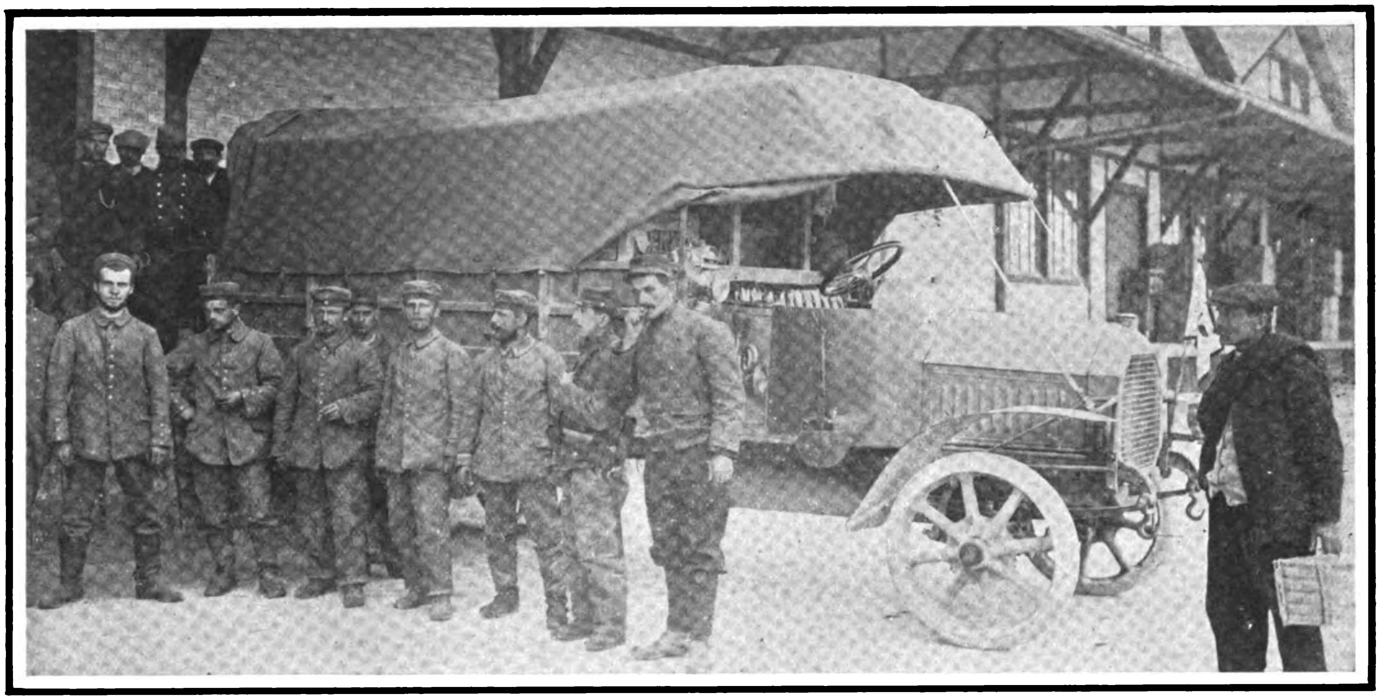
Trucks must have clearance, sprags, towing hooks, four-speed gearbox and interchangeable carbureters and magnetos.

Drain cocks are necessary in cylinders and radiators.

Four-wheel-drive tractors best for artillery work.

Eight-cylinder motors are preferable in aeroplanes.

English furnish best ambulances for field work.



German prisoners being transferred from train to motor truck on their way from the front in France

sarily mean ruination for automobile firms. The tendency to look upon automobiles as a luxury is a mistake which has been clearly revealed during the last 2 months. Manufacturers of articles of luxury have their entire stocks on their hands. Manufacturers of automobiles have been able to clear out their stocks, and if they are not replacing them they are at any rate able to do some useful work for the war department.

THE OPINION IS GROWING AMONG MEMBERS OF THE TRADE THAT THERE WILL BE A RAPID PICK-UP AT THE END OF THE WAR. THE WASTAGE OF CARS IN THIS WAR IS GREAT; THE WASTAGE OF HORSES IS ENORMOUS.

It is only necessary to travel through the country occupied by the armies to realize how the life of cars and trucks is being shortened by rough work and inability to carry out repairs and adjustments at the appropriate time. As to the horses, the shallow trenches in which they are buried, the heaps of them left around unburied and the skeletons on four legs testify to the destruction being wrought among them.

It takes 5 years to breed horses. It takes a few months to produce quantities of cars. There will be a serious shortage of both horses and cars when this grim war comes to a close. The former shortage cannot be met immediately; the latter can. The obvious conclusion is that there will be a big demand for all types of automobiles.

The Truck's Opportunity

IN THE COMMERCIAL FIELD, WHERE TRUCKS WERE FORMERLY USED, THEY WILL BE FOLLOWED BY TRUCKS. THIS IS OBVIOUS. WHERE HORSES WERE EMPLOYED THERE WILL BE EVERY REASON TO REPLACE THEM BY MECHANICAL TRACTION. THE CLOSE OF THE WAR WILL BE THE TRUCK MAKER'S OPPORTUNITY.

It must not be supposed that every vehicle driven by gasoline is going to be accepted by Europe when the guns are silenced. The small cheap car trade is bound to suffer. Those persons who by a little economy have been able to secure for themselves the luxury and convenience of an automobile will undoubtedly forego this mode of locomotion for a certain length of time at any rate. THE GREAT DEMAND WILL BE FOR MEDIUM-SIZE CARS.

BIG HEAVY CARS OF COSTLY MAINTENANCE WILL BE A DRUG ON THE MARKET. FOR SEVERAL YEARS THE EUROPEAN MOTORIST HAS PAID ATTENTION TO THIS QUESTION OF CAR ECONOMY, AND THE WAR WILL ONLY SERVE TO DRIVE HOME THE TRUTH THAT MOTORING MUST NOT BE COSTLY.

Factory Organizations Intact

The main question is, will the factories of Europe be able to meet the demands likely to be made on them. Every manufacturer has been and is doing his best to keep his organization intact. Up to the present the manufacturers of France and England have succeeded. The German invasion has not yet touched the French motor car area.

AT THE TIME OF WRITING NOT A SINGLE FRENCH MOTOR CAR FACTORY HAS BEEN DESTROYED OR EVEN DAMAGED.

Parts Area Suffers

Probably the same cannot be said of Belgium. Unfortunately, also, the various industries on which the automobile manufacturer has to depend have suffered more than the automobile industry itself. The whole of the north of France and a considerable portion of Belgium supply steel and iron castings, forgings, steels and raw materials for the French and British automobile trades.

I have information of several firms having sent thousands of dollars worth of patterns into Belgium and Germany before the war and now faced with the loss of this valuable material. As in most cases, it will be impossible to regain possession of these patterns; new ones will have to be made. A busy time for pattern makers is certain.

A REVIEW OF THE SITUATION AT THE PRESENT TIME FORCES TO THE CONCLUSION THAT THE RAPIDITY OF THE PICK-UP WILL DEPEND MORE ON THE SUPPLY FIRMS THAN ON THE AUTOMOBILE MANUFACTURER PROPER.

It is interesting to note what influence this war will have on war equipment. With a really decisive result, the probability must not be overlooked of an all-round diminution of armaments—a throwing off of the burden of militarism under which Europe has so long groaned. This will only modify the extent and not the nature of the change in military equipment. Cavalry will not be affected by the automobile; but every other army service has already been completely transformed by mechanical transport.

In the army service corps horses are still being employed for bringing up food and ammunition, but their services would be dispensed with if it were possible to do so at once.

Horses Not Needed

WITH THE ALLIED TROOPS I HAVE SEEN HORSES STANDING IDLE DAY AFTER DAY—GOOD HORSES DRIVEN BY MEN WHO KNEW THEIR BUSINESS — WHILE THE MOTOR TRUCKS WERE KEPT ON A DAY AND NIGHT SERVICE. IT HAS BEEN CONCLUSIVELY PROVED THAT HORSES ARE NOT NECESSARY, INDEED THAT THEY ARE PREJUDICIAL TO THE BEST WORK OF AN ARMY SERVICE CORPS IN THE FIELD.

Officers, with a blind faith in horseflesh, have been very slow to admit this. The old argument was put forth that motor vehicles would break down and for lack of some little screw, nut or bolt would be entirely lost. Spare horses, on the other hand, could always be had, and if an animal went lame it would quickly be replaced.

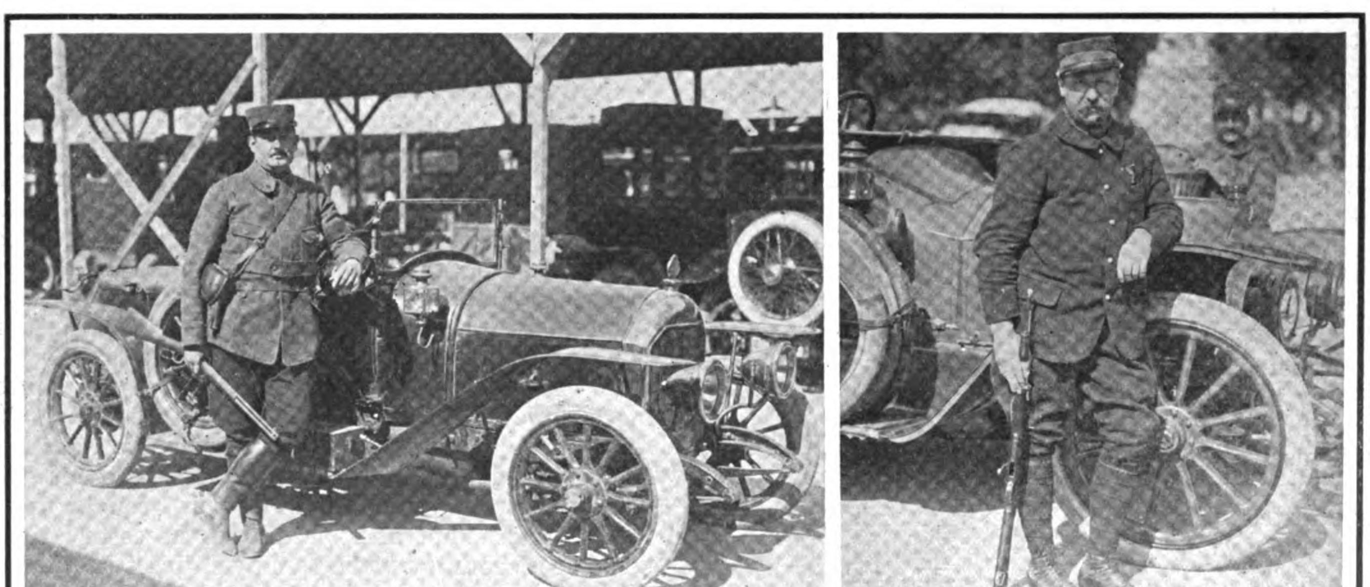
Thus, at the opening of the war the arrangements were for motor trucks to carry ammunition and food from the railhead to a point a certain distance back of the firing line and make the final distribution by means of horse-drawn army wagons. This plan has been abandoned. The transfer caused a loss of time and the final distribution by horses was far less reliable than a direct delivery by motor. Thus, whenever possible, the horse has been cut out of this service altogether. It is practically immaterial whether the railhead be 10, 20 or 30 miles behind the firing line, for the trucks can be relied to come right up with unfailing regularity.

Trucks Under Fire

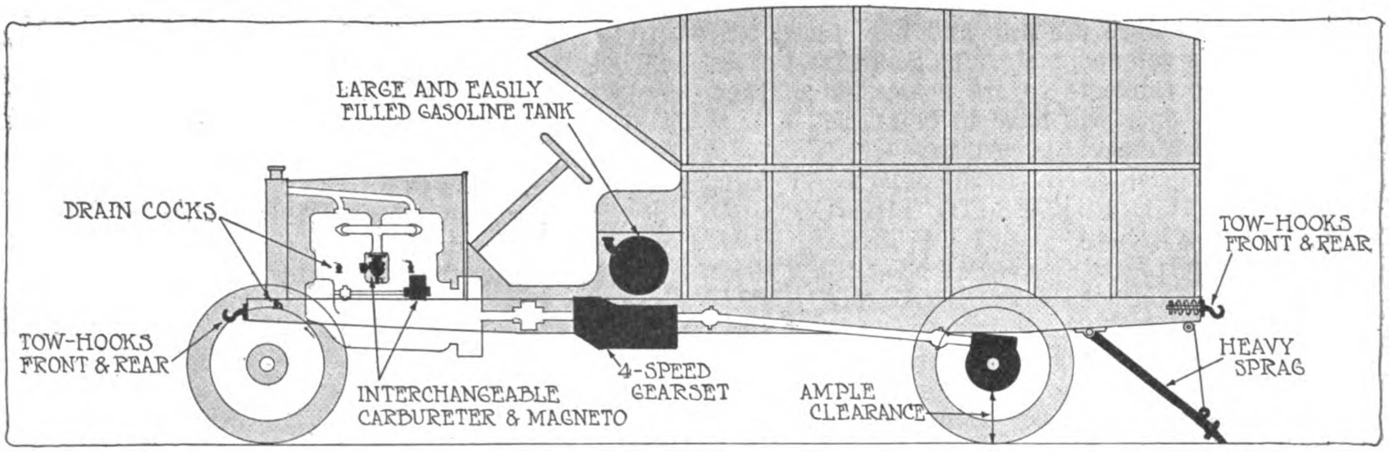
A motor convoy under fire is in less danger than a number of horse-drawn wagons. A great proportion of the horses used in the army service corps are taken direct from peaceful occupations, and are naturally scared at the tremendous roar of modern guns. It is impossible, without entering into ghastly details, to describe the confusion caused in a column by a few horses struck by bullet or shell. Although the motor truck has not been made bullet-proof, it is surprising how difficult it is to put it out of business. I have seen trucks speckled all over with shrapnel without having their running qualities in the least affected. Compared with a horse, the modern motor is a very small target, and unless a bullet strikes the cylinders or goes through the radiator the vehicle is not likely to be incapacitated.

The Ideal Vehicle

THE MOST SUITABLE TYPE IS A VEHICLE CARRYING A USEFUL LOAD OF 2½ TO 3 TONS, DRIVEN BY A FOUR-CYLINDER MOTOR OF 3¾ TO 4-INCH BORE. THE IMPORTANCE



Left—D'Avaray, a competition driver for Buick, doing service for the French Army on a Pierron car. Right—Arthur Duray, winner of second place in last Indianapolis race, now in military service with the French army



Illustrating the requirements brought out as necessary in the construction of motor trucks for military service by the experience gained during the fighting in France

OF CERTAIN FEATURES HAS BEEN FULLY EMPHASIZED DURING EVEN THE SHORT PERIOD THE WAR HAS BEEN IN PROGRESS. THESE ARE ADEQUATE CLEARANCE, STOUT SPRAGS AS A PRECAUTION AGAINST RUNNING BACKWARDS, TOWING HOOKS FRONT AND REAR, THE ABILITY OF EACH TRUCK TO TOW ANOTHER OF EQUAL WEIGHT OVER ORDINARY ROADS, FOUR-SPEED GEARBOXES WITH A LOW EMERGENCY GEAR, INTERCHANGEABLE CARBURETERS AND MAGNETOS, EASILY FILLING AND EMPTYING GASOLINE TANKS, DRAIN COCKS FOR CYLINDERS AND RADIATORS.

Trucks Must Tow

This question of towing ability is really important. It is an everyday occurrence for a truck to be temporarily disabled. If it can be got back to headquarters a few hours' work will put it in full running condition. If, on the other hand, a tow is not immediately available the vehicle may have to be destroyed or fall into the hands of the enemy.

Big capacity gasoline tanks are an important feature. There has never been any permanent shortage of gasoline among the allied troops, but it frequently happens that unusually long journeys have to be made without any possibility of renewing the fuel supply. The more gasoline a truck can carry without in any way interfering with the useful load, the better.

Provision should also be made for a reserve supply. A tank which can be quickly emptied is a valuable feature. I have had several experiences as follows. English drivers have asked on the wayside for petrol, which is the French word for kerosene. They have been given exactly what they asked for, with the result that a few hours later they found themselves stranded with fouled plugs and a spluttering motor. To get the kerosene out of the tank not fitted with a special drain-off cock is a longer job than one would imagine.

Bad Water Connections

Up to the present really severe weather has not been encountered. Nevertheless it has been sufficiently cold to remind us that frost will have to be feared and radiators and waterjackets emptied. Looking into this matter, I have been struck with the fact that it is sometimes absolutely impossible to get the water out without breaking one of the rubber connections. In the shops it would not be a difficult matter to fit drain cocks in the base of the radiator; but there is little time and few conveniences for carrying out such work at the front.

Two Hours to Start

Already the cold weather is making it a difficult matter to start up in the morning. Before all the motors in one convoy to which I was attached had been wound up 2 hours had been lost. This incident occurred after a very cold damp night spent out of doors. When benzol and alcohol have to be used the difficulties are so much greater that permanent provision should be made for warming up the carbureter before attempting to crank.

There has been no necessity in this war to work entirely away from made roads. Thus there is no necessity for anything more than a liberal clearance.

Four-Wheel-Drive Tractors

It is quite probable that after this war there will be an entire reformation of the artillery service, four-wheel-drive tractors being used in place of horses. At the present time horses do the bulk of the work of hauling guns. The French, however, are using tractors for their 155-millimeter guns and obtaining such good service from them that they are certain to be extended. The advantages of mechanical over animal traction in the commissariat department are amplified in the artillery service. The future points to guns without horses, for a four-wheel drive tractor can do all, if not more, than a team of horses; it is not so vulnerable and it can be more rapidly replaced.

All-drive tractors are also a valuable auxiliary for bringing up ammunition. At the present time the great bulk of the ammunition is brought up on motor trucks, but as it is always necessary to do some cross-country work to travel direct to the batteries, a four-wheel-driver has a decided advantage over a vehicle alive at only one end.

This war had not been in progress many days before it was evident that the allies were short of automobile guns. The Germans, who were supposed to possess a smaller number of automobiles than the French and English, had not overlooked the importance of mounting their medium-sized guns on automobile chassis. Caliber for caliber, a gun mounted on a chassis is infinitely superior to one drawn by horses. An automobile battery will remain in position until the last possible moment. When it is about to be attacked at close quarters it will get away beyond the possibility of pursuit.

THE VALUE OF THIS ARM HAS BEEN SO CONCLUSIVELY DEMONSTRATED THAT BOTH THE ENGLISH AND FRENCH HAVE PLACED BIG ORDERS FOR AUTOMOBILE GUNS SINCE THE WAR BROKE OUT.

In very many cases ordinary 2½-ton chassis are being made use of, the fitting of the gun being carried out by the arsenal. While this makes a valuable weapon, better results are obtained with a specially designed chassis having provision against the recoil of the gun and a certain amount of armor plating.

Much use has been made of armored automobiles for rapid invasions into the enemy's country. Two or three such machines sent out to explore the country are practically invulnerable and most effectively prepare the way for the advance of more important bodies.

Eight-Cylinder Motors Best

I am not particularly interested in the aeroplane as a weapon of offence and defence. Even military experts are not unanimous regarding the services it has rendered. The aeroplane motor question, however, has its bearing on the automobile.

THERE IS A GROWING OPINION AMONG AVIATORS AND AEROPLANE MECHANICS THAT THE FIXED TYPE OF MOTOR IS PROVING MUCH MORE VALUABLE THAN THE VARIOUS ROTATING CYLINDER MOTORS. THE GREAT OBJECTION BROUGHT AGAINST THE ROTARY MOTOR IS THAT IT REQUIRES MUCH MORE ATTENTION THAN CAN BE GIVEN IT UNDER WAR CONDITIONS.

Trials and manoeuvres are so entirely different from actual warfare that it has required the events of the last 2 months to reveal the weaknesses of the rotary motor. The two leading types of eight-cylinder V motors, made by De Dion Bouton and Renault, have been conspicuous for the service they have rendered and the small amount of attention they have required. This is important at the present time, for the De Dion Bouton eight-cylinder aviation motor is practically identical with the eight-cylinder car motor produced by that firm.

Gasoline Tanks Too Small

Touring cars have given all that was expected of them and considerably more than most people hoped. The main faults I have noted against touring cars on military service is the inadequacy of the accommodation for spares, tires, gasoline and spare gasoline supply. For this work cars should have a capacity of 200 miles without refilling the gasoline tank.

WITHOUT LITTERING THE BODY IN ANY WAY, IT SHOULD BE POSSIBLE TO CARRY 2 GALLONS RESERVE GASOLINE, 1 GALLON RESERVE OIL, TWO SPARE SHOES, FIVE OR SIX TUBES, A BIGGER SUPPLY OF TOOLS THAN USUAL AND A MODERATE SELECTION OF SPARE PARTS.

It is surprising how few cars can stow these things away without infringing on the passenger-carrying space. Very few actual defects can be charged against the cars in the field. Certain makes of cars built for good road conditions have suffered from spring trouble, but this is not a general complaint.

Small Cars Best

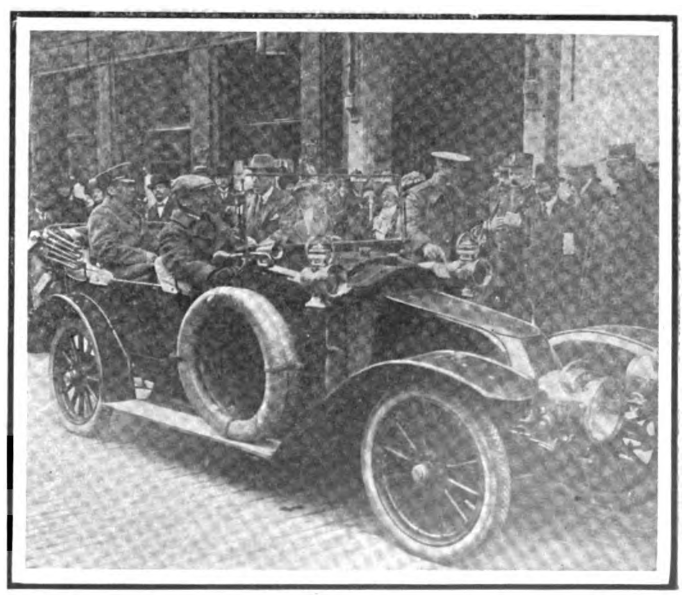
While the cars themselves have generally been satisfactory, their method of employment has often left much to be desired. The fast, powerful touring car is not the most suitable vehicle for work near the firing line. Crack motorists who have been given 70 and 90-horsepower cars have soon discovered that they could get better service out of 15-horsepower machines than out of the semi-racing models.

At the front the roads are encumbered; all the power available cannot be used; a heavy car embedded in mud or dropped into a ditch is much more difficult to move than a lighter machine.

For work right at the front much better results are being got out of four-cylinder touring cars of approximately 3 by 5 inches bore and stroke than out of machines of double that size.

Fast Cars for Dispatches

The proper place for very powerful extra rapid cars is on the open road, carrying officers or dispatches from the front to the base or the government headquarters. For instance, at the present time the French government is at Bordeaux, 400 miles from the firing line. All the dispatches are carried between the two centers by two relays of cars, the first driver covering 200 miles, then handing his dispatches over to a second driver waiting at the half-way position. With 70 and 90-horsepower cars this



Earl Fitzwilliam, head of the mechanical transport service of the British army, leaving Paris for the front work can be done faster than by trains under peace conditions.

Many Poor Drivers

The suitability of the driver for the car he is handling is another important matter. When cars have been requisitioned from factories, not enough attention has been paid to the question of getting drivers from the same factory. It is obviously advisable for a man who has spent 10 years of his life tuning up Panhard cars to be put at the wheel of a machine of this make rather than a Peugeot, a Renault, or any other. In the main this has been done, but there are nevertheless some glaring inconsistencies.

Gabriel, who has probably driven cars longer than any man living, has been pushed into a line regiment.

Louis Wagner, one of the most skilled and daring drivers alive, as well as an experienced aviator, is a private in an artillery regiment.

The famous Jules Goux was wasting his talents in a fort for a couple of months before he was given a car.

Jean Chassagne, the man who has driven further in 1 hour than any person dead or alive, has not been allowed to touch a car since war was declared.

On the other hand, could be mentioned chief engineers and heads of testing departments who are riding on trucks as private soldiers while some non-technical man is at the steering wheel. This is a phase of motor application to war which must be given the closest attention if best results are to be obtained.

Good English Ambulances

Little criticism can be levied at the quality of the motor ambulance work of the British army, although its quality might be improved. The method is for motor ambulances to go as close to the firing line as possible, load up with the wounded brought in by the stretcher men and carry them to the railhead or general headquarters, where they are tended in temporary hospitals, which are frequently nothing better than churches, barns or railroad stations. From this point the wounded are carried to the rear by trains and finally distributed among the hospitals by more motor ambulances.

The type of ambulance most generally used at the front is a 20-horsepower touring-car chassis fitted with a large capacity canvas body with mica windows. The body is of sufficient size to carry four stretchers in two tiers, leaving a space down the center for the ambulance attendant.

Most of these vehicles have been supplied by the Wolseley company, and are the pick of the British fleet. There are other and more hastily prepared ambulances carrying six men in two vertical rows of three. With such a load it is practically impossible to give any attention to the men when on the move, while loading and unloading present greater difficulties.

The French system of slinging stretchers inside the closed trucks which are returning from the firing line to the rear has the advantage of getting the men away quickly, but it offers little in the way of comfort.

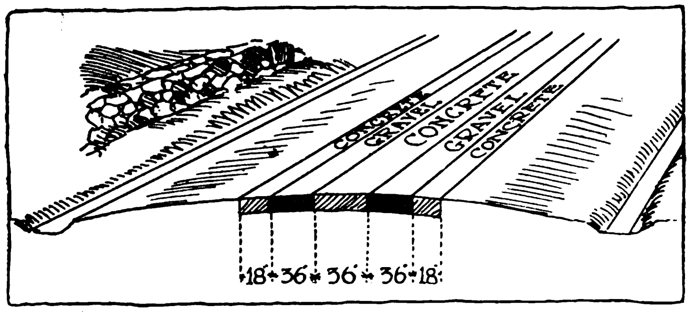
One Failure

The great defect in the general organization is the inadequacy of the motor system for removing men from the hospitals just to the rear of the firing line. Frequently wounded men have to spend 15 to 20 hours lying on straw in a freight train, when touring cars could bring them back in 3 to 4 hours. The army does not possess these cars, but hundreds of private individuals and several private associations would be glad to undertake the work, and indeed have undertaken it to a limited extent. Why this work is not carried on on a bigger scale and in a more effective manner it is difficult to say. There is no doubt that the car is infinitely superior to the railroad for this task.

Michigan County Makes Highway Like Railroad

THE influence of railroad practice is noted in an experimental road being tested in Kent county, Mich. The wear and tear of traffic is taken by strips of concrete, the space between the strips being separated by gravel. Three strips are used, the center one being twice as wide as the other two and intended to be used in common by traffic in both directions.

As will be noted in the accompanying illustrations, the two outer strips are 18 inches in width while the center one is 36. The bands of gravel between the concrete are 36 inches in width. The total breadth of the roadway is 9 feet 4 inches. The two intermediate widths are composed of gravel cemented into place with glutrin.



Method of constructing road in Kent County, Mich., designed especially to prevent ruts. It costs $3,000 per mile

The inventor of this new construction is Alvah Brown, one of the commissioners of Kent county. He explains that the natural inclination of horses is to follow the rut and it is therefore necessary to design a road which will withstand heavy wear without forming ruts and which will not at the same time involve heavy construction cost.

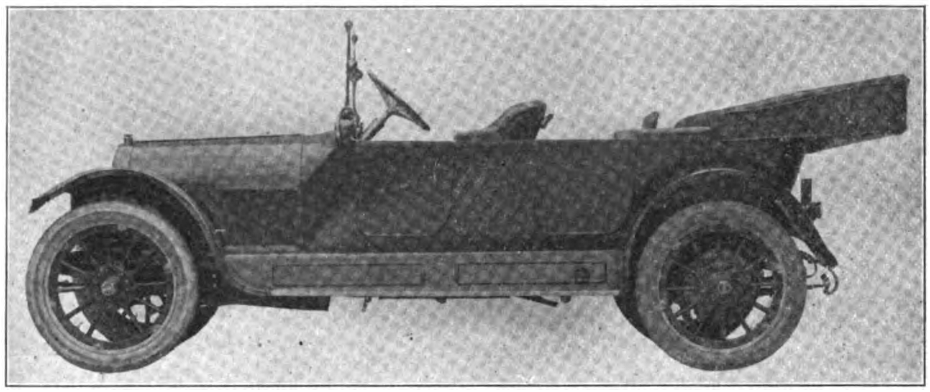
In commenting upon his method, Mr. Brown says:

"It is no more necessary to have the entire portion of the roadway cemented than it is to have iron spread the full length of the ties on a railroad. All that is necessary is narrow hard surfaces for the wheel treads and these, being built according to my design, will be dustless and meet all requirements for modern traffic. Every 30 feet each strip of concrete will have an expansion joint with metal strips therein, so the concrete ends at joints will not be broken by steel tire vehicles.

"After the roadbed has been graded and settled, this class of road can be built complete, including concrete and glutrinized gravel, for about $3,000 per mile.

Seven-Passenger Overland Six $1,475

New Block Motor 3 1-2 by 5 1-4 —Electric Starting and Lighting— Equipment Is Unusually Complete

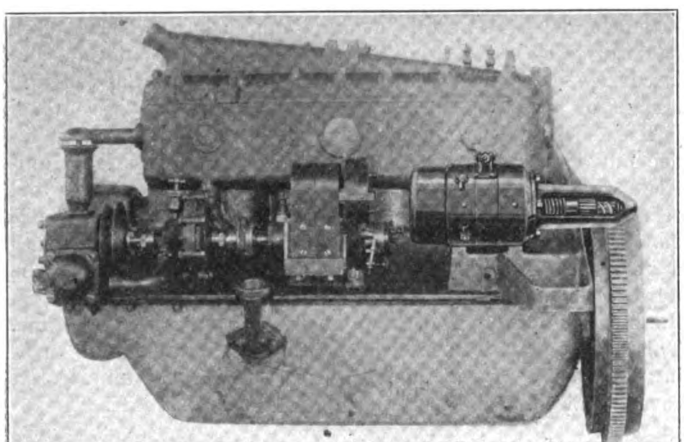


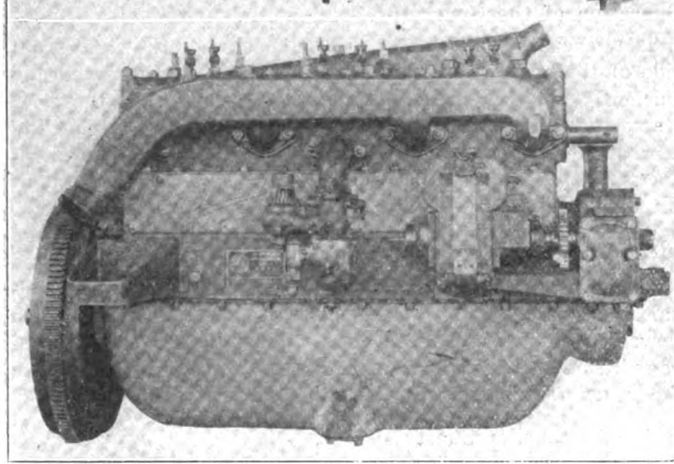
Six-cylinder, seven-passenger Overland touring car which sells for $1,475 with electric starting and lighting and complete equipment

ALTHOUGH the Willys-Overland Co. told the public in June that it would have a six-cylinder car bearing the Overland name on the market early in the fall, it did not make known any of the details at that time. Now the fall is at hand and so is the new Overland, the first six that the big factory has ever turned out.

Seven-Passenger Body Standard

Only the one body type is offered, a seven-passenger design which has the same general outward appearance as the four-cylinder Overlands, being a smooth-sided model with clear running boards, domed fenders conforming closely to the curve of the wheels, and cowl sloping in graceful curves to the bonnet, which also has a slight slope to the radiator. Like the rest of the Overlands of the year, the radiator is specially attractive, being of the rounded-edge type with the shell pressed from one piece of sheet steel.





Views of both sides of the block motor used in the new Overland six. The valves are all on the right, inclosed by aluminum cover plates which are easily removable. Note mounting of electric starting and lighting system

The price has been set at $1,475 with complete fittings ready for the road. There is an electric cranking and lighting system, besides an unusually complete list of equipment including speedometer; rain-vision, ventilating windshield; mohair one-man top and top boot; electric horn; demountable rims with one extra; tire carriers in the rear; robe rail; foot rest; tools, tire repair kit; jack and pump. Tires are 35 by 4 1-2 inches and the rear pair are of the non-skid variety.

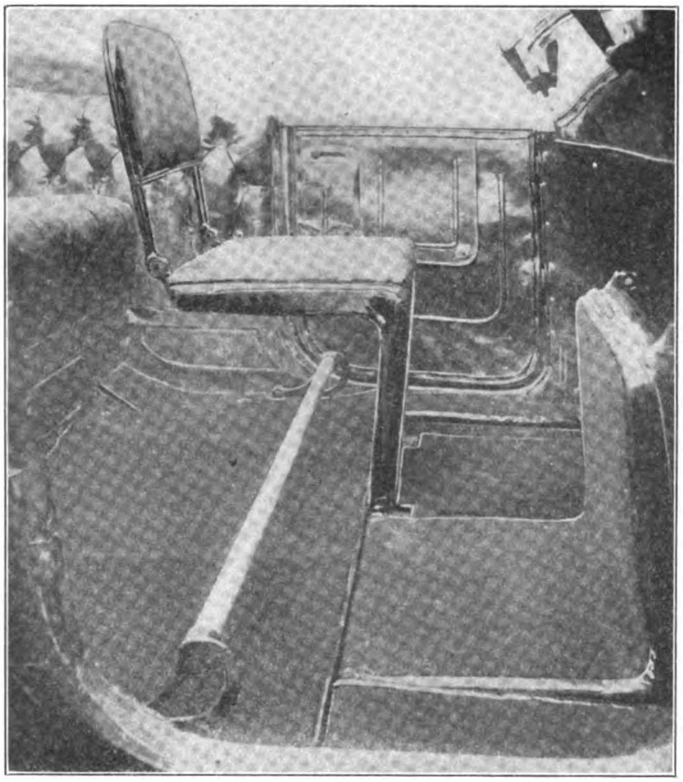
New Long-Stroke Block Motor

While the general mechanical construction of the chassis is in accord with Overland design as practiced in the four-cylinder models, the motor of the six is new to Overland engineering. It is a block-cast type having a bore of 3 1-2 inches and a stroke of 5 1-4 inches. The cylinder head is detachable as a unit and the upper half of the crankcase carrying the crankshaft is a part of the cylinder casting. The lower half attaches at about the center line of the bearings and thus an advantageous adaptation of the detachable cylinder head design together with the better manufacturing proposition brought about by making part of the crankcase integral with the cylinder casting, is worked out.

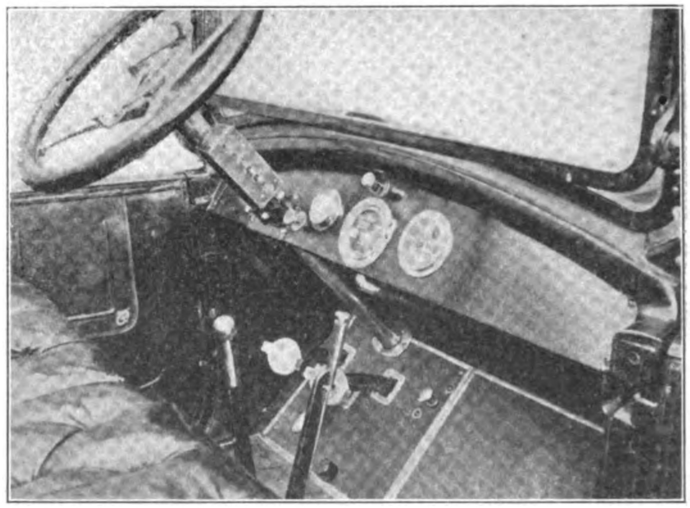
The stroke is quite long in comparison with the bore, the ratio being 1.5 to 1, and with this relation the developed horsepower is greatly in excess of the S. A. E. formula rating of 29.5 horsepower. According to the maker, the engine produces 45 to 50 horsepower in test in very excellent fashion and with a striking absence of vibration. The piston displacement figures to approximately 303 cubic inches.

Rear Axle Gearbox

Although the gearbox is not in unit with the motor, it being a part of the rear assembly as in all Overland cars, the motor is of the three-point suspended type with substantial arms integral with the cylinder block casting running outward to the chassis supports just forward of the flywheel. The front end rests upon a cross arm by means of a form of foot also integral with the cylinder casting. Two bolts, one either side of the bearing in the supporting member for the crank-handle shaft, fasten the motor in place in front; this mounting really serving as a single-point construction. The arrangement may be seen in the motor view.



Illustrating the manner in which the auxiliary seats in the tonneau of the seven-passenger Overland six fold into the back of the front seat



Driver's compartment of the new Overland six, showing left drive and center control, together with mounting of instruments on cowl board

The valves are all on the right side, and are neatly housed by two aluminum plates held in place by five set screws each. There are four openings from the exhaust ports to the exhaust header, two for each set of three cylinders. But there is only one opening from the casting to the intake pipe running from the carbureter. This is at the center of the casting just below the exhaust pipe, the distribution to the several intake pockets being accomplished by cored passages within the casting itself. This serves to aid vaporization of fuel because the gases are heated by the jacket water around the cored passages.

The cylinder head, which is held in place by a number of steel bolts, carries the water outlet connection to the radiator as an integral part, holds the spark plugs and priming cups. This head when removed exposes cylinders, pistons, valves and valve chambers.

Spiral Gearing Much Used

The drive for the camshaft, magneto, pump and generator is unusual in that spiral gearing plays an important part. A transverse shaft, spirally driven from the crankshaft in turn drives the magneto and pump shaft on the left side by spiral connection and the generator on the right side by the same type of gearing. The camshaft is also spirally actuated from the same shafting, all of which is completely housed at the front of the motor. This makes a very compact and well-balanced design which should be very silent in operation.

Accurate Balance and Light Weight

Accurate balance of reciprocating parts is also a feature of the motor, and vibration is reduced to the minimum not only by this means but also by reducing the weight of the reciprocating parts as much as possible so as to be consistent with the strength required. The crankshaft which is substantially mounted on three main bearings is manufactured to very close limits, while the camshaft, carried on four bearings, is also very strong.

The lubrication of the motor is of the constant level splash type in connection with pressure feed to the main crankshaft bearings. The oil base is in the bottom of the crankcase, and the pressure pump forces the oil from it to the main bearings and also the connecting-rod troughs, individually placed under each cylinder and the oil from them being thrown to the various bearing surfaces from the ends of the rods. The lubricant drains back to the crankcase reservoir for recirculation after straining.

Cellular Radiator

Cooling is very efficient and employs a centrifugal pump mounted ahead of the magneto and operating from the same shaft. Its cooling work is augmented by a good-sized fan which is belt driven from a pulley on the pump shaft. The radiator is of the cellular type with vertical circulation, and is carried on swivel trunnions which allow for the twisting strains of rough travel.

The electric lighting and cranking system is entirely independent of the Bosch high-tension magneto used for ignition. Cranking motor and generator are separate units and occupy positions on opposite sides of the engine. The electric motor connects to the engine for cranking purposes through a gear meshing with the teeth cut in the outer rim of the flywheel, a pedal when pressed sending current to it from the storage battery and meshing the gears at the same time. This cranking unit is very powerful and is capable of turning the engine over at about 140 revolutions per minute. It revolves at 11.33 times the speed of the crankshaft.

Operation of the Generator

The generator which rests upon a bracket on the right front side of the engine is driven at 1 1-2 times engine speed and efficiently charges the 80 ampere-hour storage battery. It starts to send current to the latter when the car is traveling at about 8 miles an hour and reaches its maximum output at about 25 miles an hour car speed. The electrical system is of the 6-volt, single wire type, which is the simplest possible.

Leaving the motor, the next step in the power transmission is the cone clutch which is leather faced with spring-pressed studs under the clutch facing, these insuring easy and gradual engagement. A clutch brake is also provided which serves to stop the released cone from spinning when disengaged, this being an advantage for easy gear shifting, since the gears are not spinning to clash when meshed.

Inclosed Propeller Shaft

Regular Overland practice is seen throughout the balance of the chassis in the inclosed propeller shaft with universal joint at the front end, and the torsion tube surrounding it having a yoked front end hinging to a cross member of the frame at either yoke arm end. The torsion tube terminates in a flange which bolts to a mating flange on the front end of the compact gearbox. This latter bolts through another flange to the differential housing so that axle, drive members and gearset are all one unit. Strong radius rods run from the front end of the tube to the outer ends of the axle tubes as a strengthening feature.

Three-Speed Gearbox

The gearset is of the selective, sliding-gear type giving three speeds forward and reverse. The gears are of ample proportions, made of double heat-treated nickel steel and having strong stub teeth. The shafts are carried on annular ball bearings. This gearset is a special design for the six chassis, though conforming to the same general construction as that used for the other cars, only having larger bearings, and so on.

The rear axle is a floating design in which the car load is carried on the axle tubes and the shafts within are used for the sole function of driving the wheels. These shafts are removable, connecting to the differential conventionally by means of splines. The differential consists of the usual four bevel gears within the ring gear. Adjustable taper roller bearings are used throughout, there being two in each wheel and two for carrying the differential. The axle ratio is 4 to 1, which should give the car plenty of pulling power.

The brakes are large and powerful and said to be ample for a much heavier car. However, such factors of safety are commendable for no part of the car is of more importance than the brakes. The contracting service brakes measure 14 3-8 inches in diameter by 2 1-4 inches wide, while the expanding emergency pair are 14 by 2 1-4 inches.

Rear Springs Are Underslung

The spring suspension is well taken care of by the conventional half-elliptic front springs and three-quarter elliptics in the rear. Leaves are 2 inches wide, while the front length is 38 inches, and the rear 52 inches. To bring the suspension lower down and add to easy riding qualities, the rear springs are slung under the axle and have swivel seats. The maximum freedom of motion is thereby attained. These springs are attached outside of the frame rails by means of gusset plate construction and their rear ends are of the scroll form.

Left Drive and Center Control

Control of the car is standard in every respect, excepting that all control buttons for horn, magneto, starter and lights are conveniently located in a switch box attached to the steering column, just below the wheel. Drive is on the left by means of an 18-inch steering wheel operating a worm and full gear type of steering mechanism, while center control is also featured. The spark and throttle levers occupy the usual position on the steering wheel quadrant above the spider, while the various gauges and dash instruments are conveniently arranged on the cowl dash, those requiring to be reached when in driving position being nearest the drive seat.

The wheelbase of the newest Overland is 125 inches, 19 inches longer than that of the model 81 small four, and 11 inches greater than the larger four, model 80. Tread is standard at 56 inches.

Vacuum Feed Fuel System

Although the gasoline tank is placed under the front seat, making gravity feed to the carbureter very reliable, the new Overland makes assurance doubly sure by the use of the Stewart vacuum feed system with the vacuum tank mounted on the front of the dash. This makes the carbureter supply positive under all driving conditions such as steep hill work and the like. It raises the level of the fuel going to the carbureter about 6 inches above the main tank level.

The principal motor specifications follow:

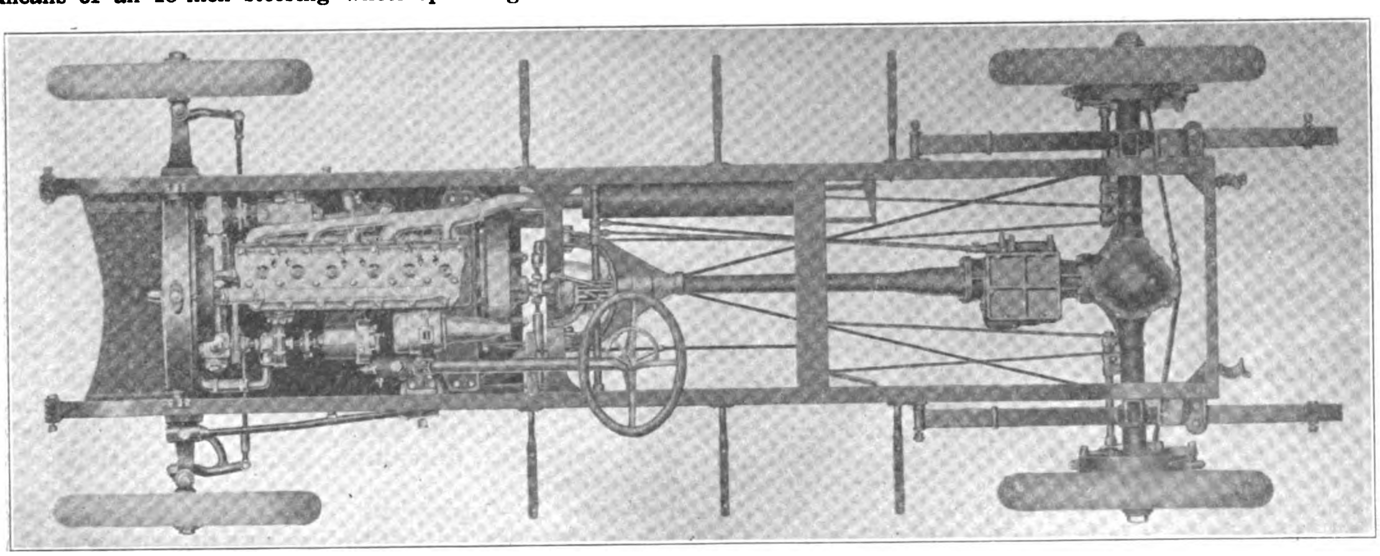
Camshaft diameter	1 1-4 inches
Camshaft bearing, front	2 1-4 by 2 3-4 inches
Camshaft bearing, No. 2	1 by 2 3-16 inches
Camshaft bearing, No. 3	1 by 2 1-8 inches
Camshaft bearing, rear	1 1-2 by 2 1-16 inches
Connecting-rod, length	9 3-8 inches
Connecting-rod bearings	2 by 2 3-16 inches
Crankshaft, diameter	2 inches
Crankshaft bearing, front	2 3-16 by 3 inches
Crankshaft bearing, center	2 7-32 by 2 1-2 inches
Crankshaft bearing, rear	2 1-4 by 3 inches
Piston, length	3 3-4 inches
Piston pin bearings	1 1-16 by 1 1-2 inches
Piston rings, three, width	3-16 inch
Valve, diameter	1 13-16 inches
Valve stem, diameter	3-8 inch

Form American Drop Forge Association

DETROIT, MICH., Nov. 2—About twenty representatives of some of the largest drop forge manufacturing concerns in Michigan, Ohio, Indiana, Virginia and Canada, met at the Ponchartrain recently and took the preliminary steps towards the organization of what has been temporarily named the American Drop Forge Assn.

The object of the new body is to get together for the purpose of business, pleasure and good fellowship.

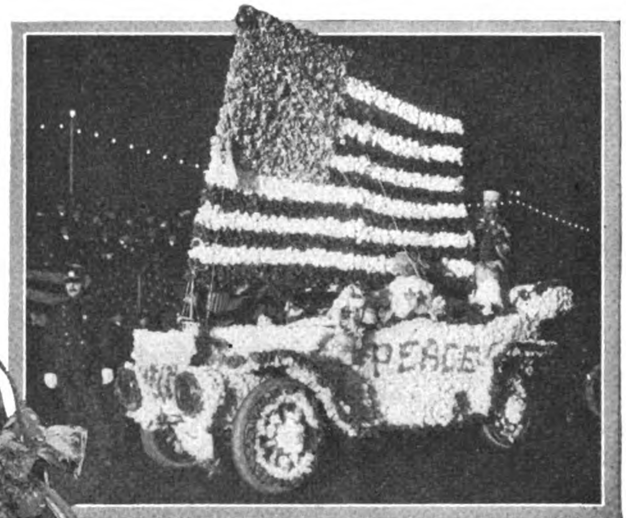
The following temporary officers were elected: R. R. Ellis, superintendent Detroit Forging Co., president; George Desautels, manufacturing manager, Anderson Forge & Machine Co., vice-president; A. E. Dibble, department manager, Frost Gear & Machine Co., Jackson, Mich., secretary; E. B. Horne, forge and foundry superintendent, Packard Motor Car Co., treasurer.



Chassis used in the new Overland seven-passenger six, showing mounting of block motor, electric units and rear axle gearbox

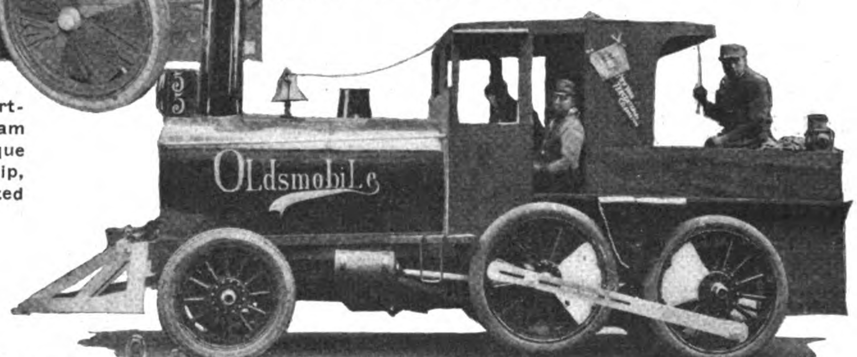
New York's Tercentenary Pageant

Veteran Cars and Novel Decorations Win Many Prizes



Above—Peace float of C. B. McCoy, Jr., Philadelphia, Pa., which was awarded the $500 first prize for the best decorated car

Above—Autumn decorated Waverley, Poertner Motor Car Co. Right—Oldsmobile steam engine, $200 first prize winner in Grotesque division. Below—Oldsmobile Christmas ship, which took $200 prize as second best decorated car



NEW YORK CITY, Oct. 30—The Automobile Pageant of New York City's Tercentenary Celebration, which was held Wednesday night, was a great success.

Many unusually well decorated cars and trucks were in line and great originality was shown by the dealers, clubs and individuals participating. The list of prize winners as officially issued, is as follows:

DIVISION A—Early Models—Oldest car completing the line of march under its own power. First Prize, $100, Joseph Devantry, Brooklyn, N. Y., 1899 Panhard. Second prize, $50, Oldsmobile Company of New York, 1898 Oldsmobile.

For best appearing car operating under its own power built during the period of January 1, 1902 to December 31, 1905. Third prize, $25, Harrolds Motor Co., 1902 Pierce-Arrow.

DIVISION B—Grotesque. First prize, $200, Oldsmobile, Steam Engine. Second prize, $100, Fleischmann Company, John Dough. Third Prize, $75, Michelin Tire Company, Bibendum Twins. Fourth prize, Douglas Fairbanks, He Comes Up Smiling, Bathtub Float.

DIVISION C—Pleasure Car—Class 1. Best decorated car. First prize, $500, C. B. McCoy, Jr., Philadelphia, Peace Float. Second prize, $200, Oldsmobile Co. of America, Christmas Ship. Third prize, $100, Allen Auto Specialty Co., Autumn Float. Pleasure Car—Class 2. Best decorated runabout. First prize, $250, John W. Cleary, Brooklyn, N. Y., Oriental Pagoda. Second prize, $100, Poertner Motor Car Co. Class 3—Regularly established club with the highest rating of points. First prize, $200, Long Island Automobile Club. Second prize, $100, Automobile Club of America. Third prize, $75, Bug Club of Harlem. Class 4—Dealer having the greatest number of cars of one make represented by him in a division. First prize, $200, Ford Motor Co. Second prize, $100, Chevrolet Motor Co. Third prize, $75, Brady-Murray Motors Corp., Chandler.

DIVISION D—Commercials. Class 1—Best decorated commercial car. First prize, $500, New York Sporting Goods Co., Indian Motorcycle Float. Second prize, $200, Edward Callen

Third prize, $100, Max Schling. Class 2—Merchant entering the largest fleet of commercial trucks as owned and operated by him. First prize, $200, Loose-Wiles Biscuit Co. Second prize, $100, New York Edison Co. Third prize, $50, Ward Bread Co. Class 3—Dealer having the greatest number of commercials in one division. First prize, $200, Autocar Co.

DIVISION F—Advertising. Best appearing vehicle carrying advertising other than merely name and address of owner regularly used in service. First prize, trophy valued at $150, Omar Cigarettes. Second prize, $100, Bull Durham Tobacco. Third prize, $75, Atlas Cement Co.

Special prizes donated by various individuals were allotted as follows: Silver Cup by J. Sanford Saltus, for the best French car, awarded to Emanuel Lascaris, DeDion-Bouton car. Other special prizes for the automobile division were the Hub Odometer, Brown Oil Boxes, Automobile Club of America. The odometer given by the Veeder Mfg. Co. was awarded to Doelger Brewery Co. for the largest fleet. The Brown oil box donated by the Brown Trafilog Co. to the Vivandière car. The Automobile Club for long distance mileage. Special mention, the Grotesque Class, Tipperary Float and Baby Olds. Dealers' Window Display prize, $100, Firestone Tire Co.

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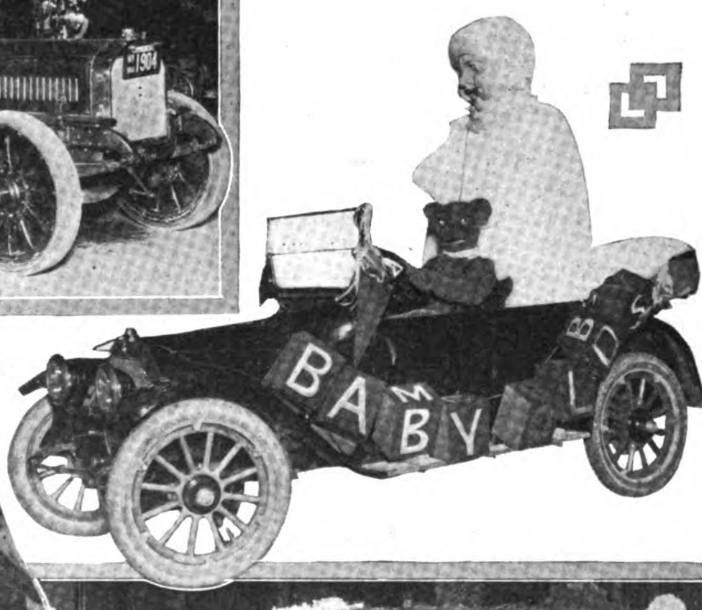
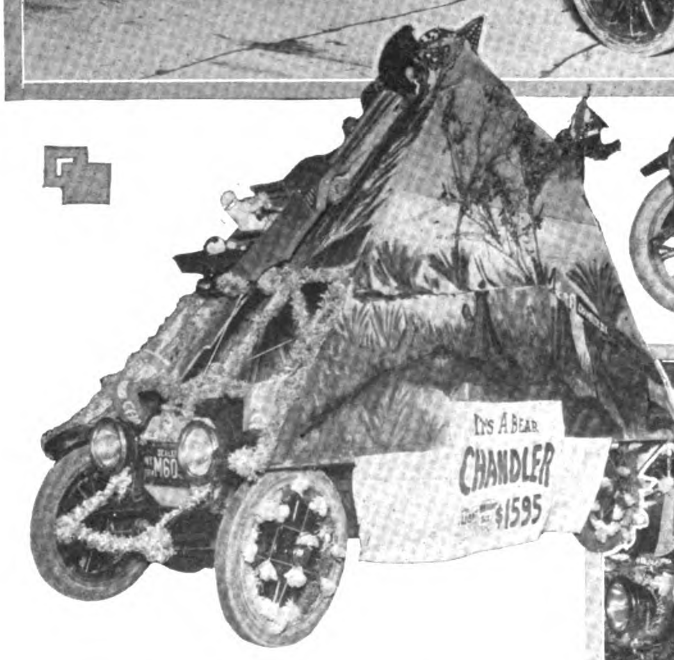
Fischer Car to Be Built in York

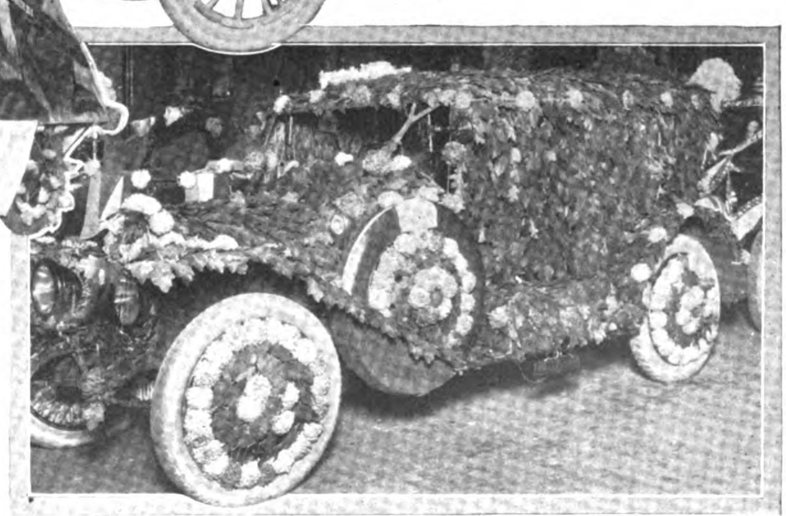
YORK, PA., Nov. 3—Announcement of a new automobile to be manufactured in York was made recently by C. J. Fischer, of Detroit, Mich. Yorkers have provided $50,000 capital to launch the concern. Operations will be started in the plant of the Glen Rock Stamping Co., located at Hill street and the Maryland & Pennsylvania railroad. The car will be an assembled one and the first will be turned out in 2 weeks, it is said. Sample cars are now in the city.

The corporation, which will be known as the Fischer Motor Vehicle Co., will, it is stated by Mr. Fischer, build five models on one standard chassis. There will be a two-passenger speedster at $595, a two-passenger cabriolet at $645, a two-passenger tourist at $595, a four-passenger Sedan at $845 and a four-passenger tourist at $645. The designs are by Mr. Fischer himself.

Left—Float of the B. F. Goodrich Co. in the Tercentenary pageant. Below—Baby Oldsmobile, which was awarded special mention in the Grotesque division







Above—One of the Chandlers. Brady-Murray Motors Corp., Chandler dealers, were awarded third prize of $75 for having most cars in a division. Right—Autumn float of Allen Auto Specialty Co., which took $100 third prize for best decorated car

Thinks Driving Through Springs Impairs Their Efficiency

The Automobile Engineers' Forum

Endurance of Springs Is a Function of the Stresses Imposed on Them—Effect on the Rear Axle Design

DETROIT, MICH.—Editor THE AUTOMOBILE:—Your notes on this question in THE AUTOMOBILE for July 23 and July 30 have been of interest, and a few additional points might profitably be added.

Referring first of all to the question to taking the driving, torque and braking stresses through the springs. This certainly reduces the production costs by reason of the elimination of torsion tubes and radius rods. The question as to which is the better method is worth discussion, however.

Might Impair Spring Action

General opinion would seem to suggest that the method of transmitting these additional forces through the springs is likely to impair their abilities to perform their functions as vibration dampers.

Primarily the springs need to have a predetermined flexibility, to give easy riding.

The endurance of the springs is a function of the stresses imposed upon them and, assuming equal physical properties of the spring steel, will the imposition of these additional stresses materially decrease their life?

An Explanation Needed

In view of the extremely satisfactory results attained from their use in this direction in instances of extreme severity, to instance the London omnibuses so equipped, and the fact of their being used on nearly all racing cars, some explanation should be forthcoming.

To consider the action of the forces imposed by the drive and torque.

The tendency of the springs when subjected to these loads is to assume a shape as shown in Fig. 1 where it will be seen that a point of inflection occurs at a point h in this extreme position.

Now let p = drawing effect concentrated at the anchored end, that is assuming the front end of the spring is fixed, thereby placing the spring under compression, and T the driving torque which is equal and opposite in magnitude and direction the axle torque. W = vertical load on the spring. The effect of the torque will be to increase this weight W by the amount I ÷ L.

The spring will normally have a certain camber H; the thrust P will therefore have a movement about the spring center equal to PH.

The effect of this movement PH will be to oppose the effect of the torque to create a point of inflection h which is the critical point and a condition which must be avoided.

This extreme condition is likely to take effect if when a violent bump occurs, the spring assumes a negative camber, as it will be observed that the moment PH due to driving thrust would increase the tendency to contrary flexure.

Reasonable Camber Desirable

Therefore the spring should have a reasonable camber under load.

This is contrary to general practice because it is well known that a flat spring under load will ride much better than one of excessive camber. This follows by reason that with a flat spring the momentary increase in load will act perpendicularly to the spring eliminating any horizontal component which would be delivered in the form of an impact from wheel to chassis.

Again, since the spring acts as a strut under the action of the driving effort, its resistance would obviously be greater if the direction of the force was directly along the neutral axis of the section.

Thin Leaves for Flexibility

It is generally supposed that the top leaf of the spring should be made of greater section to resist this additional force, but this would destroy the feature of thin leaves which are alone conducive to good flexibility, minimum stress, and hence long life.

In what manner will transmitting the drive and torque through the springs affect the design of the axle?

Effect on Axle Design

In the first place, the springs need to be rigidly connected to the axle case. The case will need to be made substantially stronger to transmit the torque, as on account of the length or distance of the twisting couple, that is from the center of the drive to the attachment of the spring, the angle through which the axle case would twist would be proportional to L and is a measure of the resulting stress.

Prefers Full Floating Axle

Therefore it would seem that a full floating axle would be preferable as the axle case would be sufficiently strong, while even were the semi-floating type to be considered for divergent reasons, its axle case would have to be materially strengthened, bringing its total weight approaching that of the full floating type while it would not possess the advantages of the former.

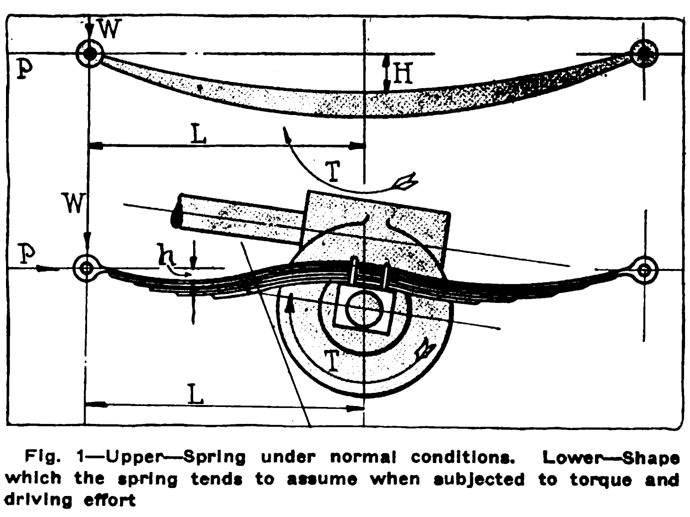


Fig. 1—Upper—Spring under normal conditions. Lower—Shape which the spring tends to assume when subjected to torque and driving effort

Again, a point worth noticing in the rigidly connected axle and casing, is the stresses induced in the axle casing by the oscillation of the wheels.

Assume one wheel to rise relative to the other. Normally the distance between the spring centers is L, Fig. 2.

When one wheel rises it should follow the arc of radius R with the center of the corresponding wheel as pivot, but since the point A is constrained to move in a vertical direction by the spring the axle must lengthen by an amount X equal to the difference between the length of L_1 and L.

A Fracture of the Axle

If, as is usual, the springs are stronger in their resistance to transverse twisting, fracture of the axle will eventually occur.

The alternative is the excessive binding action on the shackle pins causing excessive wear.

Instances of fractures of this kind are proved conclusively by the fact that the fracture occurred on the compression side of the axle, namely, on the top.

Eliminating Twist on the Axle Case

Where a separate torsion tube or radius bar is fitted a lighter axle will result, because the torque will be resisted by the tube at the center of the axle, eliminating the twisting effect throughout the axle case.

Instances where a cast-aluminum axle tube and casing were used joined in a vertical plane at the axle center, showed that, while the axle as a whole was strong enough to resist bending it would not stand up to the torque stresses and a steel liner had to be put along the whole length on the inside, with provision for transmitting the torque from the axle center to the point of attachment of the springs and hence to the frame.

Where a separate torsion member is fitted the best results of springing will be obtained when both ends are free, which means that the torque members and radius rod will need to such as to keep the axle in its correct relative position to the chassis.

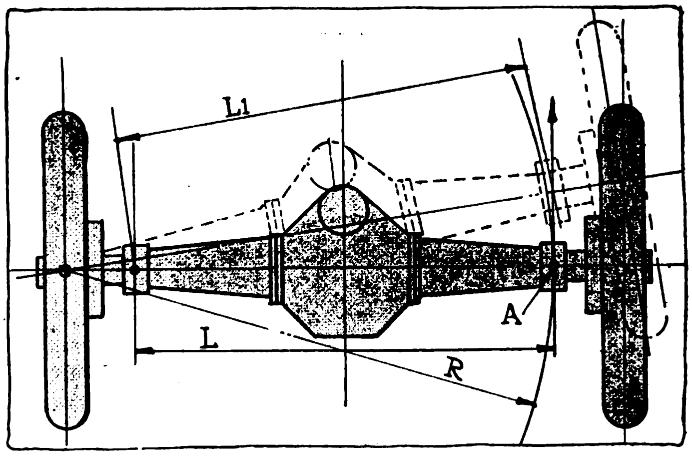


Fig. 2—Diagram illustrating the movement of the axle when one wheel passes over a bump

Single Torsion Member Inadequate

A single torsion tube or member would not suffice. Either two radius rods, one on each side or a triangulated member would have to be used.

Freedom of springing is obviously impaired when the springs are anchored at the forward end to serve as radius members, and a torsion tube is used in addition, as the axle when oscillating is restricted in its line of movement; following an arc of radius equal to the length of the torsion tube, but the path through which it would travel were there no torsion member would be an arc of radius equal to the distance from the spring center and anchored end, which will vary as the deflection. Hence unless these two paths can be made to coincide the springing is impaired.—A. A. Bull.

A Recent Court Decision—Husband Held Responsible

NEW YORK Appellate Division in an extreme case decides that a husband must stand responsible for injuries to a person struck by his automobile while his wife is using the car and chauffeur.

A physician who resided in Albany and owned a car ordered his chauffeur to drive him to a country club. On arriving there he directed the chauffeur to call for him at about 6 o'clock that evening. Late the same afternoon the physician's wife decided that she would drive to the country club and meet her husband there. There had been no arrangement of any kind made as to their meeting at the club and her decision was just made on the spur of the moment. Accordingly, she telephoned to the chauffeur and told him to bring the automobile around for her. He did this and, while she was on the way to the country club the chauffeur discovered an injured woman by the roadside and directed her attention to the injured woman. The doctor's wife ordered the car stopped and, finding that the woman was too badly injured to be moved, she told the chauffeur to go and get some nearby doctor. He did this and, while the doctor was coming back to the injured woman the chauffeur collided with a wagon and the doctor was injured. He thereupon sued the other physician, who was the woman's husband.

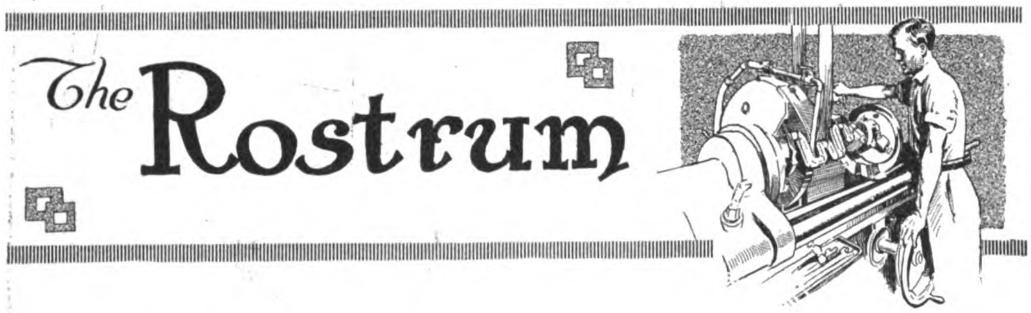
The Court held that, under the circumstances, the wife was not exercising exclusive control over the chauffeur but, having had authority to direct him to go for a doctor, her orders to him to do so did not destroy the relation of master and servant otherwise existing between the chauffeur and her husband. The Court therefore held that the husband was liable for the chauffeur's negligence which caused injuries to the doctor, after the jury decided that the chauffeur was the servant of the husband and not of the wife at the time of the accident. All the judges, except one, agreed on this decision; the one who disagreed claiming that, as there was no proof that the husband had hired an incompetent or careless chauffeur, or had a defective car, or even that he had any knowledge that his wife was assisting an injured woman, he was not liable for damages, stating that it would be carrying the rule too far to hold him liable in a case of this kind.

This case rather muddles up things in New York State as regards a man's responsibility for injuries caused by someone employed by him when that person is under the direction and control of a third party. Up to this time the New York courts uniformly held that, in order to render a car owner liable, it was necessary to show that the chauffeur was either acting under the owner's control or was engaged in the owner's business at the time of the accident.

It is to be hoped that the physician in this case will appeal to the Court of Appeals, in which event it would seem likely that the case would be reversed, in view of previous cases on this point decided by this court.—*McHarg vs. Adt*, 149 *N. Y. S.*, 244.

Ford Ships 21,976 Cars in September

Detroit, Mich., Oct. 28—During September, 1914 the Ford Motor Co., sold and shipped 21,976 cars, or an average of 733 daily. Compared with September, 1913, this year shows an increase of 11,479 cars, while in comparison with last August the increase is 1,338 cars. During the first 2 months of its new fiscal year beginning in August the Ford company has thus shipped 42,614 cars.



Where Power Is Lost in Automobiles

EDITOR THE AUTOMOBILE:—1—What is the percentage of efficiency of the average modern automobile?

2—What per cent. of the power developed by the engine is delivered at the rear wheels?

3—Explain where the efficiency is lost?

Lebanon, N. Y. CYRIL C. LAWTON.

—1—The efficiency varies greatly with conditions. Assuming that you mean the overall efficiency and not that of the motor, this depends on the road resistance, the wind resistance, the temperature, the efficiency of the motor and driving mechanism. The overall efficiency is the percentage of energy utilized in propelling the car to that supplied in the form of fuel.

Assuming that the car under consideration is one which was tested recently and which averaged 22 miles per gallon when running at an average speed of 24 miles per hour, the weight of the car being 3,230 pounds and the bore and stroke 4.25 by 5.25, the efficiency can easily be calculated if we know the road resistance and wind resistance. Not knowing these, we will assume that the road resistance is 50 pounds per ton and that the wind resistance is calculated.

The total tractive force required is $\frac{3,230}{2,000} \times 50 = 80$ pounds approximately. This force moves through a distance of 22 miles.

According to the formula given by Strickland, the pressure due to wind resistance is represented by the formula,

$$P = .0025\ SV^2$$

where P = pressure in pounds, S = surface in square feet, and V = velocity in miles per hour. S can be taken as 12 square feet, and the velocity, as previously stated, is 24 miles per hour.

Therefore, $P = .0025 \times 12 \times 24^2 = 17.25$ pounds.

Thus the total force which must be overcome is $80 + 17.25$ or 97.25 pounds. The total work done in foot pounds in moving the full 22 miles is therefore, $97.25 \times 5,280 \times 22 = 11,300,000$ foot pounds. Since 1 B.t.u. equals 778 foot pounds, this quantity is equivalent to $\frac{11,300,000}{778} = 14,600$ B.t.u. The heat in a gallon of gasoline expressed in B.t.u. is about 130,000 and therefore the efficiency is $\frac{14,600}{130,000} = 11.2$ per cent.

2—The average loss in the gearset on direct drive may be taken as 3 per cent. and the loss at the bevel pinions as 5 per cent. Allowing 1 per cent. for all the other losses the total will be 9 per cent. Therefore in this particular case, 91 per cent. of the power developed by the motor would be delivered to the rear wheels. In other cases the power transmitted might be higher and in others might fall as low as 80 per cent. This is assuming that the car is in high, on second the loss in the gearset may be taken as 6 per cent. This would increase the above estimate by 3 per cent.

3—You do not state whether you mean in the whole machine or just from the motor to the rear wheels. About 70 per cent. of the power is lost to the cooling water and discharged through the exhaust, then there is the friction in the bearings of the motor and the power required to operate the motor auxiliaries, such as the pump, generator, magneto, etc. There is a slight loss in the coupling between the clutch and gearset, and some power is wasted in the gearset, as already noted. A small amount of energy is absorbed by the universals, and the rear axle also requires energy, as previously stated. The rest of the power is absorbed in road friction, and in wind resistance. According to our calculations in answer to your first question, the distribution of energy may be tabulated as follows, the mechanical losses in the motor being calculated by subtracting all the rest from 100.

Lost to cooling water and exhaust heat..	.70
Mechanical losses in motor............	.10
Gearset losses	.03
Universals	.01
Bevel rear axle	.05
Road and wind resistance..............	.11
	1.00

How to Attach Electrical Meters to Hupp

Editor THE AUTOMOBILE:—1—I have a 1914 Hupmobile with Westinghouse starter and ignition system. Would you kindly explain how a voltmeter and ammeter could best be wired from the dash to the generator. A diagram would be much appreciated.

2—Will you also give me the names and addresses of reliable companies who manufacture ammeters and voltmeters?

3—Can an aluminum transmission case which is cracked, be welded or soldered strongly enough to withstand the continuous strain and jar? I have found that common solder will not adhere to aluminum; how is this accounted for?

Woodstock, Vt. E. H. REED.

—1—The wiring is extremely simple. The ammeter is connected as shown in Fig. 1, it being directly in the path of the current it is to measure. The voltmeter, on the other hand is attached across the two terminals of the generator, because it measures the pressure.

2—Following are a few names taken from the Automobile Trade Directory: General Electric Co., Schenectady, N. Y.; Hoyt Electrical Instrument Works, Penacook, N. H.; Keystone Electrical Instrument Co., Ninth street, and Montgomery avenue, Philadelphia, Pa.; Wagner Electric Mfg. Co., 6400 Plymouth avenue, St. Louis, Mo.; Weston Electrical Instrument Co., Newark, N. J.; Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

3—An aluminum solder was described in the Sept. 17 issue of THE AUTOMOBILE, page 564. According to the maker, this solder is stronger than the aluminum, and the aluminum will break before the solder will. If the crankcase is welded, it should also be strong enough to withstand the strain.

Edison Storage Battery Lighter

Editor THE AUTOMOBILE:—1—What is the difference between an ordinary storage and an Edison battery?

2—What does each weigh, such a size as is used on a 3-ton truck, and what is the cost of each?

3—Can such a battery be charged while current is being drawn from it? If so, how long will it take and what equipment is necessary to do it.

4—Is there very much difference between these batteries and a battery used for cranking and lighting?

5—Will you publish a list of addresses of manufacturers of garage tools supplies and steel working machinery?

6—What is the address of the Stanley Steam car?

7—What are the objections to a two-cycle motor?

8—Where can an instruction book for Elmore cars be obtained?

9—Why was the manufacture of these cars discontinued?

10—Can gas such as generated from carbide be used in an automobile engine?

11—How many cubic feet of gas and vapor will a pound of carbide produce?

Cooper, N. C. A READER.

—1—The ordinary lead storage battery uses lead plates immersed in an electrolyte of sulphuric acid of a specific gravity of about 1.280, when the battery is charged. The positive plate consists of lead peroxide and the negative plate is sponge lead. Pure lead is used to form the framework of the plates or grids, which carries these two substances, lead and lead peroxide. These grids also carry the current out to the battery terminals.

Edison Uses Potash Solution

The Edison cell on the other hand uses a 21 per cent. solution of potash in distilled water. The positive plate consists of one or more perforated steel tubes heavily nickel-plated, filled with alternate layers of nickel hydroxide and pure metallic nickel in excessively thin flakes. The tube is drawn from a perforated ribbon of steel, nickel-plated and has a spiral lapped seam. This tube, after being filled with active material is reinforced with eight steel bands, equi-distant, which prevent the tube expanding away from and breaking contact with its contents.

The negative plate consists of a grid of cold rolled steel, nickel-plated, holding a number of rectangular pockets filled with powdered iron oxide. These pockets are made up of very finely perforated steel, nickel-plated. After the pockets are filled they are inserted in the grid and subjected to great pressure between dies which corrugate the surface of the pockets and force them into practically integral contact with the grid.

These plates are housed in a jar or container made from cold rolled steel. The container is welded at the seams, the walls are corrugated for strength and the steel is nickel-plated.

Hard to Make Fair Comparison

2—It is difficult to compare these batteries, because the capacities used in various trucks will vary with the make of truck, etc. The only fair way would be to determine how much each type of battery would weigh and cost, to give the same performance in the same truck.

To give you an idea, however, a lead battery for an ordinary 3-ton truck might weigh 2,500 pounds and cost about $500. Such a battery would have an ampere hour capacity of 260 and would give 110 volts, 44 cells being used.

Another truck, of 3.5-ton capacity, however, is equipped with an Edison battery weighing 2,250 pounds, and costing $1,980. This battery has an ampere hour capacity of 375 rated and 475 actual under ordinary conditions of operation. The voltage is 72.

Therefore it is seen that the conditions are so different that little comparison can be made.

3—This is an obvious impossibility and there is no place where it is required. If you attempted to draw current from a battery on charge you would draw from the charging circuit and not from the battery.

4—The only material difference between the different types is that the starting and lighting battery is made of just the right capacity for the work it has to do and therefore it is of much smaller size.

5—This is entirely too long as there are many hundred names on the list. We advise you to write the Automobile Trade Directory, 239 West 39th street, New York City.

6—Stanley Motor Carriage Co., Newton, Mass.

7—The objections to the two-cycle motor are that it is difficult to throttle down, it is uneconomical, and is not as adaptable to high speeds as the four-cycle.

8—Possibly the Auto Parts Co., Chicago, Ill. or the Elmore Auto Repair Co., 247 West 47th street can supply you. These two concerns handle parts for this car and may be able to furnish you with an instruction book.

9—The manufacture was discontinued because the company failed.

10—Yes. Occasionally we hear of a motorist driving home on acetylene gas when his supply of gasoline is exhausted. The objection to the use of this gas is that it is much more expensive than gasoline.

11—One pound of carbide will produce .407 pounds of acetylene and this corresponds to 6.3 cubic feet at 70 degrees Fahrenheit.

Motor Overheats Badly: Water Boils Away

Editor THE AUTOMOBILE:—I have a model 14 Buick runabout. It has a two-cylinder, opposed motor. To date the car has not been run to exceed 1,000 or 1,200 miles. The trouble is it heats the water excessively, using about 1 gallon to every 7 or 8 miles. Have had it overhauled by several and they pronounce it to be in good working order; has good power and it performs satisfactorily, only uses too much water. It has a thermo-syphon system of cooling.

Recently I had a pump installed, but this does not lessen the consumption and heating of water. Have had new 1 1-4-inch hose put in the circulating system and thoroughly traced water course for any stoppage, but none to be found. Seems to boil the water in the jackets like when water is poured on a hot stove. The original radiator was somewhat battered on the inside by the fan wheel getting loose, and I had the radiator reconstructed so as to hold about a gallon more water. It heats as much now as with the original one. So I do not think it is in the radiator as it got just as steaming hot before I had any change made. I have had the timing changed, which has helped the speed and power at least 25 per cent. I use plenty of lubrication but this does not seem to help any.

The maker claims it is all in the radiator, but I do not think so, as the original one heated the same. Would like

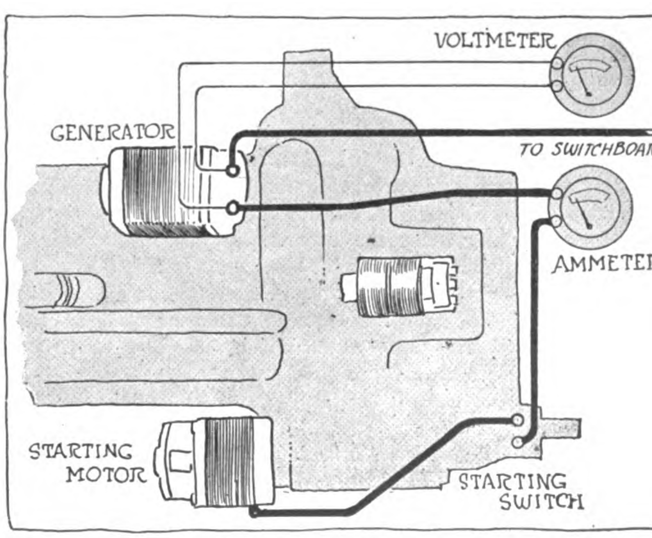


Fig. 1—Diagram showing wiring connections for attaching ammeter and voltmeter to 1914 Hupmobile

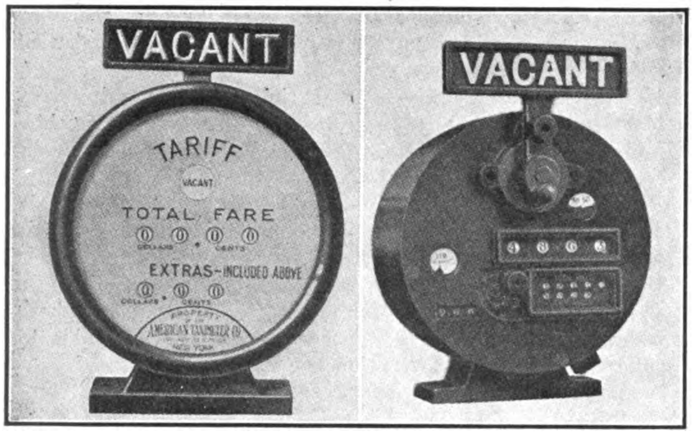


Fig. 2—Front and rear views of a taximeter

to hear from any one who can suggest a remedy for this trouble. Have tried a dozen or more suggestions but with no results. What does THE AUTOMOBILE think is the cause? There is no stoppage in the water circulation; carbureter works well and no misfiring; everything else is all right.

Syracuse, N. Y. A. W. SMITH.

—The Buick model 14 uses a vertical tube radiator, in which the water runs simultaneously through all tubes. If your radiator ever worked properly a repair such as you speak of could not increase its capacity by a gallon. It may be, however, that, prior to the accident a part of the radiator, a tube or two, was closed, and when the radiator was repaired, was opened up. The water capacity of this cooling system is 2 1-2 gallons, and if it does not hold this much, something is radically wrong. It may be possible that while your system is up to normal capacity, the water does not circulate properly, due to an obstruction in the line, perhaps in the cylinder passages. Continued use of hard water may have deposited a scale in the interior of the radiator that prevents proper radiation. To determine which of these is the case, or if none of them, what the real difficulty is, proceed as follows, always remembering that it is not a fault in design but the result of an abnormal condition.

First Drain Radiator

First drain out your radiator and cooling system, refilling it with clean water. Measure the amount that you put in, and if it is not as much as 2 1-2 gallons, you may know that your system is not of normal capacity, due either to stoppages in repairing the radiator, or core sand, or deposit from dirty or alkali water. When the radiator is full start your motor, and let it run until the water is hot, then feel all of the tubes in the radiator. If any of them are cool, they are not circulating, and are probably clogged or closed through an error in manufacture or repair. Next, to test the circulation, disconnect the outlet hose, and with the motor running, put fresh water into the radiator to take the place of the water running from the disconnected exhaust. Drop some aniline color or ink into the radiator, watching the outlet to determine how long it will take it to run through the system. If it comes through greatly diluted, and continues to come long after the last is put into the radiator, there is an obstruction in the passages which allows the water to pass only very slowly, and may be due to caked core sand and scale, or vegetable matter or sand in the water, introduced into the circulation by careless straining of the water. It is barely possible that a lump of iron was left by the core in casting which escaped the notice of the inspectors.

If, after all of these tests, it is found that the cooling system accommodates its full capacity of fluid, that it reaches every surface of the radiator, and that the circulation is rapid and thorough, your over heating must be due to errors in driving, to wit, running on retarded spark, in low gear, or with an over-rich mixture, or to a deposit of scale on the interior of the radiating surfaces which prevents proper radiation. If the former, the remedy is obvious, if the latter, the system should be cleaned with one of the numerous radiator cleaning compounds.

If it is found that the water is not circulating through all of the radiator tubes, the radiator should be thoroughly cleaned and overhauled, and the ends of the tubes inspected if possible. If there are obstructions in the cylinder passages, their nature should first be learned, and if possible immediately removed. If it is found to be a flaw in the casting, it may be necessary to replace the cylinder, if no way can be found of reaching it from the outside.

How a Taximeter Works

Editor THE AUTOMOBILE:—1—Will you please give me the addresses of several manufacturers of taximeters? 2—What sort of a record does a taximeter keep? Does it show anything besides the amount of money taken in? How does the clock attachment work?

I am contemplating starting a taxicab line, but know but little about the working of the meters.

McCook, Neb. ROBERT L. FERGUSON.

—1—According to the Automobile Trade Directory, taximeters are made by the following concerns: American Taximeter Co., 735 Seventh avenue, New York City; International Taximeter Co. of America, 239 West 68 street, New York City, and the Pittsburgh Taximeter Co., Center and Negley avenues, Pittsburgh, Pa.

2—There are two principal types, the one-tariff meter which registers at but one rate, and the two-tariff meter which will permit of charging at one rate for one or two passengers, and at a higher rate for three or more. Provision is made for additional charge for baggage, etc., under extras. This record is rung up by the driver and shown separately on the dial.

In some meters the extras are automatically added to the total fare, while in others the totalizing feature is omitted, the extras being computed separately.

When the cab is disengaged, the flag on the meter is upright, displaying the vacant sign. Upon a passenger being taken, the flag is turned to the right 90 degrees, or one-quarter of a circle, and the figures Tariff One and the initial fare appear upon the dial. In this particular case for instance, the initial charge is 50 cents. This will carry the passenger the first half-mile, at the end of which the meter will record an additional charge of 10 cents for every quarter-mile thereafter, and 10 cents each 4-minute period of waiting time. Any other rates of fare may be had.

Where it is desired to use Tariff Two—for a larger number of passengers—the flag is turned around three-quarters of a circle, to a position opposite to that of Tariff One. This will cause the figures Tariff Two and the initial charge of 50 cents to appear. The initial charge will in this case cover the first one-third mile, registering 10 cents additional for every one-sixth mile thereafter. Waiting time is recorded as the same time as Tariff One—10 cents for each period.

At the termination of a trip the flag is turned to the lowest point of its travel. This is the Not-Recording position. The dial reading Total Fare, and Extras is unchanged, but the words Not-Recording appear instead of Tariff One or Two. The clock is disconnected from the Total Fare reading, preventing the automatic addition of money for waiting time while the passenger is in the act of paying his fare.

The Non-Recording position is also used in the event of mishap to the cab, necessitating repair or the procuring of a substitute cab, in which case the passenger is not responsible for the loss of time, and would naturally object to paying for it.

Should the driver attempt to operate with passengers, the flag being in the Not-Recording position, additional fare and mileage will continue to record. Upon the fare being paid, the flag is again moved to the Vacant position, the dial is returned to zero, and the meter records only the total mileage when the cab travels, until another passenger is taken and the flag again operated.

The Owner's Record

The rear face of the taximeter contains the owner's record. It is permanent and is not returned to zero by the movement of the flag after each trip, but continues to register all additional fares, mileage, etc.

The circular dial in the upper right side shows the number of trips, or times the flag has been operated from Vacant to Vacant. Below this is the permanent cash record, or total amount of the fares, including Extras received. This is read backward. For instance, the figures 4863 would mean $368.40.

Mileage is registered in miles and tenths in two lines of numerals in the lower right side. The top line records total mileage. The lower line total paid, or live mileage. Unpaid mileage can be easily found by subtracting the lower amount from the upper.

The small circular dial on the left registers the time in 1-minute periods that the flag is in the Not-Recording position.

Recording of Extras

Extras are recorded in the oblong space on the lower left side. They are also included in the cash record. The separate recording of this item will prevent any abuse of the Extras feature on the part of the driver.

The flag may be locked in any of its positions, preventing tampering by malicious persons in the possible absence of the driver. The locking, registration of Extras, and winding of the clock, are accomplished by means of a key furnished for these purposes.

Advantages of Friction Drive

Editor THE AUTOMOBILE:—Has there ever been published in THE AUTOMOBILE an article on the advantages and disadvantages of the disk-friction-chain drive compared with other types of transmission now more commonly used? If so, would you kindly give me the reference? If not, will you please give me your views on the subject?

Ithaca, N. Y. FRANK E. RICE.

—Nothing has been published on this subject in the past few months. The advantages of the friction transmission are that it offers an infinite number of gear ratios, is silent, cheap to manufacture and simple. The disadvantages are that the friction disk must be renewed every few thousand miles; this is a small matter, but worth noting; and that the amount of horsepower that it will transmit under the conditions found in automobile design is limited. Therefore it has never been used to any extent on large cars but has found favor on some cars of medium size and on more small cars.

Not Advisable to Change Gear Ratio

Editor THE AUTOMOBILE:—I am the owner of a 3,000-pound car, having a bore of 4 1-8 inches and stroke 4 1-2 inches with tires 34 by 4 and a gear ratio of 3 3-4 to 1, and am desirous of changing it to a 4 to 1 gear ratio. Would you please explain the difference between the two ratios relative to this car in regard to vibration, heating and wearing of engine parts, gasoline mileage, hum in differential and other advantages or disadvantages between the two ratios?

This car shows no vibration at 30 miles at present ratio. Am in the habit of running 15 miles per hour.

Waltham, Mass. C. A. DUBOIS.

—There will be little difference in these two ratios, the lower one will require that the motor run 1.066 times as fast, and this will increase the noise, vibration, heating, wearing, and gasoline consumption just that much.

This difference is not worth the change as it will cost a considerable amount to put in the new gear ratio. A new pinion and gear will be required and if these cannot be obtained from stock it will be necessary to make them up specially at additional expense.

If your car is in good condition, there is no reason why you should discard the gear ratio you now have because the motor should be powerful enough to make the car a good hill-climber. However, if you desire a lower gear it would be better to install a 4.5 to 1 ratio, as this will make a noticeable difference.

Bent Knuckle Hard to Repair

Editor THE AUTOMOBILE:—1—Please advise me regarding an argument which we had in our shop lately.

We had a steering knuckle on a Buick car which required straightening. I argued that it could be done either cold or by heating and that heating would do no harm, but on the other hand would lessen the danger of crystallization.

Other parties argued that heating would allow it to bend easier in the future and that no good machinist would do it any way but cold.

Titonka, Ia. VICTOR LAMOREUX.

—If the knuckle is straightened at all it should be done hot. It is better to put in a new one, however, as it is difficult to straighten it so that the wheels will run true. If the bend is in the spindle there is no possibility of straightening it satisfactorily and even if only the arm is bent it will be hard to true it up.

Buy New Set of Ford Magnets

Editor THE AUTOMOBILE:—I am under the impression that I saw a letter in THE AUTOMOBILE explaining a method of charging Ford magneto magnets without taking them out. If you have published such a letter, I would be pleased to have a copy containing it.

Fairchance, Pa. CARL LIGHTFOOT.

—We have never described such a device. Recharging these magnets is hardly worth the trouble because a new set may be purchased complete and ready to install for a total expenditure of about $4.

Will Water Remove Carbon?

Editor THE AUTOMOBILE:—I note in THE AUTOMOBILE that someone advocates dropping water in the carbureter when the engine is hot and running to remove carbon. I heard of this several years ago but dared not try it until recently. I thought it worked well. What do you think?

Portland, Me. GEO. W. CHASE.

—We have had no experience with this method of removing carbon. Possibly some of our readers have tried water and will give their experience.

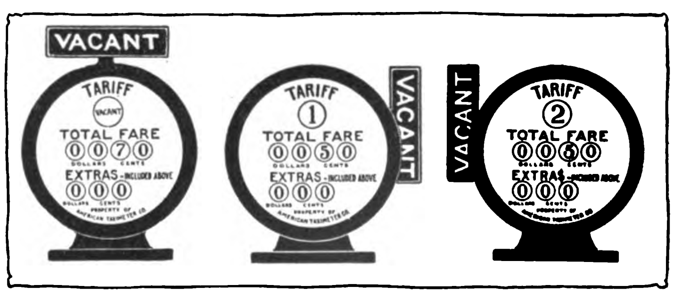


Fig. 3—Three positions of the flag. At the left is the position when the cab is vacant, in the center is the position for tariff 1 and at the right for tariff 2

Control of Materials and Dimensions in German Manufacture of Steel Balls and Ball Bearings

A SUBJECT BEARING UPON AMERICAN INDEPENDENCE OF IMPORTATIONS

THE means adopted by the Deutsche Waffen- und Munitionsfabrikken in Berlin to secure uniform qualities of the materials used for balls and ball bearings and uniform accuracy in the dimensions of these products are described by W. Bockermann.

From 1898 to 1909 the D. W. F. concern conducted its scientific investigations of problems arising in the manufacture of steel balls and bearings in connection with the Zentralstelle für Wissenschaftlich-technische Untersuchungen (Central Institution for Scientific-technical Investigations) at Neubabelsberg near Berlin. Its own testing department for materials was established in 1910 and was combined with the department for the mechanical testing of the products, which had already existed for about ten years and which was enlarged on the same occasion.

The mechanical laboratory, Fig. 1, comprises a Martens-Heyn hardness tester, a Brinell press for testing hardness, an Amsler-Laffon press of 60 tons capacity with an auxiliary cylinder of 6 tons pressure; also a press of 200 tons capacity. To the right in the illustration there is seen a machine for grinding and polishing of test pieces for metallographic examinations and in the background a device for the control of the accuracy of pyrometers. The microscopes are all made by Carl Zeiss of Jena and include a measuring-microscope for the hardness tests, a large metallurgical microscope and a binocular microscope [to give the perspective effect of the etched portions of polished test pieces—ED.]. A Martens mirror is at disposal for measuring deformations during testing operations.

Figs. 2 and 3 give an idea of the equipment of the chemical laboratory, showing respectively the titration room with the analyzing room behind it and the electrolytic plant with device for burning carbon electrically. Some of the mechanical testing devices for the finished product may be recognized in Fig. 4, while Fig. 5 shows the arrangement of the ball inspection department.

The chemical analysis of some of the steels used for balls and races is given in an appended table.

Percentage of	Balls up to .5 in. diam.	Balls above .5 in. diam.	Races.
Carbon	1.23	0.95	1.01
Manganese	0.31	0.29	0.26
Silicon	0.16	0.36	0.23
Phosphorus	0.017	0.028	0.020
Sulphur	0.015	0.028	0.020
Copper	0.012	0.01	0.008
Chromium	——	1.25	1.33

Material is received, according to its purpose, in the form of wire, rods, tubes, disks or blocks. Samples are taken from every lot and are examined with regard to chemical composition, texture, natural hardness and hardness as well as toughness after hardening by heat treatment. There is demanded a material free from cracks and pores and showing a microstructure of fine-grained perlite. The best test for hardness has been found in the Brinell method of measuring the indentation made by pressing a steel ball into the material. But this test is not made with a ball of 10 millimeters diameter and a pressure from 2,000 to 3,000 kilograms, as is usual, but with a 5-millimeter ball and 500 kilograms pressure. Under the higher loads the hardened material frequently developed superficial cracks, and these may be very detrimental for the durability of a ball bearing. This does not occur with the smaller ball and the 500-kilogram load. The conditions for obtaining reliable results by this method comprise: a press working perfectly, balls of uniform hardness, a good polish of the surface where the indentation is made, a delicate film of lampblacking, correct

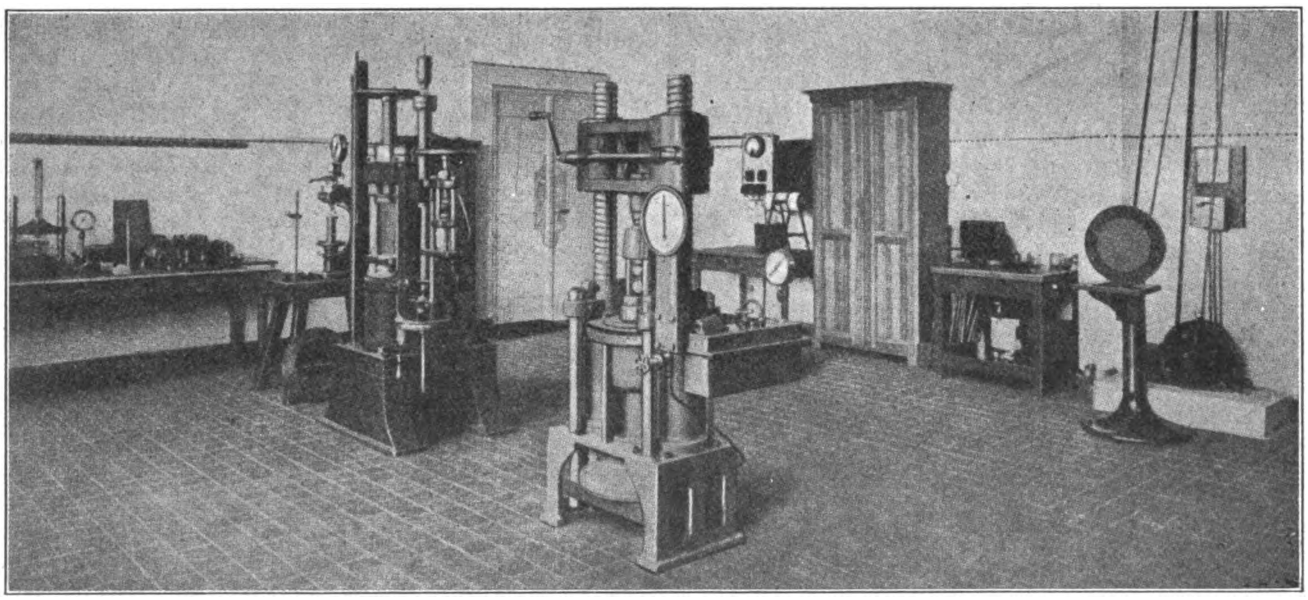


Fig. 1—Mechanical laboratory with presses for testing raw materials for hardness and toughness; also micrographer equipment

adjustment of the microscope (so that the planes of the image and of the crossing threads coincide accurately), a suitable illumination and, finally, practice on the part of the workers. The balls used for the press are made specially for this purpose and of unusual hardness, which is the property that is most essential, but their toughness is thereby somewhat reduced and the number of wasters is increased.

The determination of the toughness of the hardened steel gains additional importance from the fact that the results indicate how well the material has been handled at the rolling mill. This property is measured by bending tests, and these are also directly useful, as the chief stresses to which a ball bearing is subject are pressure and bending stresses.

The examination of the materials is continued during the processes of manufacture. Each bearing ring is measured and inspected for defects after each machine operation and each process of heat treatment. After the hardening the rings are tried searchingly for hardness and toughness. Each ring is tried for hardness in several places with a three-cornered file and thereafter it is dropped on a steel plate from a height of 2 meters. Those which are too brittle are broken by the fall.

The bearing balls are, as a rule, not inspected till finished. By the play of light and shadow when the balls are moved around on a glass plate, defects of material or workmanship become plainly visible, and balls seen to be defective are of course put aside by the young women doing this work, (Fig. 5.)

Rings and balls are often tried for hardness, toughness and strength. The toughness of rings is determined by compressing them radially between two flat plates. Hardness of balls is tested by pressing two balls of equal size against each other. In the case of large balls, which preferably should not be destroyed by the test, the load applied is $5D^2$ kilograms, where D stands for the ball diameter in one-eighths of an English inch, so that the load for a 2 1-2-inch ball, for example, becomes $5 \times 20^2 = 2{,}000$ kilograms. By this load no measurable permanent deformation arises. When the value of the test-object is of no importance the hardness is decided with loads from $50D^2$ to $300D^2$.

The toughness of the balls is also determined by pressing two of them against each other. They are placed in a guide block, one over the other, as in Fig. 6, and loaded to destruction. It is an interesting observation in connection with this test that, when a cone whose base equals the area of contact between the two balls is driven in between them, only one of the balls, as a rule, is destroyed at first. The other one bursts frequently at the moment the load is removed, into two even halves, but it also happens often that it does not

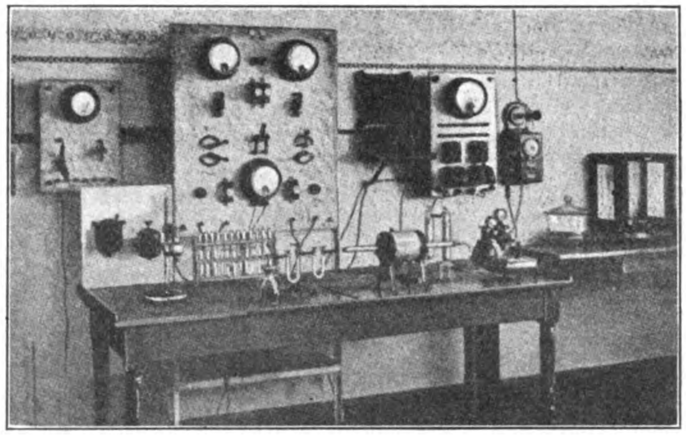


Fig. 3—Plant for electroplating and determination of carbon contents

burst till after a considerable length of time, which may be hours and even days, and then with a distinctly audible report. Fig. 7 shows a pair of balls destroyed in this manner, together with the shearing-cone.

The ultimate load for balls varies within rather wide limits, but this is not so objectionable as might appear at first thought, as it is the balls which for some reason—slight variations in the hardening temperature—have become least hard which show the greatest ultimate load. When this load is taken as a measure for toughness, the hardness should therefore at the same time be considered. A high ultimate load is only then a sign of satisfactory toughness when the hardness is also sufficient.

In the department for the testing of the steel materials the other substances which are used are also examined, such as bronzes, brass, oils, benzine, soaps and paper, and these examinations relate mainly to the properties required in these materials for their use in connection with ball bearings. [The author here refers to the ball cages, whose metal should not wear off on the balls and should hold their shape and their cross-pins, to lubricating oils, etc., which should be free from acidity, and to the avoidance of hygroscopic properties in the wrappings for ball bearings held in stock.—Ed.]

The Control of Dimensions

Aside from the accuracy required in the machine tools by which the parts of ball bearings are turned out, a large and varied collection of fine measuring tools is a necessary equipment, and in order to keep these fine tools constantly up to a high standard of accuracy a measuring department has been established.

A considerable wear of the measuring tools follows from

Fig. 2—Titration room with chemical analysis room adjoining

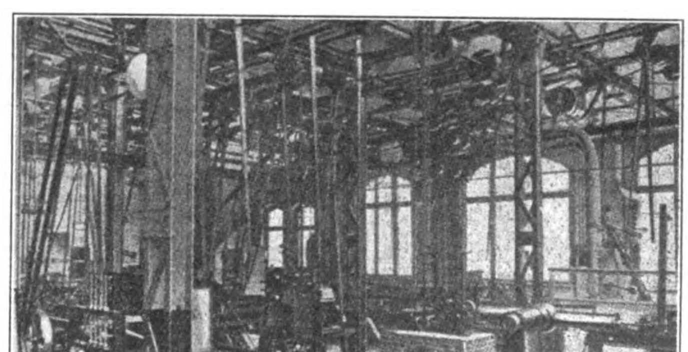


Fig. 4—Equipment for mechanical testing of finished bearing rings

the fact alone that the tolerances allowed in the manufacture are very small, so that much rubbing takes place. The tolerance for the bore of a bearing ring does not exceed 0.015 millimeter, and the same accuracy is required for external diameters up to 50 millimeters, increasing to 0.02 for rings of larger dimensions; for balls the variations must not exceed 0.002 millimeter. Naturally the manufacture is operated from beginning to end with tolerance calipers and rules, and these are produced and calibrated at the factory. The

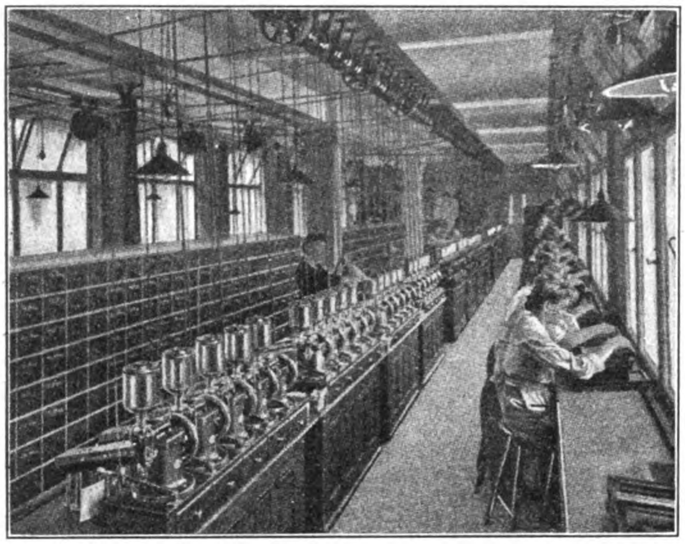


Fig. 5—Testing of steel balls by play of light

calibration is done in the measuring department by means of the following machines:

(1) A measuring machine from I. E. Reinecker of Chemnitz, with a range of about 300 millimeters. To this machine belongs a set of Reinicker measuring blocks in lengths from 5 to 100 millimeters. These blocks are tested by the Physikalisch-Technische Reichsanstalt with an accuracy of plus-minus 0.001 millimeter and are revised from time to time in the same place. Up to lengths of 50 millimeters an accuracy down to even 0.0005 is guaranteed. To go further seems unnecessary, as a difference in temperature of only 1 degree centigrade makes a differnce of more than 0.001 millimeter on a length of 100 millimeters.

(2) A Sauter & Messner measuring machine of the same range.

(3) A device for measuring thickness, from Carl Zeiss, with a range of 105 millimeters. The two other measuring-machines apply a pressure, when used, of respectively 4.2 and 5 kilograms on the work piece, and this pressure in some cases would interfere with accuracy. Thin rings, for example, are ovalized by it and balls are flattened at the measuring places. While these minute deformations lie within the elastic limit and have no permanent effect upon the actual dimensions of the work piece, it is a matter of experience that they result in the diameter of such pieces being regularly measured too small. With the Zeiss measure this drawback is avoided, as the pressure is only 0.09 kilogram.

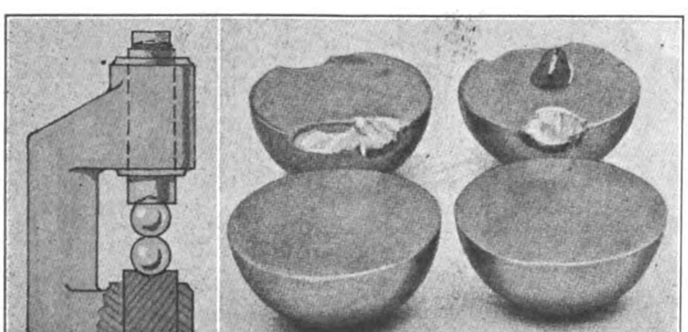


Fig. 6—Ball press for toughness test. Fig. 7—Test illustrating that two balls are never of equal strength

(4) A thickness and ovalization measure with minimeter from Hirth at Cannstatt. This device, like the measuring-machines, must be adjusted by means of the measuring-blocks, and the range for each adjustment is rather small and depends upon the individual minimeter that is used. With a multiplication of 1 : 500 the range is only 0.04 millimeter. The instrument is therefore mainly used for measuring tolerances.

(5) Two standard sets of Johannson measuring blocks, of which one is used constantly while the other serves for controlling the first one.

(6) An extension set of Johannson blocks in lengths from 150 to 300 millimeters.

The Reinecker measuring-machine is protected by a glass case against dust and changes of temperature, and the measuring-room where it is kept has northeast exposure, an outside wall 50 centimeters thick and double windows, so that the temperature can be kept almost constant.

For trying out complaints there is in the measuring-room a complete set of tolerance calipers from 5 to 100 millimeters of an accuracy of plus-minus 0.001 and adapted for measuring all of the tolerances guaranteed in the firm's catalogs. It is found advantageous to have complaints thus passed upon apart from the commercial offices.

The normal temperature is assumed to be 20 degrees centigrade; that is, all measuring-tools agree exactly with their nominal dimensions at this temperature. While in scientific institutions the normal temperature is taken as 0 degree, most large concerns have found it unpractical to adopt this standard, as it is very seldom that a piece of work can be measured at this temperature, while it is comparatively simple to keep the measuring room at 20 degrees, thereby avoiding calculations or reference to tables.—From *Zeitschrift des Vereines Deutscher Ingenieure*, August 15.

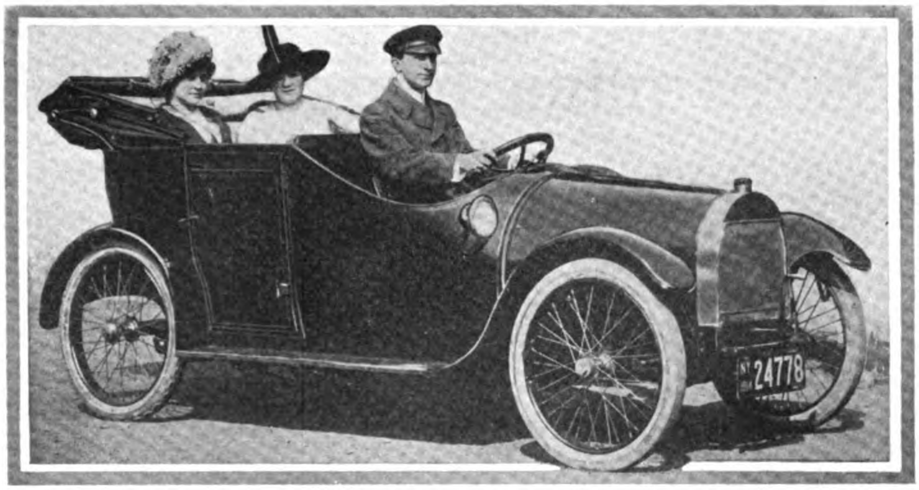
(*To be continued*)

Dividing Germany's Export Trade

IN discussing the best means for securing the export trade which Germany has established all over the world, and not least in France, England and Russia, the French and English technical and class journals furnish many interesting figures to show the volume of the trade involved. It is noticed that the total German exports in 1912 amounted to about 2,240 million dollars of which 38 per cent. went to the nations with which she is now at war. The machinery trade represented 170 million dollars and during the first six months of 1914 electric machinery alone brought Germany more than 35 million dollars. The steel export aggregated in 1912 more than 140 millions, coal the same amount, cotton fabrics 106 millions and leathers nearly 60 millions.

During the same year, however, the German importations amounted to about 2,700 million dollars, and when it is assumed that it should be possible to capture most of the German export during the war and to hold it afterwards, the purchasing capacity indicated in the German importations should also be considered; that is, means should also be discussed for taking from those countries which have traded with Germany an amount of goods similar to that which Germany had to buy from them in order to establish a practicable trade balance, without which the purchasing capacity ceases to exist.

The demands of the situation thus revert curiously to those existing two generations back, when shipowners or captains bought suitable cargoes for speculative export to some foreign port and were prepared to take suitable return cargoes for their home country or intermediate ports—the days when commercial adventure filled the place since taken by commercial organization and international banking facilities.



Two views of the new Twombly taxicab to sell for $600. The passengers have an unobstructed view because the driver sits in the center

Twombly Taxi $600

Maximum Rate 25 Cents Per Mile—Four Cylinders and Sliding Gears

TAXICAB transportation for two passengers at a cost of 25 cents per mile is the maximum rate allowed for the new cab manufactured by the Twombly Car Corp., Nutley, N. J. This cab, which was briefly described in the October 22 issue of THE AUTOMOBILE, is a well-finished landaulette design, painted maroon and upholstered in cloth. The low charge for passenger transportation is due to the fact that there is no excess weight, the car complete tips the scales at 1,400 pounds it is claimed and the initial cost is low, being $600. The motor is a four-cylinder water-cooled design. The wheelbase is 100 inches, the tread 44 and the tires measure 28 by 2.5 inches.

Realizing that if these cabs were sold outright without any restrictions many short-sighted owners would charge the same rate that present taxicab operators are charging, the Twombly company will not actually sell these cars but will give a perpetual lease which allows the owner of the lease all the privileges that a purchaser would have with the exception that if more than 25 cents per mile is charged the cab may be taken back. The operator of the cab may charge as much less than this rate as he sees fit.

This small, light-weight, two-passenger cab was designed, it is stated, after studying the taxicab situation in New York City, where it was found that 80 per cent. of the time not more than two passengers were carried.

Running Expenses Low

The actual running expenses of this cab are extremely low, and guaranteed to be not over 1 5-8 cents for gasoline, oil and tires. It should actually be much below this figure. Probably for the first time in history, it is claimed, a tire company has agreed to guarantee the tire cost to be not over 5-8 cents per mile and the Twombly company guarantees that the consumption of gasoline will not exceed 1 cent per mile.

It is expected that within a few months, a fleet of cabs will be operating in New York City, the charge for the first mile being 25 cents and 5 cents for every quarter mile thereafter. This is just half the present rate. These cabs are to be operated by an independent company. The Twombly company is confining its efforts entirely to manufacturing.

It is anticipated that with the increase in popularity of these low-rate cabs that there will be sufficient of them on the streets and sufficient demand for them, to eliminate the loss due to returning to the cab stand empty. At present, the taxicabs start from the stand, deliver their fares and return empty, the return trip is a dead loss. By reducing the rate, the demand will increase, and with it the number of vehicles with the result that near the spot where the fare is delivered a new fare will be picked up. In this way the cab will eventually work back to its stand, and pay its way while so doing.

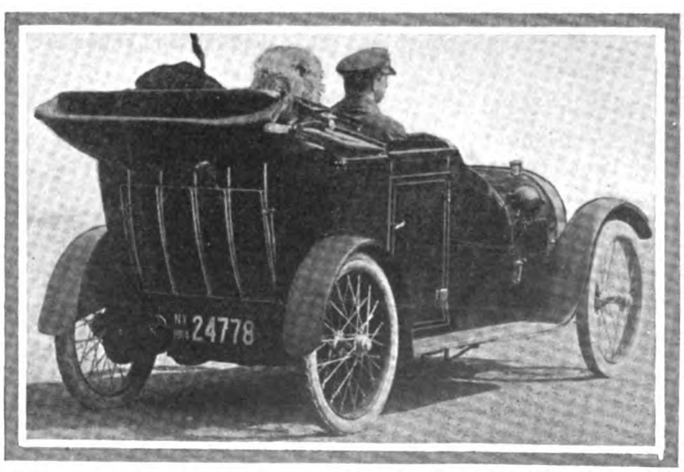
L-Head Block Motor

The motor is an L-head, block design, 2.75 by 4 inches. Cooling is by the thermo-syphon system, a honeycomb radiator being used. Lubrication is by a combination splash and force-feed system.

The rear axle is fitted with New Departure bearings and the differential action is obtained by the use of roller clutches. The front axle is a drop-forged, I-beam type with annular ball bearings in the wheel spindles. There are two brakes on each rear wheel, the service being external and the emergency internal.

The steering gear is an adjustable design which the driver can swing out of his way when getting in or out. A 14-inch wheel is used and the gear itself is an irreversible worm and sector type. There is a hand throttle on the dash and a foot accelerator. The service brake is pedal-operated, and the other is actuated by a lever.

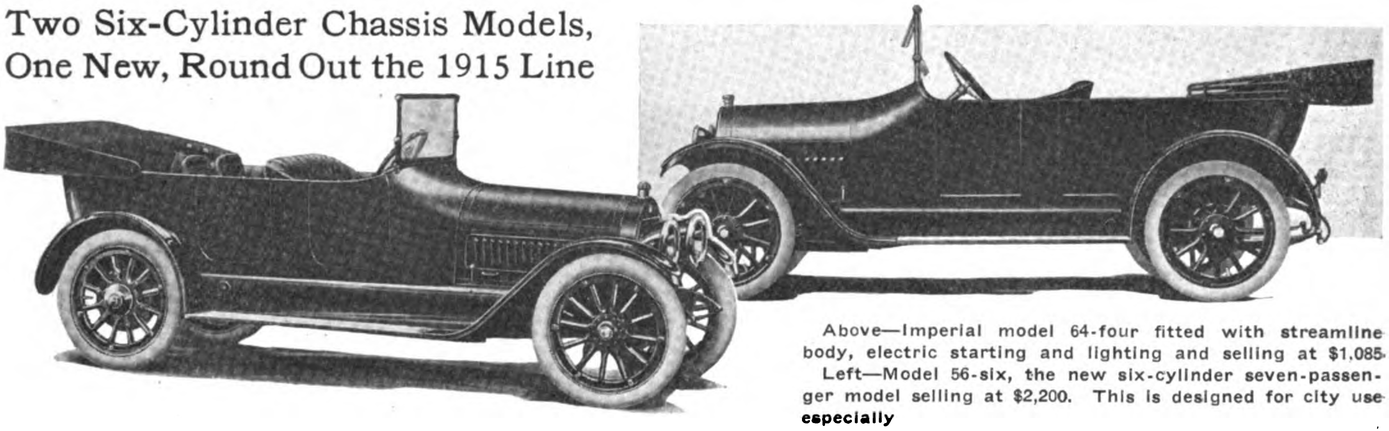
The top is a patented design which may be raised or lowered by one man in 30 seconds. The front is inclosed by two glass windows through which a full view of the road can be had by the passengers, because of the central position of the driver. Provision for baggage is made by installing a substantial trunk carrier in the rear.



Rear view of cab showing trunk rack

New Imperial Streamline Four at $1,085

Two Six-Cylinder Chassis Models, One New, Round Out the 1915 Line



Above—Imperial model 64-four fitted with streamline body, electric starting and lighting and selling at $1,085. Left—Model 56-six, the new six-cylinder seven-passenger model selling at $2,200. This is designed for city use especially

A FOUR- and two six-cylinder models comprise the 1915 line of the Imperial Automobile Co., Jackson, Mich. Model 64-four is the feature, listing at $1,085 or $415 lower than the previous four-cylinder model. It has a 115-inch wheelbase, 3 3-4 by 5 Continental L-head block motor rated at 22.5 A. L. A. M. horsepower, Gray & Davis starting and lighting system, thermo-syphon cooling, cowl fuel tank and streamline body with rounded radiator. Gills in the bonnet sides, smooth doors, concealed upholstery and well designed fenders add to its appearance.

The four-cylinder type mentioned and the 56-six listing at $2,200 are new models. The other six, model 44, selling at $2,000, is practically a continuation of the same model of 1914, except that many minor refinements have been made and the new type of body entirely alters its appearance. Continental motors with the cylinders cast in threes are used in the sixes and the streamlines of the bodies are consistent in all models.

The chassis of the four has a strong and light appearance with well-proportioned springs carrying the frame.

The motor has the gearset in unit, the whole being three-point suspended in the frame. The crankcase has two integral supporting arms at the rear while the front support is at the center. The usual aluminum crankcase construction, with the upper and lower parts horizontally split, is used. Valves are all on the right and inclosed by two cover plates. The exhaust header also is placed on this side, there being an individual opening into each cylinder from it. But the intake passages are cored in the cylinder casting and pass across to the left side, where they unite into one opening to the carbureter intake pipe. This has the advantage of simplicity outwardly and at the same time serves to heat the incoming gases which is a factor in efficient vaporization of the fuel.

Light-Weight Parts

The working parts of the motor are well balanced and their weight has been made as light as possible. The pistons, cast from the same grade of iron as the cylinders, are each fitted with three diagonally split rings, while oil grooves are turned in their surfaces to aid in oil distribution. I-beam connecting-rods attach to the pistons by means of steel tubing pins which are fixed in the pistons.

Low carbon steel is used for the camshaft, also a three-bearing proposition with integrally forged cams. This is driven from the front by the usual timing gear train, the gears being helically cut and completely housed. Conventional poppet valves are used.

The cooling of this engine is by thermo-syphon. Lubrication is of the combination force-feed and splash variety with a horizontal plunger pump, driven by an eccentric from the camshaft, forcing oil through copper tubes direct to the timing gears and front main bearings and over the rear main bearing. It then drains back into the oil pan.

Gasoline Tank in Cowl

The gasoline system of this car is new to Imperial practice in that the cowl type is used. A 10-gallon reservoir located in the cowl supplies the carbureter by gravity. The Atwater Kent Unisparker type of ignition is employed, this automatically adjusting itself to the speed of the engine.

In their application to the Imperial four, the Gray & Davis cranking and lighting units occupy their usual positions, the generator being driven by the external shaft connected to the front gears and on the right side of the engine. The cranking motor, which spins the engine at about 150 revolutions a minute, is placed so as to gear to the flywheel rim.

Unlike the preceding Imperial fours, the model 64 delivers its power to the rear through an uninclosed driveshaft. The intermediary members are a multiple steel disk clutch and three-speed selective gearset, both in unit with the engine.

The axle is a floating type which is fitted with Hyatt spiral roller bearings. Its axle shafts are removable without disturbing the rest of the construction. Twelve-inch brake drums with internal expanding and external contracting brakes are provided.

The spring suspension of this car is noteworthy on account of its easy riding properties. Seven plate oil tempered three-quarter elliptic rear springs 50 inches long and underslung from the axle suspend the rear of the chassis, while 38-inch springs of six plates take care of the front. All leaves are 2 inches wide.

Wheels are of the usual artillery wood type, to which are fitted Detroit demountable rims. They carry 32 by 3 1-2-inch plain tread tires.

The equipment includes a one-man top, electric horn, speedometer, windshield, dash lamps for illuminating the gauges and instruments, etc.

The New Six-56

The Imperial company characterizes this model 56 as a city car, although its seven-passenger commodiousness and luxury seem to invite the motorist to country roads as well.

A 3 3-4 by 5 1-4 engine of 33.8 A. L. A. M. horsepower is mounted on a chassis of 130 inches wheelbase. Its motor is somewhat different in general design from the four. The cylinders are cast in sets of three, valves are on the right and though integral crankcase arms support it in the frame at the rear, an arched cross member at the front serves as a support from which to hang the front center of the crankcase. The gearset is in unit, giving three-point suspension.

The crankshaft and camshaft are on three bearings, while drive of the camshaft and the magneto shaft are by helical gears. A silent chain runs from a sprocket on the crankshaft to the generator shaft sprocket on the left.

Cooling by Centrifugal Pump

Cooling by centrifugal pump in conjunction with a large cellular radiator is used, while lubrication is maintained by a force feed splash system whereby constant level in the troughs is insured by pump. The electric functions of cranking and lighting are cared for by a North-East combination motor and generator, driving through silent chain to the front of the crankshaft. This unit, with its two windings, acts first as a motor to start the engine, after which it becomes a generator for charging the storage battery and operating the lights.

A disk clutch connects the drive parts to the engine, while the gearset affords the usual three-speed changes ahead. The gears used are chrome vanadium and they are carried on nickel-steel shafts mounted on annular ball bearings. But unlike the new four, the propeller shaft is inclosed within a torsion tube which takes drive and torque. This shaft is 1 3-8 diameter, of chrome-nickel steel.

The rear axle is floating and has a malleable housing. Like the propeller shaft, the axle shafts are chrome-nickel steel. Their diameter is 1 1-2 inches. The axle ratio is 3 7-8 to 1. The brake drums are 16 by 2 1-4 inches.

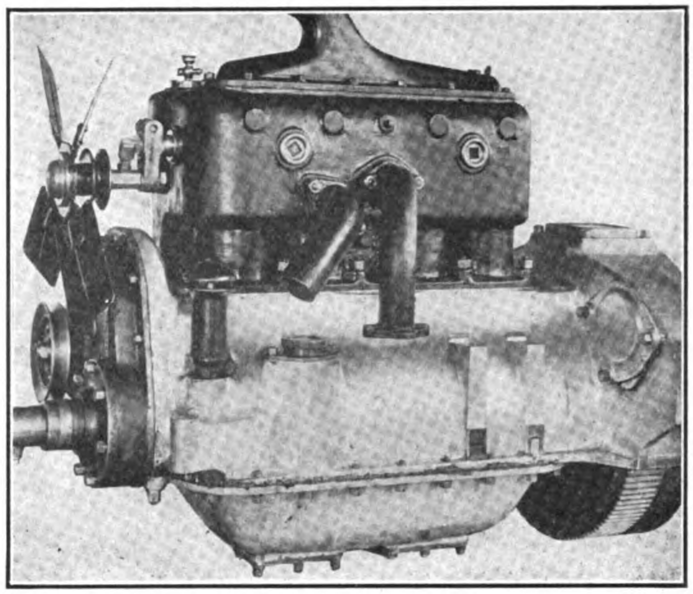
Body work on this car is specially attractive, the full streamline effect being carried out. The upholstery does not protrude over the top edges, and with clear running boards, doors with concealed hinges and inside handles, the outward appearance is exceedingly trim.

The wheels are fitted with demountable rims, and carry 36 by 4 1-2 tires all around. Complete equipment, which includes a one-man top, windshield, speedometer, electric horn and so on, is furnished. Left drive and center control are used, and the 20-gallon gasoline tank is carried at the rear. It feeds by the vacuum supply system to an auxiliary tank, and thence by gravity to the carbureter.

Model 44-Six

The other Imperial six, model 44, is a continuation of the same model of last season with new body. The motor, drive parts, etc., are the same as in the six just described. With its wheelbase 4 inches less—126 inches—this car carries a five-passenger body somewhat similar to that mounted on the 56. The inclosed driveshaft gets its power through a disk clutch and three-speed gearset. The floating rear axle has a ratio of 3 1-2 to 1, its housing being a pressed steel type rather than of the malleable form as used on the other six.

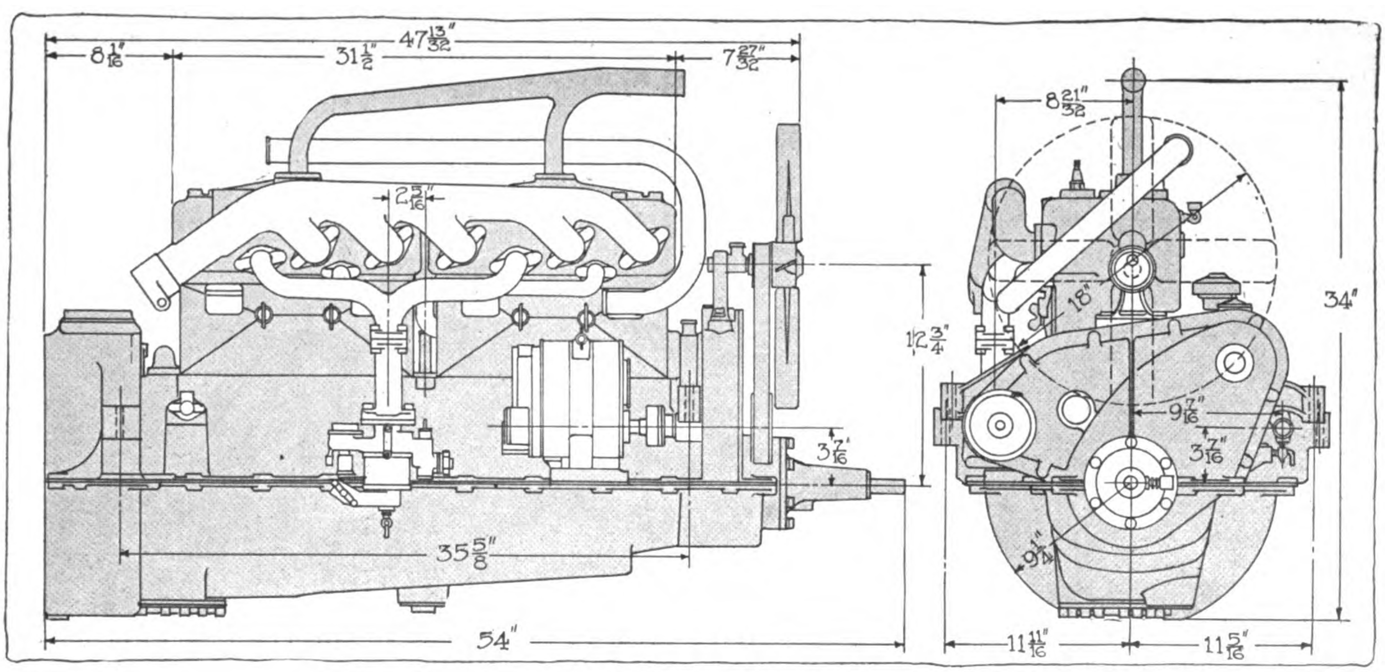
This model also has North-East cranking and lighting, carries complete equipment and uses 36 by 4 1-2 tires.



Four-cylinder Continental motor used on Imperial 64-four for 1915, showing clean design. Note large water passages for thermo-syphon cooling

Principal Dimensions of Motors in 1915 Imperials

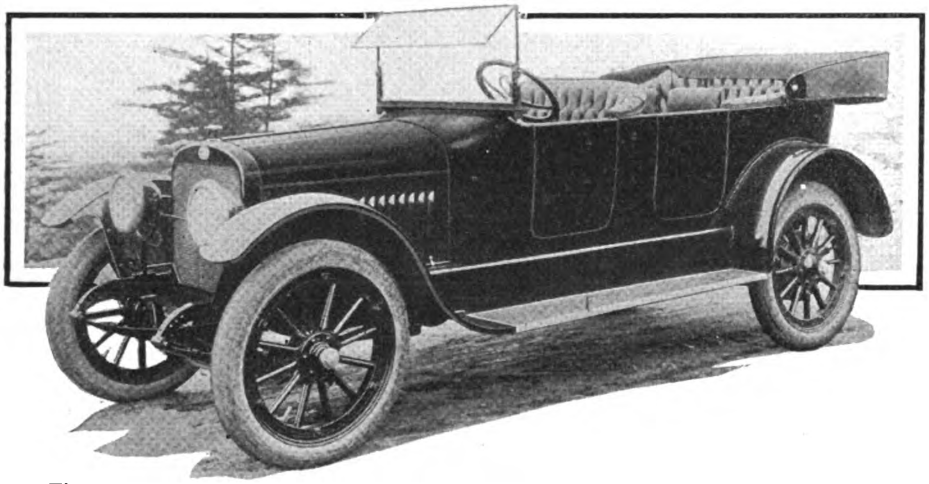
PART	FOUR	SIXES
Valve diameter	1 11-16	1⅞
Crankshaft front bearing	2 3-16 by 2⅞	2 by 3¼
Crankshaft center bearing	2 7-32 by 2½	2¼ by 3
Crankshaft rear bearing	2¼ by 3	2 by 3⅞
Camshaft front bearing	2 19-32 by 1½	2¼ by 2⅝
Camshaft center bearing	2⅝ by 1⅛	2 by 1⅞
Camshaft rear bearing	1½ by 1¾	1⅛ by 2⅛
Piston pin bearing	1 3-32 by 1½	1 7-32 by 1⅞
Piston length	3¾	5
Connecting-rod bearing	1⅞ by 2 3-16	1⅞ by 2⅛



Left—Side view of six-cylinder Continental motor used in 1915 Imperial models 56-six and 44-six, showing cylinders cast in threes and arrangement of manifolds. Right—Front view of the same motor

Enger Six to Sell for $1,495

1915 Model Has 50-Horsepower Motor and Weighs 2,865 Pounds—Standard Parts Used Throughout—Seven-Passenger Body Used



Three-quarters front view of new Enger selling for $1,495. It is fitted with a seven-passenger body

A SIX selling for $1,495 and equipped with a motor rated at 50 horsepower is the offering of the Enger Motor Car Co., Cincinnati, O., for 1915. The motor has a bore of 3.5 inches and a stroke of 5 inches, and is combined with clutch and gearset to form a unit construction supported on three points.

The weight of the car is 2,865 pounds, fully equipped with top, windshield, battery, lamps, starter, speedometer, tools and extra rim. The wheelbase is 124 inches and the clearance 10 inches.

A comfortable body of the streamline type, with gradual curves from front to rear, is mounted on the chassis. The body is capable of seating six or seven passengers, there being space for two or three on the back seat and two on auxiliary folding seats.

The running boards are clean of all obstructions, the tools being carried under the rear seat while the storage battery is hung from the frame. The slope of the cowl is unbroken as the side lights have been done away with, these being combined in the headlights.

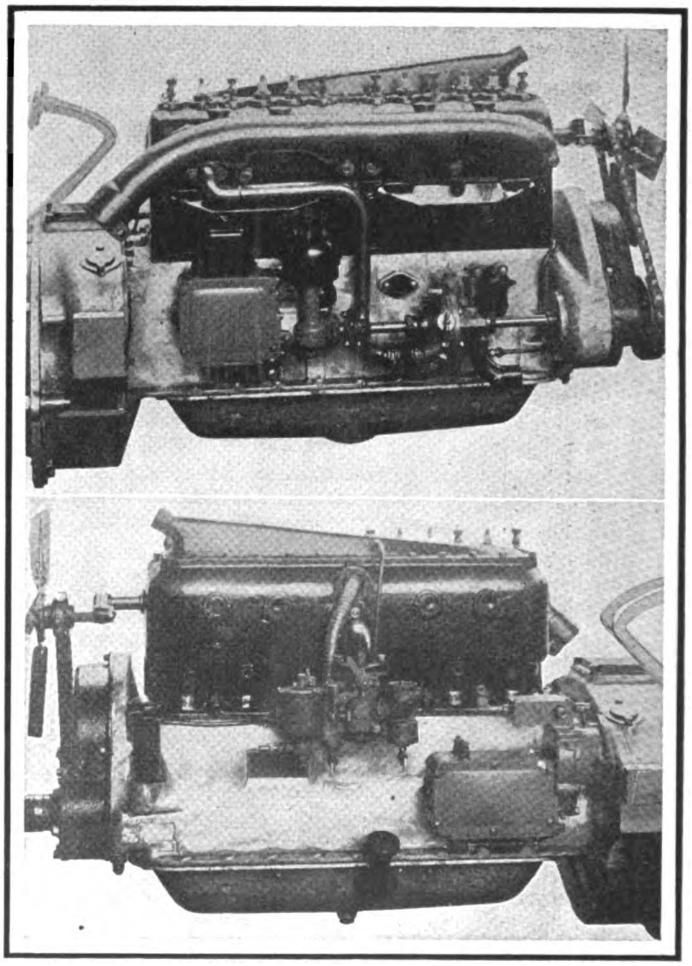
One-Man Top

The upholstery is from 10 to 12 inches deep and is made from leather. The top is a five-bow, one-man type with patented quick-adjustable curtains. On the cowl are found a Stewart-Warner speedometer, a gasoline gauge, and an electric indicator. All dials are electrically illuminated. The button for the electrically driven motor horn is mounted conveniently on the center of the steering post.

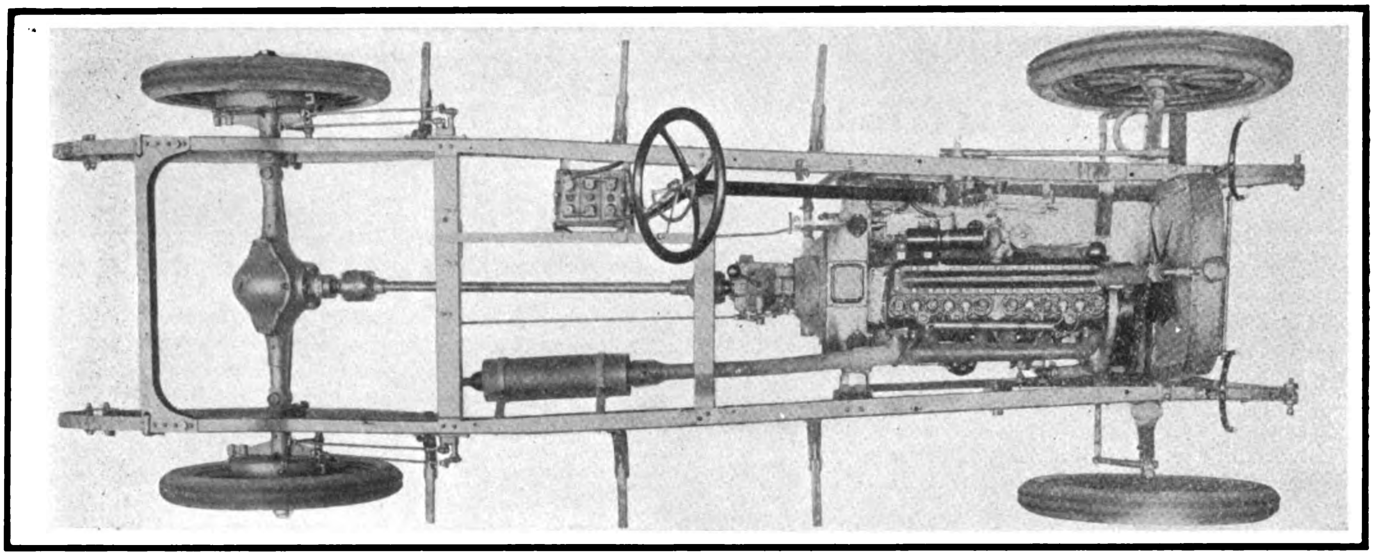
The motor is a Continental make, model 6-N. It is an L-head, block design with the valves on the right and fully inclosed. Also on this side are most of the motor auxiliaries. The shaft which drives the centrifugal water pump also operates the Atwater Kent Unisparker and the generator. The former is driven from the pump shaft by a bevel gear while the latter is directly connected. The four-bladed fan which aids in the circulation of the cooling air is driven by a sectional belt from a pulley attached to an extension from the front end of the pump shaft.

On the right side of the motor is the carbureter, and starting motor. The carbureter is mounted high and is very accessible. It is a Rayfield product, is fitted with a dash adjustment for starting and is water jacketed. The starting motor meshes with gear teeth cut in the flywheel rim. The oil breather and filler opening is located at the front on this side and there is also a gauge for determining the amount of oil in the crankcase.

Connection between motor and gearset is made through a multiple disk clutch which is housed in the flywheel which in turn is inclosed in a bell-shaped extension of the crankcase.



Two views of Enger motor. The upper one shows the right side and the mounting of the pump, sparker and generator, while the lower one shows the left side of the motor and the position of the carbureter, starting motor, breather and oil gauge



Plan view of Enger chassis, showing unit power plant suspended at three points, the position of the battery and the general arrangement of parts about the chassis

The gearset is bolted to this member. It is a three-speed sliding gear type. Gear changes are made through a lever which is mounted directly on the top of the case, which makes a very simple arrangement and is in accord with modern practice. Large inspection plates are provided in the clutch case, while the gears may be looked over by taking off the top cover which carries the shifting lever.

Power is transmitted to the rear axle through two universals. No torque or radius rods are used in the rear construction, the drive being taken through the springs, which are of the three-quarter elliptic type. The main leaves are constructed from vanadium steel and they measure 54 inches in length.

The rear axle is a floating type fitted with a diagonally placed differential cover plate so that the differential gears may be readily inspected or removed.

Two sets of brakes are employed. Both operate on the same rear wheel drums, one being contracting and the other expanding. They are faced with a special-treated friction material. Brake equalizers equally divide the force applied to each wheel.

The steering gear is mounted on the left. It is irreversible and is adjustable for wear. The wheel is of polished ebony and provision is made for easy lubrication of the gear.

Thirty-four by 4-inch tires are used all around, being fitted to Firestone demountable rims.

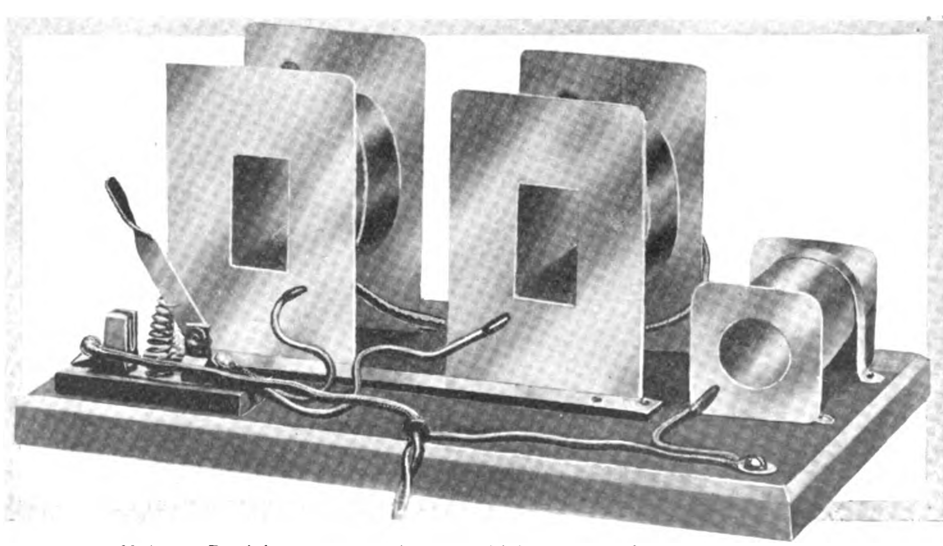
Metzger-Daniels Magnet Recharger Does Work in 6 Seconds

MAGNETO magnets may be charged in 6 seconds by means of a recharger manufacturer by the Metzger-Daniels Co., Portland, Ore. An ordinary 6-volt storage battery, or six dry cells in an emergency, may be used as the source of current. The device consists of two powerful electro-magnets compactly mounted on a suitable base, to which the binding posts and switch are fitted. When charging, a current of about 30 amperes is required, but the time during which it flows is so small that it does not injure the battery in any way, it is stated. In operating the instrument the switch is opened and closed intermittently, it being closed for about 2 seconds at a time.

To locate the correct charging position in relation to the polarity, the operator merely holds the magnet to be charged close to the rectangular openings in the coils, and makes a short contact at the switch. If the charging position is correct the magnet will be attracted by the coils, but if the charging position is not correct the magnet will be repelled. After locating the correct charging position the magnet is inserted in the coils so the ends of the magnet protrude through the coils. A piece of iron or steel is now placed across the ends of the magnet, and three contacts of the switch for about 2 seconds each will fully charge the magnet. The magnet may now be placed back on the magneto in the original position.

As the retentive qualities are dependent on the hardness and grain of the magnet it is difficult to establish a standard charge for any make of magnets, due to the varying quality.

The Metzger-Daniels magnet charger is guaranteed for a period of 5 years from date of sale, and the list price is $25.

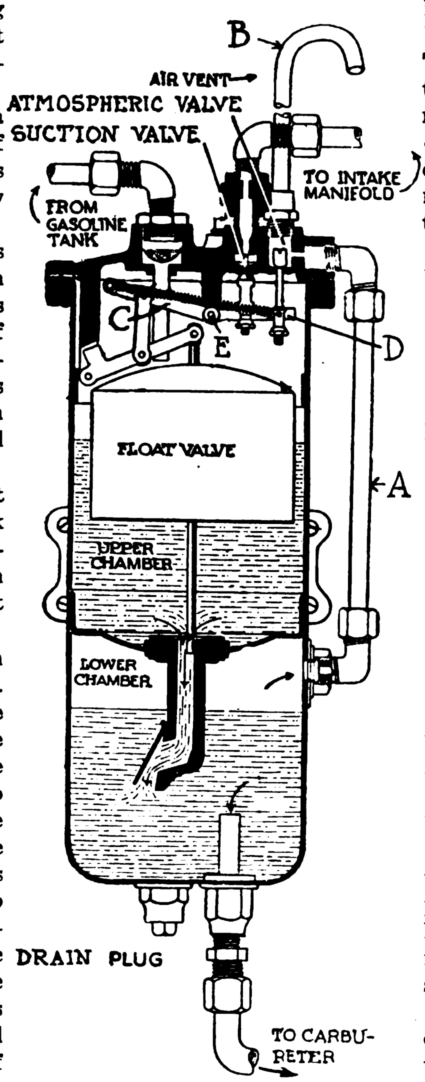


Metzger-Daniels magnet recharger which operates from a 6-volt circuit

Stewart Fuel Feed More Compact

Valve Mechanism Completely Housed Within Cylindrical Tank—One Atmospheric Vent

SEVERAL detail changes have been made in the Stewart Vacuum Gasoline system since it was described in the April 2, 1914 issue of THE AUTOMOBILE. The principle has not been altered but the design has been made more compact and simple. The valve mechanism is now contained entirely within the cylindrical housing while formerly it was located in an offset at one side. There is now but one atmospheric vent, while formerly there were two. These and other slight changes make a description of the device, as it now is, of interest, especially since the system has been made standard equipment on many 1915 cars.



Vertical section through tank housing Stewart-Warner vacuum system

In this system the suction of the motor is employed to draw gasoline from the main fuel tank to the carbureter, and with its use the tank can be located at the rear of the car the same as with the pressure system. It is claimed that all the advantages of the pressure system are obtained with very little more complication than is found on the ordinary gravity feed.

In common with the pressure system it has the advantage of the gasoline tank hung at the rear, yet it avoids the complication of the former by doing away with all pumps, gauges and reducing valves. Not even an air-tight tank is needed.

The actual construction of the mechanism is shown by the accompanying illustration. This mechanism is all contained in the cylindrical tank shown, which may be mounted on the front of the dash or on the motor as desired. The tank is divided into two chambers, the upper one being the filling chamber and the lower one the emptying chamber. The former contains the float valve and the pipes running to the gasoline tank and to the intake manifold. The lower chamber is called the emptying chamber and from it runs the pipe to the carbureter. This chamber is under atmospheric pressure at all times and the flow of fuel from it is by means of gravity only. However, since this chamber is located somewhat above the carbureter there is always a free flow of gasoline. Atmospheric pressure is maintained by means of the pipes A and B, the latter opening into the atmosphere.

Referring to the accompanying illustration it will be seen that in order that fuel may be sucked from the main tank to the upper chamber the suction valve must be open and the atmospheric valve closed, the float then being at the bottom. Under these conditions the suction at the intake manifold draws the gasoline from the main tank to the upper chamber. When the upper chamber is filled, the float rises to the top, closing the suction valve and opening the atmospheric valve. Thus the suction is cut off and the lower chamber is now filled by gravity, there being atmospheric pressure in both chambers now. The flap valve between the two chambers is to prevent the gasoline in the lower chamber from being sucked back into the upper one.

The float is designed to be intermittent in its operation. When the level of gasoline drops to a certain point, the float falls, the suction valve opens and the atmospheric valve closes. The suction of the motor then causes a flow of fuel from the gasoline tank. Then, when the level rises to a predetermined height, the float returns to its upper position. It takes about 2 seconds for the chamber to become full enough tc raise the float—.05 gallon being transferred.

The atmospheric and suction valves are controlled by the two levers, C and D, both of which are pivoted at E, their outer ends being connected by two coil springs, only one of which is shown in the illustration. It is seen that the arrangement of these two springs is such that the float must be held at the extremity of its movement. It cannot assume an intermediate position. This intermittent action is required in order that the upper chamber may be under atmospheric pressure part of the time in order for all gasoline to flow to the lower chamber. It will be noted that the movement of the float mechanism is so large that no adjustment is needed on the valves.

The pipe running from the bottom of the lower chamber to the carbureter extends up into the chamber, so that there is little chance of dirt or water being carried to the carbureter. A drain plug is provided to the left of this pipe for cleaning out dirt.

Few Parts to Wear

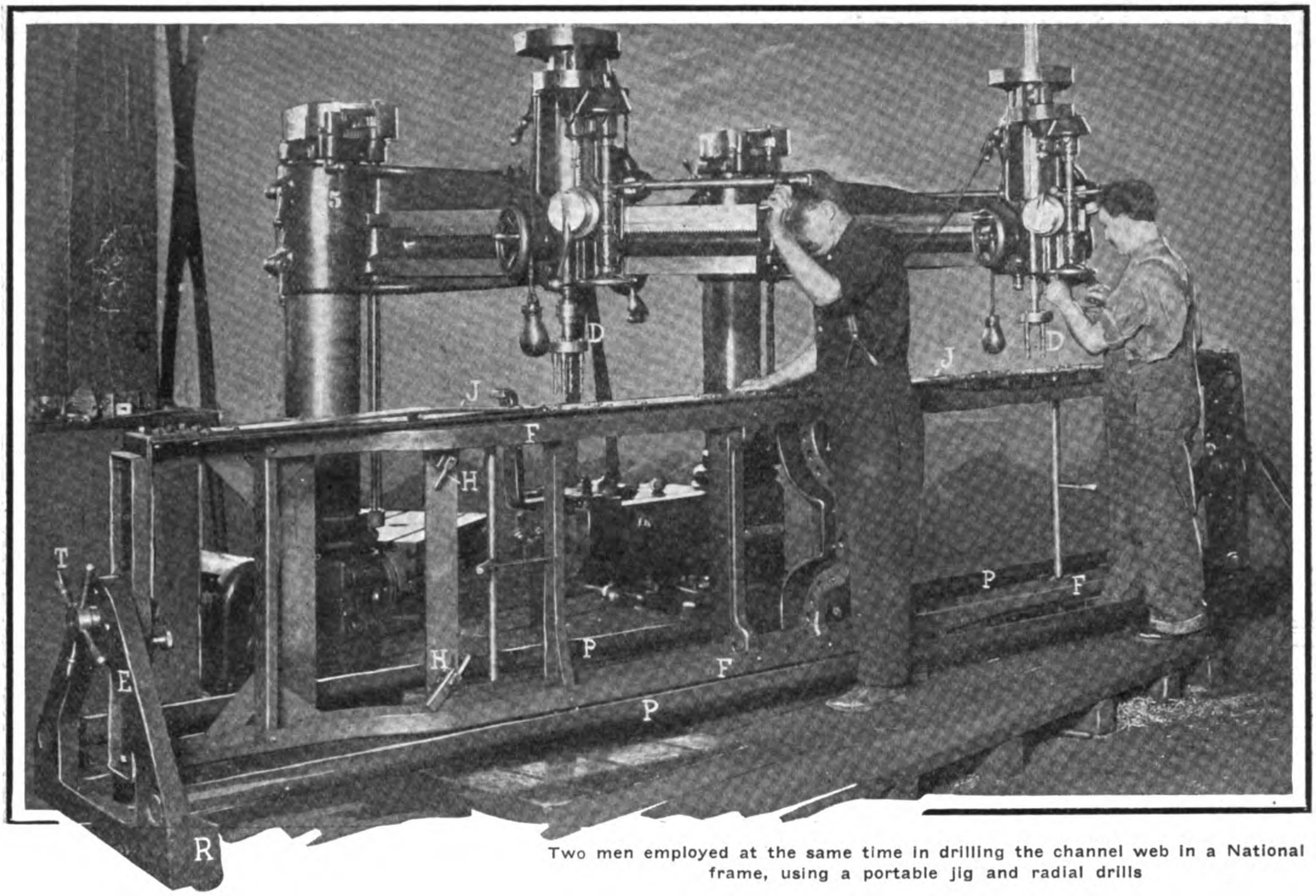
Great durability is claimed for this device because there are few parts to wear. The springs are made out of No. 28 gauge bronze and have a stretch of only .125 inch, so they should last a lifetime.

The only time that the vacuum can become so low that it will not draw gasoline from the rear tank is when the tank pressure is below 4 ounces, and this condition can exist only when the motor is running below 600 revolutions per minute with wide open throttle. In actual practice a car is never operated under these conditions long enough to exhaust the supply of fuel in the tank. Running with open throttle below a speed of 600 revolutions per minute means that the motor must be laboring up a hill, and as this is detrimental to the motor the Stewart-Warner system acts as a safeguard.

If the car is allowed to stand long enough so that the tank becomes empty it will be replenished after the motor has been cranked over four or five times with the throttle closed.

The installation of the Stewart-Warner vacuum-gravity system is very simple and can be accomplished in a short time without the use of any special tools. The suction pipe is tapped into the manifold at a point as near to the cylinders as possible, while the fuel pipe is inserted into the gasoline tank and runs to the bottom. There is a screen at the end of the fuel pipe to prevent any trouble due to sediment. Since the fuel is sucked from the gasoline tank, the filler cap need not be air-tight but on the contrary should be provided with a small vent so that the pressure in the tank will be at atmosphere.

It is manufactured by the Stewart-Warner Speedometer Corp., Chicago, Ill.



Two men employed at the same time in drilling the channel web in a National frame, using a portable jig and radial drills

Portable Jig Aids in Drilling National Frames

Clamping Frame in Jig and Rolling It Under Two Radial Drills Saves 50 Per Cent. in Time

FRAME drilling in the National plant at Indianapolis is accomplished by an ingenious jig. Instead of having to resort to the setting up of multiple spindle drills for each different series of jobs to be done on the frame, it is merely clamped in the jig and rolled under a pair of radial drills as shown in the accompanying illustrations. The drills are made up in sets and setting up is accomplished in minimum time.

Referring to the illustrations, the frame F is clamped in the jig J by means of the dogs H. The jig is composed of two end castings E, and large tubular connecting members P. Inside this framework the jig is free to swing on a pivot support at its center. The jig can be held in any desired position by turning the hand nuts T. The radial drills D, are all made up in sets and the workmen merely have to clamp them in the chuck.

In order that the work will be as convenient as possible there is a platform for the men to stand upon and the end pieces for the jig have been so constructed that the rollers lift the jig above the platform and it can be rolled into position without interference.

Two men can work at the same time on the frame, one handling one of the radial drills and the other handling that on the other end of the frame. When the two are through their work, the frame is simply turned over by loosening the hand nuts. The drills are then all set up for work on the other side. The frame is put in the jig to one side of the drills where there is a clear floor space for the purpose. It is quickly slipped in place in a horizontal position and the dogs clamp it in the proper position. The jig is then turned up on edge to bring the frame in proper position for the work and the entire outfit is rolled under the drills. It is estimated that a cut of at least 50 per cent. in the required time for frame drilling has been effected by this system.

National frame in jig placed beneath the radial drills. When one side is drilled the jig can be rotated with the frame

New Books for the Engineer

A WEALTH of motor literature is submitted by British publishers. Most complete of these, from an engineering standpoint is A Manual of Petrol Motors and Motor Cars by F. Strickland, Charles Griffin & Co., publishers. Others take up Motor Traction, Petroleum Storage and several subjects pertinent to motor car manufacture. *The Autocar*, through Iliffe & Co., has published some interesting and instructive handbooks on motor car troubles.

A MANUAL OF PETROL MOTORS AND MOTOR CARS. By F. Strickland. Second Edition. Charles Griffin & Co., Ltd., Exeter street, Strand, London. Cloth; 378 pages; 352 illustrations; 18 shillings.

This book sets forth clearly and concisely everything concerning a motor engine from its history to calculations of curves of inertia, and pressure and differential gear stresses. All matter is, however, so simply conveyed that it would make itself clear to the most veritable novitate. Effort has been made to show the amount of power necessary for cars of given weight, with figures, as to engine stress.

MOTOR TRACTION FOR BUSINESS PURPOSES. L. M. Meyrick Jones, A.M.I., Mech. Eng.; and Horace Wyatt, B.A., from data collected by the editorial staff of *Motor Traction*. Iliffe & Sons, London, publishers.

This book is a guide to the selection, cost of running and maintenance of commercial and public service motor vehicles. In it are taken up the general conditions governing the adoption of motor haulage, legal restrictions and the working costs of almost every form of motor tractor.

All data has evidently been carefully compiled and thoroughly considered. This book should prove itself valuable to anyone contemplating the purchase of motor vehicles.

A PRIMER ON THE STORAGE OF PETROLEUM SPIRIT AND CARBIDE OF CALCIUM. By Major A. Cooper-Key, Chief Inspector of Explosives and Member of the Council of the Institute of Petroleum Technologists. Charles Griffin & Co., Ltd., London, publishers. Price 2 shillings 6 pence.

Devoted to a consideration of the best means of effectively administering the Petroleum Acts. Taking up from the viewpoint of the inspector of explosives, the things which are necessary for keeping within the law in handling petroleum and calcium carbide. Points are given on proper licensing, together with possible future legislation.

HYDRAULICS. By W. M. Wallace, Wh. Sc., A.R.C., Sc. A.M., I.C.E., The Technical Publishing Co., London, W. C.

For engineering students and engineers in practice. Including recent research and invention in hydraulics. The first part of each chapter, deals with the main principles in easy language, leaving the more mathematical demonstrations to the second part, examples at the end of each chapter being graduated similarly. As far as possible the author has avoided using the hydraulics as a peg on which to hang essentially mathematical demonstrations which lead to results, the truth of which, more often than not depends on somewhat arbitrary assumptions.

SMALL ACCUMULATORS. By Percival Marshall, A.I. Mech.E. Spon & Chamberlain, publishers, 123 Liberty street, New York City.

A scientific hand-book for students and engineers, published in answer to the questions sent the author as Editor of *The Model Engineer and The Amateur Electrician.* Setting forth the making of storage batteries and cells, methods of charging and governing.

COMPLETE HINTS AND TIPS FOR AUTOMOBILISTS. From *The Autocar*. Iliffe & Co., London, publishers. Fifth Edition. Price 2 shillings 6 pence, net.

Compiled from the many inquiries, and the answers they have elicited in *The Autocar*, of London., since 1902. The booklet contains an index, giving immediate access to the explanation of the best means of overcoming motor-car difficulties.

FAULTS AND HOW TO FIND THEM. Iliffe & Sons, London. Edited by J. S. V. Bickford, B.A. Price 2 shillings 6 pence.

Containing a list of 180 faults in motor cars and their remedies. This book covers about everything that could happen to an automobilist in the course of his travels.

THE MOTOR MANUAL. The Temple Press, London, publishers. Price 1 shilling 6 pence.

A simple description, fitted for amateurs, of the working parts of cars together with remedies for faults which may crop out. Every part of the motor is described carefully. Much space is devoted to explanations of motor starters and electric lighting. Concise information is given of all recent developments.

Many new hints are also given in repairs and adjustments.

The fuel question is taken up quite exhaustively, with several pages devoted to benzole, which is taken as the only practical substitute for gasoline.

THE MAINTENANCE OF MOTOR CARS. By Eric W. Walford. Iliffe & Sons, publishers. Price 2 shillings 6 pence.

For the large number of owners who have had little or no motor car experience. Descriptions are for this reason, made as clear as possible, the assumption being made that the reader has not much technical knowledge, also removing many of the bogies that haunt prospective buyers of automobiles.

PUNCHES, DIES AND TOOLS, FOR MANUFACTURING IN PRESSES. By Joseph V. Woodworth, the Norman W. Henley Publishing Co., 132 Nassau street, New York City. Cloth, 500 pages, 702 illustrations, $4.

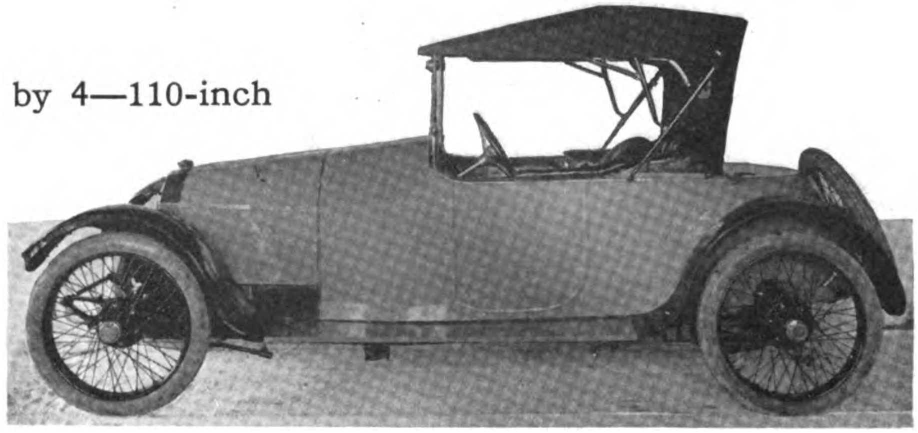
This work is a companion volume to the author's elementary work entitled Dies, Their Construction and Use. It does not go into the details of die making to the extent of the author's previous book, but gives a comprehensive review of the field of operations carried on by presses. It might well be termed an encyclopedia of die making, punch making, die sinking, sheet metal working, and making of special tools, subpresses, devices and mechanical combinations for punching, cutting, bending, forming, piercing, drawing, compressing and assembling sheet metal parts and also articles of other materials in machine tools.

DIES, THEIR CONSTRUCTION AND USE FOR THE MODERN WORKING OF SHEET METAL. By Joseph V. Woodworth, the Norman W. Henley Publishing Co., 132 Nassau street, New York City. Cloth, 384 pages, liberally illustrated, $3.

A most useful book, and one which should be in the hands of all engaged in the press working of metals, treating on the designing, constructing and use of tools, fixtures and devices, together with the manner in which they should be used in the power press, for the cheap and rapid production of the great variety of sheet metal articles now in use, It is designed as a guide to the production of sheet metal parts at the minimum of cost with the maximum of output. The hardening and tempering of press tools and the classes of work which may be produced to the best advantage by the use of dies in the power press are fully treated. Its 505 illustrations show dies, press fixtures and sheet metal working devices, the descriptions of which are so clear and practical that all metal-working mechanics will be able to understand how to design, construct and use them. Many of the dies and press fixtures treated were either constructed by the author or under his supervision. Others were built by skillful mechanics and are in use in large sheet metal establishments and mechanic shops.

Luxury at $775 in New Scripps-Booth

Four-Cylinder Motor 2 7-8 by 4—110-inch Wheelbase—Electric Door Openers—Electric Starting and Lighting—Wire Wheels—Three Body Types

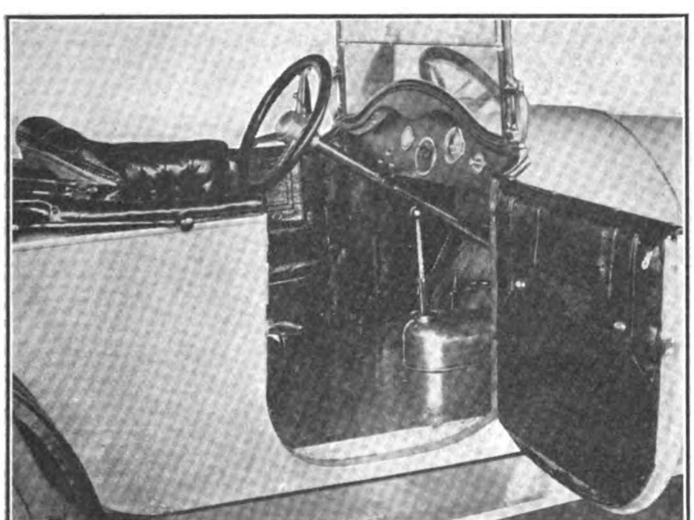


Side view of new streamline Scripps-Booth light car which sells at $775 with complete equipment including electric lighting and starting and wire wheels. The frame is overslung instead of underslung as shown in the illustration

THE new Scripps-Booth car to succeed the cyclecar which this concern brought out a year ago, is one of the most luxurious types of automobiles in its class, which has been brought out. Fitted with a four-cylinder motor 2 7-8 by 4 inches bore and stroke, with 110-inch wheelbase, with 30 by 3 1-2-inch tires, and with such up-to-date equipment as motor-generator for engine cranking and lighting, Houk wire wheels, electro-magnetically controlled doors, electric horn, 9-inch upholstery in the seats, and many other details, show how the Scripps-Booth Co., Detroit, Mich., has endeavored to produce a car with all luxuries at $775 as a roadster. This price includes equipment, such as an extra wire wheel with tire, silk mohair top, rain-vision windshield, side curtains, and Klaxet electric horn.

The new Scripps-Booth is made with an option of three treads, 40, 56, or 60 inches. In addition to the four-cylinder motor with an S. A. E. rating of 13.25 horsepower, but claimed to show 19 in actual performance, the car makeup includes cone clutch, three-speed gearset, shaft drive, and double set of rear wheel brakes. The chassis frame is overslung in front on semi-elliptic springs. In the rear cantilever springs, giving a 7-inch radius of action, are employed.

It is in connection with the bodies that the luxury of the Scripps-Booth appears. It is made in three body styles, namely, roadster, cabriolet, and coupé, all with three passenger capacity. The roadster sells at $775. This body has come under the hands of a clever designer for it is exceedingly attractive. It is a streamline type with a decided slope to the bonnet. The effect is carried out by a V-shaped radiator of German silver, and by continuing the bonnet slope back to the end of the cowl. The rear is given the torpedo shape, and this is attractively set off by the mounting of a spare wire wheel on the deck.



Control features of new Scripps-Booth, showing left drive and center gearshift as well as arrangement of instrument board

Seating is well worked out. The drive seat is placed slightly forward of the passenger seat which gives a modified staggard arrangement, and ahead of this there is mounted an auxiliary folding seat to accommodate a third person. Deep Turkish upholstery of long-grain buffed leather, unusual in a car of this type and price, and having a depth of 9 inches is used.

Electric Door Opener

One entirely new feature is the use of electric door latches, eliminating entirely door handles of any form. A push button, placed close to the door in the side of the body, operates the latch magnetically. Domed fenders do their part in making the machine attractive, and with wide doors and clear running boards the body meets every requirement of the most fastidious. The door width, to be exact, is 21 inches.

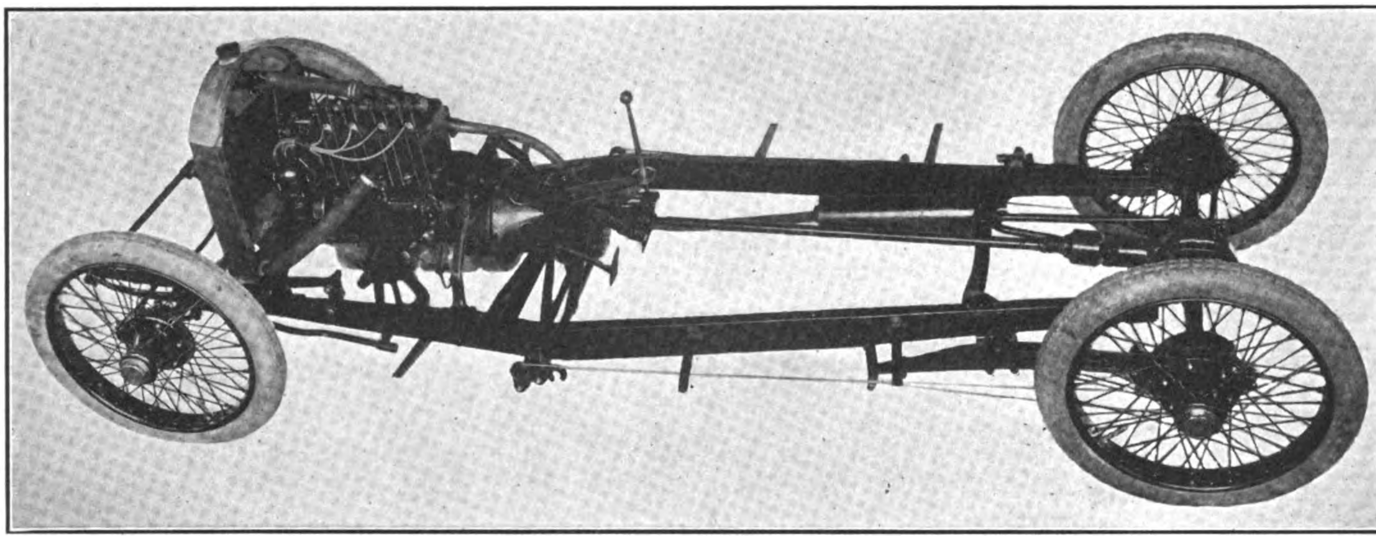
The drive is on the left, a 16-inch walnut steering wheel being used. On this, there is a throttle lever swinging vertically, and an unusually large push button operates the Klaxet horn. This is a domed aluminum affair placed at the center of the steering wheel spider and having a 3-inch diameter to make horn signalling as easy as possible.

On the cowl board are arranged the sight feed oiler, the starting strangler on the carbureter, ignition switches, ammeter, and flush-type speedometer. A dash light in the center illuminates these. Back of the cowl board is the gasoline tank with filler protruding through the board.

Three-Point Suspension

The power plant is of the unit type with gearbox bolting to the rear of the flywheel housing. This assembly is supported in the frame by arched cross members, from which it is hung by bolts, there being two points of attachment to the rear cross piece and one to the front, giving the well-known three-point suspension.

The motor is really a high-speed type and is made by



Scripps-Booth chassis, showing tapered frame, cantilever rear springs and mounting of the four-cylinder unit power plant

Sterling. It attains speeds as high as 2,750 revolutions per minute without appreciable drop in the power curve.

Silent operation has been well attained by the special design of the cams which allow the valves to drop to within 1-1000-inch of their seats and then slowly lets them down the remaining minute distance. These valves have a clear opening of 1 1-8 inches.

The general arrangement of the cylinder block is of the form in which the crankcase and the cylinders are cast in one piece, the head carrying valves and passages to the intake ports being detachable. Rods run up from the camshaft to the rockers overhead operating the valves, and are very silent in action. The exhaust manifold is a separate piece and bolts to the cylinder head. Access to the main bearings is possible through the large plate at the bottom of the crankcase. The crankshaft is carried on two main bearings, and the camshaft has three.

The oiling is of the circulating splash type with a small pump supplying a constant level of lubricant to the individual troughs under each connecting rod. Provision is made for assuring a constant trough level despite the angle of the motor.

Thermo-syphon cooling is used and the radiator is a cellular type of large capacity.

Ignition has no connection with the motor-generator for cranking and lighting, except that the distributer receives its current from the same battery as is used for the balance of the electric functions. The distributer is an Atwater Kent with automatic advance, there being no hand control.

Motor-Generator System

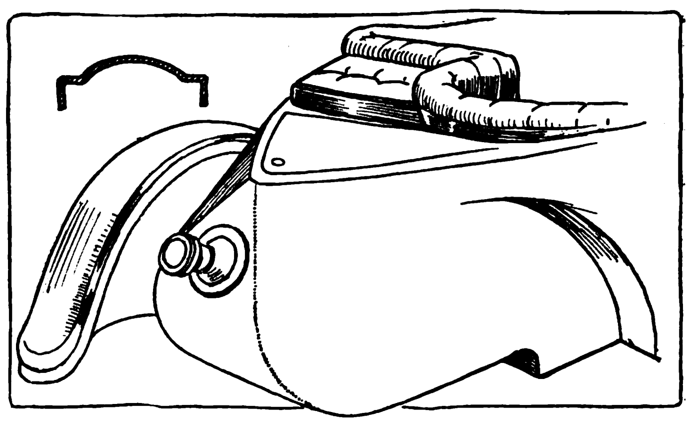
Hung from an integral bracket on the right side of the crankcase is the combined motor-generator which operates either as an electric motor for cranking or as a generator for supplying lighting current and charging the storage battery. This electric unit is driven through silent chain connection direct to the crankshaft. A sprocket placed just ahead of the flywheel on the extension of the crankshaft accommodates this chain. On test, this starting motor has spun the engine at 265 revolutions a minute for 12 minutes at a temperature of 60 degrees.

The headlights are of the two-bulb type, the small bulbs dimming the lamps for city work. The storage battery is conveniently located in a compartment just back of the driver's seat in the roadster.

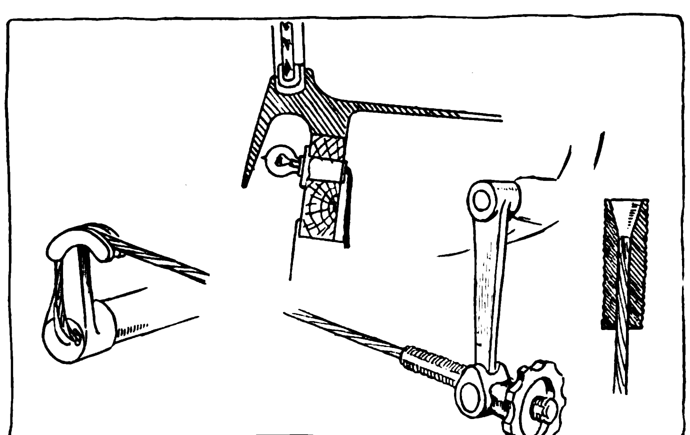
Cone Clutch Used

The clutch is a leather-faced cone and back of it is the three-speed selective gearset. Unusually large gears are employed of the substantial stub-tooth variety. These gears have a face width of 5-8-inch, and are constructed of 3.5 per cent. nickel steel. The control lever, of the ball-and-socket type, is mounted at the rear of the gearbox and gives center control.

A 1 1-4-inch tubular drive shaft, uninclosed, conveys the power to the rear axle. Though light in weight, this shaft is strong and proof against whipping due to its tubular section. Both front and rear ends of the shaft are fitted with a new type of universal joint, manufactured by the Universal Products Co. These are of ball type and allow for end play of the shaft due to the varying position of the rear axle with respect to the chassis.



Rear construction of Scripps-Booth with bracket for carrying spare wire wheel. At upper left is shown a cross section of the fenders



Above is shown the electric lamp on the instrument board so arranged as to shield the passengers while throwing the light on the instruments. Below is shown the novel brake adjustment

The drive is taken through the springs, while a triangular torque arm of tubular construction takes the torque. This arm hinges to the rear axle housing, and has a spring buffeted attachment at its front end to a frame cross-member placed only a short distance forward of the rear axle. The result of this construction is that the torsion member is exceedingly short, and therefore light in weight.

The rear axle, which is a specially designed type, is of floating construction. Very large gears are used, these being of six pitch and having 1 1-4-inch face. The pinion is one piece with the pinion shaft, while the whole mechanism is carried on annular ball bearings. Three and a half per cent. nickel steel is used in making the gears.

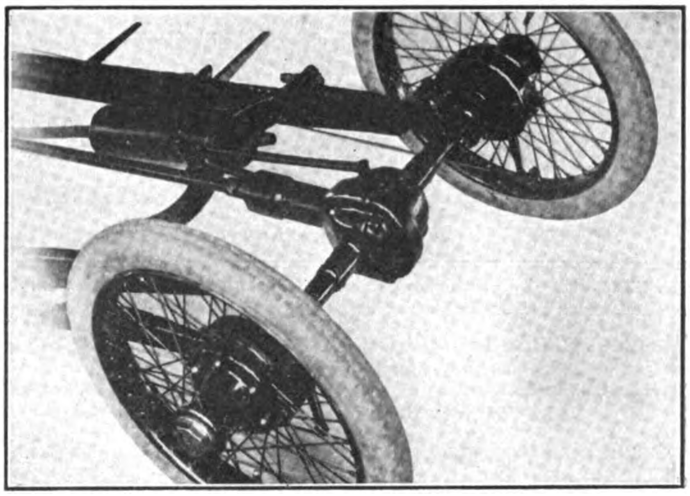
New Frame Shape

In order to give a substantial support to the body, which slopes to both front and rear, the frame is of unusual shape, having a taper forward as well as to the rear. The widest part is a little forward of the center of length where the body is widest. This is about at the cowl. The pressed steel channels have a 4-inch depth of section and are well braced.

The chassis is underslung due to the use of semi-elliptic front springs carried over the tubular front axle, and cantilever rear springs. The latter are 32 inches long and have a 7-inch vertical action. Due to the small amount of unsprung weight, the car is very comfortable to ride in.

Pedals for Brakes

The braking system is unusual in several respects. Though both service and emergency sets operate on rear wheel drums, they are both controlled by pedals instead of the emergency set working through hand lever. The clutch pedal operates the service set as well as the clutch, while the emergency pair are brought into action by the pedal to the right of the clutch pedal. This latter is fitted with a ratchet to hold the brakes. Steel cables run from the equalizers back to the brake drums, and adjustment is made very easy through the use of small hand adjusting wheels at the drums. These steel cables not only are a factor for lightness, but they are obviously free from rattle. They have very often been used on racing cars.



Rear construction of the Scripps-Booth showing the cantilever spring supporting the rear ends of frame, mounting of muffler, etc.

Des Moines Garage Adds to Appearance of Residential Section

THE Brown Garage, operated by the Brown Garage Co., Des Moines, Ia., which was recently opened by a show, and a convention of the automobile men of that city, has many unusual features. The garage, which is two stories in height, is built of light brown stone. The front is made attractive by potted plants and flowers placed in all the windows, making the garage, although in a residential district, a decided addition to the appearance of the section.

Interior improvements are many. Each car stall, which is 8 feet square, is equipped with air, water, electric light and a ventilator. An outside runway leads from the street to the second floor, thereby making unnecessary the use of an elevator, with its attendant delay and possibility of accident.

Three oil tanks with a capacity of two barrels each, are located in the rear of the building. Nine oil pumps are located in the basement and two upper floors. There is also a large gasoline pump at the curb. Air and water taps are also mounted in two boxes at the curb at each end of the building.

The garage is constructed of steel and concrete throughout, and is absolutely fireproof. The entire rear of the building is of steel and glass, giving it plenty of light. The front doors are opened and closed by electricity.

Brown Garage in Des Moines, Ia., which is rendered attractive by means which unfortunately are unusual in garage construction

Industrial Welfare Conference November 17-19

HARRISBURG, PA., Nov. 2—A call for second conference of the Pennsylvania Industrial Welfare and Efficiency Conference has been made. This will be held in the State Capitol, this city, on November 17, 18 and 19. This conference is held under the auspices of the Pennsylvania Dept. of Labor and Industry and the Engineers' Society of Pennsylvania. The purpose of the conference is to enable the employers and employes to work out together the problems before them with reference to increasing the welfare of the employes and the prosperity of the industries.

Careless Iowa Motorists Warned

DES MOINES, IA., Nov. 2—The Iowa State Highway Commission has issued a bulletin showing that sixteen Iowa people were killed at railroad crossings in the state during August; that three lost their lives as the result of reckless speeding on country highways; that two were killed as the result of narrow grades and bridges. The commission warns Iowa people against reckless driving and against careless approaches to railroad crossings. Six of the nine accidents at railroad crossings were due to trains striking automobiles. Five deaths were due to trains striking horse-drawn vehicles.

NEW YORK CITY, Nov. 2—Deliveries on the Singer Six have commenced by the Singer Motor Co., Inc.

The AUTOMOBILE

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Fewer Roadsters

THE policy of several makers of gasoline cars not including roadster bodies for next season, suggests the thought that for touring the four or five-passenger car is really the more comfortable, and comfort must never be lost sight of when making a tour. The roadster offers a most attractive vehicle for fine weather and general service but is not so inviting for long-distance work where baggage must be carried as well as passengers.

At first thought it seems bad business not to meet the demand for single-seated cars, but several good reasons for this policy can be found. In the first place, there is only a small patronage for the roadster body type as compared with the sales of five-passenger designs. In nearly every case where roadsters are offered, they go on the same chassis as a touring car, and therefore a machine carrying the former body is really designed for a slightly heavier one, and can carry it just as well.

So far as the mechanism is concerned, so far as fuel and oil consumption and tire wear are to be considered, it costs nearly as much to operate one as the other. One can make as much speed as the other for all practical purposes, and the business man is beginning to think it just as well to be able to carry three extra persons when he wants to as to be limited to only one besides himself.

Looked at from the manufacturing standpoint, the concentration upon one body model is desirable for it is less expensive to make a certain number of one type than to equal that number with more than one.

In the low-priced field, where the dollars count most to the buyer, he will recognize the advantage of the two-seated car more and more, and the result will soon be that only the higher-price car makers will be offering roadsters, for their trade can afford to waste power.

Touring in Electrics

IT still remains a most disputed problem as to whether the electric vehicle should be looked to to play any part in long-distance touring or not. On one side are ranged those who believe that the electric in its present status is not well suited for such work. On the side opposite are those who think otherwise. In general manufacturers do not believe that the present electric should be used for country touring on the ground that it has rather been designed for city use.

From the standpoint of arbitrary mileage there are many sections in the East where charging stations are close enough together to admit of using the electric for much country work. In these sections at present the electric is not generally used for this work, largely because those who do the touring are often undecided as to the exact distance they want to make, and distance is the great criterion of the success of the electric for touring.

The electric today is so dependable a vehicle that it can successfully be used in trips between cities where the distance is less than the battery mileage. In this capacity it acts as a substitute for the suburban trolley or the steam train.

But touring in the accepted sense goes further. Touring today has a more comprehensive meaning than it had 5 years ago. Today touring is getting more and more off the beaten path. It is not so much mileage as the desire to reach places that have hitherto been looked upon as inaccessible. In this sense it means getting away from those sections where the charging station is found and naturally the electric suffers in this respect.

But there is another side to the question, namely, that touring today does not mean mileage solely as it used to years ago. Today there is more thought of comfort, and having an opportunity to see the country, rather than endeavoring to make as many miles as possible. In this respect the electric is more favored than it was some years ago.

Before the electric reaches the stage of being taken seriously as a vehicle for country touring it will have to be more adapted to the needs of touring. The lighter open body will take the place of the palatial closed types of today, which are so well suited for city uses. The lighter body will add to mileage possibilities and will also give the tourists an opportunity of seeing the country, which still remains a valuable factor in touring. The field of inter-city work for electrics can also be cultivated.

Should Test Motors on Spring Chassis

Metropolitan S. A. E. Hears That Mounting of Motors on Rigid Test Blocks Is Wrong—Prof. Riedler's Work

NEW YORK CITY, Oct. 29—At the regular monthly meeting of the Metropolitan Section of the Society of Automobile Engineers which was held at the Automobile Club of America to-night, Professor Marshall discussed the work of Dr. A. Riedler in the laboratory for motor cars at the Royal Technical University, Charlottenburg, as recorded in Dr. Riedler's book, "The Scientific Determination of the Merits of Automobiles."

The book, which is published in English by the General Oil Publishing Co., Ltd., 6 Broad Street Place, London, E. C., contains 333 pages and 227 illustrations. The reports on tests of motor cars include all types from those of a military transport wagon running 10 miles per hour up to a 100-horsepower racing car with a speed of 90 miles per hour.

While the report is supposed to be unbiased, deductions have been drawn which are most favorable to German-made cars and motors. Further, the German cars were in perfect adjustment and were of modern construction, which was not always the case with the foreign cars.

The book is divided into ten reports: 1—To explain the test stand used and the methods of testing; 2—the investigation of a 30-horsepower Renault car; 3—test of a 100-horsepower Benz racing car and comparison of the Benz and Renault; 4—test of a 75-horsepower Adler racing car; 5—Mercedes electromobile; 6—35-horsepower Bussing military transport wagon; 7—test of the motor for the above wagon; 8—slide valve motors, method of test—comparison with poppet valve motors; 9—test of a 40-horsepower English Daimler-Knight car; 10—conclusion of reports 1-9.

In all these reports Dr. Riedler has used diagrams freely, the most common being those showing the energy, running, gradient and power losses in the various parts of the car.

Other diagrams are the acceleration, specific power, efficiency, opening of suction pipe and ports of Daimler-Knight.

There are several half-tone cuts of complete cars and of motors; also many line drawings of chassis and details of motors which were tested.

The testing apparatus was of the drum type with dynamo brakes. The rear wheels of the car were supported on these drums, the front wheels were placed on small plates resting on roller bearings, and the car was prevented from moving forward by means of a cable attached to the rear, which was also used in connection with the measurement of the draw bar pull.

The conclusions drawn were as follows: The correct investigation of power vehicles assumes accurate measurements corresponding to the actual working of the motor and car. In these tests accuracy was made doubly sure in most cases by two methods of measuring entirely independent of each other. The mounting of motors on rigid test blocks is wrong. They should be on spring chassis. The testing requires trained and clever attendants and not a staff kept by makers of cars for running in motors. It is a mistake to use car test stands as a substitute for the running in of cars. Not much has been done to increase the thermal efficiency of motors. The small amount of gearbox losses shows the futility of efforts to improve the driving members of cars. The power curves of the Benz and Adler motors show that the motor power increases almost directly with the speed. Economic operation of motor cars and trucks especially shows that economy is inseparably bound up with low traveling speed. In the interest of road maintenance only rubber tires should be used. The resistance of iron tires is large. Springing in the drive is of great value for working of the motor clutch. At low speeds, the flywheel greatly influences the acceleration and retardation conditions.

Much Valuable Data

Professor Marshall goes on to conclude that Dr. Riedler's reports contain much of value to the engineer regarding the various losses in the transmission of power in the various types of automobiles. There is nothing new in his method of testing cars on brake drums by means of electric motors connected to these drums.

By omitting many details which he terms secondary in order to arrive at conclusions of his own the reader is compelled to accept the results and conclusions arrived at, for there are no records given to examine to check the results obtained.

No indicator cards or valve settings are given, and neither is the method of measuring the gasoline consumed. No exhaust gas analyses have been reported. There is no conclusion or formula for the comparison of the performance of different cars in terms of gasoline used, transmission and gear ratios, wheel dimensions and car resistance.

Road tests were not made to determine the air resistance, but this was calculated from an assumed area. There is no statement as to the resistance of the air on the wheels when moving at speeds on the test bench corresponding to actual speeds on the road. The accelerometer which has proved its worth in road testing is not even mentioned, and thus Dr. Riedler failed to avail himself of one of the most valuable instruments for testing work.

Dr. Riedler compares the test results of two cars of widely varying types, a Renault touring car of 1905 with a high-powered racing car of modern construction, a Benz of 1910. Naturally the latter gave a better performance.

The effect of using different makes of tires is not touched upon nor is mention made of the condition of the tires, points of importance in discussing tire losses.

No account of carbureter efficiency or the effect of proper mixture is given.

Poor results were obtained in testing the Daimler-Knight motor, because the valves were improperly set, giving low power at high speeds; the carbureter was too small for the motor and lubrication was defective. For these reasons Dr. Riedler failed to obtain within 50 per cent. of the maximum horsepower possible with this motor as determined by Professor Morgan at the University of Bristol.

Some Criticisms Made

In the discussion Professor Riley of the Massachusetts Institute of Technology stated that in his opinion the tests were disorderly and that many mistakes had been made in translation. He also said that the proper basis of comparison for different types of motors was the mean effective pressure per square inch of piston area. He stated that good four-cycle designs of both the Knight and poppet type had given pressures as high as 110 pounds per square inch. He gave the following formula for calculating these pressures:

$$\text{Effective pressure} = \frac{\text{B. H. P.} \times 1008000}{D^2 \times S \times N \times P}$$

where D = bore, S = stroke in inches, R = the revolutions per minute and N = the number of cylinders.

He also said that if the specific pressure as calculated by this formula dropped below 70 pounds the valves were not properly set, and for high speed this figure should be at least 85. In the White and Poppe, for example, in 1,700 tests the pressure varied from 85 to 109 pounds.

Herbert Chase was of the opinion that for comparative purposes it was better not to drive through the tires because tires offer varying resistance, depending on the make and also upon the weight of fabric and the thickness of the tread. The amount of power that different tires will absorb will vary as much as 100 per cent.

Owen Thomas stated that the horsepower developed by the Daimler when tested by Professor Morgan at Bristol was 61.3, while the same model tested by Riedler showed an output of 41.3 horsepower. In the one case the horsepower per litre of cylinder volume was 16.3 and in the other 11.1.

Some of those present were of the opinion that laboratory testing was so different from actual road work that the results were not worth the expense, but Arthur B. Brown and Professor Lockwood of the Sheffield Scientific School stated that in the testing laboratory at Yale the tests in the laboratory agreed very closely with these on the road, and that the laboratory tests were of great advanage because of the possibility for accurate measurement.

At the next meeting of the section, which will be held on Tuesday, November 24, D. McCall White of the Cadillac company and designer of its eight-cylinder motor will discuss this type of engine.

AKRON, O., Nov. 3—The Swinehart Tire & Rubber Co. has declared a quarterly dividend of 1 1-2 per cent. payable January 15. The books close December 31.

S. A. E. Winter Meeting January 6-7

Professional Sessions on Both Days—Standards Committee Meets November 17-19

NEW YORK CITY, Nov. 2—The full program of the winter session of the Society of Automobile Engineers has been announced. Professional sessions are scheduled for the morning, afternoon and evening of January 6 and 7 in the Engineering Societies Building, 29 West 39th street. Plans are being made to have the members dine together informally on each of the meeting days.

The Standards Committee convention will be held November 17-19 in the rooms of the society at 1790 Broadway. The purpose of this meeting is to provide an opportunity to discuss the various standards and practices under consideration for recommendation, as well as some standards and practices that have been accepted heretofore. It is expected that reports will be made by several of the Standards Committee divisions. The subjects which will probably be touched upon are the following:

Stock sizes of roller bearings.	Non-glaring headlights.
Flanges for side outlet carbureters.	Wiring systems for motor cars.
	Scientific tests for engines.
Thickness of truck felloe bands.	Horsepower formula data.
Electric vehicle standards.	Pneumatic tire stock sizes.
Industrial truck standards.	Tap drill sizes.
Properties of S. A. E. steels.	Vehicle taxation formula.
Heat treatment of steels.	Leaf spring clips.
Steel casting specifications.	Bell housings for unit plants.
S. A. E. lock washer standards.	Motor support dimensions.

The council will hold a meeting at the time of the convention and meetings of about a dozen of the divisions and sub-committees of the Standards Committee will be held during the 3 days' convention. Members of the society who can attend are welcome at the Standards Committee meeting.

Weed Wins Another Final Injunction

DETROIT, MICH., Nov. 3—*Special Telegram*—Judge Tuttle in the United States District Court here has issued a perpetual injunction restraining Arthur S. and Milton H. Perry from doing business under the name of the Perry Chain & Grip Co., the Union Steel Screen Co. and the Motor Specialty Co. from making automobile tire chains and held that patent No. 723,299 was duly issued to Harry Parsons, March 24, 1903.

This is the final decision in the suit brought by the Weed Chain Tire Grip Co. and the Parsons Non-Skid Co., Ltd., and Harry D. Weed, who are allowed about $18,000 profits and interest made by the Perrys.

Poole Makes Report on European Conditions

DETROIT, MICH., Oct. 30—The first report concerning business conditions in Europe written by John L. Poole, European export manager of the Hupp Motor Car Co., since his return to Europe was received a few days ago and concerns the situation in the United Kingdom.

"In general," writes Mr. Poole, "business conditions have improved in the Kingdom, and I can see no reason why we should not do a fairly good business in the motor car line during the coming season, unless, of course, England itself is open to an invasion by some hostile nation.

"As the Olympia, the annual motor car show of England, will not be held this season, Whiting, Ltd., Hupmobile distributors for the British Isles, will hold a motor car exhibit of its own, and anticipate a visit at that time from the eighty odd dealers who are located throughout England, Scotland and Ireland.

Nine Papers for Chicago Road Congress

NEW YORK CITY, Nov. 2—The American Road Builders' Assn., this city, has received acceptances from a number of well-known highway officials and engineers, announcing their willingness to prepare the leading papers on various subjects to be presented at the American Good Roads Congress to be held in Chicago, December 14-18. The acceptances so far received and their subjects are as follows:

"Road Foundations: Concrete, Telford, Gravel, Etc.," L. A. Johnston, division engineer, Massachusetts Highway Commission.

"Organization of a State Highway Department," John N. Carlisle, Commissioner of Highways of the State of New York.

"Traffic: Present Tendencies, Probable Development, Regulation," A. W. Dean, chief engineer, Massachusetts Highway Commission.

"Machinery for Construction and Maintenance: State, Municipal, Contractors, Traction Haulage of Stone, Care of Machinery, Instructions to Engineer and Operator," T. R. Agg, professor of highway engineering, Iowa State College.

"Brick Roads and Streets," John Laylin, division engineer, State Highway Department of Ohio.

"Surfaces or Floors for Bridges," Clifford Older, bridge engineer, Illinois Highway Department.

"Bituminous Construction and Maintenance, Recent Practice," William D. Uhler, assistant engineer, Bureau of Highways, Philadelphia, Pa.

"Concrete Roads," H. J. Kuelling, County Highway Commissioner, Milwaukee County, Wisconsin.

"Street Paving in Small Cities," Thomas H. MacDonald, State Highway Engineer of Iowa.

Saxon Adds Light Delivery for $395

DETROIT, MICH., Nov. 2—The Saxon company has branched out into the commercial field by adding a delivery car of 400 pounds carrying capacity to its well-known two-passenger type and selling at the same figure of $395. This vehicle is mounted on the same chassis as the roadster, and with its light weight it should have a big field among the various lines of business requiring quick delivery of light packages.

With practically the same bonnet and control features, the main change is the placing of an open-box type of body back of the driver's seat, which body has about the same length front and back of the rear axle. The carrying space is 48 1-4 inches long and 38 inches wide, with the sides 45 inches high.

The Saxon chassis has a wheelbase of 96 inches, is carried on 28 by 3 tires, on wire wheels, has cantilever spring suspension and a 15-horsepower motor, 2 5-8 by 4.

This motor is a four-cylinder L-head with cylinders and crankcase cast in one piece. It operates through a two-bearing crankshaft of drop-forged steel. Helical timing gears housed at the front operate the camshaft which is also a drop-forging having integral cams. Cooling is by thermo-syphon, ignition by Atwater Kent distributer system, and lubrication by the vacuum-feed arrangement. In this the level of the lubricant is automatically maintained at the same height as the controlling feed standpipe.

The clutch is a five-plate disk type steel against Raybestos, while drive to the rear is through a shaft enclosed within a torsion tube, this shaft being fitted with a universal joint at the front end. The gearbox, affording two forward speeds, is mounted on the rear axle, being controlled by center lever. The rear axle is of the semi-floating type with a pressed-steel housing, the outer end of the drive shaft being carried on Hyatt roller bearing, while the two-pinion differential is of plain bearing construction.

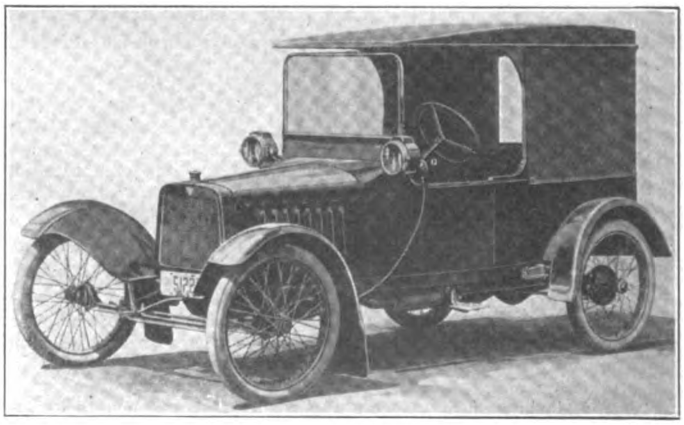
There are two sets of brakes on the rear wheels, the service set being 8 inches diameter Thermoid lined, while the emergency is steel on steel, 7 11-16 inches diameter.

The listed equipment is top and storm curtains, windshield, two gas headlights, oil rear lamps, gas generator and bulb horn.

The tread of the Saxon is standard 56 inches.

Gas-Electric Taxicab for N. Y. Taxicab Co.

NEW YORK CITY, Oct. 29—That the Mason-Seaman Transportation Co. will probably employ the combination of the gasoline engine and the electric motor in its taxicabs, is stated by W. H. Barnard of that company. Mr. Barnard states the company is at present experimenting with a new 1,000-pound cab which will be propelled by the above system, the invention of Mr. Rockwell, also of that company.



New Saxon light delivery car on standard chassis

National Shows Have 548 Exhibitors

118 Accessory Makers Take Space in Addition to Those Previously Announced

NEW YORK CITY, Oct. 30—Judging from the number of exhibitors who have been allotted space for the Fifteenth Annual National Automobile Shows to be held in New York and Chicago, it is evident that manufacturers of automobiles, motorcycles and accessories are preparing for the greatest year of business in the history of the industry. Announcement already has been made by Manager S. A. Miles, of the car exhibitors who will display their products at both shows, and the Motor and Accessory Manufacturers have announced the space allotted to their members. However, since those announcements were made 118 accessory makers and 13 motorcycle concerns have secured space for the national shows, bringing the total number of exhibitors for both exhibitions up to 548. The New York Show is to be held in the Grand Central Palace, January 2-9, and the Chicago show will be held in the Coliseum and First Regiment Armory from January 23 to 30. The complete list of accessory manufacturers exhibiting at both shows to date is given below:

Panama-Pacific West's First Big Show

SAN FRANCISCO, CAL., Oct. 28—The first show of any magnitude west of the Rockies covering the automobile industry will be held in the Palace of Transportation at the Panama-Pacific International Exposition the coming year. Nearly 40 per cent. of the space in the mammoth structure built to house the transportation exhibits is given over to the makers of pleasure cars and accessories. The available space has been heavily over-subscribed and the department has been compelled to utilize every available foot of space possible in an effort to accommodate the exhibitors.

There are several noteworthy features connected with the coming automobile exhibition. Divisions have marked the holding of a number of shows in the east in the past, the manufacturers and their dealers grouping themselves into associations and holding separate exhibitions. There are no such restrictions regarding exhibitors at the coming show, the gates being thrown open to any worthy exhibit.

The automobile section occupies nearly the entire eastern half of the building. Running along the north and south central aisle in the nave of the building is a façade of Italian pergola design and divides the section from the other portion of the building. There are domes over the entrances to the aisles in the section for a lattice-work effect

The accessory manufacturers and dealers are given space along the side walls of the section. The walls about and above their exhibits will be decorated by the exhibitors themselves.

The exhibits in the section will be many and varied. In addition to the usual display of finished types of cars will be shown cutaway chassis, cars in course of construction, assembling plants and the making of various parts. The exhibits are intended to have a distinct educational value.

The official headquarters for automobilists will be found in the offices of the California State Automobile Assn., located just to the east of the main entrance. A well-equipped information bureau will be maintained.

Boston Electric Show Opens with 10 Exhibits

BOSTON, MASS., Oct. 30—The Second Electric Automobile Salon under the auspices of the Electric Motor Car Club of Boston is being held in the Grand Ballroom of the Copley Plaza Hotel in Boston from Monday to Friday, November 2 to 6, inclusive.

It is not quite so crowded as last year's Salon for there are but seventeen vehicles exhibited while the first one had twenty-six. But it is a really representative exhibition, for all the various types made by the electric men are displayed. There is a good chance to note the tendency of some makers toward the streamline design of body; the five-passenger model, by widening the bodies and the wire wheel.

Special attention has been given this year to interesting a large number of prospective purchasers over a wide territory including Boston and the prominent cities and towns within a radius of 40 miles. A special list of prominent people has been prepared and invitation cards mailed to them. Over 16,000 cards have gone out in this way in addition to the large number mailed by the Boston representatives of electric automobile manufacturers to their prospects.

The exhibitors and the number of cars displayed are:

NAME OF CAR	NO.
Bailey	3
Buffalo & Babcock	1
Detroit Electric	5
Ohio	2
Rauch & Lang	3
Waverley	3

ACCESSORIES	TYPE
Edison Storage Battery Co.	Batteries
Electric Storage Battery Co.	Batteries
Philadelphia Storage Battery Co.	Batteries
Wagner Electric Mfg. Co.	Rotary Converters

WASHINGTON, D. C., Oct. 30—President Sturgis, of the American Institute of Architects, has appointed a committee, composed of E. C. Jensen, Chicago, W. T. Mills, Columbus, and Benjamin Hubbell, Cleveland, to act in an advisory capacity to the Lincoln Highway Assn.

The purpose is to insure uniformity in treatment of all the bridges, markers, stations and monuments.

LIST OF ADDITIONAL ACCESSORY EXHIBITORS AT NEW YORK AND CHICAGO SHOWS

Adams & Co., Henry T..........Chicago, Ill.
Ajax Trunk & Sample Case Co., New York, N. Y.
American Taximeter Co.....New York, N. Y.
Arnold, N. B..................Brooklyn, N. Y.
B. & L. Auto Lamp Co.....New York, N. Y.
Benjamin Electric Mfg. Co..New York, N. Y.
Braender Rubber & Tire Co..Rutherford, N. J.
Brown Co. ....Syracuse, N. Y.
C. R. G. Mfg. Co.............Saugus, Mass.
Champion Spark Plug Co..........Toledo, O.
Chicago Electric Specialties Co...Chicago, Ill.
Cleveland Worm & Gear Co.....Cleveland, O.
Cutler-Hammer Mfg. Co.....Milwaukee, Wis.
Dann Oil Cushion Spring Insert Co., Chicago, Ill.
Detroit Steel Products Co......Detroit, Mich.
Dreadnaught Tire & Rubber Co., Baltimore, Md.
Edeman & Co., E..............Chicago, Ill.
Forest City Electric Co.........Cleveland, O.
Frazer Lubricator Co...........Chicago, Ill.
Globe Rubber Tire Mfg. Co....Trenton, N. J.
Grossman Mfg. Co., Inc., Emil, Brooklyn, N. Y.
Hans Motor Equipment Co...La Crosse, Wis.
K-W Ignition Co..............Cleveland, O.
Kemco Electric Mfg. Co........Cleveland, O.
Lawrence & Co., L...........Newark, N. J.
McQuay-Norris Mfg. Co........St. Louis, Mo.
Mayo Mfg. Co..................Chicago, Ill.
Metal Stamping Co..Long Island City, N. Y.
Morrison-Ricker Mfg. Co........Grinnell, Ia.
Newmastic Co............New York, N. Y.
New York Coil Co...........New York, N. Y.
Peerless Motor Specialty Co..New York, N. Y.
Perkins-Sampbell Co..........Cincinnati, O.
Platt & Washburn Refining Co., New York, N. Y.
Power Gas Products Co., Inc., Minneapolis, Minn.
Pyrene Mfg. Co............New York, N. Y.
Sharrer Patent Top Co......New York, N. Y.
Smalley Daniels ....Detroit, Mich.
Standard Woven Fabric Co., Framingham, Mass.
Steel Pneumatic Tube & Tire Co., New York, N. Y.
Stevens & Co...............New York, N. Y.
Tingley & Co., Charles O.......Rahway, N. J.
Triple Action Spring Co..........Chicago, Ill.
United States Air Compressor Co., Cleveland, O.
Universal Shock Eliminator Co., New York, N. Y.
Wayne Oil Tank & Pump Co., Fort Wayne, Ind.

NEW YORK ONLY

American Express Co.......New York, N. Y.
Armstrong Cork Co..........Pittsburgh, Pa.
Asch & Co. ....New York, N. Y.
Ashley Wire Wheel & Rim Co., New York, N. Y.
Ashland Mfg. Co. ....Ashland, O.
Auto Rescue Mfg. Co............Streator, Ill.
Baum's Castorine Co............Rome, N. Y.
Baush Machine Tool Co....Springfield, Mass.
Berg Auto Truck & Specialty Co., New York, N. Y.
Bontempi Rust-Proofing Co..New York, N. Y.
Davis Mfg. Co., D. D..........Chicago, Ill.
Essex Rubber Co..............Trenton, N. J.
Faw, Inc., J. J.............New York, N. Y.
Fentress-Newton Mfg. Co.......Detroit, Mich.
Fitzgerald Mfg. Co.........Torrington, Conn.
Flentje, Ernst ....Cambridge, Mass.
Frasse & Co., Inc., Peter A...New York, N. Y.
Fulton-McCutcheon Co. ....Chicago, Ill.
Haverford Cycle Co. ....Philadelphia, Pa.
Holt-Welles Co.............New York, N. Y.
Houpert Machine Co.........New York, N. Y.
Kales Haskel Co...............Detroit, Mich.
Prosser & Son, Thomas ....New York, N. Y.
Laidlaw Co. ....New York, N. Y.
Marathon Tire Sales Co....New York, N. Y.
Marvel Auto Supply Co........Cleveland, O.
Master Carburetter Distributers, New York, N. Y.
Merritt Co., S. Whyle.......New York, N. Y.
Mesinger Mfg. Co., H. & F..New York, N. Y.
Miller, Charles E...........New York, N. Y.
Mutty Co., L. J.................Boston, Mass.
O'Banron Corporation ......New York, N. Y.
Pennsylvania Shafting Co....Spring City, Pa.
Reilly & Son, P................Newark, N. J.
Rutherford Rubber Co......Rutherford, N. J.
Silvex Co. ....New York, N. Y.
Stanley Co., Inc., John T....New York, N. Y.
Steel Pneumatic Tube & Tire Co., New York, N. Y.
Stewart & Co...............New York, N. Y.
Waldt, Ralph ....New York, N. Y.
Willey Co., C. A.....Long Island City, N. Y.

CHICAGO ONLY

American Wood Rim Co......Onaway, Mich.
Breakstone, S. ....Chicago, Ill.
Buchanan Electric Steel Co..Buchanan, Mich.
Buda Co. ....Harvey, Ill.
Celfor Tool Co..............Buchanan, Mich.
Cleveland Hardware Co........Cleveland, O.
Electric Products Co..........Cleveland, O.
Funke & Co., Inc., H. F. L...New York, N. Y.
Miller, Charles E. (Anderson Rubber Works), New York, N. Y.
Mossberg Co., Frank ....Attleboro, Mass.
Niehoff & Co., Paul G...........Chicago, Ill.
Oakes Co. ....Indianapolis, Ind.
Pierce Speed Controller Co....Anderson, Ind.
Pratt Mfg. Co., William E.......Chicago, Ill.
Stewart Auto Accessories Co.....Chicago, Ill.
Tuthill Spring Co..............Chicago, Ill.
United States Gauge Co......New York, N. Y.
Universal Auto Euipment Co...Detroit, Mich.
V-Ray Company ....Marshalltown, Ia.
Wells Mfg. Co., R. C......Fond du Lac, Wis.

Weidely Motors for the Trade

Weidely Motor Co. Organized—Engine To Be Sold Separate or with Entz Electric Transmission

NEW YORK CITY, Nov. 2—The Weidely Motor Co., of this city, is being incorporated to build Weidely motors to be sold to the trade and also to be used in conjunction with the Entz electric transmission manufactured by the Entz Motor Corp., this city.

R. M. Owen, president of the Entz Motor Corp., which controls the patents for this electric transmission, has entered into an arrangement with H. O. Smith and George Weidely, recently of the Premier company, whereby the Weidely Motor Co. has been formed and will own and control the patents used in connection with this motor.

Arrangements have already been made with two large engine manufacturers in this country to build these motors for sale to the trade. In last week's issue of THE AUTOMOBILE it was stated that a contract had been made between Messrs. Owen, Weidely and Smith with the receiver of the Premier Motor Mfg. Co. whereby the patterns, etc., of the Weidely motor become the possession of the newly-organized Weidely Motor Co., and that the Premier Motor Mfg. Co. is given the privilege of using the Weidely motors. The Weidely motor will either be sold as a separate unit or those desiring can purchase it in connection with the Entz electric transmission, thereby giving complete motor and transmission in a single unit.

U. S. Rubber Earns Dividends

NEW YORK CITY, Oct. 31—Up to October 1, with September earnings partially estimated, the United States Rubber Co. earned its dividends with a considerable margin to spare. Estimate of earnings for October is not yet practicable and it is stated that the directors are not in a position to consider a continuation of the common dividend at a 6 per cent. rate. A dividend of 1 1-2 per cent. was declared on the common stock, payable November 1, so that there will be no further consideration of a dividend by the directors until the meeting early in January. Tire sales in September ran 35 per cent. behind the corresponding month a year ago. October will probably show approximately the same decline, as compared with 1913. While there was a 35 per cent. reduction in the value, the actual drop in the number of tires sold was considerably below the 35 per cent. figure. Tire prices a year ago were above those prevailing this Fall.

AKRON, O., Oct. 30—The B. F. Goodrich Co. has declared the regular quarterly dividend of 1 3-4 per cent. on the preferred stock, payable January 1 to stock of record December 21.

Detroit Starter Co. Organized

DETROIT, MICH., Oct. 30—The Detroit Starter Co. was organized recently and incorporated, the officers being J. W. Fitzgerald, president; F. J. Lamb, vice-president, and A. B. Porter, secretary-treasurer. Offices have been opened at 969 Jefferson avenue.

The concern is now marketing the new starter and lighting system, which is being manufactured for it on a mutual sharing arrangement by the Ross & Young Machine Co., whose present capacity is 200 starters a day.

Several of the local automobile manufacturing concerns are arranging for the adoption of the new starter on their 1915 models, and the Saxon Motor Co. recently announced that it will furnish this starter upon demand.

Tilikum Cyclecar Co. Formed in Seattle

SEATTLE, WASH., Oct. 30—The Tilikum Cyclecar Co., Seattle, has recently been incorporated and is headed by N. J. Veline, I. D. H. Adams and C. G. Benson. The car is unique in mechanical construction and body lines. The frame is fashioned after the Franklin wood frame, which reduces vibration and strain on mechanical parts. The tread is 42 inches. The seat accommodates two passengers side by side. The wheelbase is 84 inches, correctly proportioned with the tread. The motor is of the V type of 10 to 14 horsepower, air cooled. The transmission is by patented variable pulleys and belts which give the operator the choice of twelve distinct speeds, changing from any one to any other without disengaging the clutch. The car has been run from 40 to 60 miles on a gallon of gasoline.

AKRON, O., Oct. 29—Goodyear Tire & Rubber Co.'s salesman's conference was brought to a close October 31. Four hundred and fifty branch managers and salesmen were in attendance. The conference was preliminary to the launching of the company's 1915 campaign, and concludes a fiscal year in which the increase in the number of tires made and sold over 1913 was nearly 35 per cent. For 3 days the men from the selling field were the company's guests. They inspected the factory with its 2,000,000 square feet of floor space and watched the actual operations by which 7,500 workers turn out the Goodyear product. There were addresses, a banquet and other entertainment in the evenings, and the days were devoted to discussions of trade conditions.

Abner Doble Motor Vehicle Co. Incorporates

WILMINGTON, DEL., Oct. 30—The Abner Doble Motor Vehicle Co. has incorporated in this city with a capitalization of $500,000 to manufacture and deal in the Abner Doble steam automobile. The incorporators are G. W. Dillman, E. Price, M. M. Dugan, G. P. Postles and R. R. Whittingham.

A description of this car was published in THE AUTOMOBILE for April 9, 1914.

Shoemaker Resigns from A. A. A.

NEW YORK CITY, Oct. 30—T. B. Shoemaker, who for several years has served as secretary of the Contest Board of the American Automobile Association, has resigned. Chairman Kennerdell, has not as yet appointed a successor.

Splitdorf Alleges Bosch Infringes Patent

NEW YORK CITY, Nov. 2—The Splitdorf Electrical Co., Newark, N. J., has filed suit against the Bosch Magneto Co., New York City, alleging infringement of Patent No. 1,074,416, covering means in a magneto ignition system for changing the polarity of the armature to coincide with the polarity of an external current during the time that the primary winding on the armature is coupled with the external source of current. The object of this system is to use a battery and a coil in connection with the primary winding of the magneto to produce a sufficient current for ignition purposes for easy starting at low cranking speeds. This is commonly known as a duplex system.

Officials of the Bosch company state that they believe that Splitdorf's claims of infringement are not correct and that they will endeavor to prove this.

The patent in question was granted to John M. Dinkins, Franklin B. Hays and William L. Taylor, all of Indianapolis, Ind., September 30, 1913. Eight-fifteenths of the right, title and interests of the patent were transferred to William L. Taylor, and then by a written assignment dated July 10, 1914, the Splitdorf company became sole owner. This company alleges that the Bosch company has infringed since the date of the patent and since July 10, 1914.

The plaintiff prays for an injunction, as well provisional as permanent, and also that the defendant account for profits made by it and damages sustained by defendant, and that upon rendering of the decree the actual damages so assessed be tripled. The plaintiff also prays that the defendant defray the costs of the suit, and waives verification of the defendant's answer.

The suit is brought in the U. S. District Court for the Southern District of New York.

Denver Passes Anti-Glare Ordinance

DENVER, COL., Oct. 30—An ordinance designed to put an end to the dangerous glare of motor car and other vehicle headlights on Denver's streets has been passed by the city council and will go into effect tomorrow. An increasingly large number of serious accidents during the last year or more have been charged to the blinding glare of these unduly brilliant lights and a great deal of sentiment has developed in demand for a law to protect human life against this danger, In fact, many motorists themselves have declared the city behind the times because of its failure to remedy this deplorable feature of traffic conditions. The measure was urged and strongly backed by the Denver Motor Club, which has pledged the city officials its hearty co-operation toward enforcing the provisions for dimming lights.

The principal clauses of the new ordinance are:

It shall be unlawful for any person operating any automobile, motorcycle or other vehicle, upon the public streets and highways within the city and county of Denver, to use acetylene, electric or other bright headlight or any headlights, the rays from which are intensified by any condensing reflector, unless such headlight shall be properly shaded or adjusted so as not to blind, dazzle or confuse other users of the highway or make it difficult or unsafe for them to ride, drive or walk thereon.

Grossman Gets Injunction in Patent Suit

NEW YORK CITY, Nov. 2—Thomas F. Wilson and the Emil Grossman Mfg. Co., Inc., have been granted a perpetual injunction against Harry Weinstein, doing business under the trade names of Royal Auto Tire & Supply Co., Liberty Tire & Supply Co. and Union Tire Co. The plaintiffs alleged infringement of their patent No. 1,044,468 covering a form of thrust bearing by the defendant's "Radius rod anti-rattlers for Ford cars." The decree was issued with the consent of the defendant.

The plaintiffs prayed for a perpetual injunction, delivery to them for destruction of all infringing devices, triple damages and costs, but waived damages and costs when the defendant turned over to them the infringing devices.

The suit was brought in the U. S. District Court for the Southern District of New York. The Emil Grossmann Mfg. Co., Inc., owns one-tenth interest in the patent at issue, the remainder belonging to Thomas F. Wilson, the other plaintiff in the suit.

INDIANAPOLIS, IND., Nov. 2—A suit asking for the appointment of a receiver for the United Supply & Accessories Co., Indianapolis, has been brought in the circuit court in that city by S. C. Rennick, manager of the company. Mr. Rennick alleges the company is in danger of insolvency and has been unable to obtain sufficient capital with which to conduct a paying business.

To Protest Proposed Uniform Law

BOSTON, MASS., Oct. 29—A special meeting of the Massachusetts Automobile Operators' Assn. was held last week at which the proposed uniform motor law now being considered by the commissioners on uniform laws at Washington was discussed. James Fortesque, secretary of the Massachusetts State A. A. and J. T. Sullivan of the Boston *Globe* addressed the meeting pointing out that according to dispatches it was intended to put in a clause requiring drivers to wear badges, and another that convictions should be written on licenses. It was pointed out that there was a badge clause in the Bay State motor law, but because of persecution by police of drivers the legislature took it out. Also that attempts to put in a conviction license clause has been rejected by the legislature several times. President J. E. Connors was then empowered to call a special meeting of the legislative committee to frame a protest to send to the commission, and this will be passed at the next meeting.

Hard Test of N. J. Drivers

TRENTON, N. J., Oct. 29—To what a great extent automobiles are used in New Jersey is indicated by the statement of State Motor Vehicle Commissioner Lippincott today, that from January 1 last to October 1, the number of persons examined by the department for drivers' licenses was 21,901. Of this number 19,471 were passed and 2,430 were rejected, showing that approximately 11 per cent. were unable to qualify as drivers.

Standard Oil and Gulf Refining Indicted

NEW YORK CITY, Nov. 2—Despite the fact that the Standard Oil Co. was absolved in the Hudson county court in New Jersey when charged with violating one of the Seven Sisters anti-monopoly acts by price-cutting, it, and the Gulf Refining Co., have been indicted by the Hudson county grand jury; these are the first indictments to be found under the Seven Sisters acts passed under the governorship of Woodrow Wilson.

The county court held that the Gulf and not the Standard company was at fault; the evidence before the grand jury was that the Gulf company started to cut the price of gasoline in May; Standard met the cuts; the price fell from 22 to 11 cents. The Crew-Levick company alleged that its business had been damaged and it was alleged that it was the intent of the big companies to "freeze out" smaller competitors. Should the indictments result in convictions the defendants may lose their charters; trial is expected this month.

Exports for September Total $892,192

WASHINGTON, D. C., Nov. 2—Figures issued today by the Federal Bureau of Statistics show that during September, 128 commercial cars, valued at $294,288, and 646 passenger cars, valued at $597,904, were shipped abroad. During the 9 months ending September the number of commercial cars exported was 637, the value being $1,066,545, while the passenger car exports amounted to 19,530, valued at $17,209,964.

Drawback Granted on Exported Cars and Parts

WASHINGTON, D. C., Nov. 2—A series of orders has been issued by the Treasury Department instructing collectors of customs in various cities to allow, under paragraph O, section 4 of the tariff act of 1913, drawback on the exportation of various articles, as follows: Automobiles: Packard, Baker electric, Chandler and Abbott; automobile axles, Hess Spring & Axle Co., Yuster Axle Co., for account of Chandler Motor Car Co., American Ball Bearing Co.; aluminum hoods, Michigan Stamping Co.; windshields, Universal Windshield Co.

NEW YORK CITY, Oct. 29—At the annual meeting of the J. S. Bretz Co. yesterday, the retiring directors and officers were re-elected. They are as follows: J. S. Bretz, president; Jack L. Straub, secretary and treasurer, and the directors are: J. S. Bretz, J. L. Straub, R. W. Leslie, John Hertzler and C. G. Tuthill.

BROOKLYN, N. Y., Nov. 3—The Brooklyn Garage Owners' Board of Trade has arranged through a coal committee to purchase coal and coke for members for the coming winter. At a meeting held Monday evening, November 2, this committee compiled a list of garagemen who will take a total of 800 tons. The association members are enthusiastic at the work the organization is accomplishing. At its inception it secured a brand of gasoline and oil on which it placed its stamp, and now is having manufactured by a well-known tire company a tube which is put out under the name of Board of Trade tube. Several new members were added at Monday's meeting.

Market Reports for the Week

No changes of any importance occurred in this week's market reports. The metal products were held more firmly and the oils and lubricants saw some quiet trading. A stronger tone in tin was developed at the end of the week, that product closing at a gain of $1.50 per 100 pounds. Lead was quiet and steady at $3.50 per 100 pounds. Antimony is quiet, but strong and prices are nominal. The crude rubber market was quiet. Trading conditions were dull, but the market had a firmer tone owing to the action of Turkey in entering the European war. It is feared that this may result in the closing of the Suez Canal and greatly interfere with shipments of rubber from the East. Up-river Para remained unchanged for the week at $0.66.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.14	.14	.14	.14	.14	.14	......
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	1.21	......
Besemer Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	......
Copper, Elec., lb.	.11¼	.11¼	.11¼	.11¼	.11¼	.11⅕	—.00$\frac{1}{20}$
Copper, Lake, lb.	.11⅖	.11⅖	.11$\frac{2}{15}$	.11⅛	.11⅛	.11$\frac{3}{10}$	—.00$\frac{1}{10}$
Cottonseed Oil, bbl.	4.70	..	5.10	5.08	5.08	5.01	+.31
Cyanide Potash, lb.	.25	.25	.25	.25	.25	.25	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	.90	.90	......
Lead, 100 lbs.	3.50	3.50	3.50	3.50	3.50	3.50	......
Linseed Oil	.47	.45	.45	.45	.45	.45	—.02
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1:45	1.45	1.45	......
Rapeseed Oil, refined	.82	.73	.73	.73	.73	.73	—.09
Rubber, Fine Up-River, Para	.66	.66	.66	.66	.66	.66	......
Silk, raw, Ital.	..	4.25	..	..	..	4.25	......
Silk, raw, Japan	..	3.20	..	..	..	3.23	+.03
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	30.38	30.25	30.75	30.88	30.88	31.88	+1.50
Tire Scrap	.05	.05	.05	.05	.05	.05	......

DePalma Wins Four at Brighton

Five Races Altogether—10 Mile Handicap Won by Chevrolet

NEW YORK CITY, Nov. 3—Ralph DePalma and his Grand Prix Mercedes starred at Brighton Beach race track today, taking four out of the five events and capturing $650 in prize money. The other race, a handicap, was won by LeCain in a Chevrolet. Jessup, also driving a Chevrolet, was second in this race, while DePalma took third honors.

The first event was non-stock, limited to cars with less than 300 inches piston displacement. The distance was 10 miles and Ralph easily drew away from the rest of the field, winning in 9 minutes 53 2-5 seconds. Morton, in a Mercer, was second and LeCain in a Chevrolet, third.

Event number two, for 10 miles for non-stock cars under 450 cubic inches, was won by DePalma who covered the distance in 9 minutes 34 seconds. Second went to John DePalma in Ralph's old six-cylinder Mercedes, and third was won by Morton, in the Mercer.

The third race was a non-stock free-for-all for 10 miles and was likewise taken by DePalma in 9:21 4-5. John DePalma was second and Morton, in the Mercer, third.

Next was the handicap and this proved the most interesting and exciting. LeCain's Chevrolet won, with his teammate Jessup at his heels. DePalma was third, his handicap being too large as he was the only one started from scratch, about a mile in the rear. The time was 9:53.

The fifth race was originally intended to be a 50-mile contest but it was shortened to 40 miles because of darkness. It was won by DePalma, with Morton and the Mercer second and LeCain and the Chevrolet third. The time was 37 minutes 27 2-5 seconds. The little Mercer has a Fritz carbureter.

Greeks Give Out Truck Specifications

NEW YORK CITY, Nov. 4—Specifications for the 400 additional motor trucks for the Greek army, to supplement the fifty KisselKar vehicles recently purchased have been given out. These cover 1 1-2-ton chassis of standard construction, shaft-driven, with uniform tire sizes front and rear, four-speed gearboxes, good clearance, fairly high speeds, and equipped with service bodies. Among the peculiar requirements are stiff, heavy springs of little flexibility, double-jet carbureters, demountable rims, driving shaft brakes, and auxiliary water tanks under the driver's seat. The specifications follow:

Frame—Pressed steel, simple and strong.

Motor—Flexible; monoblock, 3½ by 5½, with compression release and governor set at 30 miles per hour.

Differential—Light, of dimensions as constrained as possible, and capable of resisting most violent brake strains.

Carbureter—Latest type, with double jets.

Magneto—High-tension.

Front whels—Detachable rims, 35 by 5 tires.

Rear wheels—Strong; demountable rims, 35 by 5 tires.

Drive—Cardan shaft, with two universals preferred.

Springs—Front and rear very strong with lititle flexibility.

Maximum load—3,306 pounds.

Steering—Practically irreversible, all movable parts with grease cups, and all parts very strong.

Clutch—Smooth-acting, metallic preferred.

Gearset—Strong, with four speeds forward and one reverse; selective type preferred.

Brakes—Two sets; one back of gearbox preferred; handbrake on both rear wheels.

Gasoline tank—At rear, pressure fed, holding 25 gallons; strongly secured to chassis and placed as high as possible, 20 inches from ground.

Water tank—Under driver's seat; capacity 8 gallons at least, with a cock at the outside of body.

Radiator—Of sufficiently large surface to avoid boiling of water even under the highest temperature of 104 degrees Fahrenheit in the shade; should be mounted on a shock-absorber and should have a drain cock.

Fan—Flywheel fan preferred, or else two fans.

Clearance—11.8 inches.

Lubrication—Constant-level splash-pressure system.

Speed—The truck must attain a speed of 27.9 miles per hour on the level with full load.

Body—Light and strong, of careful construction, with 43 square feet of floor-area, and with tailboard to fold down on hinges to form steps; equipped with top.

Seats—For two, driver's seat roomy and low, with an abundance of leg-room.

Cab—Must have top of folding type, which is substantial when folded.

Windshield—Solid, but folding outward; constructed to permit easy replacement of glass.

Tools—Each truck must have a kit of tools in a tool box well located in the body.

Spare parts—Complete set of most needed spare parts.

Fast Time at San Antonio Track

SAN ANTONIO, TEX., Oct. 31—Fast time, clever driving and close finishes featured the opening of the San Antonio Automobile Club's automobile races at the Fair Grounds track this afternoon. The day was ideal and a good mid-week crowd saw the events.

The following are the results of the first day's events:

Class E, 3 Miles

CAR	DRIVER	TIME
Ford	Hoffman	4:20
Buick	Meleun	
Studebaker	Johnson	

Class E, 600 Cu. In.—9 Miles

CAR	DRIVER	TIME
Simplex Zip.	Disbrow	9:10 4/5
Case Special	Ulbricht	
Braender Bull Dog	Chandler	

Class E, 300 Cu. In.—6 Miles

CAR	DRIVER	TIME
Scat	Cleary	6:05
Mercer	Milton	
Ford	Hoffman	

Team Novelty Relay Race

CAR	DRIVER	TIME
Case	Hearne	4:34
Braender Bull Dog	Chandler	
Simplex	Disbrow	
Case Special	Ulbricht	

Class D, Free for All—9 Miles

FIRST HEAT

CAR	DRIVER	TIME
Case	Hearne	8:56 4/5
Simplex	Disbrow	

SECOND HEAT

CAR	DRIVER	TIME
Case	Ulbricht	9:15
Mercer	Milton	

HANDICAP—4 MILES

CAR	DRIVER	TIME
Simplex	Disbrow (Scratch)	3:36
Ford Special	Hoffman	

A. A. A. Gives Sanction for Indianapolis 500 Mile Race

INDIANAPOLIS, IND., Oct. 31—Official sanction has been obtained by the Indianapolis motor speedway from the American Automobile Assn. for its next 500-mile race, thereby refuting recent reports to the effect that the owners of the Hoosier track contemplated breaking with the parent organization. Speedway officials assert that they are on the friendliest terms with the A. A. A. and have no thought of taking independent action.

The recent announcement by the track management that it would in the future supervise manufacturers' tests on its own responsibility, is declared well founded on precedent, similar trials having been conducted under the auspices of the Chicago Automobile Club, without A. A. A. sanction; nor, it is said, is there any animus manifested toward the A. A. A. by the speedway in taking such action. Everything points toward a most successful contest season in 1915, it is stated, so that to stir up a row at this time would be considered wholly unwise.

Race Track Planned for Omaha

OMAHA, NEB., Oct. 30—An automobile race track 2 miles in length and pitched at an angle varying from 10 to 42½ degrees will be erected in Omaha soon. It is planned by the builder, Jack Prince, to have it in readiness by November 25, Thanksgiving day, and to have Barney Oldfield, Bob Burnham and Louis Disbrow as the opening attraction. It will cost approximately $150,000.

The automobile speedway is to be located near the present motorcycle speedway. In connection with the two speedways there will also be an aviation field. The first big racing meets will not be held until next spring.

Brad-Kent-Equipped Ford Does 33 M.P.G.

CHICAGO, ILL., Oct. 29—To demonstrate the fuel economy of the Brad-Kent carbureter, made by the Frost Mfg. Co., of Kenosha, Wis., a run from Chicago to Milwaukee was made on October 23, under the direction of F. E. Edwards, chairman of the technical committee of the Chicago Automobile Club, which resulted in the average of 33.12 miles to the gallon being made in a 1913 model T Ford.

It was a cross-country run of 102.1 miles and conditions were not at all favorable, there being a 25-mile-an-hour head wind to buck, while the roads were rough in many places. Also the car was held up several times in the traffic of the cities through which it passed. The thermometer varied from 50 in the morning to 59 in the afternoon.

The weight of the car with passengers was 2,050 pounds and the gasoline was of 63 degrees at 60 degrees Fahrenheit. The exact fuel consumption was 3 gallons 10.5 ounces. It took 4 hours 28 minutes to make the run.

2-Mile Saucer for Twin-City Races

To Cost $1,250,000—80 Feet Wide—2,200 Foot Banked Curves

MINNEAPOLIS, MINN., Oct. 30—The Twin-Cities are to have one of the greatest motor speedways in the world, according to the plan of organization adopted at a special meeting in this city tonight when the Twin-City Speedway Association was started with a capital stock of $1,000,000, of which $350,000 in common stock was taken by F. H. Wheeler, Indianapolis, Ind., one of the four to finance the present Indianapolis speedway. The remainder of the stock was taken by Twin-City interests before the close of the meeting.

The new speedway is to be entirely a Twin-City affair and will be a 2-mile platter-shaped track 80 feet wide, and having on either side gravel safety zones 32 feet wide. The track will be banked throughout its entire circuit, the banking being 2 per cent. on the straightaways and 35 per cent. on the turns. The radius of the curves will be 2,200 feet. It will be 4.5 miles from the court house in either St. Paul or Minneapolis.

The present plans are to have a 300-mile race on Labor Day next year, which will be the only meet of the season. The motor sizes for this race have not as yet been announced nor have the prizes.

The organization, which will handle this new $1,250,000 speedway, for this is what it is expected to cost, is headed by F. H. Wheeler, president; Henry Habighorst of St. Paul, and J. D. Hogan, Minneapolis, as vice-presidents; Dr. C. E. Dutton, secretary; W. D. Hogan, treasurer, and directors, O. Kellogg, J. F. Sperry, and Judge Frank McNulty, of Aberdeen, S. Dakota. With the exception of Judge McNulty and Mr. Wheeler, all of the officers are Minneapolis and St. Paul business men.

Financing Scheme

In the organization there is to be an issue of $750,000 bonds bearing 8 per cent. interest, which may be retired at interest-paying dates at 3 per cent. per annum. The Van Sant Investment Co., of St. Paul has been made fiscal agent.

The new speedway is to be located in a section known as Longchamp Park. It is bounded by Snelling, Hamlin and Crosley avenues and Larpenteur Road, all boulevards leading direct from the cities. It is within reach of the Twin-City street car lines, which will be extended to take care of the grounds, and close to all the railroad lines that enter St. Paul and Minneapolis. Transportation facilities by street car, train, motor car and on foot are unexcelled.

Seats for 106,000

Plans have been drawn by Walter D. MacLeith of St. Paul, and some of the contracts will be let within a month. It is estimated that the grandstands will seat 76,450 persons and the bleachers an additional 30,000. There will be accommodations within the grounds for 100,000 motor cars.

The buildings within the oval of the track will be sunk so as not to interfere with a view of people sitting in the parked motor cars. The track itself will be below the level so that the grandstand, beginning level with the ground at the upper edge of the speedway will furnish a view to all people, whether in the boxes at the ground level, or at the top. The general type of the buildings will be progressive Spanish, in plain lines and finished in overcast stucco. Opposite the grandstand will be forty pits. The judges' stand will be four stories, accommodating 300 officials, 300 press and telegraph men, with over capacity of 100 more.

The equipment of buildings includes, beside the grandstand and bleachers, a hospital, two round house garages, power plant, twenty-two toilets, four towers in the fence, and judge and press stand to accommodate 700, connected with the grandstand opposite by a suspension bridge at the start line, and bandstand for 300 pieces. On the ground floor rear will be the entrances, with subway for motor car delivery and bridges for pedestrians to enter. On the second floor will be an automobile exhibition room, 56 by 3,225 feet, with posts only every 50 feet. Seats will be of wood. In the 1,625 boxes will be six large arm chairs each with table for service from the seven restaurants. The third story will be for storage. The hospital will be 40 by 60 feet with an operating room 12 by 18 feet and room for physicians and nurses.

In building the track, the base will be 12 inches of rolled trap rock, and the facing 6 inches of concrete laid in two layers of 3 inches each. Each side of the track is to be a 2 1-2-foot concrete breast wall topped with a 10-foot fence of 12-gauge wire to keep tires from being thrown out of the track. Ninety thousand yards of trap rock will be needed for the bed work. Four miles of fence 8 feet high will surround the entire grounds. This fence will be pierced by three gateways admitting twelve people per second. There will also be three automobile entrances capable of admitting six automobiles abreast every second.

The possibilities of attendance at this speedway become real when it is remembered that there is a population of 850,000 within a radius of 50 miles. To this can be added the vast Northwestern territory one of the richest agricultural sections in the country and a section which has been one of the greatest buyers of motor cars.

Overland's October Business Totals $5,572,000

TOLEDO, O., Nov. 3—October was the biggest month's business in the history of the Willys-Overland Co., which shipped 5,601 cars valued at $3,572,000. This was an increase of 15 per cent. over the same month's sales in 1914.

Since January 1, 11,368 more cars have been shipped than to the same date last year. The company has 18 per cent. more unfilled orders now than for the same time last year.

At the annual meeting of the stockholders of the company, October 26, all the officers and directors were re-elected. John N. Willys again heads both The Willys-Overland and Garford companies, with Isaac Kinsey as first vice-president; C. S. Jameson, second vice-president; R. R. Scott, secretary; Walter Stewart, treasurer; W. E. Tigges, comptroller, and E. L. Clapp, assistant treasurer, of the Willys-Overland Co., and C. S. Jameson, vice-president; R. R. Scott, secretary; and Walter Stewart, treasurer of the Garford Co.

The board of directors of the Willys-Overland Co. consists of John N. Willys, Isaac Kinsey, C. S. Jameson, R. R. Scott, Walter Stewart, H. L. Shepler and Rathbun Fuller, all of Toledo. The directorate of the Garford Co. is the same, except that H. L. Hooke's name appears in place of that of Rathbun Fuller.

H. L. Hooke was appointed manager of the Willys-Overland plant in Toledo and J. H. Gerkins was reappointed cashier and E. E. Weiss, assistant cashier.

Eisemann Adds Space—Works Double Shift

NEW YORK CITY, Nov. 4—The Eisemann Magneto Co., Brooklyn, N. Y., has found it necessary to add 15,000 square feet of manufacturing space to its factory, and to also work a double shift. This double shift has been in operation for 3 weeks, while previous to that the force was working 3 hours per day overtime. The company expects this overtime work to continue for the next 5 or 6 months.

Custodian Appointed for Havers Company

DETROIT, MICH., Nov. 3—*Special Telegram*—Judge Tuttle in the United States District Court yesterday appointed Lee E. Joslyn Referee in Bankruptcy as custodian of Havers Motor Car Co., Port Huron, Mich. Three creditors claiming an aggregate of $20,595 due merchandise, petitioned the court to have the company adjudged bankrupt.

Fifth Avenue Coach Co. Earns $226,673

NEW YORK CITY, Nov. 3—The Fifth Avenue Coach Co., this year increased its net earnings $62,217 over last year, the income from operations amounting to $226,673. The total revenue amounted to $1,176,650.

The report of the company for the year ended June 30 last, compares as follows:

	1914.	Increase.
Total revenue	$1,176,650	$240,982
Total expenses and taxes	949,977	178,765
Income from operation	$226,673	$62,217
Other income	4,472	1,721
Gross income	$231,145	$63,938
Deductions	40,708	3,853
Net income	$190,437	$60,085
Profit and loss adjustment debit	10,175	10,744
Surplus	$180,262	$49,341

PREPARING Chevrolet's Tarrytown Plant—Machinery is rapidly being installed in the new plant of the Chevrolet Motor Co. at Tarrytown, N. Y. This group of buildings, which comprised the old Maxwell factory, is the third Chevrolet factory. The main one is in Flint, Mich., and there is one in the heart of New York City. It is stated that the Tarrytown plant will be capable of turning out 10,000 cars per year when equipment is complete, while the New York City factory can produce 6,000 machines, under pressure. The plant at Tarrytown consists of two large, long buildings. The main one is approximately 750 feet long, 60 feet wide and three stories high throughout nearly its whole length. Paralleling this building is a one-story structure. A unique plan of production has been adopted by the company. Instead of concentrating the production in one central factory in the Middle West, it believes in locating assembling plants near points of great demand, such as New York City. Therefore, in these two Eastern plants the cars are completely assembled from parts received from the main factory in Flint and from certain parts and accessory makers. The city factory takes care of local customers and most of the shipments from this factory are made on the wheel while the Tarrytown factory is for the other parts of the territory, which embraces New England, New York State, eastern Pennsylvania and the States South bordering on the Atlantic. The advantages of these sub-factories, it is claimed that freight charges are reduced both on parts and on finished product. The factory being located close to the dealer, can give the latter individual attention and better service, and as there are comparatively few dealers, the members of this factory organization soon get to know all the dealers personally, and can, therefore, help them in marketing the product. The dealers, on the other hand, being in such close touch with the factory, can often give valuable suggestions to the manufacturer.

Auto Products to Add—The Auto Products Co., Canal Dover, O., has plans for a one-story reinforced concrete, brick and steel factory building, to be built at a cost of $15,000.

Lamp Plant in Los Angeles—J. P. Sherriffs will build a factory at 117 36th Place, Los Angeles, Cal., for the manufacture of automobile lamps. The building will be 50 by 124 feet in size, and will cost about $10,000.

Visit Canadian Factories—A large deputation from the French School of Commerce of McGill University, Montreal, Que., to the number of about thirty have recently been visiting the various manufacturing plants of the city.

New Ford Plant in Canada—A new factory is being erected at a cost of $300,000 for the Ford Motor Car Co., of Ford, Ontario, Canada. The building is to be six stories high, 200 by 195 feet in dimensions, of steel and reinforced concrete construction.

Victoria Plant in New Hands—The Auto-Rebuilding Co., Pembroke and Douglas streets, Victorial, B. C., manufacturer of automobile bodies, wheels, springs, engines, etc., has been taken over by a local syndicate with increased powers and larger working capital. The output of the plant will be increased.

New Plant for Shaw Motor—The Shaw Motor Co., Chicago, Ill., has decided upon the city of Prairie du Lac, Wis., for the location of its new plant. The plans call for a brick and concrete shop building, 60 by 108 feet, one story, with a saw-tooth roof, equipped for the production of gasoline engines. The investment on the new plant will be approximately $35,000.

Hoover to Manufacture Balls—The Hoover Steel Ball Co., Ann Arbor, Mich., which has been importing from Germany steel balls to the amount of $200,000 to $300,000 annually, has decided to manufacture a line of fine balls inasmuch as their importation from Germany has been stopped by the war. This year the stockholders of the company are receiving a dividend of 8 per cent.

New Ford Tire Co.—The Toledo-Ford Tire Co. will locate in Findlay, O., and expects to begin operations about the first of the year. The company will be capitalized at $300,000 and sell tires direct to the user. The Findlay factory will make tires in two sizes only and specialize on Ford automobile tires, reducing the cost very materially. They will sell, it is announced, 25 per cent. below the ordinary cost and save to the user about $19 per set.

Sparks-Withington Reports Good Business—"Business has never been better and the general outlook as bright," said President Sparks, of the Sparks-Withington Co., Jackson, Mich. "We have sufficient orders on hand now to keep us busy at least 90 days by working our entire force of 300 men at from 14 to 24 hours a day. Of course, the men do not work that many hours at one time, but per day and night shifts. Our home trade is excellent, but our foreign business is no less satisfactory, especially the business coming from Europe. A few days ago we received a cable order for 240 horns from Sweden and also a shipment went forward to Finland."

The Automobile Calendar

Nov. 2-6	Boston, Mass., Salon, Copley Plaza Hotel.
Nov. 3	Long Island A. C. Century Run.
Nov. 7-8-9	Los Angeles, Cal., Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 8	Philadelphia, Pa., Fletcher Cup Run, Automobile Club of Philadelphia.
Nov. 8-9	El Paso, Tex., El Paso-Phoenix Road Race, El Paso Auto Club.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 9-14	Atlanta, Ga., Fourth American Road Congress.
Nov. 12	Phoenix, Ariz., Track Race, Maricopa Auto Club.
Nov. 14-21	Providence, R. I., Show, State Armory, P. S. Clark, Mgr.
Nov. 16-21	Spokane, Wash., Show, Spokane Chamber of Commerce and the National Apple Show, Inc., G. C. Corbaley, Secretary.
Nov. 17-18-19	Harrisburg, Pa., Second Conference of Pa. Industrial Welfare and Efficiency, State Capitol.
Nov. 26	Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4	New York City, Annual Meeting of the American Society of Mechanical Engineers.
Dec. 12-19	Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.
Dec. 14-18	Chicago, Ill., American Good Roads Congress.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16	Philadelphia Show.
Jan. 11-16	Buffalo, N. Y., Show, Broadway Auditorium, Automobile Club of America.
Jan.16-23	Cleveland, O., Show, Cleveland Automobile Show Co., F. H. Caley, Mgr.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 23-30	Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb.	Portland, Ore., Show, Portland Auto. Trade Assn.
Feb.	Toledo, O., Show, Toledo Auto Show Co.
Feb. 15-20	Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27	Syracuse, N. Y., Show, Syracuse Auto. Dealers' Assn.; H. T. Gardner, Mgr.
Mar. 6-13	Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 7	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 9-15	Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

The Week in the Industry

Motor Men in New Roles

RECENT Changes in Indianapolis—Several changes have taken place in Indianapolis, Ind., trade circles. W. A. Roby, president, has bought the interest of his associate, H. L. Krieger, in the Electric Vehicle Service Station Co. W. W. Bond has been named by the Anderson Electric Car Co., Detroit, as district sales manager for the states of Indiana and Kentucky. L. C. Malott has been appointed manager of the William Small Co., distributors of the Chevrolet. D. B. Webster, formerly experimental engineer for the Hudson Motor Car Co., Detroit, has become assistant mechanical engineer for the National Motor Vehicle Co.

Downes Heads Locomobile Branch—F. H. Downes has taken charge of the new factory branch of the Locomobile Co., Portland, Ore.

Jones Resigns—W. G. Jones, until recently in charge of the service department of the Whitten-Gilmore Co., former Chalmers agent in Boston, has resigned.

Banta Sales Manager—H. A. Banta, who for some years past has been connected with Chanclor & Lyons Co., has joined forces with the Swan Carburetor Co., of San Francisco, Cal., in the capacity of sales manager.

Fickling Resigns—W. Irvine Fickling, for the past 4 years sales manager of the R. & L. Co., New York City, Eastern distributors of Garford trucks, has resigned and will shortly make an announcement of a new connection.

Adams Makes a Change—Al Adams, for 5 years manager of the used car department of the Joseph Donovan Co. in Boston, resigned last week to accept a similar position with the Auto Sales Co., on Worcester street, that city.

Bourne Double Fabric Manager—L. M. Bourne, for the past 6 years assistant production manager of the Goodyear Tire & Rubber Co., Akron, O., has been appointed factory manager for the Double Fabric Tire Co., Auburn, Ind. Mr. Bourne is an expert on rubber, and was in charge of the laboratories of the experimental department at the Goodyear plant.

Hayes Joins Pilot—E. O. Hayes, well known in the automobile trade through his former connection with the Midland, Velie and Imperial companies, is now traveling representative of the Pilot Car Sales Co., Richmond, Ind., in New England and New York.

Figman Indiana Truck Sales Manager—A. Figman, after 6 years' service with the Garford Co., New York City, has resigned to accept the office of sales manager of the Indiana Truck Co., Marion, Ind., with offices and service building at 250 West 54th street, New York City.

Fisher Chandler Branch Manager—John T. Fisher, well known formerly as a champion bicycle rider and later as an automobile driver, has been put in charge of the Chandler sales by the Northwestern Automobile Co., distributor in Minneapolis. Mr. Fisher has for three years been in charge of the Oldsmobile factory branch in Minneapolis.

Mass. State A. A. Election—The annual meeting of the Massachusetts State A. A. was held at Boston last week and President L. R. Spear, Vice-President John Coghlin and Secretary-Treasurer James Fortesque were unanimously re-elected. Reports were read by G. W. McNear, chairman of the legislative committee, and W. H. Chase of the good roads committee.

New Place for Gormley—G. B. Jeffery has resigned as advertising manager of the New England branch of the Firestone Tire & Rubber Co. at Boston, and he has been succeeded by C. J. Gormley.

Garage and Dealers' Field

Change in Paige—The Paige is no longer handled in Boston by the Nettleton-Crittenden Co. That firm also handles the Chandler and it decided to devote all its time to that make. So a new company has been formed by Sherwood Hall, Jr., formerly with the Cadillac and Hudson agencies, to handle the Paige, and he has leased the salesrooms formerly occupied by the Studebaker retail agency at 889 Boylston street.

Distinct Branch Now—The J. I. Case T. M. Co. has made the Boston branch of the company a distinct branch, taking it away from under the jurisdiction of the New York branch and placing it in charge of J. J. Gormley, formerly manager of the Lozier in that city. It will control the New England territory.

$120,000 in Sales in Winnipeg—A general feeling of optimism is noticeable in Winnipeg motor circles by reason of the big demand for new cars at the late date. The sale of new cars by Winnipeg dealers has reached a total of over $120,000 during the month of October. Many of the sales have been made to farmers.

Franklin Gets Out New Paper—The Franklin Automobile Co., Syracuse, N. Y., has come out with its first edition of the "National Cooling Record." The first edition is 100,000. The paper shows some interesting scenes along the routes of the recent low-gear tests of that company and also some scenes of historical interest, showing Franklin No. 1, built in 1902.

Houpt and Studebaker Exchange Places—The Studebaker Corp., New York City, has leased the five-story building, northwest corner of Broadway and 56th street, covering a 50 by 120-foot plot, for a service salesroom, at an aggregate rental of $300,000. This building was formerly occupied by Harry S. Houpt, who has now taken the former Studebaker building at Broadway and 59th street.

Maxwell's Omaha Service Station—The Maxwell Motor Sales Corp., of Detroit, has leased a building on Ninth and Jones streets, Omaha, Neb., where they will open up a branch service station. Charles Gould, of Detroit, manager of the service, has been in Omaha during the week arranging the deal. Omaha will be service headquarters for a large territory, comprising the states of Nebraska, Wyoming, South Dakota, Colorado, Idaho and a part of the state of Iowa.

Automobile Agencies Recently Established

PASSENGER CARS

Iowa

Creston	Cole	L. M. Butts
Creston	Moon	J. F. Russell & Sons
Conroy	Glide	H. E Geiger
Cole	Moon	P. W. Bronhard
Drakeville	Moon	J. W. Thompson & Sons
Decorah	Moon	Kijome & Lynne.
Des Moines	King	Holsman Sales Co.
Des Moines	Moon	Means Auto Co.
Eagle Grove	Moon	Wm. Pletcher
Fort Dodge	Saxon	Bell & Kitterer
Independence	Oldsmobile	J. H. Wright
Keesaugua	Moon	E. W. Peacock
Madrid	Briscoe	Jones Auto Co.
Newton	Moon	Woody Auto Co.
Orange City	Oldsmobile	Wm. Van Pelt & A. Van Pelt
Riceville	Oldsmobile	Roche Bros.
Riverside	Haynes	H. F. Griffith
Sioux City	King	E. A. Christianson & Co.
Sully	Haynes	W. H. Holdsworth
Waterloo	Moon	Burd Auto Supply Co.
Tama	Moon	Thompson & Graham
Webster City	Moon	Parkhurst & Lavender
Whiting	Oldsmobile	A. B. Elliott

Kansas

Holyrood	Moon	C. L. Baker
Kiowa	King	Geo. B. Wilson
Sylvia	King	G. A. McPherson Auto & S. Co.
Wichita	Haynes	Wahl Motor Car Co.

Kentucky

Covington	Haynes	Madison Motor Car Co.
Louisville	Oldsmobile	Kentucky Auto Co.

Louisiana

Alexandria	King	J. D. Fuselier
New Orleans	King	August Stef
New Orleans	Saxon	W. P. Parkhouse Auto Co.

Maine

East Millinocket	Haynes	Chas. H. Pennings
Eastport	Oldsmobile	David Blanchard
Fort Fairfield	Haynes	H. G. Richards & Son

Maryland

Berlin	Oldsmobile	Murphy's Garage

Massachusetts

Boston	Ford	Ford Motor Co.
Charlton	Haynes	Frank Knight
Springfield	Moon	Moon Motor Sales Co
Worcester	KisselKar	E. J. Kehoe

Michigan

Alpena	Oldsmobile	Alpena Garage
Alpena	Studebaker	C. F. Steele
Bay City	Saxon	D. K. McKerlie
Detroit	King	King Motor Sales Co.
Eaton Rapids	Saxon	A. E. Ranney
Holland	Overland	Westrate & Brouwer
Howell	Saxon	R. E. Silsbee
Jackson	Dodge Bros.	Buell Auto Co.
Lakeview	King	C. C. Bollinger
Kalamazoo	Saxon	H. J. Cooper
Lansing	King	Henry L. Andrus
Mancelona	Hudson	Frank Harding
Mt. Pleasant	King	A. Z. Campbell

Accessories for the Automobilist

HARTFORD Economizer—A 35 per cent. saving in fuel is guaranteed to Ford owners by the use of the economizer announced by the Hartford Suspension Co., 172 Bay street, Jersey City, N. J. A decided increase in power is also claimed. This new device, shown in Fig. 3, supplies superheated air to the mixture as it comes from the carbureter. The hot air is introduced through a flange fitting which has a series of radial openings around its circumference so that the hot air issues into the intake passage in small jets. The effect of this, it is said, is not only to heat the mixture but also to break it up and mix it thoroughly, thus making the mixture perfectly homogeneous. In other words, vaporization is aided in two ways, the heat turns any small particles of liquid gasoline into vapor while the mechanical action of the hot jets of air, impinging upon the mixture rushing through, churns the mixture up and makes it uniform.

The air is heated by passing it through a stove which is clamped to the exhaust pipe, as illustrated. The intake to the stove is at the lower left corner, and from here the air passes back and forth two and one-half times before it issues from the pipe which leads to the intake. The total length of the path through the stove is about 2 feet, and therefore it is seen that the air is well heated.

According to the company, mileage tests on a Ford car with an ordinary carbureter adjustment show that without the economizer the average mileage per gallon at speeds averaging 20 to 25 miles per hour is 20.1, and with the economizer attached, but all other conditions left the same, the mileage per gallon registers 27.7, a gain of 37.8 per cent.

There is a valve controlled by a lever from beneath the steering wheel which regulates the amount of hot air, and it is claimed that with the economizer valve wide open and the throttle closed the maximum speed of the car is around 25 miles per hour, and that up to this speed the car should be operated entirely by the lever controlling the economizer, the throttle being closed.

The attachment of the economizer is a simple matter. Outside of a hole which must be punched in the pressed-steel fitting holding the steering column to the dash and bored through the dash, there is no work that cannot be done with a wrench.

First, the carbureter is removed and the economizer flange slipped in place with a gasket on either side. Then the long control lever is bolted to the steering column at the top, and at the bottom it slips over the steering-wheel shaft and the spark and throttle rods. From this point an adjustable rod connects with the valve on the economizer.

The price of the complete outfit is $10.

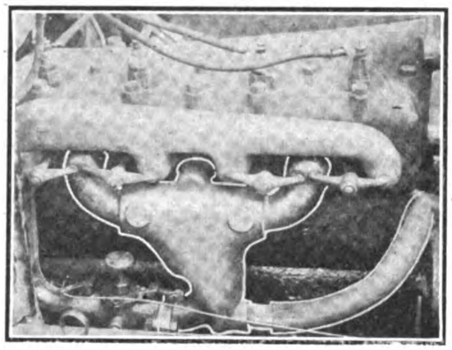


Fig. 1—Ford water-jacketed manifold

Spranger Wire Wheel with Demountable Rim—The feature of the wire wheel just announced by the Spranger Rim and Wheel Co., 705 Ford Bldg., Detroit, Mich., is that the rim is demountable and that any make of quick detachable rims may be used in connection with it.

The rim, Fig. 2, may be removed by loosening three bolts and no tool outside of any ordinary wrench is required to accomplish this. The rim is held in place by three sets of wedges, each operated by the bolts mentioned. As will be noted in the illustration, there are two metal blocks attached to the rim and when the rim is placed in the felloe, tightening the three screws draws up the wedge A which forces out the two arms B tightly against the two projections on the rim.

A further advantage of the new wheel, it is claimed, is that there is an air space between the felloe and rim which assists materially in carrying the heat off from the tires. It is also stated that the new construction is several pounds lighter and that it is necessary for the owner to carry a spare rim only instead of a complete extra wheel.

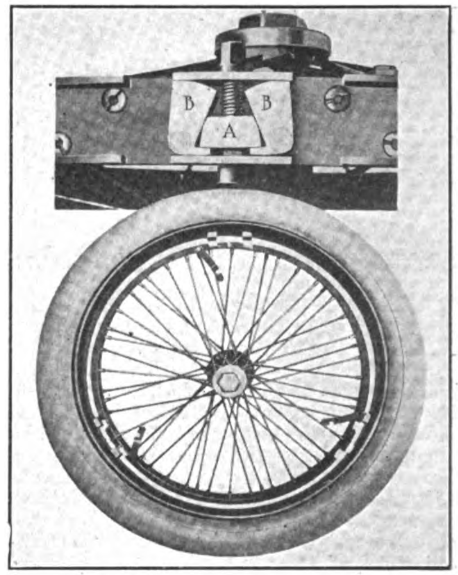


Fig. 2—Spranger wire wheel with demountable rim

Ford Water-Jacketed Manifold—Many advantages are claimed for the water-jacketed intake, Fig. 1, made by the Motor Devices Co., Mansfield, O., for Ford cars. According to the maker it not only gives a fuel saving of from 20 to 30 per cent., depending on the carbureter, but also gives increased power, speed and flexibility.

Gray & Davis Ford System.—A complete starting and lighting system for Ford cars, Fig. 4, has been brought out by Gray & Davis, Boston, Mass. Starting motor and lighting generator are distinct units, but they are compactly mounted in one casing, the motor being placed above the dynamo. In addition to these units a 6-volt battery, wiring, all the necessary connections and switches are included in the outfit.

Both units are connected to the crankshaft by means of silent chains. The motor is started by pressing a pedal and the lights are controlled by a switch

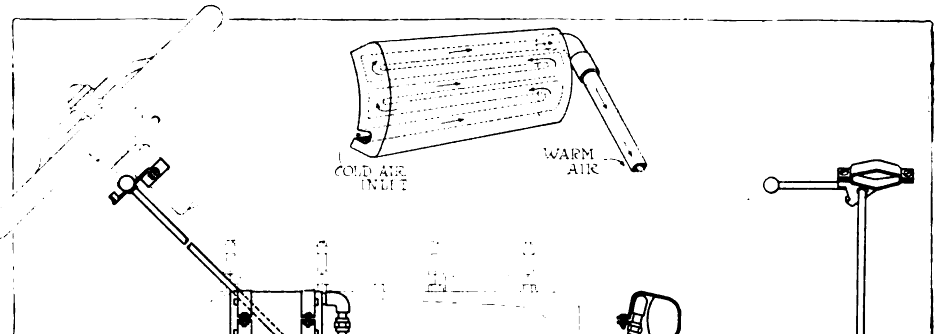


Fig. 3—Hartford economizer for Ford cars. Jets of hot air are drawn into the manifold. A 35 per cent. saving of fuel is guaranteed


THE
WILLARD
LBA
BATTERY

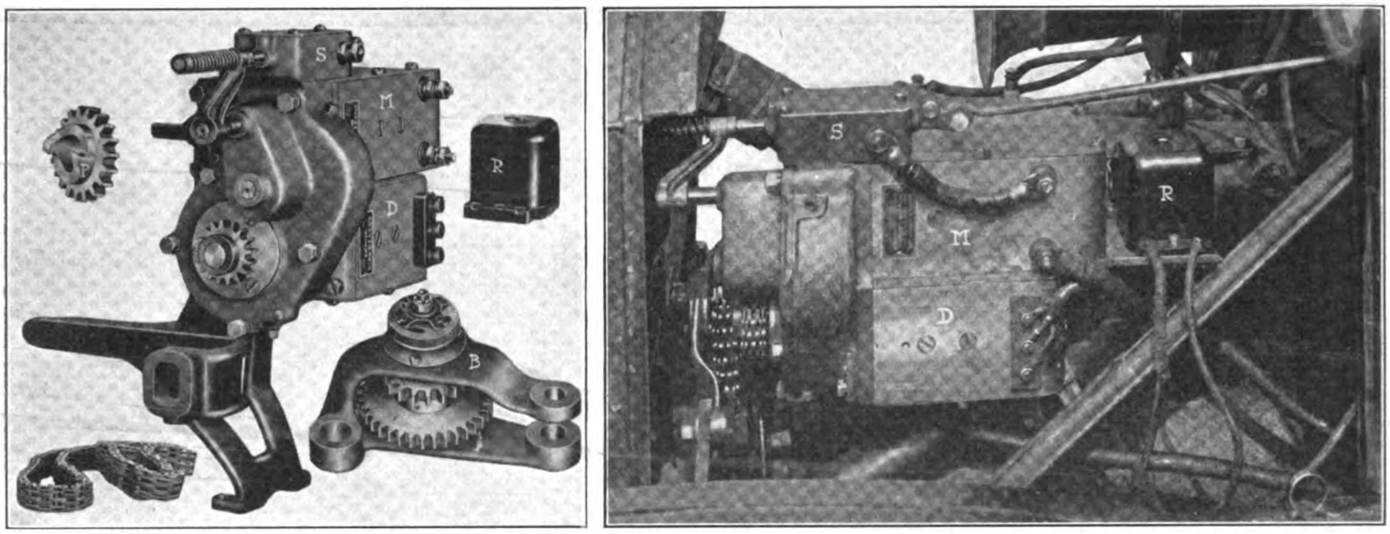


Fig. 4—Gray & Davis starting and lighting system for Fords. Right—System attached to Ford. Left—Details of system. R is the regulator, P the driving sprocket, B the bracket, M the motor, S the switch, and D the dynamo

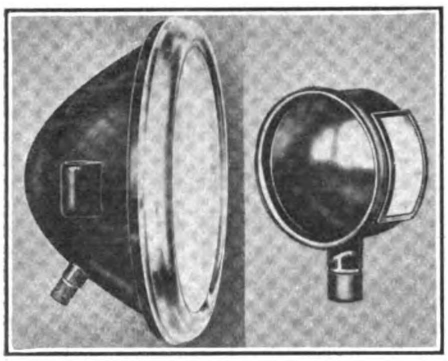


Fig. 5—Left—Gray & Davis Ford headlight. Right—Ford tail light

within easy reach on the dash. It is stated that the only attention required is occasional lubrication and addition of distilled water to the battery every 2 weeks.

To go with this new system this company is manufacturing electric head and tail lamps. These are shown in Fig. 5.

Thor Electric Drills—Four types of electric drills adapted for automobile repair work are manufactured by the Independent Pneumatic Tool Co., Chicago, Ill., under the name of Thor. These vary in capacity from 0 to 1-4, 0 to 5-16, 0 to 3-8 and 1-8 to 9-16 inches. The first is adapted for sheet metal work, drilling holes in frames, fenders and boring in wood up to 3-8 inch in diameter. The second size is used for the same work as the first, but it has a greater capacity. The third size is especially adapted for automobile body work, while the fourth, Fig. 6, is for general use in garages.

Ball bearings are used on the armature shaft and roller bearings on the spindle. The pinion on the armature shaft is removable. An improved type of switch is fitted, and the brushes are accessible. Any of these drills may be had for a 10-day free trial.

Compton Air Starter—An air-starter system, Fig. 7, is being put forth by the American Motor Utilities Co., New York City, which is featured by an automatic control which may be used in connection with any air pump maintaining the pressure at any predetermined point.

The starter unit is an air motor which has no dead center. It is stated that it develops a constant shaft torque of 3,200 inch pounds when operating under 100 pounds pressure.

Special care has been taken in designing the valves so that they will hold the pressure. All valves are brass seated when either open or closed, thus obviating stuffing boxes which may leak. All joints are ground brass unions attached to flaring ends of copper tubing, eliminating brazing and soldering.

The system is adaptable to big and little cars. The starter is installed at the side of the engine underneath the hood. Through the hollow starter shaft a smaller diameter shaft extends, from a sprocket wheel at the driven end, connected by silent chain drive to engine shaft, to a clutch at the driving end, which is brought into engagement with pump shaft and disengaged instantly and automatically as the air pressure falls below or is increased to predetermined points, respectively.

A pneumatically-operated roller bearing thrust clutch, provided with back-fire release, engages the air starter with shaft, driving or rotating the engine shaft the instant the starting valve is pushed downward. When explosions take up the propulsion the starter clutch is automatically thrown out of engagement, the sleeve shaft of starter remaining idle until the operation is repeated to again start the motor. The smaller shaft, passing through but not touching the sleeve shaft of starter, is brought into engagement with the pump shaft by the automatic control and restores the air pressure in storage tank to its maximum again, when the pump is automatically disengaged. The motor is started by pressing a button.

The air tank, which is 8 by 42 inches, may be located under the car. Sixty pounds pressure is all that is necessary to operate the biggest motors, but the maximum pressure generally carried in tank is 150 pounds for large cars and 80 pounds for cars of the Ford type. The automatic control is adjustable, so that it may be set in a moment to operate at any desired maximum and minimum pressures. An outlet at the pump, with hose connections, is also provided for inflating the tires.

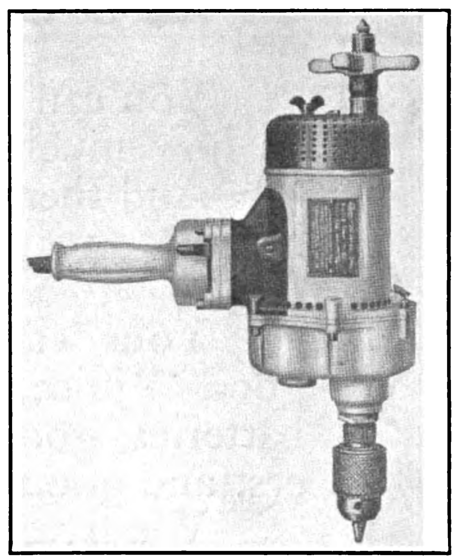


Fig. 6—One type of Thor electric drill

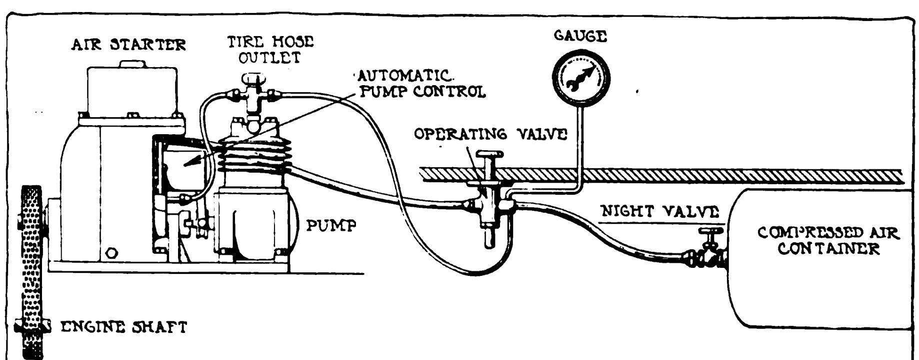


Fig. 7—Compton air starter installed on a car. Any make of pump may be used

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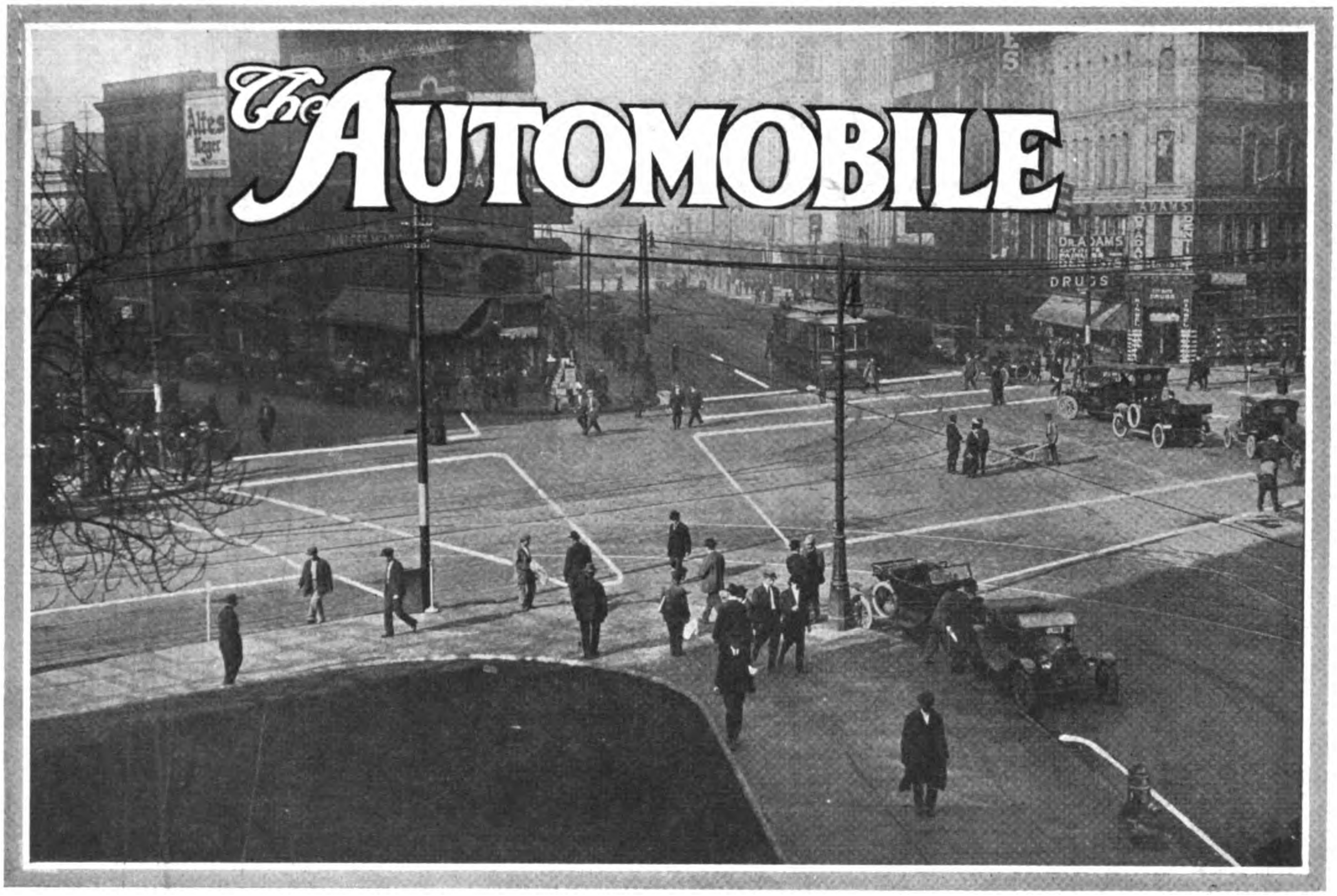


View in Detroit at Griswold, Lafayette and Michigan at 10 a. m., showing the tennis-court traffic lines

Tennis-Court Traffic in Detroit

Automobiles, Trolleys and Pedestrians Regulated by Chalk Lines

By Marc Braun

TRAFFIC runs along chalk lines in Detroit. When a man is said to "walk a chalk line," he is known to be well ordered, disciplined, regulated. Detroit's down-town streets are actually chalk-marked and automobiles, coal wagons, shoppers, messenger boys and tired business men are hop-scotching along the white boundaries from block to block in perfect order and without complaint.

The Neutral Zones

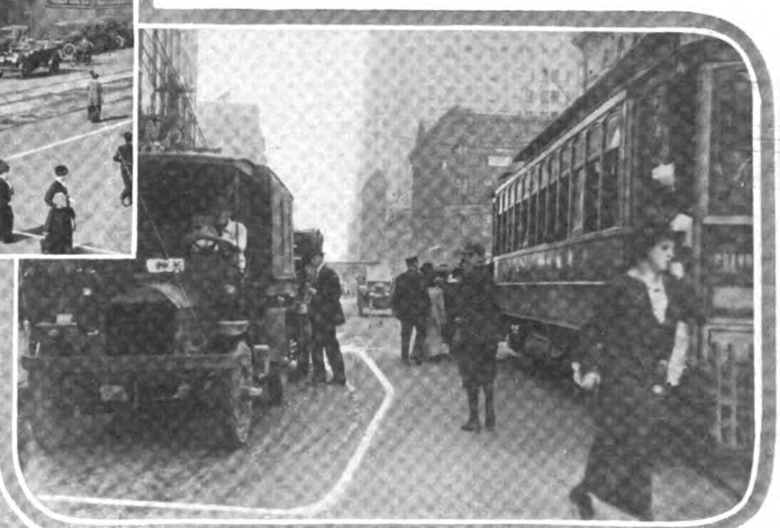
When you cross a street at a down-town corner, the lane in which you are supposed to walk from side to side is bounded by white lines on the pavement, almost duplicates of the lines marking a tennis court. When you get into the middle of a busy street to board a trolley car, there is marked out in white a safety zone for you to stand in and on the confines of which the heavy horse dray, the motor van or the bicycle must not encroach. At the fire hydrant are found the tennis-court lines declaring in silent tones the neutral zone on which you must not park your automobile, lest it interfere with fire apparatus in the event of a fire. Along the curbs in the down-town section are zones telling you where you can and where you cannot park your car. Along the curb at many places are conspicuous signs telling you to park your car "parallel to the curb" or "at an angle to the curb!"

There are more automobiles in proportion to area and population in Detroit than in any other American city. Also, there is only one main popular thoroughfare, Woodward avenue, leading into the heart of down-town Detroit. The congestion that

How the Tennis-Court Traffic

White Chalk Lines Mark Zones of Spaces for Automobiles—Prevents Jay-Walk

Pedestrian safety lane and street car safety zone on Woodward avenue and Grand River



One of the congested corners at busy times of day. Griswold, near State. Note the safety zone around trolley car

The system violated! Note signs forbidding parking of cars at this point

Above—Line-up at 1 p. m. on Griswold north from State. The car without driver in the street is a post office collecting vehicle

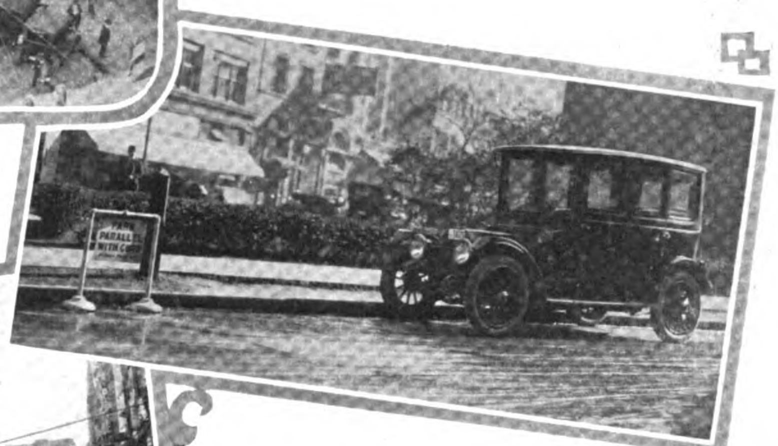
Left—Farmer street, on one side the library and on the other, two department stores. Naturally, this makes a very busy street. Note department store delivery cars

System Works Out in Detroit

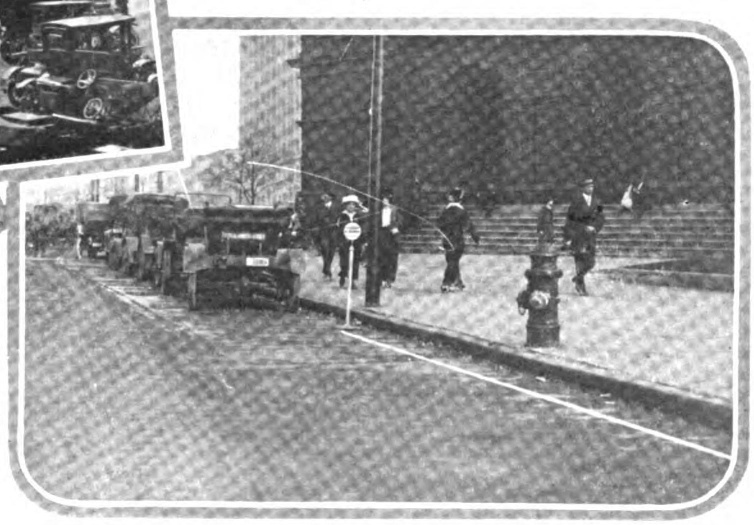
Safety for Pedestrians and Parking
System, Properly Operated,
ing and Driving

Criswold, in front of the Dime Savings Bank and the City Hall opposite at 10 a. m.

From a photograph taken at 10.30 a. m. on West Fort street, showing cars in front of banks

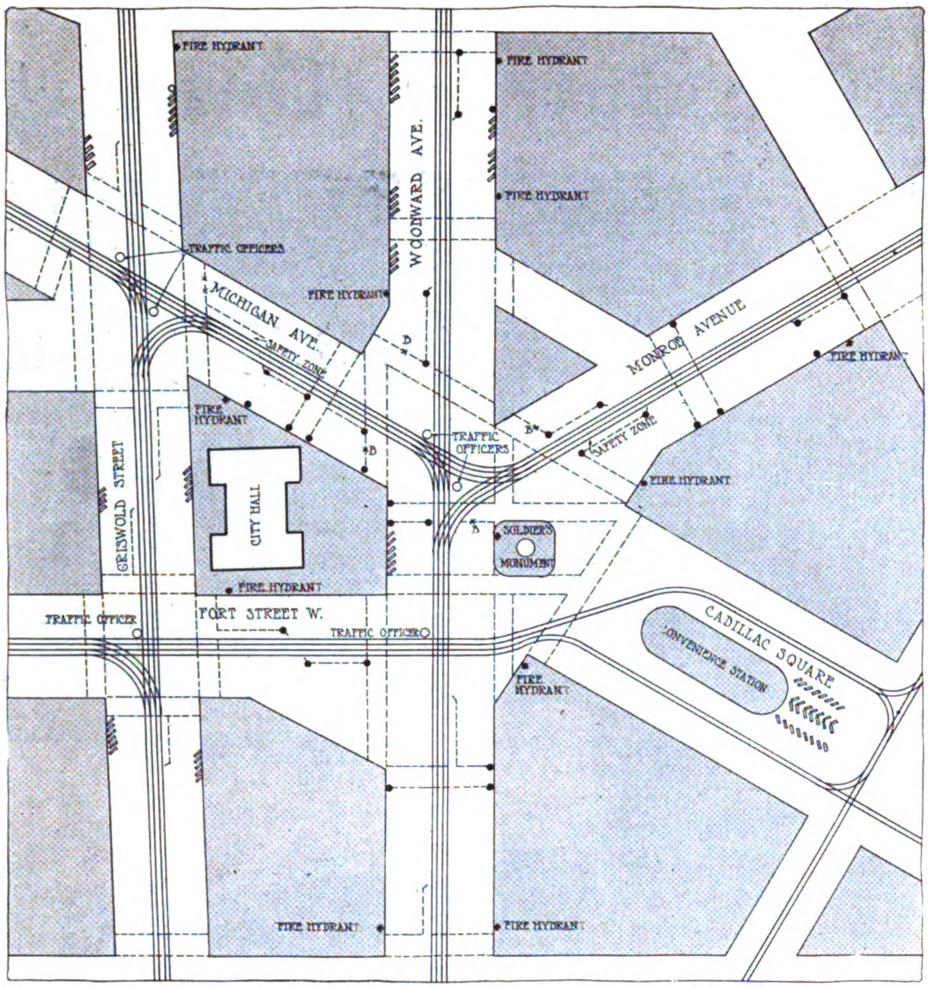


One of the warning posts distributed throughout the city indicating method of parking cars



Above—A view on Woodward avenue at 2 p. m., looking from State street. Note the cars parked diagonally to the curb

Right—How each fire hydrant is marked out with safety zone to insure ample space around it for the firemen to work in case of an alarm from that district



How the tennis-court system of regulating is laid out in Detroit, as exemplified by the central business district of the city. Traffic officers are indicated by rings. Black dots indicate posts supporting notice boards relating to parking of cars, etc. At the points B all automobiles and other vehicles must stop to await the traffic officer's signal to proceed. Note cars parked at the curbs. Also note crossing places and safety zones

results impelled an entirely new method of traffic government.

Tested first last June, the new system is now permanently adopted. Its approval by traffic experts probably will result in similar street markings in many other cities.

The marked lanes are supplemented by a variety of sign posts that not only are educational in relation to the new system but have the Safety First legend.

Rush-hour jams, jay driving and jay walking, and accidents at street car stopping points have been diminished by the new chalked boundaries.

The Tennis-Court Boundaries

The street-crossing lanes for pedestrians are generally 18 feet wide, the same width as that of the sidewalk, and the white lines of chalk extend from sidewalk to sidewalk.

At street car stopping places the white lines indicating the safety zones are 60 feet long or the length of one or two street cars. The line is drawn 6 feet from the car line tracks.

Along the outer white line of the pedestrian street crossing zones there are posts bearing the words: "Crosswalk—By Order" or simply the word "Walk" under a cross. At the end of the white line near the street car tracks there is generally a post bearing the words, "Safety First."

Parking Regulations

Near fire hydrants posts are generally placed either in front or on both sides of a white line and the words, "Hydrant—No Parking—By Order," are on it.

On those sides of the street where no cars must be parked or where they are to be parked only within certain space, there is generally one or several posts bearing inscriptions like these: "No Parking Allowed on this side of Michigan avenue," "Cars must not park within this space."

Near street car stopping places at street crossings automobiles and other vehicles may not be parked for a distance of 75 feet.

In front of public buildings, banks, theaters, one or more posts are generally in place on both sides of a space of 15 or 20 feet to permit people to alight from their car.

In the avenues or streets which are wide enough automobiles are parked obliquely while in most side streets along Woodward avenue they are parked parallel with the sidewalk.

On certain thoroughfares traffic is permitted only one way.

The various posts have the warnings painted in black upon white while the white safety posts have the words "Safety First" painted in red. All post warnings have the words: "By order of the Police Department," or the words, "By order" under the warning inscription.

The System's Area

The new traffic system, which at first took up only a few of the most congested business blocks in the heart of the business district, on Woodward avenue and some of the side streets, was quickly extended and now comprises a section of the city extending along Woodward avenue from Jefferson to Warren in length, and from Randolph to Shelby in width. This is an area having dimensions of fourteen blocks by four. A few other streets and sections of Woodward avenue having heavy traffic are similarly regulated.

At the present time fifty-four traffic officers are on duty daily on the streets within those blocks. Some start at 7 in the morning, some at 8, and while they work in shifts some are on duty till 8 in the evening in the business district.

Generally only one officer is at a street crossing, but there are places where two and more men are required. For instance at Woodward and State streets four traffic men are on duty from 4.30 to 6 p. m. At this particular crossing, it was claimed by one of the traffic men, more automobiles, street cars and pedestrians cross during the hours of 4 and 6 than in any other city in the country, with the possible exception of New York.

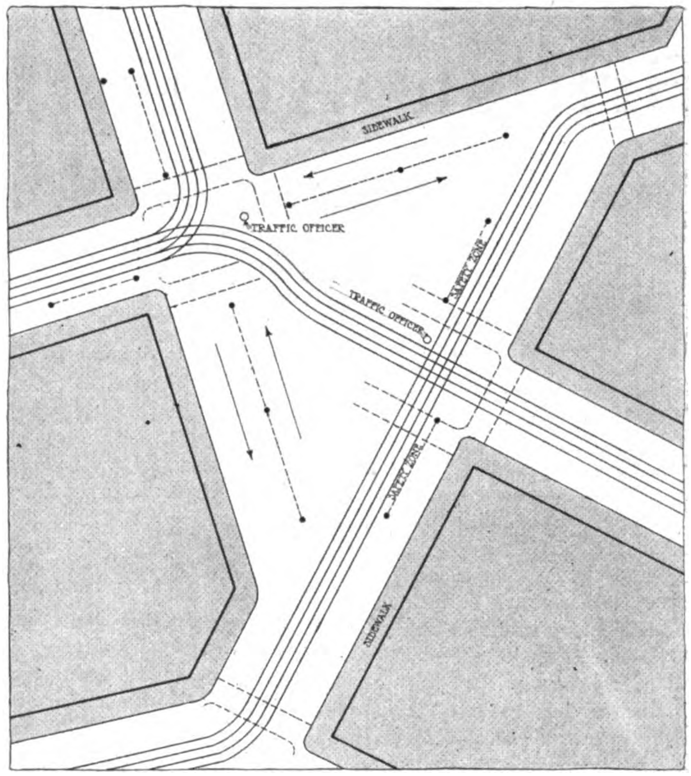
The one main thoroughfare to the business district, the theatres and the principal hotels is Woodward avenue. Practically all automobile drivers use it to come to their places of business and to drive home. Most of the side streets are rather narrow and poorly paved and have street car traffic.

Parking the Cars

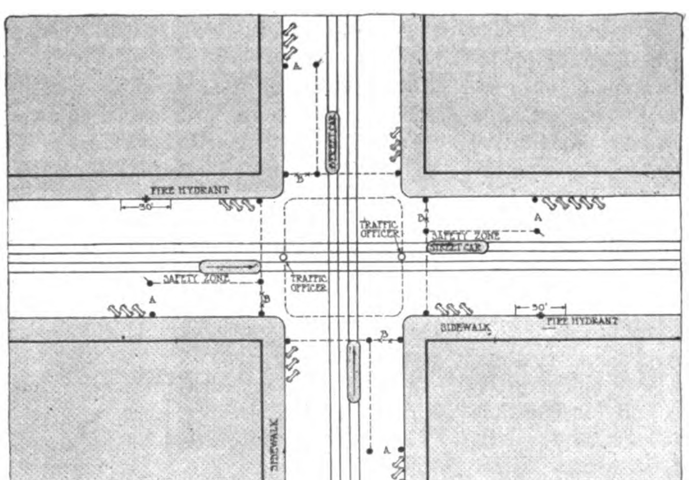
Most automobile owners or drivers leave their cars in the street in front of their building. Thus most of the streets have cars parked on both sides, sometimes parallel with the sidewalk and mostly obliquely with the sidewalk.

This oblique parking system has given excellent results as it permits about three times as many cars to remain within a city block than in the old way of having the car backed in full length against the curb of the sidewalk. To give an idea of the improvement a count was made of the number of cars actually standing along the sidewalk from Campus Martius to Grand Park Circus, on Woodward avenue, between 4 and 5 o'clock of a certain day. Within the four city blocks there were 190 cars parked, ninety-six on one side and ninety-four on the other side. These 190 cars took up a total space of 1,520 feet by being parked obliquely instead of one behind the other, in which instance the total space required would have been 2,280 feet. Thus the new way means a saving of 760 feet of space, or at the very lowest, the equal of two city blocks.

There are only twenty-one garages in the quarter-of-a-mile circle which starts from the city hall and which territory comprises 150 city blocks. Fully two-thirds of the 2,000 to 3,000 cars which are parked along the streets daily are found within less than twenty-five of these 150 city blocks. The twenty-one garages could accommodate 1,426 cars on a basis of fairly prompt service, which means that it would require an average of 5 minutes at least to get the car in or out. In some cases it would require fully 10 minutes.



How the triangular street intersections are treated in the Detroit tennis-court system of regulating traffic, showing crossing places, sidewalks and safety zones besides trolley car stopping places



A typical street intersection. No parking is allowed within the space indicated between A and B on each street. Method of parking cars, safety zones, posts of traffic officers and crossings are shown as well as fire hydrant zones

While, figuratively speaking, the 2,000 or 3,000 cars remain on the streets from about 10 in the morning till 5 in the evening, from 40 to 50 per cent. of these cars are used from time to time during the day by their owners and thus it would not be practical, on account of loss of time, to have them in garages.

City Statistics

The total number of automobiles now operated within the 42 square miles of city territory is estimated at between 21,000 and 22,000 according to the officials of the secretary of state's department. City officials say that the city now has very near 620,000 inhabitants and thus on the basis of 21,000 cars there is one automobile per thirty Detroiters and 500 automobiles to the square mile of city land.

When the new traffic regulations were tried for the first time most of the traffic officers did not believe that the people would give much attention to the broad white chalk lines at street crossings. Neither did the officials think that the safety zones at street car stopping places would be found real safety aids.

But from the very first day it seemed that all Detroiters understood the undeniable advantages of thus being provided with safety walking spaces or lanes, and pedestrians and drivers of horse and non-horse vehicles showed a decided disposition to "be good."

British Army Truck Efficiency

Organization Is Most Complete—Facilitates Food Distribution—Some Problems

By J. M. C. Rowley
Special to THE AUTOMOBILE.

PARIS, Nov. 1—Nothing approaches in efficiency the work of the ordinary motor truck in the service of the British Army Service Corps, the most thoroughly organized army service corps in the world. The work of those trucks is wonderful and the drivers no less ask to be praised. Back of the fighting line I have seen them tearing along those fine French roads fully laden, frequently entering into the line of fire having to pass gaps when the enemy's forces are not directly opposed.

That admirable distribution of food supplies which has been a characteristic feature of the allied army is immensely facilitated by the trucks running from post to post carrying provisions which are afterwards taken to the regimental base and from there frequently to the men in the trenches by orderlies who run great risk in so doing. I was wondering whether small armored tri-cars could be used for such field distribution, and discussed the subject with a sergeant, but he was inclined to think that across field work would be too heavy for them. It would be interesting, however, he admitted, to have such a small car designed with powerful motor and heavily armored.

More Armor Needed

I met three British armored cars this morning along the high road leading into Paris. The radiators were practically unprotected. Is it absolutely essential that the radiator should be directly in front of the truck or car? A distribution of air could be made by radiators placed at the sides, so that the front of the motor could consist of a solid steel plate.

Still, the radiator danger is minimized because it is very rarely that a truck or car would come face to face with the enemy's fire. A truck's principal duty in actual warfare is to link up the line of operations. In the present campaign the line is immensely extended and exceedingly elastic. It is the automobile that renders this possible. I am firmly convinced that such a huge front between two armies of such power as those of the German and the Allies could not be kept without the automobile.

As an actual instrument of attack the motor car is not being used. It was tried by the Germans in Belgium, twenty cars charging in line, but failed. It is very rarely that sheer weight wins in a charge against skillful opponents.

No Trucks in Paris

In this city I have seen no commercial vehicles of any kind, except one—engaged in ordinary commercial work. In fact, all commercial work seems to a very large extent, to have failed. A Frenchman connected with the motor business told me the other day of what a lot of trade had been done in automobiles by Germany with Russia, the Balkan States, Belgium, South America and Italy. Especially so was this the case in regard to Russia, and, if ever there was a big field now for motor vehicles *asking* to be captured, it is in Russia.

In France and England all private cars are being utilized—for very varied purposes. As ambulances their value is great, and 500 cars are to arrive immediately in France for the British Red Cross society. They enable the wounded to arrive at the hospitals three or four times quicker than by train. Again, the cars are being used to take convalescent soldiers for a ride when they are able to go out into the open. The American Red Cross branch is exceptionally well organized in connection with automobile conveyance.

The British officers are all one in praising the work of the automobile. Perhaps its practical value is greatest as a conveyance for orders, a mechanical aide-de-camp. I have been out three times with the Red Cross to the battlefields and noticed scarcely any ruined vehicles, so conclude that they do not operate in the immediate field of action, and they are very effective in operation, suffering very little mechanical trouble.

A wounded truck driver has told me how his truck, a 3-ton, was in operation practically all day, he and his comrade serving as shifts. It was used for conveying food supplies from a base to the camps. The conveyance over fields is difficult and the truck is of practically no value. Lately, too, the roads in the field of operations have been muddy and sticky with clay and it has been difficult to operate any trucks heavier than 3 tons. That capacity is found to be most universally useful. The solid tires are wearing well, although there is great tendency to pulp up in certain parts. The wear and tear on a solid rubber tire does not seem to be at all regular, bumps seem to break off, and some I have noticed in ruined condition, although the vehicles still bump along.

How Trucks Are Used

The quick retreating and advancing movements that have been a special feature of the present campaign have been made possible *only* by the motor vehicles. Infantry can cover 30 miles during the day easily, while the cavalry can move trebly as quick. But an army has always been retarded by its baggage; it clogs the wheels of movement and hangs like a millstone round its neck. Thus, the perils of short rations and ultimate starvation were always to be expected when large bodies of men were engaged in very quick movements over a large stretch of country.

The German army is extremely quick in movement, that is movement en masse. Yet without similarly adequate methods of conveying baggage and supplies, their operations would have been futile. The motor vehicle has given both armies the additional wing which enables them to pursue or fly, as the case may be, so swiftly.

It is hard to imagine with what an extremely difficult problem a quartermaster is faced in actual warfare. It is hard enough in mimic operations. But when life depends on the skill of his arrangements, its difficulty is accentuated to the extreme.

It is not permitted by the censor to name positions, but let me illustrate this by an actual example. Take the following diagram:

ABC represent the retreating army corps of the Allies.

DEF represent the attacking army corps of the enemy.

The ABC army till now has been attacking; and has always kept its base of supply well behind the center B. The army arrived at the banks of the river, but found the defenses very strong all along the opposite banks, so it was found necessary to retreat in the direction from which they had come, namely, that opposite to the arrow in the diagram. Accordingly the retreat commenced in a northeasterly direction, but to the northeast it was found to be impossible to proceed as it was necessary to concentrate all force with M on the further side of the river, faced by a large body of the defenders, N, subsequently the attackers. A retreated quickly to the base G, B advanced in front of base of supply attacked by E and F. D crossed the river, and swept northwards, threatening the rear of the base of the supplies by an attack on the right flank.

The commander at G had a most serious problem, and had it not been for motor vehicles it would have been impossible to save the supplies, and as a consequence the forces A and M would have been cut off, B and C perhaps effecting a retreat to the northeast. But the base G was able to move as quickly as the attacking force in flank D and sped in the rear of C, B waiting to protect the retreat. The base moved easterly along the river, C crossed and joined M and A and B took up a position of strength along the river bank. It was because they were able to move at a moment's notice their basis of supply and with equal celerity to the approach of the attackers that the army was then saved. It is when a base feeds numerous armies liable to be separated that the quartermaster finds difficulty.

Collecting the Wounded

Ford cars are much used, but chiefly as messenger carriers. Only big cars are of any use for the transportation of wounded. I saw one transport car loaded and loaded again with wounded all higgledy-piggledy, poor fellows! But taken as a whole, the arrangements for the wounded are excellent.

A certain number of automobiles usually arrive at a certain central position immediately in the rear of the seat of action, covering an area which is called the area of the field ambulance work. At the front of this there is a dressing station, or, rather a number of dressing stations, fed by the ambulance bearers from different points of the field. From the dressing stations the wounded are conveyed to a kind of clearing-house, where they are distributed to the general base hospitals, and it is here, of course, that the automobile is so useful. In former times it was along this route, often over a long distance, that many of the wounded succumbed, but the automobile links up the field with the base.

The front has to be cleared first. That is done in double-quick time. Now, there is little delay in sending the wounded to the base hospitals, the one place, of course, where proper aid can be given them. Many wounded seem to be arriving unwashed and with their wounds undressed, while men suffering from epidemics are frequently near to those not so afflicted.

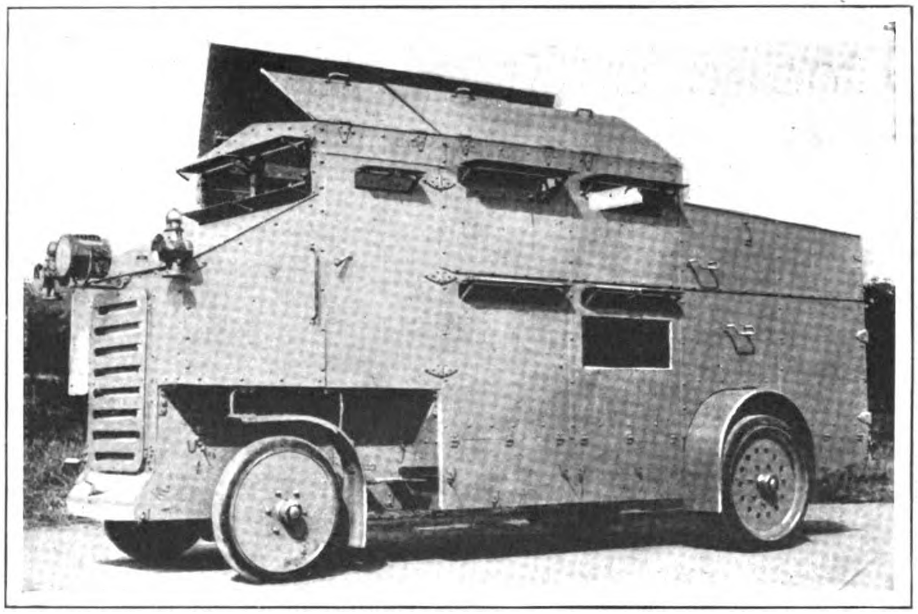
The German advance through Belgium on to the northeast provinces of France was one of the quickest movements ever executed in military history, being of tremendous extent in line and face to face all the while with an active and sheltered enemy. What was the principal agent in the German advance? What enabled that huge arm pivoted in Luxembourg to sweep with massive vigor against northeast France and crash toward Paris? What kept the regiment of that arm united? The motor vehicle.

The German army possesses a bigger, stronger and more thoroughly organized system of motor traction and inter-communication than the allied forces, and I understand that there are many thousands of vehicles ready at a moment's notice to take the place of injured cars, although the number of the latter is comparatively slight.

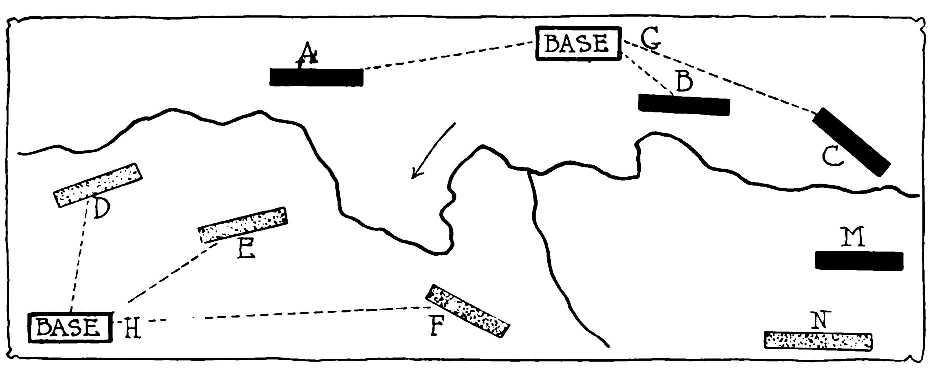
Russia has a huge fleet, but there is very little detailed news coming in from the Galician frontier, and I have not yet been able to secure any information relative to the immense work which must have been done by motor vehicles in the mobilization of the Russian army—a work, by the way, of wonderful celerity Their work will have to be suspended, however, during the coming winter as during this season the roads in this district are in many places impassable.

German Armored Cars

The German car for war work is much more often armored than that of the Allies. All the cars seem to have been commandeered touring cars fitted with plates of steel, protecting all the vital parts and frequently the occupants. I noticed several of these in Antwerp captured in action by the Belgians, some being those, it was said, used by the Kaiser in a mad motor charge full in the face of a pitiless fire. The machine didn't seem injured in any way and in most cases it was the driver who was shot before the car was damaged. He was supposed to be protected by a steel plate in place of the windshield, but this was ineffective protection, the side of the driver's seat being open and leaving the driver exposed to fire.



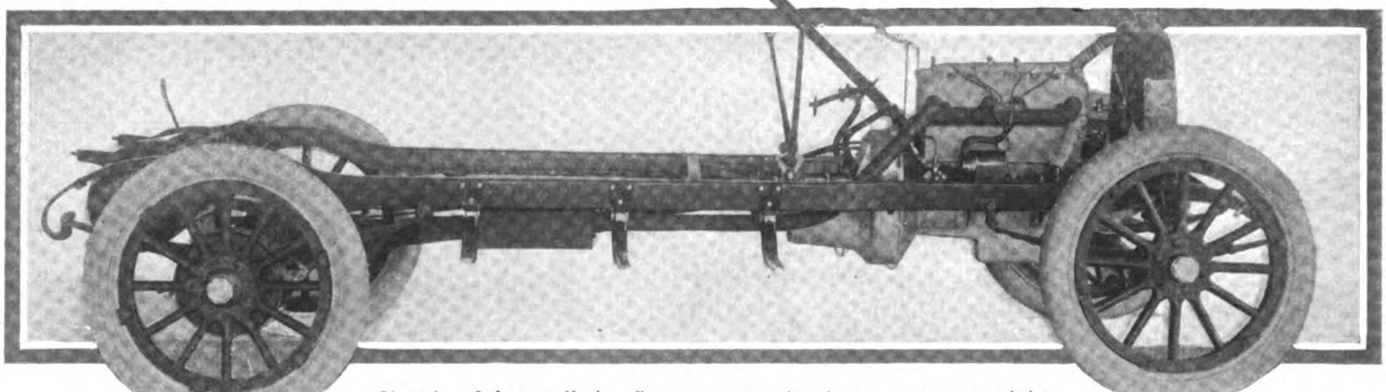
One of the German army's armored motor trucks which took a prominent part in the siege of Antwerp. Note the protected radiator



An illustration of motor truck operation on the field of war

Dodge Is Streamline Touring Car at $785

Block Four-Cylinder Motor 3 7-8 by 4 1-2—Five Passenger Body—Complete Electric System



Chassis of four-cylinder five-passenger touring car announced by Dodge Bros., Detroit, Mich., to sell for $785 with complete equipment

ALL the mystery about the Dodge Bros. contribution to the world of motoring has been cleared away with the announcement this week of the make-up of the car. Even the price speculation has been quieted, for it is set at $785. Furnished only in five-passenger touring form, the Dodge car is a streamline machine of sturdy mechanical construction. The specifications include a block-cast, L-head motor, 3 7-8 by 4 1-2 size; gearbox in unit with the engine; drive through a propeller shaft inclosed in a torsion tube to a floating rear axle; cone clutch; three-quarter elliptic rear springs; overslung frame; and left drive with center control.

The wheelbase is 110 inches, and tires 32 by 3 1-2 all around, the rear set being of the non-skid variety. Equipment is of note in view of its completeness, taking in such items as North East combination motor-generator set for cranking and lighting, Eisemann magneto, Jones speedometer, one-man top, rain vision and ventilating windshield to which the front of the top fastens, Willard battery, etc.

The body is a trim affair being an example of all-steel construction. Even the frame is of steel. Upholstery is of machine and hand-buffed leather. The body and bonnet are united without any disturbing lines due to the consistent slope of both cowl and hood, which is finished out with a radiator of the coped-over edge type. The fender construction is good, being of the oval molded type rounding into the splashers.

The cowl board arrangement shows that the instruments necessary in driving are placed a little to the drive side of the center. To the right of them is a small compartment with a lock which may be used for carrying gloves, etc. The instrument panel is of pressed steel.

The motor, S. A. E. rating of 24 operates with a compression pressure of 65 pounds per square inch. There is no question that this motor is amply powerful for the car, for with a ratio of stroke to bore of 1.16, it has a displacement of 212.3 cubic inches. When the car is running at about 10 miles an hour on high, the motor is turning over at 380 revolutions per minute.

Separate Cylinder Heads

The general arrangement of the motor is of the type in which the cylinder head is a separate piece, bolting to the cylinders. The intake passages are cored through the single-opening to the carbureter on the left to the intake ports on the right, the cored passages being between cylinders Nos. 2 and 3. The exhaust manifold is a separate casting with an opening individually from each cylinder. A single long plate incloses the valve mechanisms.

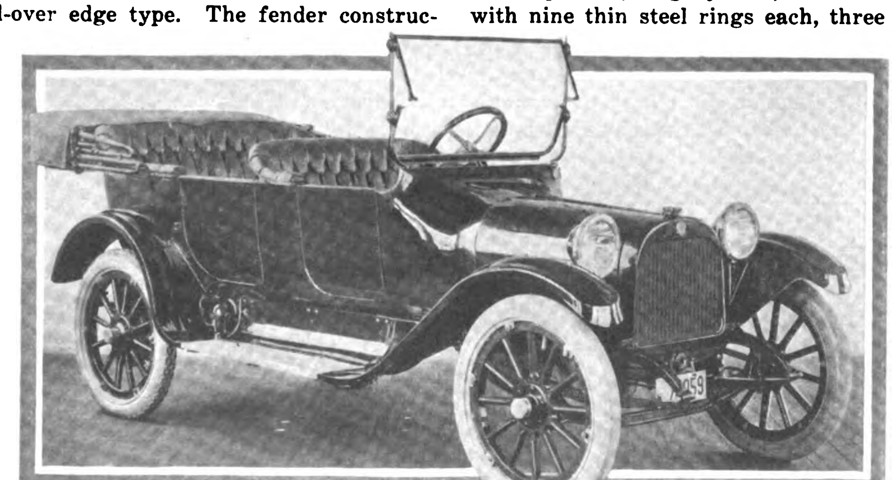
On the left is mounted the motor-generator in addition to the carbureter, and the magneto and water pump are placed on the right.

The suspension of the motor is three-point.

The Reciprocating Parts

The pistons, of gray iron, and 4 3-8 inches long, are fitted with nine thin steel rings each, three to a groove. Connecting-rods attach to the pistons by 13-16 inch pins held to the pistons by set screws, the rods bearing on them with 1 3-4-inch phosphor bronze bearings. The rods are vanadium steel drop forgings of usual H-section, and measure 9 1-8 inches center to center of bearings.

The crankshaft is of the same material as the rods and rotates on three brass-backed babbitt



New Dodge car, showing streamline five-passenger body, rounded-over edges on radiator, smooth doors, etc.

bearings. The rod bearings are of the same material. The crankpin diameter is 1 1-2 inches. The three main bearings are 1 5-8 inch diameter, and their lengths are 2 15-32 inches front, 2 1-4 inches center and 2 19-32 inches rear. Like the crankshaft, the camshaft is a vanadium steel drop forging and has the same number of bearings. It operates through steel timing gears housed at the front.

The valves, of 1 9-16 diameter in the clear, have vanadium steel stems and springs. Their lift is 5-16 inch.

Circulating-Splash Oiling

The oiling is by the circulating splash scheme which makes use of an eccentric pump driven by spiral gear on the crankshaft. It feeds oil through a pipe lying along the roof of the crankcase, this pipe being drilled to throw jets of oil into the troughs under the connecting rods and into pockets above the crankshaft and camshaft bearings. From these points the oil finds its way back into the oil pan where it is filtered and made ready for re-circulation.

Cooling is by a centrifugal pump driven at crankshaft speed and operating in conjunction with a six-blade pressed steel fan belt driven from the pump shaft, which is carried on an adjustable bracket to take up belt stretch. A 5-quart radiator of tubular construction with six rows of twenty vertical tubes each is the main cooling agent. The total waterjacket capacity is 2 gallons.

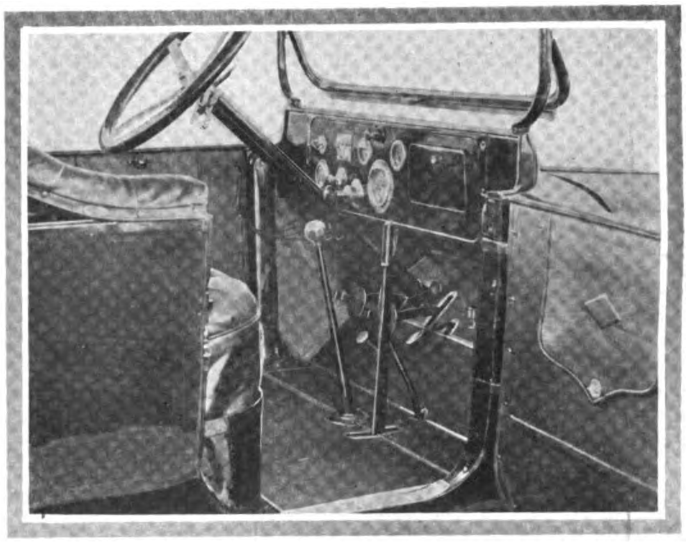
The ignition current is supplied by an Eisemann G-4 high-tension magneto of waterproof type. This is driven from the end of the pump shaft and it connects to a set of A. C. spark plugs with the firing order 1, 3, 4, 2.

Motor-Generator System

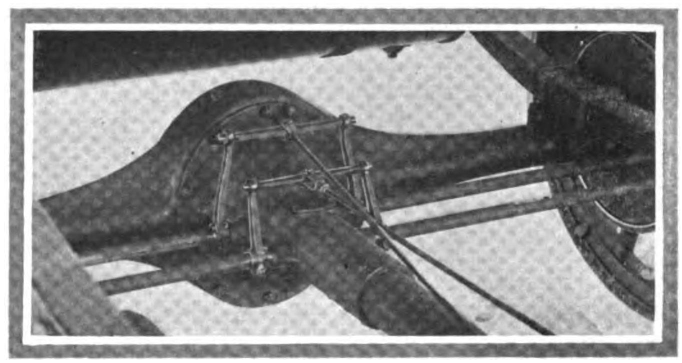
The combined motor-generator which takes care of all electrical requirements except the ignition is a North East 12-volt unit, mounted on the left forward side of the engine and driving through an inclosed silent chain from the crankshaft with a 3 to 1 reduction. It operates in the regular way either as an electric motor for starting or as a generator for charging the battery and lighting the lamps. The battery, carried under the left front seat, is a 12-volt Willard of 40 ampere-hours capacity.

The starter pedal is placed in the center of the toe board, and after switching on the ignition, it is only necessary to press this pedal to turn the crankshaft with a torque of 35 foot-pounds. After the starter pedal is released, the unit automatically becomes a generator.

Connection between motor and final drive is by a cone clutch having spring inserts under the leather facing. The cone has a mean diameter of 14 inches and the face width is



Driver's compartment of Dodge car, showing left drive and center control and instrument board



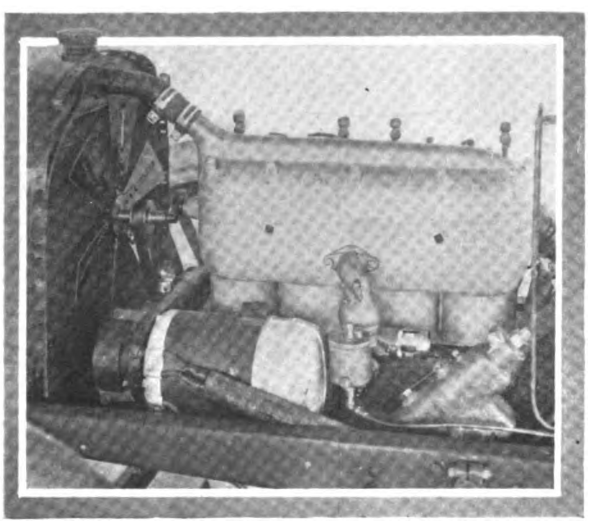
Dodge rear axle, showing torque tube carrying driveshaft. Note brake equalizers

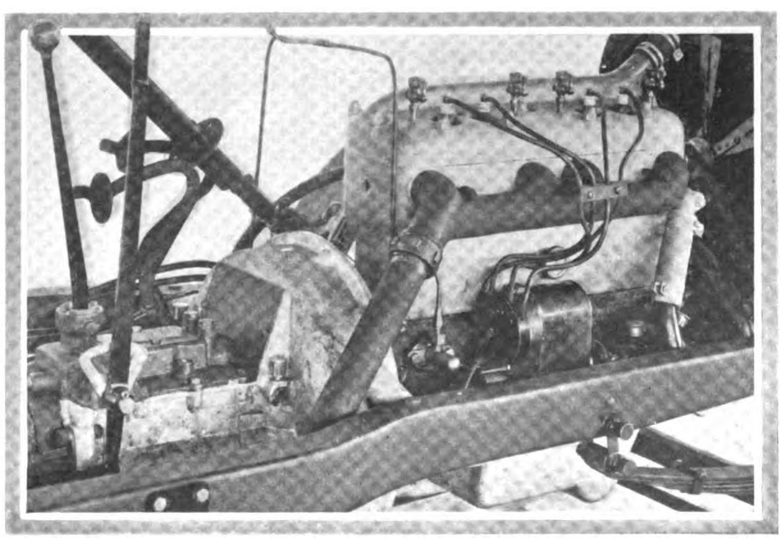
1 3-4 inch. It is inclosed within the integral extension of the gearbox which forms the flywheel housing and bolts to the crankcase.

The gearset is a three-speed, selective, sliding type, one which is unusual in that when on direct drive the countershaft gears do not rotate.

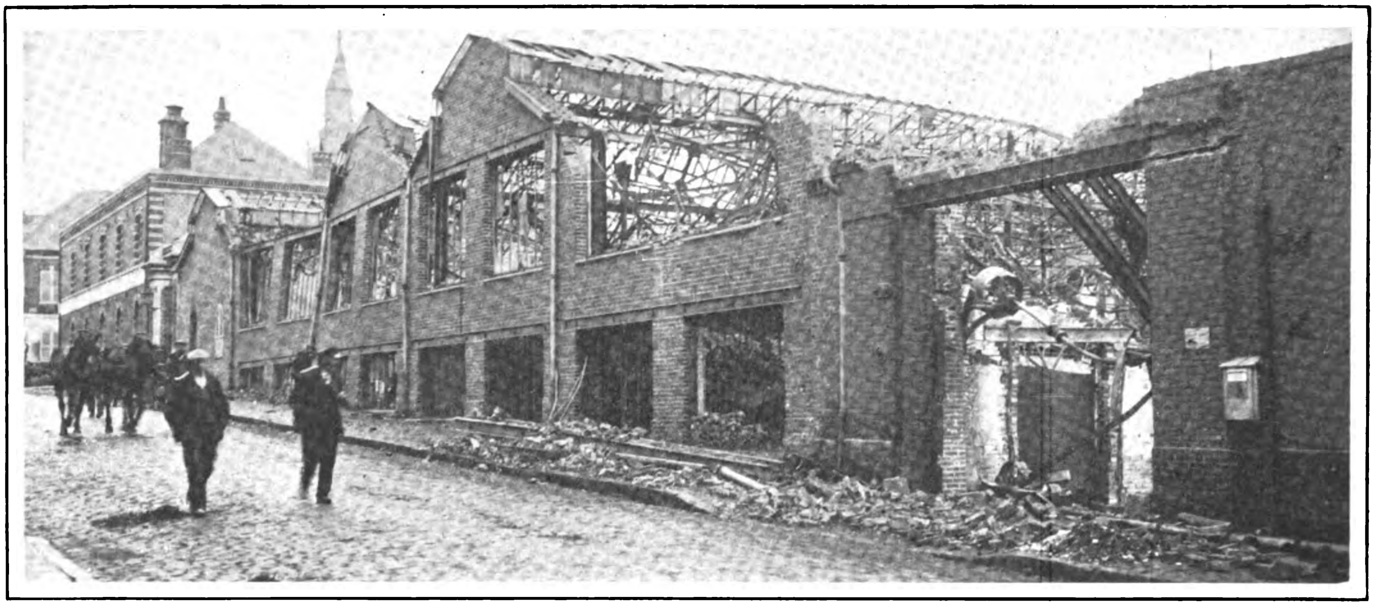
The train of gears driving the countershaft is shifted out of mesh when the dental clutch connecting mainshaft direct to power shaft is engaged. The gears are constructed of

(*Continued on page* 914)





Left—Intake side of Dodge four-cylinder block motor, showing mounting of North East electrical system. Right—Exhaust side of power plant, showing Eisemann magneto mounting



The Rochet-Schneider factory at Albert, Sommes, France, destroyed by the German army. The main plant is at Lyon and is safe

French Factories Suffer in War

One of Rochet-Schneider Plants Destroyed

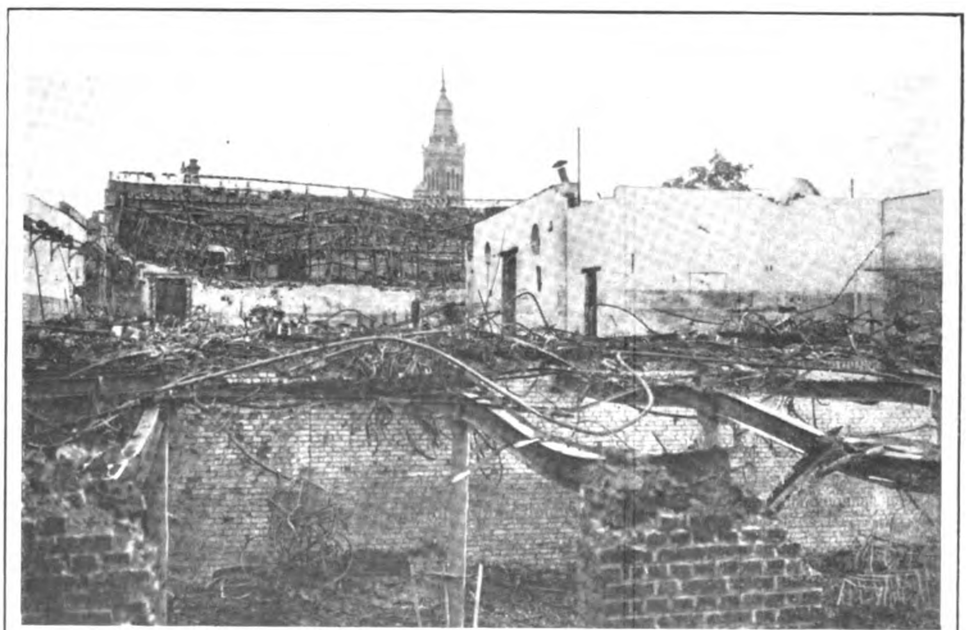
By W. F. Bradley

PARIS, Oct. 23—Owing to the severe censorship, travel restrictions, and the complete stoppage of all civilian automobile traffic, it is difficult to obtain accurate information regarding the fate of the factories allied to the automobile industry. Practically all these establishments—foundries, steel works, sheet metal works, etc., are in the north and northeast of France where the most severe fighting is taking place. Probably annoyed at their failure to get within striking distance of Paris, and the serious setback they received during and since the battle of the Marne, the German troops have made systematic attacks on French factories. If she cannot gain a military victory, Germany appears determined to crush the industrial development of France.

The Rochet-Schneider motor factory at Albert, in the Somme department, has been wantonly destroyed. Before entering the city the Germans shelled the factory, and on gaining possession of the town they completed their work by setting fire to the wrecked buildings. Blackened walls and twisted iron are all that remain of the works. The deliberateness of the attack is shown by the fact that the buildings around the factory have been spared and the conspicuous town hall, visible several miles away, has not been damaged.

Main Plant Is Safe

The main factory of the Rochet-Schneider company is at Lyon, well out of the military zone. The works at Albert are occupied largely with the production of bicycles and motorcycles and various accessories. In connection with the photograph of the wrecked factory, which was secured immediately the Germans were driven out of the town, it is interesting to note that the photographer was arrested on the suspicion of being a spy, was handcuffed and kept in prison for several hours. He was released and considerately treated by the French authorities on his identity being proved, but so thorough is the spy hunting campaign that the incident failed to excite attention or to call forth an excuse. Newspaper men and photographers in the war area must be prepared for this.



Another view of ruined Rochet-Schneider plant at Albert with town hall in distance

Directions for Oxy-Acetylene Welding

Specific Instructions for Welding Cast Iron, Malleable Iron, Aluminum and Alloys, Copper, Brass, Bronze, Etc.—Speeds in Work—Educating the Workman —Fluxes—Cutting Metals by Oxy-Acetylene Flame

By H. Sidney Smith
Engineer Prest-O-Lite Co., Inc.

INDIANAPOLIS, IND.—Editor THE AUTOMOBILE:—In the automobile field the savings that can be effected by acetylene welding are enormous. This industry provides welding with a unique field. The process is generally employed for repairing cracked cylinders, gear-cases, building up teeth on gears, repairing and reinforcing broken frames, constructing exhaust manifolds, etc.

As the process becomes more developed there is no doubt that it will be employed in the construction of motor cylinders built up from sheet iron parts welded together, especially in the case of aeroplane engines where light weight is an essential feature.

Flame for Hardening

The oxy-acetylene flame is now employed extensively for hardening the wearing surfaces of steel parts: it is applicable to such purposes as the hardening of the surfaces of gear teeth, template holes and in general to the local hardening of any small area upon a large piece, especially where case-hardening might cause distortion which it would be difficult to remove by grinding. The feature of the process is the quick transit of an intensely hot flame over the surface to be treated, so that it is raised in one continuous wave to hardening heat, and then as rapidly cooled as soon as the flame has passed, by the coolness of the remaining metal, leaving the surface at the maximum hardness the composition of the steel will allow. The hardening will be found to penetrate to a depth of about 1-16 inch.

In the tool room the process is found of service, especially in the construction and alteration of jigs, and economy in the use of high-speed steel can be effected by welding short pieces to lengths of inferior steel.

Blowpipe Welding

Oxy-acetylene welding is a process by which pieces of metal are melted and joined together by means of a flame of sufficiently high temperature, and additional metal of the same composition added if desired. The joint thus obtained is today commonly called an autogenous weld. As a matter of fact the weld obtained by forge welding or by the electrical process can be called autogenous, as use of a metal cement is not necessitated as is the case with a brazed joint. But it is general today to use the term autogenous weld only in connection with welds effected by means of a gas blowpipe.

Flame temperatures produced by the combustion of a fuel gas in air or oxygen depend on two factors, the calorific value of the fuel gas and the nature of the products of combustion. Taking the case of a fuel gas with a high calorific value burning to products of low specific heat, we have a flame of high temperature, but if the products of combustion have a high specific heat the flame temperature is lowered proportionately. As an example, suppose we burned sufficient hydrogen to produce a fixed number of heat units, and then burned sufficient carbon to produce a similar number of heat units; in the first case the product of combustion would be water vapor and in the other carbon dioxide (CO_2). Water vapor, however, has a much higher specific heat than CO_2; hence the temperature of the hydrogen flame would be low as compared with the carbon flame or fire, as the flames have to supply the heat to raise the temperature of the products of combustion.

Gas Characteristics

With the exception of hydrogen, all fuel gases burnt with oxygen in a blowpipe consist of carbon and hydrogen, and therefore their combustion results in the production of water vapor and carbon dioxide; the less the quantity of water vapor produced, the higher will be the flame temperature. It will, therefore, be appreciated that the gas having the highest percentage of carbon will produce the highest flame temperature. Acetylene (C_2H_2) has a higher specific gravity and calorific value than any of the commonly employed fuel gases; it contains but about 7 per cent. of combined hydrogen and is the nearest possible approach to gaseous carbon. Pintsch, natural, coal, Blau, water, and other fuel gases all contain 2 to 50 per cent. free hydrogen and also more hydrogen in combination. This hydrogen burns to water vapor, which, as before stated, has a high specific heat and will absorb heat and lower the flame temperature.

Oxy-Acetylene Welding

Oxy-acetylene welding was first practiced about 13 years ago. Previous to that time it had been fully appreciated that wonderful results would be obtained from using oxygen and acetylene in a blowpipe, but it had been found impossible to construct a blowpipe that would consume acetylene at low pressure. Acetylene under pressure then came on the market and the blowpipe difficulty was soon overcome.

At a later date, injector blowpipes were produced which permitted a low-pressure acetylene being employed. Experience has proved that the best results are obtained when acetylene is delivered at the burner tip under considerable pressure. Today it is usual to obtain acetylene from a pressure generator or from a cylinder of dissolved acetylene with any type of blowpipe, or to use an injector-type blowpipe drawing the acetylene from a low-pressure apparatus with excess of pressure on the oxygen supply to provide power to suck in the acetylene and deliver the mixture of gas to the blowpipe nozzle at a suitable pressure. However, there is no doubt whatever that in order to obtain economy and really satisfactory working, both gases should be delivered to the blowpipe under pressure.

One volume of acetylene (C_2H_2) requires theoretically 2 1-2 volumes of oxygen to burn it completely to its products of combustion, which are carbon dioxide and steam; but in actual practice it is found that 1.1 or 1.5 volumes of oxygen only have to be supplied to the blowpipe to 1 volume of acetylene, depending upon the nature of the acetylene supply and the blowpipe employed.

Qualities of Gas

Acetylene is an endothermic gas and immediately on issuing from the nozzle of the blowpipe dissociates or splits up into its two constituents, carbon and hydrogen. The carbon burns with the oxygen supplied through the blowpipe to form CO, producing the white flame at the nozzle. In order to form CO, equal volumes of acetylene and oxygen are required, but then another phase of combustion takes place; the CO burns to CO_2 and the hydrogen later combines with oxygen to form steam. If a blowpipe could supply an absolutely perfect mixture of equal volumes of acetylene and oxygen at its nozzle, the remainder of the oxygen required to burn the CO to CO_2, and the hydrogen to steam, could be extracted from the air. This has not yet been quite attained and in practice some of the oxygen required to burn the CO to CO_2, has to be supplied through the blowpipe, although as stated above, the best blowpipes produced today require only 1.1 volumes of oxygen to 1 volume of acetylene.

It should be understood that the hydrogen combines with the oxygen of the atmosphere only after it has passed away from the high temperature zone of the white welding flame, the temperature of which is about 6300° F., at which figure it is impossible for steam to exist, as it is far beyond its dissociation temperature. The result is that the molten metal is surrounded by free hydrogen, tending to prevent oxidation, the hydrogen also protecting the inner, or welding, flame from loss of heat.

Two Types of Equipment

There are today in the field two styles of welding outfits, commonly known as the high- and low-pressure systems. With the low-pressure system the acetylene is supplied from an acetylene generator which delivers gas to the blowpipe at a pressure of 2 or 3 ounces, and the oxygen is supplied under pressure in an ordinary trade cylinder. The low pressure of the acetylene supply necessitates the employment of blowpipes of the true injector type, in which excess pressure has to be used on the oxygen supply in order to suck in sufficient acetylene and deliver the mixture of gases at the blowpipe nozzle at a proper pressure. With this method it is more or less impossible to get perfect mixtures of the gases, and the oxygen consumption is undoubtedly higher than when both gases are supplied under pressure. A certain unsteadiness of the flame also has to be contended with. Notwithstanding its drawbacks the low-pressure generator system has one important point in its favor as compared with the high-pressure generator system, namely, that the insurance companies look upon it with much less disfavor.

The high-pressure system of oxy-acetylene welding may be sub-divided into two classes: first, the plant in which the acetylene supply is obtained from a generator which delivers and generates the acetylene gas under pressure; and second, those plants which employ cylinders of dissolved acetylene instead of the high-pressure generator. With both these styles of plants, any type of blowpipe can be employed, and as both gases can be delivered to the blowpipe under pressure, a nearly perfect mixture of gas can be delivered to the blowpipe nozzle, which is not the case when the oxygen only is delivered to the blowpipe under pressure, as in the low-pressure system.

High-pressure acetylene generators are looked upon with disfavor by all insurance companies, and in some cities their use is prohibited by the authorities on account of the many accidents which have occurred through their employment. They are, as a rule, designed to deliver the gas at a pressure not exceeding 15 pounds to the square inch. Under this pressure acetylene, if it has no air mixed with it, is not explosive, but at times the class of generators under consideration gets out of order, excess pressure frequently being the result. At 30 pounds pressure acetylene is explosive, and between 15 and 30 pounds its action is somewhat uncertain.

Using Dissolved Acetylene

Where dissolved acetylene is employed instead of a high-pressure generator, immunity in respect to accident due to excess pressure is obtained, due to the fact that the acetylene while under pressure is stored in a porous mass contained in the cylinders, which makes it quite impossible to propagate an explosion through it. Acetylene, when delivered from the generators always contains a small percentage of impurities which are, as a rule, ammonia, sulphuretted and phosphoretted hydrogen. These can be eliminated from the gas if proper purifying apparatus is installed with the plant, but this is very seldom done, with result that the gas delivered from the high-pressure generators always contains a small percentage of the impurities mentioned above. Any one familiar with the working of iron and steel will appreciate fully what will occur if molten iron or steel is brought into contact with the gas containing phosphoretted and sulphuretted hydrogen. When dissolved acetylene, however, is used, instead of a generator, this possibility is overcome, due to the fact that manufacturers of dissolved acetylene always wash, dry and purify their gas before compressing it into cylinders.

Impurities in Weld

Many tests have been made to find what effect the presence of phosphoretted and sulphuretted hydrogen has on a weld. A number of gasoline and gas containers were welded, some with unpurified gas drawn from an acetylene generator, and others with gas drawn from a cylinder of dissolved acetylene. All the welded vessels were tested under pressure, and it was always found that those welded with the unpurified gas did not survive as well under the test as did the others. It may also be noted that when impure acetylene is used the welding flame is colored and much more difficult to regulate.

Users of acetylene generators are apt at times to overload them, with the result that there is undue heating. This heating may cause polymerization, or breaking up, of the acetylene itself. The presence of this altered gas in the pure acetylene will cause changes in the welding flame which affect very seriously the work and necessitate the use of more oxygen than if the acetylene were in a pure state. A cylinder of oxygen and a cylinder of acetylene can be moved readily on a truck to any position in a shop desired, whereas an acetylene generator should be stationary, although there are today on the market various acetylene generators which are stated to be portable. These, however, are not really suitable for welding work, as they are too small to generate gas fast enough to feed the blowpipes without undue heating, which, as mentioned above, is not only dangerous but deleterious to the acetylene itself.

Making Oxygen

Very few users of the oxy-acetylene process manufacture their own oxygen, but purchase it from the large oxygen manufacturers. For commercial purposes oxygen is manufactured by either the liquid air or the electrolytic process and can be obtained in a state of comparative purity from either class of plant. Any impurity contained in oxygen manufactured by the liquid air process is mainly nitrogen, and while freedom from nitrogen is desirable a slight percentage is not fatal to good welding of iron and steel. However, should the percentage of impurities exceed 1 1-2 per cent. the welds will be somewhat porous, due to the absorption of the nitrogen by the molten metal.

The purest possible oxygen should, however, be procured for welding aluminum, copper and brass, as at high temperature these metals have a strong affinity for nitrogen. Any impurity in oxygen made by the electrolytic process will be hydrogen; excess quantities will reduce the flame temperature and of course necessitate the use of more oxygen in the blowpipe. Electrolytic oxygen, however, is generally supplied in a comparatively pure state.

Strength of Weld

The strength of a weld produced by the oxy-acetylene flame is, as a rule, less than that of the original metal unless certain precautions are observed.

This can easily be accounted for. It is rarely possible to obtain for filling-in purpose rods of similar material to that being operated on. It is common practice to use rods of high-grade Norway iron for filling-in. This permits of a sound, soft, homogeneous joint being made, but Norway iron has a low tensile strength as compared with the iron and steels of commerce that have to be operated on. This naturally weakens the weld as regards tensile strength. Tests have been given out from time to time which tended to show that steel plates up to ⅝ inch in thickness could be autogenuosly welded and that the weld was stronger than the original plate. This is impossible unless the material used for filling-in be of higher grade than the plate itself.

A claim of 100 per cent. weld strength is unsupportable. Practice has shown that with thin steel sheets, say, ⅛ inch thick, one can get a weld strength of 95 per cent. and that this figure falls to 85 per cent. for 1 inch thick plates. However, in most cases where welding has to be carried out there is no objection to adding a fillet of metal along the joint or using special high-tensile-strength steel for filling-in, when the welded portion can be made to equal or exceed the strength of the rest of the work.

Skilled Men Needed

Satisfactory results will never be obtained unless skilled workmen are employed to operate the blowpipes. It does not take very long for an intelligent workman to become a fair welder on straight-ahead work on steel plates and similar classes of work which does not exceed ⅜ inch in thickness. To weld metals under ⅛ inch thick requires considerable skill, which practice alone can produce. It takes considerable time for a beginner to attain the necessary steadiness of hand to make a neat weld and avoid piercing the plates. On this class of work buckling difficulties also have to be contended with, but experience soon shows how to overcome them.

Skill in Thick Material

To weld work over ⅜ inch thick takes very considerable skill, and honesty on the part of the operator is indispensable. It is impossible to judge the quality of a weld by merely examining the work after completion—it may have a good appearance and yet be poor work; that is to say, if the plate were fractured at the weld it might be found that the proper fusion had not taken place right through the section and a proper homogeneous mass produced.

The skill necessary to undertake this class of work should be attained after a few weeks' practice. Men employed on it should never be hurried; otherwise poor work will result. Piece-work should never be considered under any circumstances. Welding on thick plates is as a rule connected with work of importance; a faulty weld may have serious results; consequently unless the workman can be trusted, careful watching during the welding process is essential, as that is the only time when the bad work can be detected.

Anyone watching the welding process for the first time comes to the conclusion that the operation is very simple and that any workman can operate the blowpipe with little or no practice. This has been a somewhat serious handicap to the industry, as enthusiasts after seeing the process have purchased an equipment and then without any preliminary practice attempted to use it on work of some importance; of course, failure has been the result in most cases and the blame laid not to the operator but to the process.

Skilled Welder Essential

Oxy-acetylene welding must be considered a trade; a skilled welder is just as much of an artisan as the ordinary blacksmith. This has been appreciated fully in Europe, where welding schools are located at all important centers, and men are thoroughly instructed in the process; after leaving the schools they are placed out on probation in shops where the process is in general use; if, after a period, they have attained the necessary skill they are granted a certificate. Manufacturers will rarely employ a man for welding work who does not hold a certificate from one of the schools.

Cleaning the Parts

One of the chief points to be borne in mind, if oxy-acetylene welding is to be carried out successfully, is that very careful preparation of the work is necessary. The parts to be welded must be free from rust and grease.

When making butt or end-to-end welds on plates, it should be certain that the work is cut true. Plates over ⅛ inch thick must, when a butt joint is desired, be beveled and the opening across the top of the V should at least equal the thickness of the plate so as to make possible the metal being welded throughout the entire thickness of the plate.

Plates over ¼ inch thick should be beveled if possible on both sides; also welded from both sides.

Many workmen will try to weld plates up to ⅜ inch thick without beveling, but a poor joint is invariably the result, mainly due to burning of the metal, caused by too lengthy application of the blowpipe flame.

The welding together of plates of different thickness is somewhat difficult, but not by any means impossible; in most cases where this has to be done some special manipulation can be devised to make the job practical.

Welding Speed

The following table shows the speed at which the welding of steel and iron plates can be carried out; also the necessary acetylene gas consumption:

Thickness of metal Inches	Run Per Hour Feet	Acetylene Per Hour Cu. Ft.
1-32	30	3.25
1-16	25	5.00
3-32	20	8.25
1-8	15	12.00
3-16	9	18.00
1-4	6	25.00
3-8	4	42.00
1-2	3	60.00

The oxygen consumption will be 1.1 to 1.5 times the acetylene consumption, depending on the quality of the blowpipe employed. As would be expected for metal over ⅜ inch thick the gas consumption per foot run of work increases rapidly, and the speed at which the work can be done falls. This leads one to conclude that for constructional work 3-8-inch metal is about the thickest that should be worked, except in cases where older methods, such as riveting, are impossible. For repair work the case is altogether different; metal of any thickness can be worked, and in almost all cases the repairs effected will be made more quickly, better and more economically than by old methods.

Relieve Internal Strains

In every case of welding internal strains are inevitably set up, due to the metal expanding when heated and contracting when cooling. When the parts welded form part of a structure and are restrained during the welding process, the strains produced may cause cracking of the metal, especially in the case of cast iron; and the tendency to crack will be greatly increased if the cooling of the metal, after fusion, is rapid or irregular.

Whenever local strains exceed the strength of the metal, a fracture must occur.

In order to relieve welded metal from internal strains due to welding, it is desirable to preheat the whole work, before welding, and also to reheat it after the welding is completed. In the case of cast iron in a restrained part of a structure this treatment is imperative; the heating should be carried on slowly and the work kept free from air-drafts. This treatment is less essential for steel but can never be anything but beneficial.

Welding Cast Iron

To one not acquainted with the process, the welding of cast iron appears to be more difficult to accomplish than work in steel or wrought iron, but such is not the case. Carbon exists in cast iron, in different states; in what is called white iron, which is very hard, the carbon is combined with or dissolved in the iron, but in gray iron, which is soft and easy to work, most of the carbon is in a free state in the form of graphite. Since it is generally necessary to work a weld in cast iron, it is indispensable that the line of welding be constituted of gray iron.

The obtaining of welds of gray iron depends on the state of the carbon in the metal. Rapid cooling tends to bring about the combination of the carbon and iron, that is to say, the formation of white iron. Slow cooling or reheating after the welding is completed tends to bring about the precipitation of the carbon and the production of a softer material.

It is found by employing silicon in the filling-rod in the form of ferro-silicon, the iron combines with the silicon in preference to the carbon and allows the carbon to take the form of graphite and thus facilitate the formation of gray iron.

The presence of manganese has exactly the opposite effect. It will be seen that in order to get good workable welds there must be slow cooling after the welding is completed. The filling-rod must contain a percentage of silicon, and there must be no manganese present.

Flux for Cast Iron

The welding point of ordinary cast iron is lower than that of iron or mild steel and lower than the melting point of iron oxide; therefore, if any oxides are formed during the welding process they cannot be melted and blown away by the flame as is the case where iron or steel is fused, when this can be done, due to the fact that the melting point of the steel is higher than that of the oxide. It will, therefore, be seen that when welding cast iron it is necessary to employ some flux to break down any oxides formed. When working on thick cast iron the parts to be joined should be beveled as for steel.

Avoiding Breaks

Cast iron is a comparatively poor heat conductor, and has no elasticity or elongation before rupture. It is therefore necessary to appreciate that when welding it expansion and contraction may bring about breaks if the parts oppose free play of the metal, and special precaution must be taken to prevent this. When the size of the piece to be welded allows complete preheating of the whole and slow cooling, breaks or cracks are not to be feared, but with large castings where total preheating is impossible, the welder must exercise thought as to how he can overcome the effects of expansion and contraction by heating other parts of the piece away from the welding point.

The welding of malleable iron is a somewhat difficult and uncertain operation. Malleable castings are supposed to be of the same texture throughout, but in some cases consist of a core of cast iron surrounded by a layer of iron. It will be appreciated that between the surface of the casting which is nearly free from carbon and the core which is cast iron, there exists a more or less carbonized zone. In some cases where castings have thin parts which are properly decarbonized and the fracture is in the thin part, the welding can be carried out just the same as in mild steel. In the thick part of a casting, however, it is different, as the metals of the core and the surface are not the same and require altogether different treatment.

Aluminum Field Large

The welding of aluminum by the oxy-acetylene process provides an enormous field. Those attempting the work for the first time are apt to be discouraged by their failure, which is common until a few little points have been mastered.

The melting point of pure aluminum is about 650 degrees Centigrade, and the metal is very fragile in the near neighborhood of this temperature. It is the low melting point combined with high conductivity and specific heat that makes welding difficult for the beginner. The high melting point of the oxide (alumina) as compared with that of the metal itself has to be contended with also.

To insure good welds the work must be absolutely clean. To remove all traces of oil from an old aluminum casting takes considerable time; this is best done by heating slowly over a charcoal fire and carefully wiping the oil away as it exudes from the metal. The welding or filling-rod employed on pure aluminum must also be quite pure, as the introduction of foreign elements may bring about disintegration along the line of welds.

The low melting point of the metal necessitates skilful manipulation of the blowpipe, although a hot and fairly large flame is necessary on account of the high conductivity. The oxide formed during fusion does not necessarily rise to the surface as it is denser than the metal; it is therefore essential to use a proper flux. It might seem that deformation of castings due to expansion would be difficult to overcome, but such is not the case in practice, as the high conductivity of the metal tends to distribute the heat over the whole mass. When preheating a casting before welding, care should be taken not to raise the temperature to over 500 degrees Centigrade; otherwise it may deform under its own weight.

The welding of aluminum alloys, particularly aluminum zinc, is more important than the welding of the pure metal, as most castings are made of this alloy. The percentage of zinc varies as a rule from 10 to 30 per cent., and copper is generally present in small quantities. It is impossible to know the composition of all aluminum alloy castings that come along for repairs; therefore it is necessary to use a filling material that will be generally serviceable. Rods made up of 88 per cent. aluminum, 10 per cent. zinc, 2 per cent. copper, give good results.

Aluminum alloys are not very ductile; hence trouble from expansion and contraction must be guarded against. Some castings have ribs which tend to produce cracks during cooling and in some cases it may be necessary to cut the ribs to allow for the necessary expansion and contraction. These can easily be welded up later.

Good Work in Copper

Until quite recently the successful welding of copper was considered impossible, but this was due to the fact that welders were ignorant of the disturbing factors which contributed to poor results and took no steps to counteract them. It is easy to make a joint that has the appearance of a good weld, but a full knowledge of the nature of the metal and how it should be treated is required before welds can be made that not merely look good but prove under test to be as strong and malleable as any high-grade copper.

To obtain good results special filling-in-rods must be used; the best results are obtained with phosphor-copper rods which are specially manufactured for welding work. It must not be thought that any phosphor-copper is suitable; the amount of phosphorus must be just enough to do the work required of it and no more.

A good flux to employ when welding copper consists of a mixture of salt, borax and boric acid, but should be used sparingly.

After welding the work should be reheated and hammered along the weld, again reheated, and if possible plunged in water. Copper when heated radiates its heat very rapidly, and as it is also an exceptionally good conductor of heat it is found that the heat of the blowpipe alone when dealing with large masses of copper is not sufficient to keep up the fusion; therefore additional heat supply should be provided and as much of the work as possible covered with asbestos to prevent radiation.

The employment of phosphor-copper as a filling-rod prevents the formation of copper oxide, which in excessive quantities renders a weld extremely fragile and weak, although a small quantity of this oxide is not detrimental and is considered by some to improve the quality of the metal. Molten copper will dissolve hydrogen and carbon monoxide in considerable quantities and when the metal solidifies the gases are evolved. This causes a frothing of the metal in solidification, the resulting metal being spongy. Unfortunately the gases present in the blowpipe flame are those on which copper exerts its solvent property, but the use of phosphor-copper prevents this, the phosphorus either suppressing their solution or aiding their evolution before the metal solidifies.

Copper has a high coefficient of expansion; the consequence is that in cooling considerable stresses may be set up due to contraction, and as coppper has very low tensile strength these, unless counteracted, may cause fractures; but precaution can be taken to prevent this and as a rule the contraction stresses can be nullified by opposing them by means of local heating applied to certain parts, dependent on the shape of the article, or by proceeding with the welding on a certain plan.

Brass Welds Easy

The welding of brass is quite simple, although it would appear at first sight that evaporation of the zinc would be detrimental. This difficulty is overcome by the employment of special welding rods containing a small percentage of aluminum.

A good flux to employ when welding brass consists of a mixture of sodium-chloride, borax, and boracic acid. Hammering of brass after welding considerably improves the metal. It should be done cold on brass with a high percentage of copper, and hot on brass with a low percentage of copper. After cold hammering the brass should be annealed.

Neutral Flame in Bronze

The welding of bronze requires that the welding flame be quite neutral. Special welding rods have to be used, containing a percentage of phosphorus in proportion to the nature of the bronze. A similar flux to that employed in brass may be used. Annealing after welding is essential.

Metal Cutting by Flame

It is probably not out of place to refer to the development of metal-cutting by means of oxygen. The blowpipe used for cutting metals by oxygen generally consists of an oxy-acetylene blowpipe fitted with a central following jet for oxygen only. The work that has to be cut is first of all heated up by means of the oxy-acetylene jet, and as soon as it is raised to a temperature at which oxygen will ignite it, the separate oxygen jet is turned on, and the metal at once burns away very rapidly.

The oxygen supply has sufficient pressure behind it to blow away the oxide as it is formed, with the result that a clean, narrow cut can be made through plates up to 12 inches in thickness and over. The speed at which this work can be done is high, varying from 100 feet per hour for metal 1-4 inch thick to 12 feet per hour for metal 12 inches thick; the oxygen consumed in this process varying from 0.50 cubic feet per foot run in 1-4-inch plates to 50 cubic feet in 12-inch plates.

The users of the oxy-acetylene welding process find it most advantageous to have oxygen-cutting blowpipes in conjunction with their plants. They are found most useful in preparing work which has to be autogenously welded, more particularly in opening out cracks.

Miscellaneous Application

It will be appreciated that the applications of autogenous welding are innumerable when it is considered that it is possible to weld practically almost any commercial metal without in any way seriously altering its nature, and to add at will any metal to any piece of work. The following are some of the applications to which the process is put today:

Repairs to all classes of boilers in place, such as building up wasted landings and corrosion, repairing cracks in flues and patching same. Repairing cracked or broken castings of any metal. Making good castings that come from the sand with blow or sand holes.

It replaces brazing on cycle frames, forks, and wheel rims. The manufacture of small steel boats; substituting riveting. Manufacture of safes; castings impossible to mold can be made in parts and united; artistic ironwork; railway steel car construction and repairs; building up parts worn by friction; pipe jointing; repairs to locomotive frames, cylinders, boilers, etc.; manufacture of steel barrels; manufacture of air and gas containers; filling up holes drilled in error, and many others.—H. SIDNEY SMITH, Engineer of the Prest-O-Lite Co., Inc.

How the Moon Sales Department Is Organized

PRESIDENT
VICE PRESIDENT
SALES MANAGER

EASTERN SALES MGR	CENTRAL SALES MGR	MISS. VALLEY SALES MGR	NORTH WESTERN SALES MGR	SOUTH WESTERN SALES MGR	SOUTH EASTERN SALES MGR	PACIFIC COAST SALES MGR
HEADQUARTERS IN NEW YORK CITY EVERYTHING EAST OF ALLEGHENY MTS. NORTH OF LOWER VIRGINIA LINE	*HEADQUARTERS IN* COLUMBUS, OHIO, INDIANA, MICHIGAN WEST VIRGINIA, W. PENNSYLVANIA, WESTERN NEW YORK	*HEADQUARTERS IN* ST. LOUIS, MO. MOON MOTOR CAR CO. ILLINOIS BELOW PEORIA, ARKANSAS, KENTUCKY, MISSOURI	*HEADQUARTERS IN* MINNEAPOLIS, MINN. N. AND S. DAKOTA, MONTANA, WISCONSIN, NORTH WESTERN. CANADA	*HEADQUARTERS IN* TEMPLE, TEXAS, NEBRASKA, KANSAS, OKLAHOMA, TEXAS.	*HEADQUARTERS IN* BIRMINGHAM, ALA. TENNESSEE, MISSISSIPPI, N. AND S. CAROLINA, ALABAMA, GEORGIA, FLORIDA, LOUISIANA	*HEADQUARTERS IN* LOS ANGELES, CAL. PACIFIC SLOPE WEST OF ROCKY MOUNTAINS

The sales organization of the Moon Motor Car Co., St. Louis, Mo., is divided in several districts, all presided over by the sales manager, who reports to the vice-president.

The sales manager of the Eastern district William J. Coghlan, with headquarters in New York City, handles everything east of the Alleghanies and north of the lower Virginia line.

Southeastern sales manager O. M. Graham covers Tennessee, Mississippi, Alabama, Georgia, North and South Carolina, Florida and Louisiana.

Central sales manager J. H. Gibson, who was formerly sales manager of the Hudson company, covers Illinois below a line drawn through Peoria, Missouri, Arkansas and Kentucky. Mr. Gibson makes his headquarters in St. Louis.

Ohio territory is covered by P. J. Eubanks, formerly the sales manager of the Chicago Electric Co., with headquarters in Columbus, and he also handles Indiana, Michigan, West Virginia, western Pennsylvania and western New York.

The northwestern sales manager, J. A. O'Brien, makes his headquarters in Minneapolis. He also covers North and South Dakota, Montana and the northern portion of Wisconsin, as well as such Canadian territory which is tributary to Minnesota, namely Saskatchewan and Manitoba.

Southwestern sales manager, Guy Nunnelly, handles Nebraska, Oklahoma and Texas, and makes his headquarters in Temple, Tex.

The Pacific Coast sales manager, E. N. Sanders, who was formerly manager of the Moon Motor Car Co. of Illinois, in Chicago, but for the past 2 years on the Coast, with headquarters in Los Angeles, takes charge of all the business west of the Rocky Mountains.

In dividing the country like this, the Moon company feels that the introduction of local sales managers and the possibility of getting in closer touch with the dealers answer their requirements more promptly than would otherwise be the case.

Each sales manager has full authority and is empowered to conduct his business without any additional authority,

Saving 7 Per Cent. of Trucks' Time

Study of Boston Freight Terminal Shows This May Be Made By Small Changes—Amounts to 42 Minutes in 10-Hour Day

EDITOR'S NOTE.—*This is an abstract of a paper presented before the New York Railroad Club, entitled, "The Delivery and Handling of Miscellaneous Freight at the Boston Freight Terminals," by Harold Pender, H. F. Thomson and C. P. Eldred. It is copyrighted and all rights are reserved.*

THAT a saving of 7 per cent. can be made in the working day of the trucks using the railroad freight terminals in Boston is the conclusion drawn in a paper presented to the New York Railroad Club, at the monthly meeting Sept. 18, 1914. In a 10-hour day this amounts to 42 minutes, and this, coupled with a somewhat greater possible reduction at the warehouses in loading and unloading, shows that the amount of useful work a truck may do can be largely increased. This reduction is of more importance to the economical operation of motor trucks than of horse-drawn ones because of the greater speed of the former. In fact, this fact might, under certain conditions, make it more profitable to operate motor trucks, where before it had been cheaper to use horse trucks.

This 7 per cent. of the total working day represents 18 per cent. of the time spent in the freight yards. The time lost may be divided up into several parts. Waiting for a place at the freight house doors to load or unload causes some loss, especially during the rush periods in the early morning and late in the afternoon. At these times the yards are crowded with vehicles, while at other periods of the day they are comparatively empty. Some time is lost in searching for freight and calling at doors without loading. A large part of this time can be saved by simple changes in the clerical work. Closer co-operation between the drivers and the railroad employees would reduce the time in loading and unloading. Contrary to expectation, very little time is lost by the loafing of the drivers, and the small amount of time the drivers do waste is chargeable to the extremes of weather. Better pavements would reduce the time a small amount, especially in bad weather, and so would better location of the various freight houses.

This paper, entitled, "The Delivery and Handling of Miscellaneous Freight at the Boston Freight Terminals," was prepared by Harold Pender, H. F. Thomson and C. P. Eldred, and was the result of an investigation of freight conditions around Boston extending over a year. The investigation was started by the Electrical Engineering Department of the Massachusetts Institute of Technology in the Spring of 1912, when several students made a number of observations on the movements of all kinds of vehicles at the Boston freight terminals. This resulted in two railroads contributing $2,000 jointly for the appointment of a research assistant, and during the past year he has devoted his entire time to this work, under the supervision of the Research Department of the Electrical Engineering Department of the Institute.

This study was made because of considerable criticism, from time to time, on the part of the shippers, and truck drivers of the terminal facilities and of the methods employed by the railroads in sending out notices, and in delivering freight, particularly, less than car load lots, or L. C. L. shipments as railroad men are accustomed to calling them.

Before considering the conclusions drawn in this paper in detail, an understanding of the system of handling freight must be had. There are three railroad freight terminals, as shown by the map of the city, Fig. 1. The N. Y., N. H. & H. is represented by the five blocks in the lower right-hand corner which represent eleven freight houses and two piers. The two small blocks to the west of the South Station (Boston Terminal) represent the four freight houses of the Boston & Albany railroad. The string of blocks on the upper part of the map to the north and west of the North Station (Union Station) represent the thirty-five freight houses of the Boston & Maine.

The New Haven's terminal, the Boston & Albany terminal and one division of the Boston & Maine are each approximately 1 mile from the center of the city.

The study has been confined to the handling of loads of less than one car.

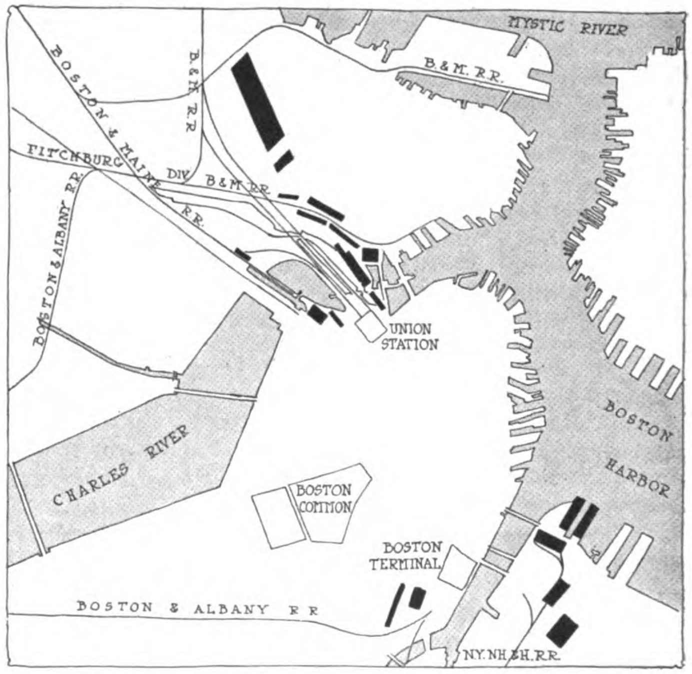


Fig. 1—Boston, showing freight terminals of the three railroads

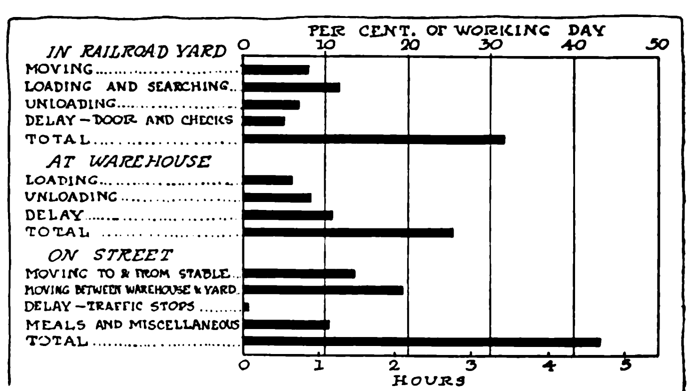


Fig. 2—Analysis of performance of eight wagons during 8 days

Inward and outward shipments are generally handled through separate houses. At the inward freight houses the driver must locate and load his freight. He first receives, at the cashier's office, a delivery check which designates the house and usually the door at which the freight will be found. After arriving at the door, he must pick out his freight and load it. In case the teamster finds freight in the house for which the delivery check is not available, he may load it upon obtaining a memorandum check from the cashier.

At the outward houses the teamster must distribute his freight at one or more doors according to its route and destination. Then he obtains a receipt from the railroad.

The New Haven and the Boston & Maine issue loading books which state the house and door number at which the freight will be received, but generally the truck drivers are allowed to unload at any door in the immediate vicinity of the one specified. This tends to avoid congestion and also to make it unnecessary for a teamster to move his wagon from door to door in case he has freight for several points normally unloaded at doors near one another.

The regular delivery check for each consignment is made out in the freight agent's office from the waybill, the latter either coming with the consignment or by mail. The delivery check is then sent to the cashier's office and the proper door number is written on it as soon as the information is received from the delivery clerk in the freight house. The check is then put into a pigeon hole near the window of the cashier's office, where it is available when the teamster calls for it.

The Memorandum Check

The system of using memorandum checks referred to is to enable consignees who expect freight to obtain it as soon as it is placed in the freight house, without waiting for the regular delivery check to be filed. A teamster is permitted to enter the freight house and look for such freight, knowing approximately where it is likely to be located. After finding it he may go to the cashier's office and obtain a memorandum check and the freight will be surrendered by the delivery clerk on presentation of this check. This system, although it requires the driver to spend more time at the freight house, is of considerable advantage to consignees in case of error.

In conducting the test, the first point determined was the percentage of time spent in the yards by one and two-horse trucks. It was found that these spent approximately one-third of the day in the yards. This is shown graphically in Figs. 2 and 3.

After this it was determined that the delay per day at the warehouses, or stores was actually greater than the delay due to the congestion in the railroad yards. Observation on 700 loads showed that the average delay at the warehouses was 38 minutes, as against 29 minutes at the yards. These were for two-horse wagons composed chiefly of goods packed in barrels, and averaging slightly over 4 tons.

In another case observations on two and three-horse wagons showed that an average of 51 minutes elapsed between the arrival and departure of the trucks at the warehouse. Of this time, only 16 minutes were spent in loading, the remaining 35 minutes being consumed in waiting for a turn at the loading platform. This fault was due chiefly to poor assignment of the wagons, more being used than could advantageously be employed under the conditions.

The relative times spent by the different types of vehicles in visiting a given freight house or group of houses is indicated graphically in Fig. 4.

Inward Peak at 9 A. M.; Outward, 5 P. M.

The number of vehicles calling at the outward and inward freight houses throughout typical days was also observed, and the results were plotted, Fig. 5. The peak of the inward traffic occurred at 9 a. m. and the peak of the outward traffic at 5 p. m. The relative volumes of traffic are proportional to

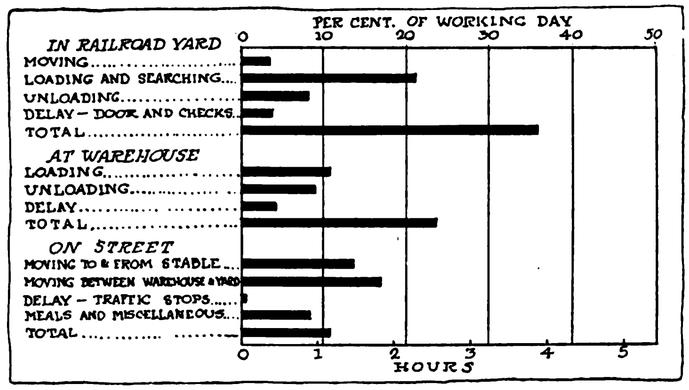


Fig. 3—Analysis of daily wagon performance based on 13 days' observations on four wagons

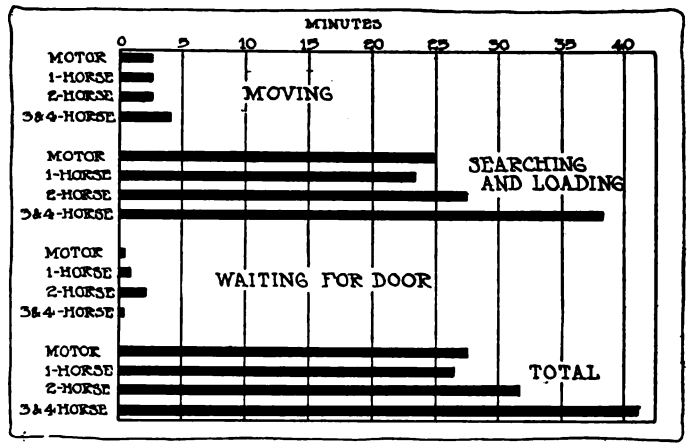


Fig. 4—Times spent per vehicle at inward freight houses

the areas under the curves. These curves show that about 30 per cent. of the total inward traffic is between 7 and 9.30 and that about 35 per cent. of the outward traffic occurs between 4 and 5.30. These curves show that one of the greatest difficulties encountered by the railroads is the necessity of providing facilities which are utilized to their maximum capacity during only 1 or 2 hours per day.

1.1 Minutes Waiting for Turn

Further observations showed that time lost in waiting for one's turn averaged 1.1 minutes during the afternoon, traffic being heavier then. On the average, each vehicle made 3.5 calls per trip at the outward houses, the total delay thus resulting being 3.5 times 1.1, or 4 minutes.

Similar determinations at the inward freight houses showed that the average wait per door was .6 minute, and that the average door calls were 2.5 per trip. Therefore, the average wait was 1.5 minutes.

The time spent in waiting for a turn is the only lost time chargeable to the railroads at the outward houses. At the inward houses, however, there may also be a delay due to three causes: inquiries at the cashier's office; loafing of the driver; searching for freight by driver.

An analysis of the total time spent by trucks at the inward freight houses is given in Table I, page 892.

Inquiries at Cashier's Office

Six per cent. of the total time spent in the freight yard is consumed in making inquiries at the cashier's office. This time is spent chiefly in obtaining memorandum checks for shipments whose delivery checks are not available, and correcting errors on delivery checks as discovered by the driver. As a large proportion of the calls are for memorandum checks any improvement in the handling of freight that would render these unnecessary would result in a time-saving.

Time spent by the driver in loafing about the cashier's office was found to be an appreciable item, especially on very

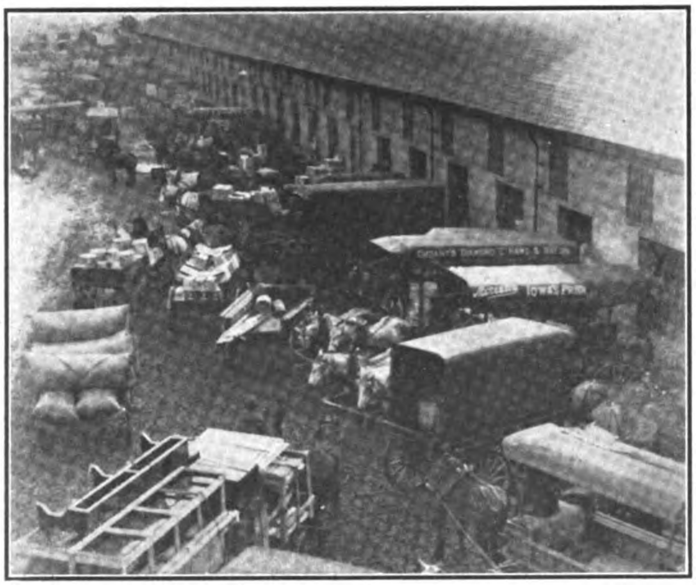


Fig. 5—Illustrating the congestion in the freight yards early in the morning and late in the afternoon

TABLE I.

ANALYSIS OF TOTAL TIME SPENT BY WAGONS* AT INWARD FREIGHT HOUSES

Number of wagons observed	88
Average number of house calls per yard call	1.3
Average number of door calls per yard call	1.8
Average number of pieces per wagon	23
Average weight per piece, in pounds (approx.)	120

Item	Av. time per wagon in freight yard	
	Minutes	Per Cent.
CASHIER'S OFFICE:		
Checks	3.8	8.1
Inquiry	2.8	6.0
Loafing	1.9	4.1
	8.5	18.2
FREIGHT HOUSE DOOR:		
Giving receipt and making inquiries of Delivery Clerk	2.2	4.7
Searching (including calls without loading)	4.1	8.9
Loading	16.2	34.8
Delay at door	0.5	1.0
Helping other drivers	1.0	2.1
Roping, etc	2.3	4.9
Loafing	1.6	3.4
	27.9	59.8
Moving in Freight Yard	10.3	22.0
Total	46.7	100.0

*These wagons on the average carried somewhat lighter loads than those on which the data given in Figs. 2 and 3 were obtained.

TABLE II.

ESTIMATED DISTRIBUTION OF TOTAL TIME IN YARD FOR AVERAGE TWO-HORSE WAGON

(Wagon receiving freight calls on the average at 1.5 houses and at 1.5 doors per house. Wagon delivering freight calls on the average at 2 houses and at 1.75 doors per house.)

Distribution of time	Time in yard for wagon to obtain load, minutes			Time in yard for wagon to deliver load, minutes		
	Present	Possible reduction by railroad	Net time after reduction	Present	Possible reduction by railroad	Net time after reduction
Obtaining checks	4	..	4	..	..	..
Receipts and inquiries	5	2	3	..	..	..
Waiting for door	1.5	..	1.5	4	1	3
Searching for freight, including calls without loading	8	5	3	..	..	..
Loading or unloading	35	5	30	25	4	21
Loafing	3.5	..	3.5	..	..	..
Moving in freight yard	10	1	9	10	1	9
Total	67	13	54	39	6	33

cold or hot days. The average loafing time in December, March and April was 7 per cent. of the time in the yard.

The average time spent in searching for freight was 9 per cent. of the total time, or 15 per cent. of the time at the freight house door. In some instances this time was spent in locating freight for which the delivery check was not available, and which the driver wished to make out a memorandum check for. A part of the searching was caused by the crowded condition of the houses, but the chief causes were the scattered consignments and neglect to place the pieces of freight so that the identification marks could be read easily. In some cases searching was indirectly due to the poor manner in which the goods had been packed and marked by the shipper—in the rehandling packages had become so battered that the addresses were almost unrecognizable.

It frequently occurs that a consignment of goods billed in one car will arrive in several cars and will therefore be scattered over the freight houses when unloaded. The remedy for this lies at the point of loading.

In many cases it was found that a wagon would call at a door and leave it without loading any freight, and observations showed that the time thus spent averaged 1.7 minutes per call. These delays were due to errors on the delivery checks and errors by drivers. In certain cases the omission of the door locations arose from the fact that the office work was ahead of the yard work and the drivers preferred to obtain the delivery checks without locations designated, and to search for the freight. Errors on the delivery checks were due to carelessness in making out the checks, to illegibility of the waybills from which the checks were made, or to the shifting of a car before it was unloaded to a position other than that reported to the cashier's office.

The above observations and the times which might be saved are summarized in the accompanying Table 2. No additional houses nor any radical change in equipment would be required to carry out these suggestions.

According to this estimate 13 minutes may be saved from the time now spent in the yards to obtain a load, while 33 minutes may be cut from the time consumed in unloading.

Obtaining Checks

This item includes the time spent by the teamster at the cashier's office in obtaining delivery checks and settling bills. The time of 4 minutes could not be reduced.

Under this head comes the time spent by the driver in making inquiries at the cashier's desk, in telephoning about lost shipments, in giving receipt to the delivery clerk and in making inquiries in the freight house. This time of 5 minutes could be reduced by greater care in making out the delivery checks, which in turn are often due to errors in the waybills. Errors in both could be reduced if the practice of making them out on a typewriter were universal.

This item was found to be surprisingly small, only 1.5 min-

(*Continued on page 900.*)

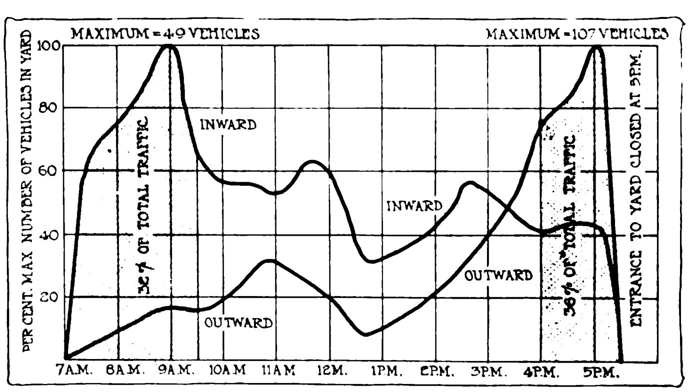
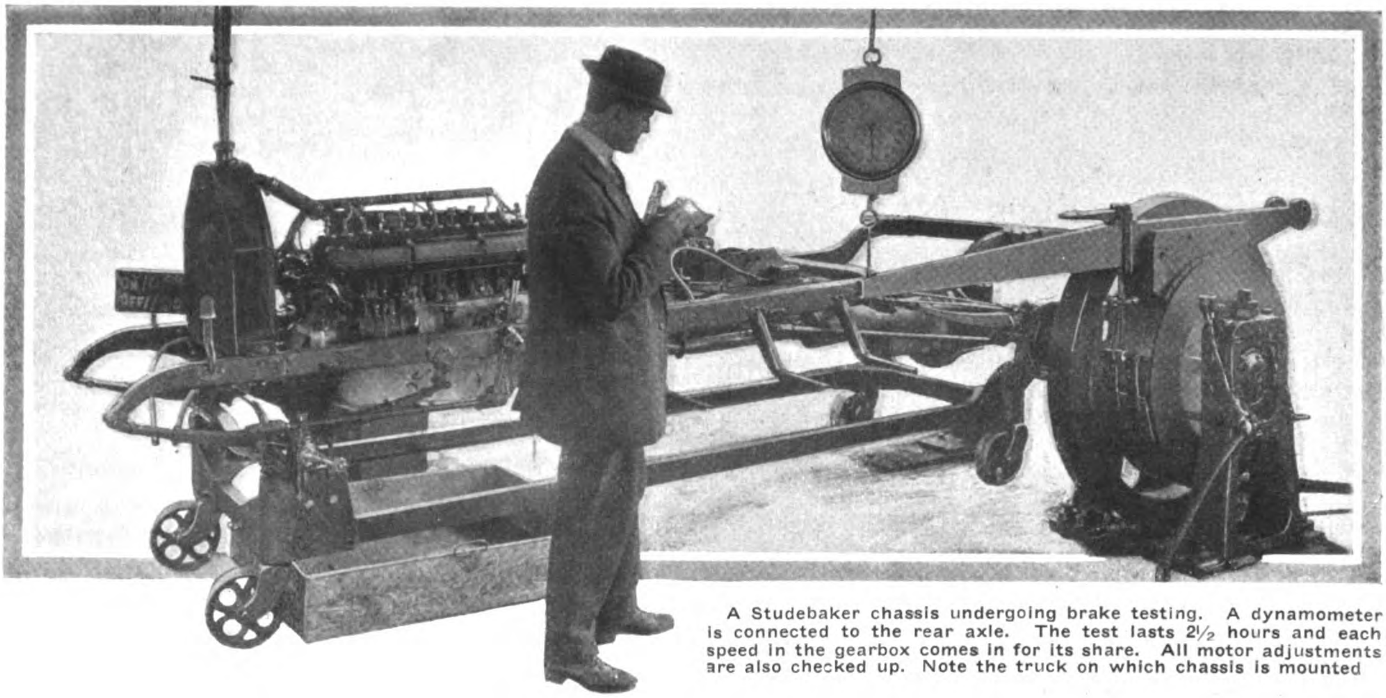


Fig. 6—Curves showing the amount of traffic both ways at various hours. It is heaviest at 9 in the morning and 5 in the afternoon

Studebaker Tests by Dynamometer



A Studebaker chassis undergoing brake testing. A dynamometer is connected to the rear axle. The test lasts 2½ hours and each speed in the gearbox comes in for its share. All motor adjustments are also checked up. Note the truck on which chassis is mounted

IN a long, narrow building the Studebaker Corp., Detroit, Mich., has installed nineteen dynamometer testing stands for trying out the new chassis as they come from the assembly departments. Along the 300 feet of length there are water mains for supplying radiators from a main tank, gasoline mains for providing motors with fuel and dynamometers for registering the power developed.

For 2 1-2 hours each chassis is run under load in this department before it can further advance in its journey to completion. Coming to the testing room on a form of iron truck which has been its steady companion ever since assembly began, the chassis is pushed to a test stand and made ready for work. At the back of the stand there is a substantial clamping arrangement which attaches to the rear axle housing and holds the chassis securely in place. A special axle shaft with an outer end arranged to couple to the dynamometer shaft is slipped into the axle, taking the place of the regular axle shaft, its inner end being splined to slip into the differential just as the regular shaft does. Fifty cars are tested per day.

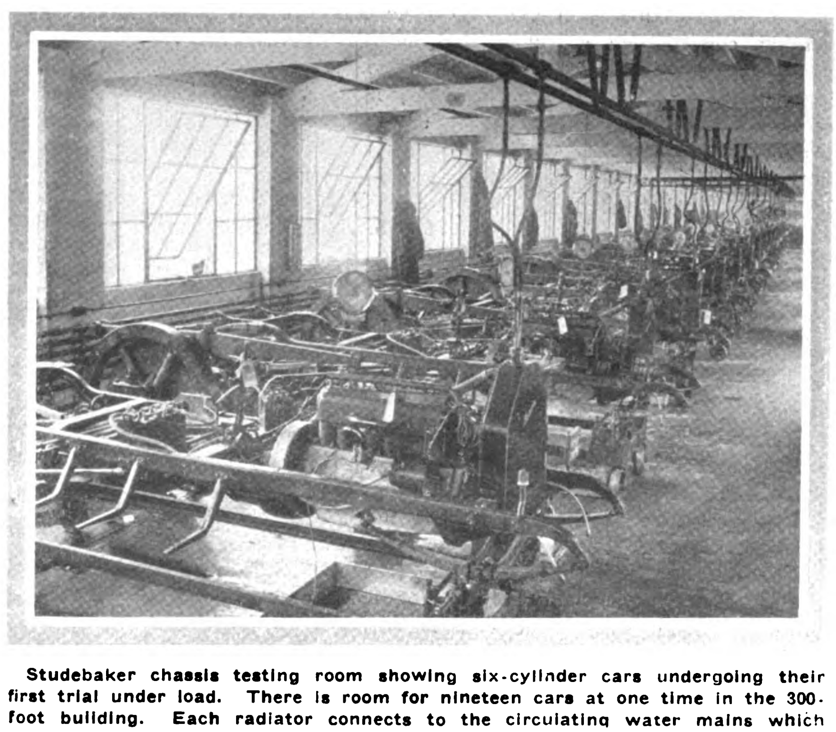
Previously, the motor and rear axle have been tested separately in their respective assembly departments. The lowest grade of gasoline is used to insure satisfaction under all conditions.

The procedure in giving the chassis its 2 1-2 hour test insures that each speed reduction in the gearbox is satisfactory as well as all other features. The first step is to throw in the reverse, for 15 minutes. The load put on the prony brake is 85 pounds, which corresponds to about 42 horsepower.

Then the first speed gears are thrown in, and the car operated for 30 minutes pulling about the same load of 42 horsepower. It is next put into second speed and run for an hour. The first 30 minutes of this second speed run the load is light, perhaps around 20 horsepower, while the last half hour is a heavy pull at about 42 horsepower.

Finally comes the run in high gear. This lasts 45 minutes, the load corresponding to a setting of 55 pounds on the brake. This amounts to from 27 to 30 horsepower load.

During these various runs, the testers watch the performance and make any adjustments which are necessary. They look for oil and water leaks, adjust the tappets and the ignition timing and check up the performance of the carbureter. After a rigid inspection the car goes to the paint shop.



Studebaker chassis testing room showing six-cylinder cars undergoing their first trial under load. There is room for nineteen cars at one time in the 300-foot building. Each radiator connects to the circulating water mains which communicate with a tank. The gasoline is also supplied to each chassis from a main pipe

Reader Describes New Two-Cycle Motor

Editor The Automobile:—I have been reading with interest various articles published by you in The Rostrum, referring to two-cycle motors, and would like to get a little information regarding the following:

Since the Elmore and Amplex companies have gone out of business, do any other automobile manufacturers in the United States use a two-cycle motor?

I am very much interested in the development of a two-stroke motor as I am about to receive a patent on one that does not use the crank case as a compression chamber but primarily compresses the charge by a means provided for this purpose on the power stroke of the piston and delivers this charge automatically to a port located in the side of the combustion chamber at or near the top of same, this delivery occurring about the end of the power stroke.

The exhaust port at the base of the explosion chamber is closed by the return of the piston and the inlet port at the top of the explosion chamber is closed by the upward movement of a tube which answers both the purpose of a circular slide valve and a means to convey the primarily compressed charge to the inlet port in the explosion chamber. This tube is provided with expansion wings to prevent the escape of both compressions, that is, the compression in the primary chamber and the compression in the explosion chamber. The tube operates in conjunction with the compression means.

This motor can be used either as a two-stroke or a four-cycle motor. When used as a four-cycle a charge is admitted to the compression chamber only on every other suction stroke, air being taken in each alternate suction stroke. For two-cycle action, gas is admitted every suction stroke. This motor will be positive in action and can be used with a single combustion chamber or it can be used as a unit to make up any number of cylinders desired.

Pittsburgh, Pa. Karl E. Dunbar.

—The Duryea, made by the Cresson-Morris Co., Eighteenth street and Allegany avenue, Philadelphia, Pa. and the Chase truck manufactured by the Chase Motor Truck Co., Syracuse, N. Y., are the only two makes of note in the United States using the two-cycle motor.

Italian Fiat Co. Makes Two Fours

Editor The Automobile:—1—Please give me a brief description of all Fiat models made at the present time in Turin, Italy, but not made in Poughkeepsie.

2—Please give me the price and mechanical description of Crane cars. How many are made in a year, and by whom?

New Jersey. S. Roebling.

—1—Two chassis are now built by the parent Fiat company in Turin, Italy. One is a 20/30 horse power model selling for $3,200, and the other is rated at 30 horsepower and sells for $3,750. The former is strictly a town car chassis and will turn in a 25-foot circle. It has a block motor 3.2 by 5.6 inches, and a pressure oiling system. The magneto is a Bosch and the carbureter is a special Fiat multiple jet type. The clutch is a multiple disk, the gearset has four speeds, and the rear axle is a pressed steel type. The foot brake is a worm-operated contracting type and the hand brake operates internal expanding drums on the rear wheels. The wheelbase is 110 inches and the tread is standard. Equipment includes two multiple-bulb headlights, electric horn, electric starting and lighting, toilet cases, and demountable steel wheels. The price of this chassis fitted with either coupé or landaulet body, is $4,700. The latter is shown in Fig. 1.

The specifications of the 30 horsepower light touring car chassis are much the same, except that the motor measures 4 by 5.5 inches, and the wheelbase is 116 inches, instead of 110. This car, Fig. 2, is priced at $3,750 with touring body.

2—These cars are no longer made.

Car Tracks Versus Cobbles for Economy

Editor The Automobile:—Which is the smaller expense, driving the car on car tracks to save the mechanism, and thereby wearing out tires, or driving the car on cobblestones in order to save the tires, regardless of the mechanism?

Baltimore, Md. Eldred B. Quarles, Sr.

—This point has never been tested, as far as we know. The motorist should use his judgment in this matter. In some cases, more harm might be done to the car by driving it over rough roads than if the car were run in car tracks to avoid the rough spots.

In other cases it is a question of comfort rather than economy. Many motorists would rather injure their tires a small amount by driving in car tracks than experience the discomfort of rough roads.

How Parabolic Reflectors Are Made

Editor The Automobile:—Will you kindly describe the process or method employed in shaping and polishing the

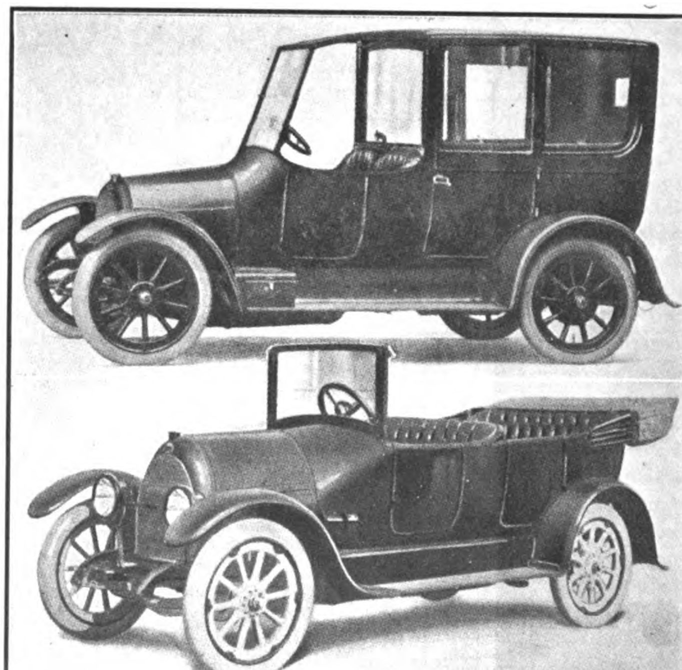


Fig. 1—Upper—Fiat 20/30 horsepower landaulet. Fig. 2—Lower—30 horsepower touring car

best parabolic reflectors such as are used in headlights and searchlights?

2—Is the parabolic form maintained throughout the reflecting surface of the ordinary parabolic automobile headlight?

Pittsburgh, Pa. I. D. W.

—1—According to Gray & Davis, Boston, Mass., parabolic reflectors are manufactured as follows: A special brass is used which gives a very fine surface. This is blanked and formed in hardened steel dies to approximately the shape of a true parabola. Then it is again placed between dies and stamped to give it a perfectly true surface. After this it is ground to a perfect surface, then buffed and finally plated with 99 per cent. pure silver. After plating it is polished.

2—Yes.

How to Calculate Miles Per Hour

Editor THE AUTOMOBILE:—Will you kindly give a simple method of calculating the speed in miles per hour when the time per mile is known?

Newcastle, Ind. E. W. H.

—You may use the formula $M = \frac{3,600}{S}$ where M = miles per hour and S = the time per mile in seconds. This formula has been plotted in the form of a curve in Fig. 3.

The derivation of this formula is a simple matter. S represents the time per mile, or another way of saying it is S = seconds per mile. Now, if M = miles per hour, $\frac{M}{3,600}$ = miles per second, since there are 3,600 seconds in 1 hour. Therefore, $\frac{3,600}{M}$ = seconds per mile, but the seconds per mile is also equal to S. Therefore, $S = \frac{3,600}{M}$. It will be noted that the expression per, in the above derivation is merely a division sign. Seconds per mile may be written seconds ÷ miles, or $\frac{\text{seconds}}{\text{miles}}$; miles per hour may be written miles ÷ hours, or $\frac{\text{miles}}{\text{hours}}$, etc. An understanding of this point will make the above derivation clear.

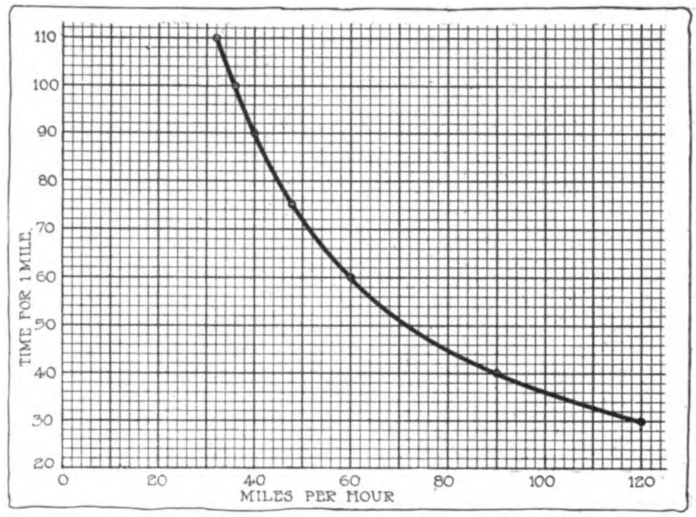


Fig. 3—Curve showing relation of miles per hour and time per mile

Dirt Causes Miss at High Speeds

Editor THE AUTOMOBILE:—As an interested reader of your Rostrum I would like to ask you for some information that I seem to be unable to obtain elsewhere.

1—I have a 1914 ——— and have had a lot of minor trouble with it. At present I find that at low speeds it runs smoothly and with ample power, but if I try and rush a hill, attaining a speed of over 30 miles per hour the motor begins to miss frightfully until it will at last stop altogether. The miss seems to start on one cylinder, increasing to three. The same seems to occur when I run at high speed on the level. A Mayer carbureter is used with Atwater-Kent ignition. The timing seems to be right and the carbureter is adjustable from the dash, so that is all right. I know the gasoline line is clean, and have a hot air attachment to the air intake. What is the trouble?

2—Exclusive of the Chicago Auto Painting Co., who would make a coupé body for this car, which is a runabout?

3—What would be the best way in which to strengthen the engine bed? I find that the motor rocks violently when pulling hard. The bolts holding it to the bed are tight and the bed vibrates with it.

4—The water circulation seems to be defective. After running but a short distance the water becomes steaming hot. This occurs before I have gone a mile. If the distance is very far the water boils. The cylinders are clean and the timing is correct. I have flushed out both the radiator and engine, so there is no stoppage. Can you suggest any way of correcting this trouble?

Orange, N. J. M. S. BALDWIN.

—1—Notwithstanding what you say it would seem that the missing was due to dirt in the gasoline line. The obstruction does not block the line entirely, but enough to prevent an adequate supply of fuel being given to the motor at all except low speeds—hence the missing above 30 miles per hour. Disconnect the gasoline line at the carbureter, and allow the gasoline to run out. If it does not flow freely clean the pipe and outlet from the gasoline tank.

2—Any body making concern will build a body to order for this car.

Hard to Strengthen Bed

3—It is next to impossible to strengthen the engine bed without putting in a new crankcase. Possibly your trouble is due to allowing the motor to pull too hard. When it begins to labor on a hill, shift to low gear. Do not strain the motor by allowing it to work under these conditions.

4—If the timing is correct and the water passages are free there is no reason why the water should boil unless the mixture is too rich or the cylinders are carbonized. Examine the timing and the carbureter adjustment once more, then inspect the cylinders to see whether they are carbonized, and look at the passageways to see that they are not clogged. Even if the radiator is free from obstructions and the hose connections are clear, there may be dirt or sand in the water jackets. Lastly, make sure that water is not being lost, either by leakage or by flowing out through the radiator vent pipe. Sometimes the vent opening is placed low, with the result that the water splashes out until enough has been lost to prevent proper cooling. To keep the water from boiling, the radiator must be full or nearly full at all times. A shortage of water reduces the amount of cooling, and when the level of water drops below the top of the return connection to the radiator, circulation stops entirely.

Six as Fast as Four

Editor THE AUTOMOBILE:—Please explain in the Rostrum why it is that a six-cylinder car will run faster than a four. It is a general impression among people not very familiar with cars that a six is faster, but you never have heard of a six-cylinder car winning a big race.

Greensboro, N. C. E. C. KING.

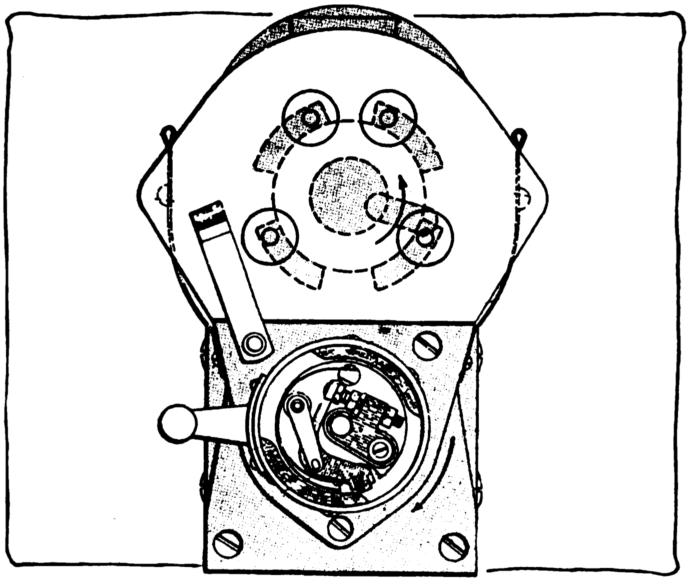


Fig. 4—Bosch DU 4 magneto showing setting for anti-clockwise rotation

—The number of cylinders has very little to do with the speed. One-cylinder cars have done considerably over 70 miles per hour, while twelve-cylinder machines have traveled about 2 miles per minute. So far as the motor is concerned, the speed of the car depends on the power the motor develops, and the number of cylinders influences this only indirectly. If it takes 60 horsepower to drive a car 70 miles per hour it does not matter much how many cylinders the motor has as long as the requisite power is supplied.

Contrary to your statement, six-cylinder cars have won some big races, although four-cylinder machines have won the majority of races, principally because the four-cylinder type preponderates.

Four-cylinder motors have generally been preferred for racing to motors with more cylinders because they are less complicated and there are fewer parts to get out of order, and because few of the advantages of the six which are evident in touring car work have weight in designing racing cars. The six has a smoother torque, less vibration at low speeds, and is more flexible than the four, but as racing motors operate at excessive speeds these points are of no advantage.

How to Change Magneto Rotation

Editor THE AUTOMOBILE:—1—I have a Bosch high-tension magneto, D.U.-4, which runs clockwise, and I would like to reverse it so it will run anti-clockwise. Will I have to send it to the Bosch factory to make this change, or can I do it myself?

2—Please give me details on timing model 27, 1910 Peerless motor.

Huntington, W. Va. W. D. A.

—1—You may do the work yourself, although it would be better to send the magneto to the Bosch factory. The present breaker will have to be changed for an anti-clockwise one and the relation between the armature and distributer shafts will need to be readjusted. In case you do the work yourself, after you have put the new breaker in place, with the spark advanced all the way and the points just ready to separate, set the distributer gear so that from one-half to two-thirds of the width of the distributer brush is still on one of the distributer segments. This relation is shown in Fig. 4, the arrows showing the direction of rotation. This setting is exactly opposite to that for clockwise rotation.

2—You do not state whether you mean the timing of the valves or the magneto. The setting of the former is easily done according to the marks on the flywheel, so that it is probable that you mean the latter.

With the spark retarded all the way, bring the number one cylinder to dead center on the compression stroke, as indicated by the center mark for cylinders 1 and 4 on the flywheel. Then set the armature of the magneto so that the breaker points are just ready to separate.

How to Apply a Cone Clutch Facing

Editor THE AUTOMOBILE:—I have a leather faced cone clutch and wish to put on a new leather one. I want to know the best kind of leather I can get to put on there. I also want a little information concerning the putting on of the leather. I thought perhaps asbestos would be better than leather, and would like to have your opinion on this matter.

Kutztown, Pa. J. F. ANGSTADT.

—Either leather or an asbestos fabric may be used with satisfaction. If you use leather you should obtain friction leather, which is made for this purpose. This may be purchased at any supply store or the following concerns, taken from the Automobile Trade Directory: Chicago Belting Co., 113 N. Green street, Chicago, Ill.; Detroit Leather Specialty Co., 275 Beecher avenue, Detroit, Mich.; Hide, Leather and Belting Co., Indianapolis, Ind.

In ordering the facing the diameters of the two edges of the cone and the width of the cone should be given. If an asbestos fabric is used, care should be taken to obtain a piece that is made for the size of cone you have. Unlike leather, strips of this material to fit cannot be cut from a large piece of fabric.

The thickness of the facing is important because too thick a facing will prevent the cone from properly entering the flywheel. One-quarter inch is an average value.

If you desire to buy a piece of leather and cut your own facing you should remove the old clutch leather carefully and use it for a pattern. Another method is to wrap a strip of paper around the face and make a pattern from it.

Before applying the leather it is well to soak it in a neatsfoot oil to soften it.

Care should be taken to cut the strip of leather to the correct length. The best way is to first rivet one end and then wrap the leather around the cone in such a manner that it slips down over the smaller end of the cone as shown in Fig. 5. Then pull it tight and rivet the other end. Now push the leather up in place all around and it should be tight and unwrinkled. If an attempt is made to apply the facing by attaching the leather to one end only, there is danger of it wrinkling, especially if the leather is not of even thickness. Any unevenness may be removed by truing in a lathe but if the leather is properly put on this should not be necessary.

The same advice applies to putting on an asbestos fabric, but there is less danger of the facing wrinkling.

Special copper rivets designed for riveting leather should be used. These have broad flat heads of medium thickness as shown in Fig. 6. Rivet holes should be cut in the leather and these should be countersunk, as shown. Riveting will be facilitated if a bolt the same diameter as the rivet head is used as a support, as shown in this figure. The round end of the bolt forces the head of the rivet into the countersunk hole and makes a good fit.

80 Per Cent. of Motors Block Cast

Editor THE AUTOMOBILE:—1—How many manufacturers are making motors with cylinders cast separately, and how many are making motors cast en-block?

2—Which are the best and why are they the best?

3—What kind of roller bearings would you recommend as the best?

4—Which style of valves would you recommend as the best for service and silence in the life of a motor, and why would you recommend that kind?

5—What type of rear axle would you say was the most durable and accessible for the ordinary man to use, and also the safest, and why is it the best?

6—Where would you consider the proper place for a gasoline tank.

Bridgetown, N. J. E. R. K.

—1—Considering only the principal makers, the methods of casting the cylinders employed by them is given in the following table:

Type of casting	Percentage
Six cylinders in a block	15.1
Six cylinders cast in threes	17.2
Six cylinders, cast in pairs	16.4
Six cylinders cast singly	1.3
Four cylinders cast in a block	24.7
Four cylinders cast in pairs	22.2
Four cylinders cast singly	3.1

2—What is best under one set of conditions may not be so under a different set. It is impossible to say that a given type of casting is best without restriction. This is proved by the fact that all types of castings are still in use. However, from the above figures it will be noted that the block casting is by far the most popular 15.1 per cent. of the sixes and 24.7 per cent. of the fours being of this type, the total being approximately 40 per cent. The advantages advanced in favor of this type are that it gives a simpler casting, is cheaper to manufacture, is more rigid, and gives the motor a simpler exterior because a large amount of piping is done away with. Against this type it is urged that in case a casting proves defective the loss is greater, two men are required to remove or replace the cylinder block, and should a cylinder become cracked through the freezing of the cooling water, it is necessary to put in four or six new cylinders, as the case may be, instead of one or more if the cylinders are cast singly or in pairs. The advocates of the block method of casting meet these objections with the argument that these faults are actually small in practice.

3—It is impossible to answer questions of this character. As has been said many times before, in order for us to state, with fairness, what make of bearing is best, we would be obliged to test every make of roller bearing on the market exhaustively. In matters such as these we cannot rely on the statements of others because they are liable to be biased. Obviously it is impossible for us to test all makes of bearings.

Each type has its advantages, and by study you can determine the one most suitable under a given set of conditions. In some places adjustable bearings are indispensable, while in others they are not so necessary. Sometimes the decision depends on the price rather than on the quality.

4—Any well-designed poppet or sleeve valve will give good service. It is generally considered that the sleeve valve is slightly quieter than the best designs of poppet valve motors. This difference is small, however, in the best motors of each type. Valve-in-head motors are generally more powerful than the other poppet types, but the mechanism is slightly more complicated.

5—Everything else being the same the durability of the axle is not greatly affected by the type, whether floating, semi-floating, three-quarter floating, etc. The floating axle is somewhat easier to take apart than the other types, but this is a small matter because the axle should not require taking apart very often. From a safety standpoint all are about equal.

6—This depends on conditions; there are advantages in every location. If placed under the cowl, the gasoline can flow by gravity to the carbureter, yet the carbureter does not need to be placed as low as when the tank is under the seat. By locating the carbureter higher, it is more accessible and the intake pipe is shortened, giving better carburetion. The gasoline is warmed by the heat of the motor so that in cold weather, at least, carburetion is facilitated.

The under-seat location of the tank also allows fuel feed by the simple gravity method, but there is danger of the flow stopping when climbing a steep hill. When the tank is being filled, the passengers in the front must be disturbed.

Putting the tank at the rear utilizes otherwise waste space and allows the space under the front seat and under the cowl to be used for other purposes. There is a slight objection to this location, however, because the gasoline must be fed to the carbureter either by pressure or the vacuum system. This means a slight amount of complication, but it is not serious as is indicated by the fact that the majority of cars now use one or the other of these systems.

Net Weights of Various Cars

Editor THE AUTOMOBILE:—Will you please state the weights of the following cars: Saxon, Chalmers, Overland, Metz, Ford, Maxwell, and Studebaker?

Jamestown, Mo. R. H.

—The weights of the different models of the makes you mention are given below. The figures are those claimed by the manufacturers and are with tanks empty.

Saxon	1,150
Chalmers Master Six, five-pass. touring	3,935
Chalmers Master Six, six-pass. touring	4,046
Chalmers Master Six, torpedo	3,928
Chalmers Master Six, roadster	3,792
Chalmers Master Six, limousine	4,439
Chalmers Master Six, coupé	3,996
Chalmers Little Six, five-pass. touring	3,534
Chalmers Little Six, couplette	3,522
Overland, 80	2,900
Overland, 81	2,600
Metz	1,150
Ford, roadster	1,395
Ford, touring car	1,510
Maxwell, roadster	1,800
Maxwell, touring car	1,820
Studebaker Six, five-pass. touring	2,865
Studebaker Six, seven-pass. touring	2,930
Studebaker Four, three-pass. roadster	2,350
Studebaker Four, five-pass. touring	2,425

Ward Leonard Makes Starters

In THE AUTOMOBILE for October 29 on page 805, in giving a list of various starters which might be used on a model 25 Buick, the starter made by the Ward Leonard Electric Co., Bronxville, N. Y., was omitted.

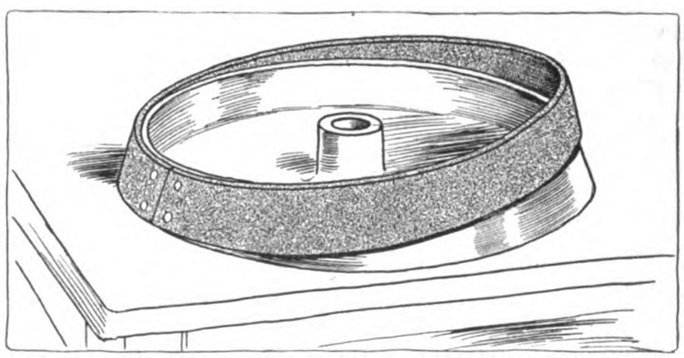


Fig. 5—Method of working clutch leather on to the cone after both ends have been riveted

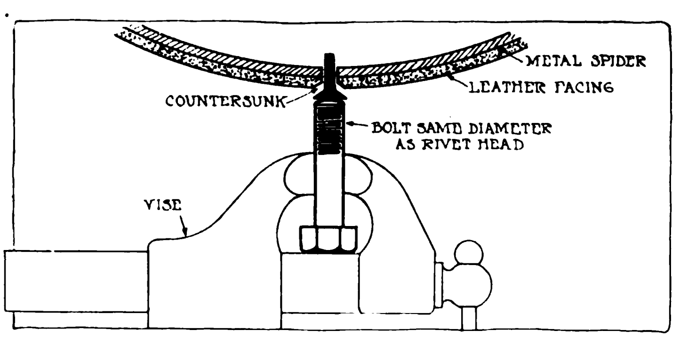


Fig. 6—Use of a bolt to countersink the rivets into the holes in the leather

The Engineering Digest

Power Testing Apparatus by Which Incidental Resistances are Obviated and First Readings are Final

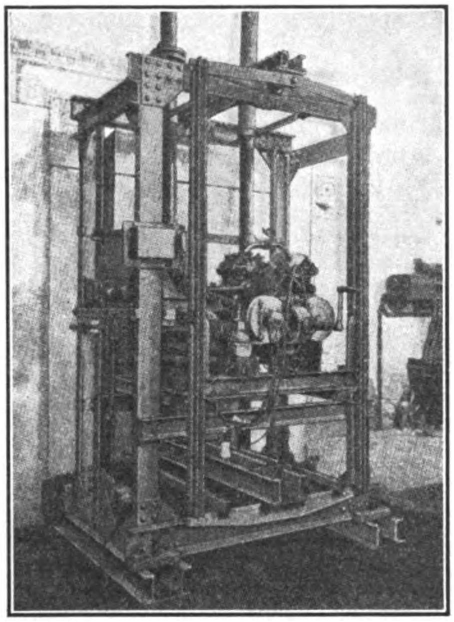


Fig. 1—The Breslau pendulum testing stand with motor mounted in it

When automobile and aviation motors are to be tested for brake horsepower at the Royal Technical College at Breslau, Germany, they are now mounted in a pendulum frame which has been designed and built at the laboratory of the institution, and the reaction of the frame upon a balance beam device serves for measuring the forces applied, in a manner which has been found accurate and convenient.

The very brief description of this apparatus furnished by Professor Baer of Breslau is amplified by the accompanying illustrations, Figs. 1 to 5, on which the principal dimensions are marked in millimeters. Fig. 1 gives a general view of the arrangement, with an air-cooled motor mounted for testing.

The deformable, motor-supporting cage suspended in the channel-iron stand consists in the essential features of two vertical frames, one at each side of the motor—which hangs upon a special cradle or barrow between them—both resting upon a rocker frame at the bottom, which acts as two pairs of parallel crankarms to receive motion from one or the other of the vertical frames, and the movement is guided by a rocker frame at the top. Fig. 2 shows details of the vertical frames and Fig. 3 those of the rigid lower rocker frame which supports them and is actuated by them when the motor is working.

The lower supports, which take up the motor power and the weight, are provided with knife-edge bearings, designed as shown in the left portion of Fig. 4, while the upper ones which only guide the action and transmit no power have ball bearings. The rocking motion of the supporting-frame also takes place upon a knife-edge bearing under the middle of it. The cradle which carries the motor (in some cases placed upon an intermediate rubber mat to absorb vibration) is hung by means of hook-shaped hangers with knife edges in pans secured in the struts of the vertical frames, on the plan shown to the right in Fig. 4.

The motor is so placed in this hanging cradle that the crankshaft extends horizontally in the middle plane between the two pairs of knife-edge bearings of the hangers and at the same level; this having the effect that the motorshaft remains quiet at small movements of the cage.

By means of special compensatory weights the center of gravity of the unit comprising the motor and its cradle can be displaced along the axis of the shaft in order to obviate the influence of unequal weight distribution, but, as an elaborate compensation by this means is in many instances unnecessary, other slidable compensation weights are provided in sufficient variety on both of the balance beams at the sides of the cage, and these weights can be more readily used to offset approximately any unequal weight distribution which might cause twisting and resistance in the ball bearings at the top of the cage.

The load for the motor is produced by a fan dynamometer brake, and this is operated inside of a strong and broad wooden casing (to help in equalizing the atmospheric conditions for any series of tests) and is calculated to give a 12-horsepower resistance at 1,500 revolutions per minute.

The torque developed by the motor reacts against the

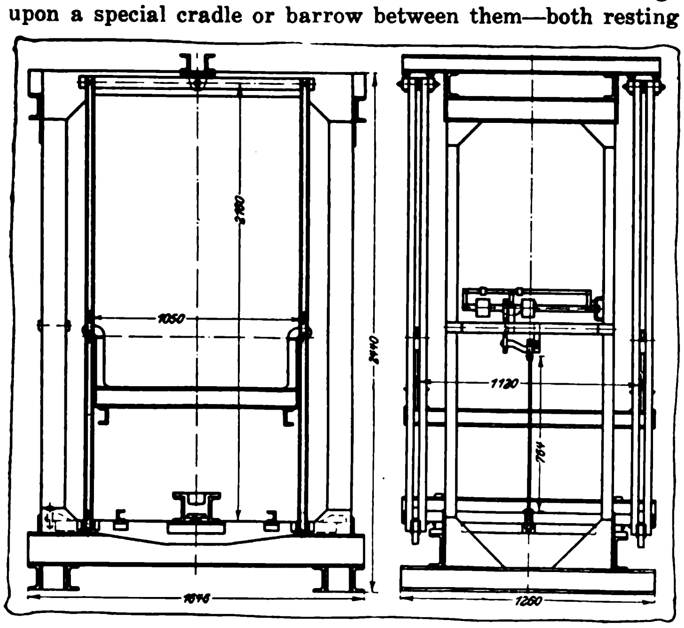


Fig. 2—Front and side views of deformable cage

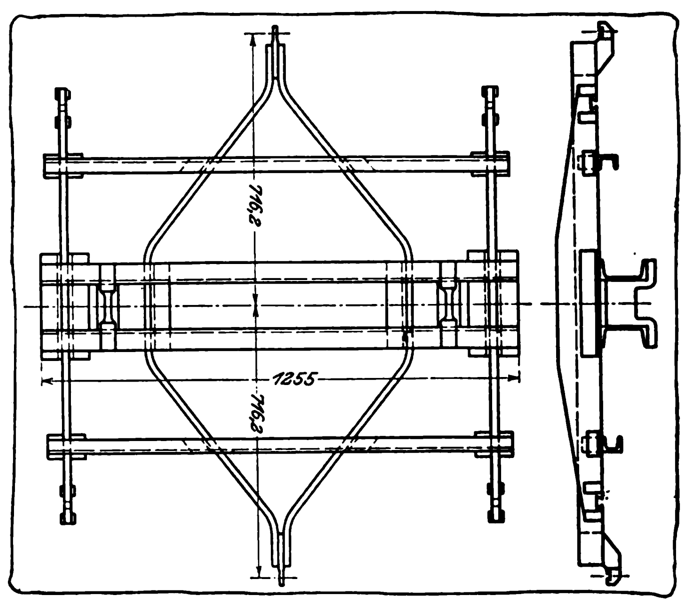


Fig. 3—Rocker frame supporting the cage

cradle and from the latter is transmitted to the vertical struts and from these to the lower rocking frame. By means of tension rods—see Fig. 2—which are disposed at a distance of 716.2 millimeters at both sides from the central vertical plane of the apparatus, the torque is carried to one or the other (according to the sense in which the motor turns) of the two balance beams. Their construction is indicated in Fig. 5. Here the force is measured which balances, at a distance of 716.2 millimeters from the motorshaft axis, against the torque developed.

The unavoidable small oscillations and vibrations are absorbed in a little hydraulic dashpot, which is operated with

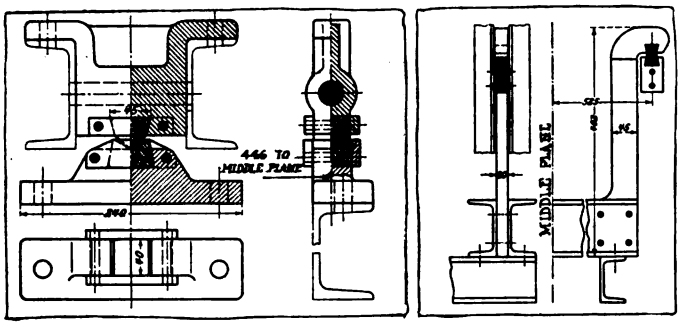


Fig. 4—Knife-edge bearings for cage and motor cradle

water but patterned after those used with oil for the regulation of centrifugal governors.

The feed pipes for fuel and lubricant are made of very flexible copper tube and the cooling-water is taken to and from the separately mounted radiator by flexible rubber hose. [Near the equilibrium, where the final measurements are taken, the resistance represented by these flexions are of course almost nil, if the original arrangement of the tubes is

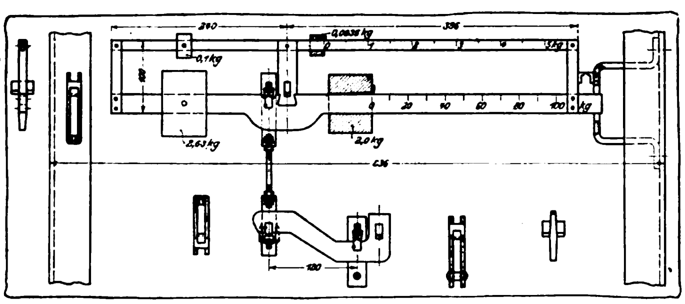


Fig. 5—Balance beam operated by rod from arms of rocker frame

made for this position.] The fuel consumption is measured by using a tank placed on a balancing scale and ascertaining the weight of the fuel used for a given time with a constant motor load, in the manner now widely adopted. A special device for measuring all the air consumed is also on hand at the institution. From *Zeitschrift des Vereines Deutscher Ingenieure*, September 12.

Special War Service Provided for German Motor Engineers

WITH a view to providing rapid solutions of engineering problems arising during the course of the German war for world domination, the Verein Deutscher Ingenieure (Society of German Engineers) has arranged a Central Shop for Engineering Work in the society's building in Berlin, where all members not subject to field service may work on assignments. Each of them must first send detailed information of the working field in which he has special experience.

A volunteer motor boat corps is also organized for river service. Former naval officers who are incapacitated for other work and graduated engineers are to command the boats.

Control of Materials and Dimensions in German Manufacture of Steel Balls and Ball Bearings

(Continued from last week)

THE apparatus arranged in the room for the testing of finished bearings serves a number of different purposes: (1) To try out the current manufacture; from time to time bearings are taken at random from the supply on hand and are tried under severe conditions for their reliability in all their functions; (2) to enlarge the scientific foundation for the construction of ball bearings; (3) to try out the manner of mounting and operating the bearings in mechanisms of widely different purposes, with imitation of such features in practical operating conditions as dust, humidity, high temperatures; (4) to try new designs in the field of parallel, roller and ball bearings; (5) to try ball bearing materials, and (6) for making tests to order for the authorities or industrial institutions.

The scope of the department is perhaps best made clear by mentioning some of the test results.

A No. 306 bearing with a brass ball cage lined with white metal was lubricated with a few drops of oil and then run for five months without further lubrication at 1,500 revolutions per minute and under the maximum load for this speed, 220 kilograms, running 12.5 hours daily or a total of 1,579 hours. At the end of this time the bearing had to be dismounted, as the inner race began to suffer from lack of lubricant, but the cage, the balls and the outer race remained uninjured.

Annular Bearings for Bicycles

The use of three-point ball bearings with adjustable cones has survived in bicycles until the present day. It was attempted, to be sure, after the first successful introduction of annular bearings in automobiles to apply this simpler type to bicycles as well, but errors in design and mounting combined with insufficient protection against dust and humidity led to unsatisfactory results. To remedy this situation, however, the D. W. F. firm three years ago brought out complete bicycle hubs in which annular bearings, supplemented by end-thrust bearings, are effectively protected against dust, water and loss of lubricant as well as against the pinching and warping of the bearing rings to which the light cycle construction has been especially liable. To test the new construction in comparison with the so-called cone bearings (meaning the adjustable ball bearings) the following arrangements were made: The same bicycle was successively fitted with the cone bearings and with the new annular bearings and in each condition was tried with and without load. The provisions were to some extent typical of the variety of facilities required for measuring the fitness of any given style of bearings for any one of its uses.

The bicycle was placed with its rear wheel on two wooden sheaves arranged tandem, and these were turned with a slightly concave circumference; the front wheel was supported on a broad and flat-rimmed wooden sheave. The place of the crankarms was taken by wood pulleys driven by belting from a jackshaft underneath, and the front wheel was likewise belt-driven from one of the sheaves driving the rear wheel, and the whole complex of pulleys was actuated, also by belt, from a direct-current electric motor of 1.9 horsepower. With all shafts mounted in ball bearings and the use of very thin and non-slipping belts the power consumption in the stand was small. The current consumption of the motor was measured with Weston meters and the rotary speed of the crankshaft with a tachometer made by Morell at Leipsic. The motor was run for one hour or until the current consumption became constant for a given load, and readings for the test arrangement were then taken for ten minutes with intervals of a half minute. From the results was to be deducted the resistance of the apparatus, varying with the load. To determine this resistance the bicycle was taken off and in its place a shaft with a brake disk was mounted in its place exactly where the crankshaft was before; from this prony readings were taken.

[The author gives the numerical values of the readings and diagrams drawn in accordance with the same, showing that the efficiency of the two bearings, measured in proportion to the power consumption in each case, varies materially. The figures show a superiority of the annular bearing of 49.7 per cent. without load and 28.6 per cent. under load of 86 kilograms.]

Examination of Injured Bearings

Among the causes resulting in injured bearings, with regard to which complaints are sometimes made and which therefore may call for examination at the factory, the most important are (1) ovalizing due to radial pinching, (2) excessive end-thrusts, (3) dust, grit or moisture in the housing and (4) acid lubricants.

Ovalization of the outer race occurs most frequently where the housing of the bearing is made in two or more pieces, usually bolted together, and not quite circular. The balls are in such cases overloaded every time they come to one of the two diametrically opposite places where the diameter is smallest, and the result is that the ball path in the outer races shows rough abrasions in just these places. Measuring reveals no fault, as the race when dismounted springs back to its original form, but the symmetrical locations of the injury furnish sufficient indication of the cause.

Excessive end-thrusts may take effect upon the balls first, but as a rule are recognized by lesions along the whole circumference in the ball paths of both inner and outer race.

If a bearing in its mounting is not protected against the admission of dust and grit, the surface of the balls and of the paths soon get a mat instead of a polished appearance by the grinding action and after a while radial play can be observed between the two races and the balls. A frequent cause of this trouble, in the case of bearings in gearboxes, is that emery powder is used for running the gears in, with the ball bearings in their place. Rust spots due to the admission of moisture may have disappeared together with their cause, the rust being worn off entirely by the movement of the bearing, but in that case small pinholes in the races and on the balls, where the rust has been, always betray that moisture has been at work.

The effect of acid lubricants is seen in the form of many but shallow scars on both balls and races remaining as the indelible marks of the corrosion to which they have been subjected.

Saving of 7 Per Cent. of Trucks' Time

(*Continued from page* 892.)

utes for inward freight and 4 minutes for outward freight. The delays were chiefly at the rush periods. It is doubtful whether any reduction could be made here.

This time might be reduced from 8 to 3 minutes by avoiding errors in the delivery checks; by having them made out and filed at the cashier's office almost simultaneously with the placing of the freight.

To overcome this trouble one road put on sorting gangs, the result being not only a reduction in time, but also giving more space to the unloading of the cars and preventing consignments from being hidden by freight arriving subsequently.

Loading or Unloading

A reduction of 15 per cent. might be made under this heading by closer cooperation between the employees of the railroad and the truck drivers. The employment of more truckmen in the freight house to assist the drivers in handling the more bulky loads would also help.

It is questionable whether the saving in the driver's time which would result from the use of the sill or single dump delivery would justify the necessary increase in labor cost by these methods.

Loafing is not chargeable to the railroads, and depends almost wholly on the season of the year.

Moving in Freight Yard

Where the buildings are near together and the pavements in fair condition this item is negligible. However, a saving of 10 per cent. might be made by improving the pavements.

It will be noted that the total possible reduction in the saving of the teamster's time as represented in this table is 18 per cent., or between one-fifth and one-sixth of the total time spent in the yards. Since the wagons spend one-third of the day in the yards, the total saving would be between 6 and 7 per cent.

Chicago Police Fighting Muffler Cutouts

CHICAGO, ILL., Nov. 6—The Chicago police have started a vigorous campaign to eliminate the cutout nuisance, adopting new tactics by making arrests in the case of cars fitted with cutouts operated from the seat. Arrests are made even when the cutout is not being operated. The very fact that the car has a cutout which can be operated from the seat is taken as evidence and arrests follow. So far about forty motorists have been apprehended for having their cars so equipped.

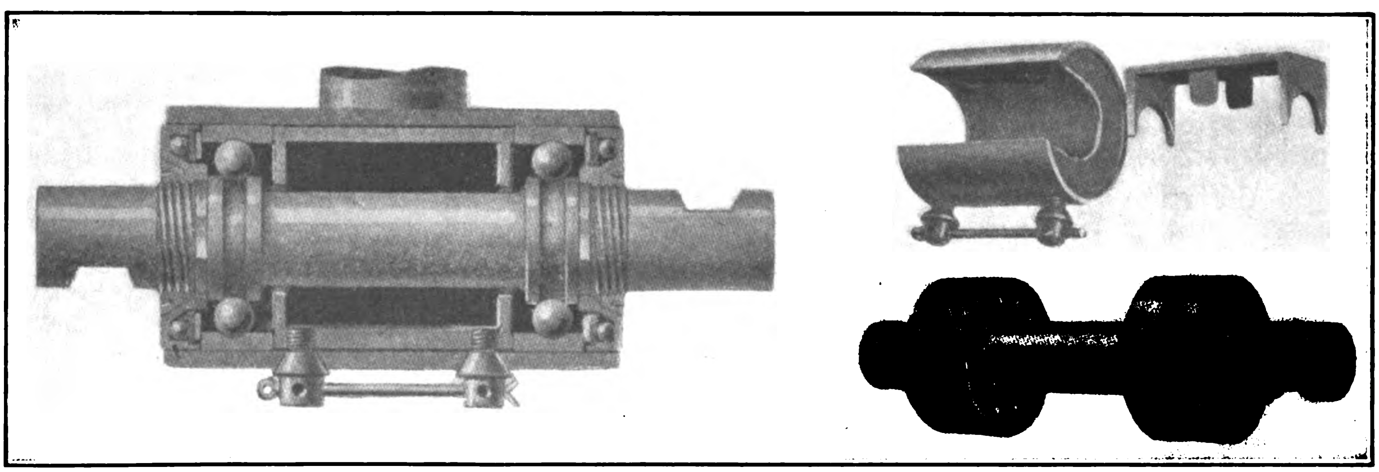


Fig. 7 (Figs. 1 to 6 last week)—Annular ball bearings in bicycle crankhanger, showing method found necessary for protecting an annular bearing against dust and moisture

Requirements Should Determine Weight of Automobile Parts

Durability and Weight Are Inseparable—Comfort a Factor—Dangers of Too Light Construction

By George W. Dunham
Consulting Engineer, Chalmers Motor Co.

PROMINENT among those points most generally discussed during the present season, regarding the different phases of automobile construction, has been weight. Weight in a motor car should be scientifically determined according to the work to be done by each part.

Always Some Trouble

The manufacturer of any article, if honest with himself, realizes that there is always a certain percentage of trouble experienced with his output, and that this percentage of trouble can be reduced only to the absolute minimum but never wholly eliminated. With our company, when three cases of a specific trouble have been reported, even though there are only three cases out of thousands of cars in service, thorough investigations are started immediately and often thousands of dollars are spent to insure that there will not be a continuation of this trouble, and that this happening was only due to chance or what is known in manufacturing as "percentage of error."

It is obvious that the more the margin of safety throughout the car is reduced, the greater the percentage of troubles is bound to be. It is also obvious that the lighter the construction, the lower the factor of safety must be.

Two other points must also be considered in determining weight. One, if a trouble should occur, will it endanger the life of the occupants, or will it merely impair the quality of the car? For instance, if a wheel breaks, some one is liable to be hurt, whereas, if the bearings in the parts supporting the springs are so small that they will wear readily and rattle soon, this is a feature that will lessen the quality of the car, but not endanger the occupants.

Second, how far shall the comfort of the passengers be considered?

The first point—safety—is by far the more important. Our steering gear could be made considerably lighter, but we consider it would be cutting too close to the danger point. Our wheels could be cut down to thinner spoke sections and lighter felloes. Here again, we would fear a percentage of broken wheels. Our axles could be lightened considerably, but we would not want to take the responsibility of the danger which might result from breakage.

In some cars the torque tube has been eliminated, which effects a considerable saving in weight but throws the entire burden of the driving mechanism into the springs. Our six is provided with a concentric torque tube. Its purpose is to hold the rear axle in the proper alignment; to relieve the springs of all work but that of supporting the car. Its advantage is apparent through the manner in which the car holds the road at various speeds, and the absence of it is shown in most cases by a car dancing and hopping when going over rough roads, cobblestones and rutted roads. The use of a torque tube practically eliminates chattering or jumping of the rear axle, when pulling in heavy sand, mud or snow.

In considering the second kind of trouble resulting from too light weight—that which reduces the efficiency and quality of a car—there are many things to be considered. Almost invariably on the excessively light cars the sheet metal used in the body, fenders, dust shield, bonnet, etc., is cut to the limit. The result is a finish which is wavy and rough; with extremely light material it is impossible to keep the paint on the bodies and the enamel on the metal work gives trouble. Another bad result of too light materials is that they soon loosen and rattle. Quite often body bracings or frame members are so lined that the panels of the body sag and wrinkle.

Comfort a Factor

The third factor in considering weight is comfort. Weight is saved on some cars by the use of small inadequate fenders, for instance, which do not properly protect the occupants of the car from flying dirt. Very frequently the size of the windshield is cut down so that a small standard size of glass can be used, saving both weight and expense, but also giving less protection to those in the car.

In the auxiliary seats many designers, probably figuring that these seats are seldom used, reduce their size until they are positively uncomfortable.

Durability Means Weight

In building a car which is best suited to the policy of building a maximum car it is not very difficult to decide which course to follow. The best car for the purpose means that it must possess some definite qualities—first, maximum safety; second, comfort, and third, stability.

Contrary to the belief of some, the extra weight which is really insurance against frequent rattles and breakages, does not increase maintenance costs. By accurate tests under normal conditions it has been proved that two cars of the same approximate size and power, one weighing considerably less than the other, consume the same amount of gasoline. In actual road work we have found that the lighter car will use as much and under some conditions slightly more fuel than the heavier car. This is true because where stability of design has been neglected it almost invariably follows that motor and carbureter efficiency have not been brought up to the highest basis. A further, and perhaps the fundamental, reason why two cars of widely varying weight burn equal amounts of gasoline is that the heavier construction means better alignment of the moving parts throughout the car and therefore less loss of power due to friction. The heavier car is almost always an easier rolling car. It clings better to the road and therefore wastes less fuel.

$15 Extra per Year

For the sake of argument, however, let us suppose that between two cars of the same approximate horsepower and size, the heavier does burn more gasoline. Experience proves that in 10,000 miles of driving, the extra cost of the gasoline burned in the heavier car would amount to only $10 to $15. In other words, in a year or year and a half of driving you would have to spend not more than $15 extra for gasoline to insure yourself a car which is always comfortable, always safe, and which gives the minimum amount of trouble.

Trade Opportunities Abroad

Consuls in Sweden, Africa, Asia and South America Report Business Openings

THAT the demand for the American automobile and motor truck in South America, Asia and South Africa is growing, is manifested by the recent reports on trade opportunities from the consuls in those respective territories. Many of these contain requests for information regarding the establishment of agencies for automobiles and accessories, while others are interested in the establishment of motor truck service. There seems to be a large demand for accessories and a fair one for trucks.

Americans have not attempted to enter the market for motor trucks in Turkey. Most of the trucks so far sold have been bought by the Army and it was reported that the Ministry of War would soon be prepared to receive bids and try cars submitted as samples with a view to purchasing 100 motor vehicles of various sorts. The trucks previously purchased have had a capacity of 2 to 5 tons and of 10 tons.

Reports from Swedish and Italian consuls have also been sent in. These requests are for the handling of American cars and accessories. Most of the consuls state, however, that the establishment of American agencies in these countries and the success of the enterprises there, would depend mostly on the keeping of the cars in stock, with repair parts.

The following trade opportunities give a brief outline as to just what is wanted. Those interested may get complete information by applying at the Bureau of Foreign and Domestic Commerce, Washington, D. C. The numbers given should be referred to when writing to the bureau.

13556. **Small Cars.**—A responsible South African business man wishes to secure agency rights for an American small car, suitable for that country. The car must be right-hand drive, good clearance, and moderate in price. An American consul writes that manufacturers should give complete description, with particulars as to prices, discounts, factory output, testimonials from users, and South African territory available. Also state if trial car could be shipped immediately, if the firm considered the proposition favorably.

13558. **Motor-car and Motor-cycle Accessories.**—A South African firm doing a good business in sporting goods, motorcycles, cycles, etc., with good up-country connections, is just opening a separate department handling accessories for motor cars, motor cycles and cycles. An American consul states that the firm will carry a very extensive stock and desires catalogues, price lists, and all available literature along these lines.

13582. **Motor Vehicles.**—An American consular officer in Sweden reports that an engineering firm in that country would like to communicate with American manufacturers of motor cars, motor trucks and motor cycles not already represented in that country, with a view to representation and selling types suitable for the market. Motor cars and trucks should be of 25 to 50 horsepower, strong and able to stand traffic on rough roads.

13587. **Motor Trucks and Other American Goods.**—An American consul reports that an American citizen, who has been residing in the East Indies for several years, was leaving for New York to represent a number of Singhalese and Tamil merchants who wish to do business with American exporters to the Far East. He is especially interested in motor trucks, but is also desirous of meeting exporters of other lines of eastern trade.

13592. **Electric Van or Truck and Runabout.**—A municipal electrical engineer in South Africa would like prices and details forwarded for one Edison battery electrical van or truck, carrying 4,000 pounds, capable of ascending an incline of 1 in 8, or 12 1-2 per cent. and a speed on level ground of 10 to 12 miles per hour. Prices are desired for chassis only and for completed car landed at a certain South African port. Specifications should indicate full mileage for each battery charge, assuming one-half distance with full load and the other half light. Quotations are also desired for an electric runabout capable of carrying four persons. Edison batteries are desired. Prices quoted should be for complete car with accessories. The same standard voltage for both vehicles would be considered an advantage.

13599. **Motor Vehicles.**—An American consul in Sweden has transmitted the name of a firm in his district which desires to be placed in touch with American manufacturers of motor vehicles.

13610. **Motor Vehicles.**—A report from an American consul in Asia states that inquiries have been received at the consulate relative to the possibility of purchasing an American automobile with which to inaugurate a passenger service between two points. It is intended to purchase more cars if the service can be operated successfully. American manufacturers interested are requested to send advertising literature to the persons named in the report.

13631. **Motor Trucks.**—An American consul telegraphs from one of the European countries stating that an American located in his district desires prices immediately from reliable manufacturers in the United States for all available 1 to 3 ton motor trucks, delivered. Prices should be cabled to the address given in the report.

13808.—**Automobiles and Accessories.**—A large firm in a European country has reported to an American consular officer that it wishes to buy small automobiles to sell from $500 to $1,000 each; also tires and accessories are desired. The firm pays cash f.o.b. vessel. Correspondence may be in English.

13925. **Automobiles and Accessories.**—A firm in southern Europe has advised an American consul that it desires to represent American makers of and dealers in low-priced automobiles and accessories. It is explained that the firm believes there is an excellent demand provided the cars can be kept in stock with repair parts. Cars selling for less than $1,000 are desired. Catalogues and correspondence should be in Spanish or French.

14005. **Magnetos and Spark Plugs.**—A firm of aeroplane builders in the Near East, which states it is in a position to offer the best of references, has informed an American consular officer that it buys magnetos and spark plugs. Correspondence should be in English.

14118. **Automobiles.**—An American consular officer in Latin America transmits the name and address of a firm in his district which is desirous of getting into touch with American manufacturers and exporters with a view of representing them on a commission basis. The firm is interested in the following lines: Automobiles and parts and lubricating oils. The firm desires catalogues, price lists, etc., covering the above lines. Correspondence should be in Spanish. References are given.

14139. **Automobiles.**—The Bureau of Foreign and Domestic Commerce is in receipt of a request from a foreign consular officer resident in the United States for the names and addresses of American manufacturers of low-priced automobiles.

14145. **Automobile Accessories and Tools.**—A firm in Italy has advised an American consular officer that it is anxious to receive offers from American manufacturers and exporters of automobile accessories and tools. The consular officer has forwarded Italian catalogues covering the desired articles. These catalogues may be inspected at the Bureau of Foreign and Domestic Commerce and its branch offices.

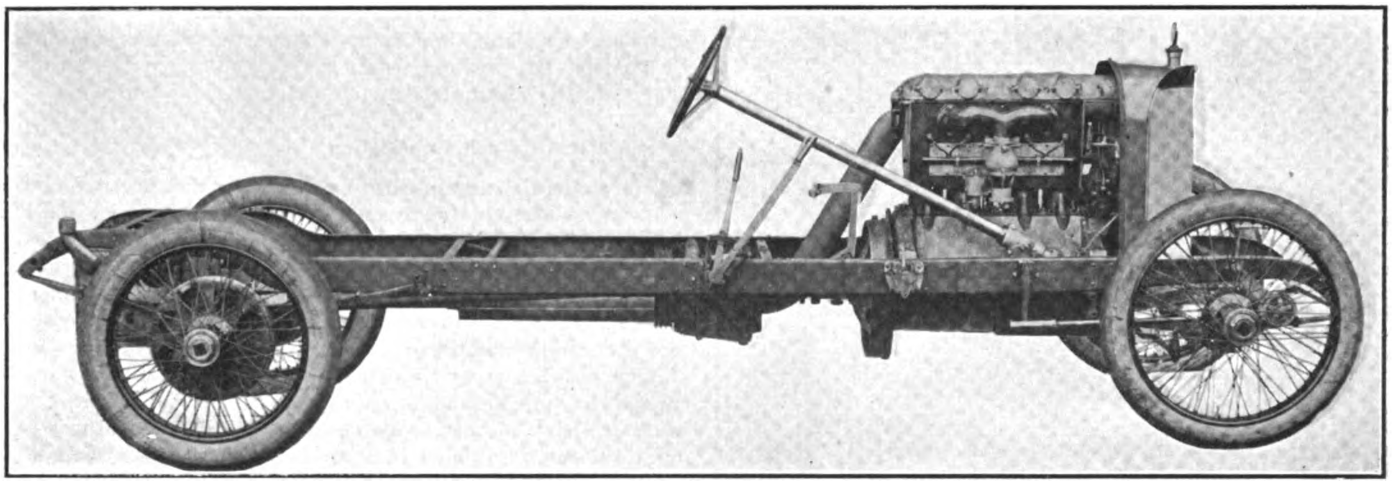
14150. **Automobiles.**—An American consular officer in South America advises that a merchant in his district, who now has the agency for a European automobile wishes to represent, directly, in his market a cheap American automobile ranging in price from $400 to $600. Correspondence should be in Spanish. Agency conditions and prices f.o.b. New York should be given.

United Electric Reduces Storage Battery Rate

NEW YORK CITY, Nov. 6—The United Electric Light & Power Co., this city, announces a reduction in the minimum monthly charge on the storage battery rate, from $25 to $10 per month beginning with November.

The company is also distributing a list of garages and charging stations in the Metropolitan District to the owners of electric vehicles operating in Greater New York and such other owners as request same.

The list is on a heavy cardboard and is designed to be tacked firmly in the vehicle in order that the operator may determine at a glance the nearest station for boosting his vehicle when such is required.



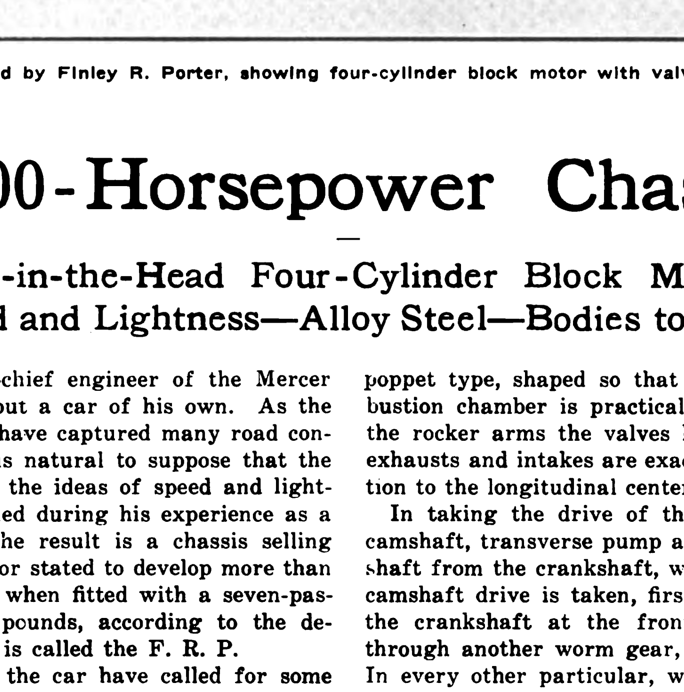
100-horsepower chassis designed by Finley R. Porter, showing four-cylinder block motor with valves in the head, V-radiator, etc.

F. R. P. 100-Horsepower Chassis, $5,000

Valve-in-the-Head Four-Cylinder Block Motor—Speed and Lightness—Alloy Steel—Bodies to Order

FINLEY R. PORTER, ex-chief engineer of the Mercer company, has brought out a car of his own. As the designer of cars which have captured many road contests in the 300-inch class, it is natural to suppose that the new car would incorporate all the ideas of speed and lightness, that Mr. Porter has gained during his experience as a creator of racing vehicles. The result is a chassis selling for $5,000, incorporating a motor stated to develop more than 100 horsepower and weighing, when fitted with a seven-passenger body, less than 3,500 pounds, according to the designer's figures. The new car is called the F. R. P.

The exceptional qualities of the car have called for some radical work in the use of materials and dimensions. As a unit, the chassis is a study in the use of alloy steel. Practically the entire steel work is of chrome vanadium, so heat treated as to meet the required specifications as to strength and rigidity. In every possible part a magnesium-aluminum alloy of great strength has been used. Tubular connecting-rods, crankshaft and driveshafts, steel pistons, steel-iron cylinders, etc., also play their part in the development of the 580-pound power plant.



Exhaust side of four-cylinder 4.6 by 6.75-inch block motor used in F.R.P. chassis, showing detachable cylinder head, mounting of Bosch electrical system and circulating pump

Valve-in-the-Head Motor

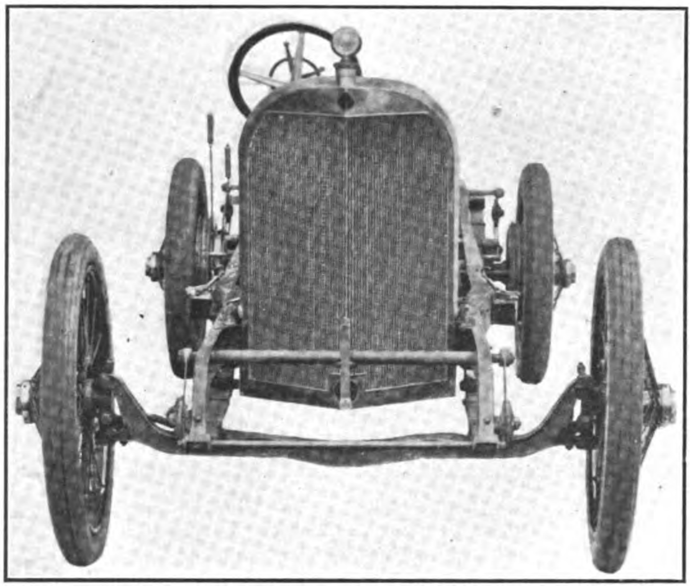
The motor is a four-cylinder 4.6 by 6.75-inch design, with valve-in-the-head cylinders cast in a block, the A. L. A. M. rating being 33.9 horsepower. The valves are operated by rocker arms from an overhead camshaft. They are of the 45-degree poppet type, shaped so that when they are closed the combustion chamber is practically a hemisphere. By offsetting the rocker arms the valves have been so arranged that the exhausts and intakes are exactly opposite one another in relation to the longitudinal center line of the cylinders.

In taking the drive of the auxiliary shafts, namely, the camshaft, transverse pump and magneto shaft and generator shaft from the crankshaft, worm gears have been used. The camshaft drive is taken, first through a vertical shaft from the crankshaft at the front end of the motor and then, through another worm gear, it is imparted to the camshaft. In every other particular, with the exception of double, 80-pound valve springs, the design does not depart from ordinary valve-in-the-head practice to any radical degree.

14 Miles to the Gallon

From tests so far conducted by the makers, the fuel consumption is estimated to be in the neighborhood of 14 miles to the gallon. The high efficiency of a motor of this size has been gained to a large degree by the high compression which is 112 pounds gauge. The test chassis upon which the experimental work has thus far been carried out has a gear reduction of 3 to 1 on direct. It has shown a speed of 88 miles an hour on the Long Island Motor Parkway.

The tubular connecting-rods are 16 inches long and are of chrome-vanadium steel with .40 carbon. The pistons are nickel steel, .20 carbon



Front view of chassis used in F. R. P. car, showing special V radiator. Note the light, strong design, wire wheels with racing type hubs and Motometer on radiator cap

and are fitted with two rings. They are 5 inches long and have a clearance of .015 inch. They are fitted with two rings above the wristpin. The wristpin bearing is 1.25 inches in diameter and 3 inches long.

The crankshaft is a chrome-vanadium forging with .40 carbon and has a diameter throughout its entire length of 2.5 inches. The center has a hollow core of 1.625 inches diameter. The shaft is carried on three bearings, each having the diameter 2.5 inches, the front bearing being 3 inches in length, the center 3.25 and the rear 5. The bearings are lined with Kelly bronze.

Valve Diameter Is 2.5 Inches

By eliminating the cage construction it has been possible to carry the valve diameter up to 2.5 inches. This plan has been rendered feasible on account of the close proximity of the water jacketing space which is within .25 inch of the valve seat. The valve stems and heads are of tungsten steel and they have a lift of .375 inch. The cams which act directly upon the rocker arms are in a unit with the hollow chrome vanadium camshaft. This shaft has a 1.375-inch exterior diameter and a hollow core 1 inch in diameter. By carburizing the outside of the cams before heat treating the shaft, the exceptional carbon content of 1.0 per cent. has been reached on the surface of the cams, giving a glass-hard bearing face. The rocker arms are not returned to their initial positions solely by the valve springs, but have in addition to these a coil spring of 40-pound-pull, hooked between each pair of exhaust and intake rockers across each cylinder. The half-time ratio is imparted to the camshaft by gearing the vertical worm shaft 1.5 to 1 to the crankshaft and the camshaft 3 to 1 to the vertical wormshaft.

Pressure and Splash Lubrication

Lubrication is accomplished by a combination pressure and splash system. On the bottom of the vertical worm shaft there is a rotary piston pump with four independent leads. One of these leads goes to each of the three main bearings and the fourth is carried to the rear camshaft compartment and connects with a pressure gauge on the dash which registers the pressure on the oil pump. This pump produces about 30 pounds pressure at 1,500 revolutions per minute and has a capacity up to 600 pounds which is sufficient to clear the line in all ordinary cases of clogging. The valve mechanism is so arranged that it is held in a series of cup-shaped compartments at each cylinder. The oil, after filling the rearmost compartment, drains forward and fills in turn each of the others. These compartments are short and deep, providing against spilling the oil on steep grades. By this arrangement the entire valve mechanism operates in a bath of oil.

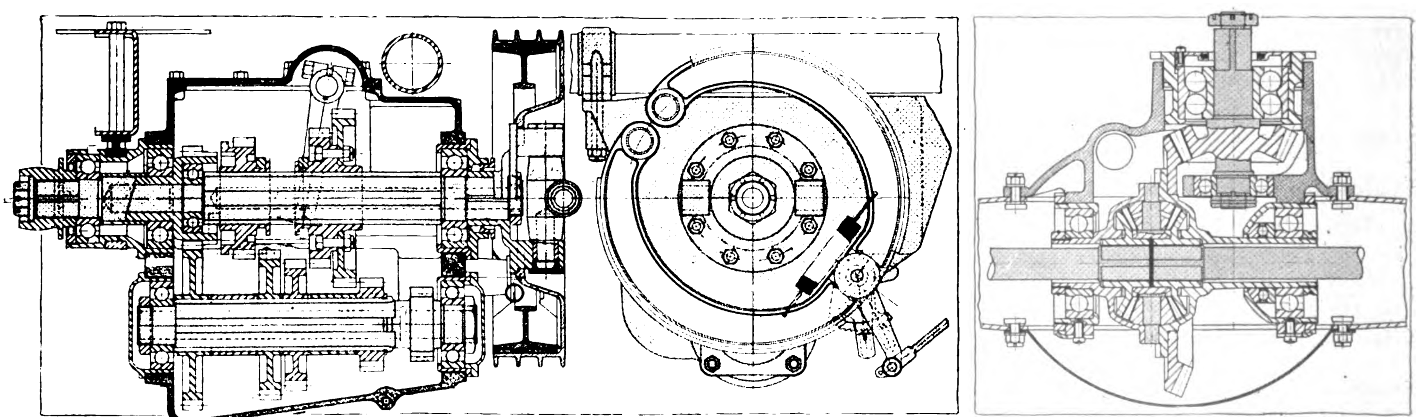
The three other leads carry the oil under pressure to the respective main bearings and after lubricating these the oil passes into a series of troughs which are held in an independent aluminum pan riveted to the interior of the lower half cf the crankcase. By means of these troughs a constant level splash arrangement is provided.

Cooling is by water circulated by means of a centrifugal pump. The water-jackets are large and in addition there is an efficient V-shaped radiator which has been made specially by the Mayo company for this car. It has a radiating area of approximately 20 by 26 inches and the honeycomb tubes are 3 inches long. The support of the radiator has been carefully worked out. It is a three-point scheme. The two bottom points are composed of vanadium steel ball trunnions in manganese bronze brackets and the third point is formed by a tie rod across the top.

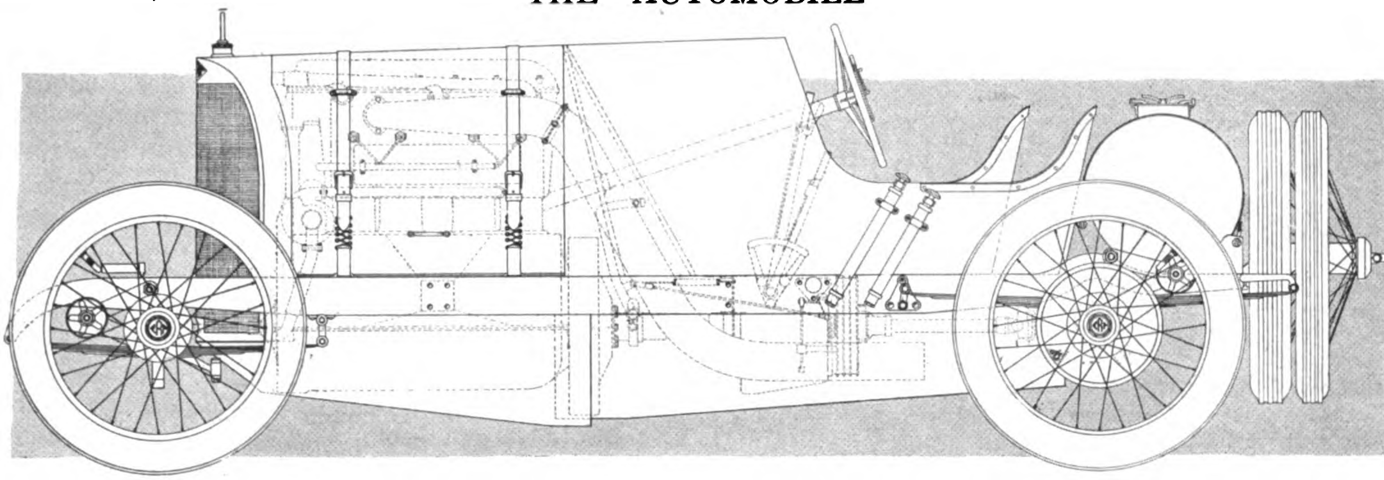
Bosch Electric Plant

A complete Bosch electric plant is supplied with the chassis. This takes care of ignition, lighting and starting. For ignition a two-point scheme, which has as its current source a high-tension magneto, is provided. For starting there is the Bosch 12-volt motor which is geared 7 to 1 to the crankshaft and which is capable of spinning the engine more than 150 revolutions per minute under ordinary circumstances. The generator is also a Bosch 12-volt unit driven at crankshaft speed and capable of carrying the entire lamp load at 12 miles per hour. The entire electric system is worked on the single wire plan and the battery is a Willard 50-ampere hour 12-volt.

The clutch is a cone housed within the flywheel. The fly-



Left—View through three-speed gearbox used in F. R. P. car. Middle—Transmission brake. Right—Section through rear axle



Side view of racing type body mounted on F. R. P. chassis, showing the mounting of the power plant, control features, etc., by means of the dotted lines. Note spare wheels carried at rear

wheel is 21 inches in diameter and is a steel forging providing a clutch surface 19 inches in diameter and 2.5 inches face. Between the clutch and the gearbox there is a compensating joint which can take care of misalignment in any direction. The gearbox provides four forward speeds with direct on fourth. It is carried on annular ball bearings and is provided with a transmission brake which acts as service equipment. This brake shaft, together with the clutch thrust and sliding members, is oiled by the lubricant which passes through the hollow crankshaft by means of a specially drilled lead. The entire gearbox assembly weighs but 80 pounds.

Drive Is Through Rear End of Springs

There are two universal joints in the drive of air-hardened steel. These, together with practically every bolt and nut in the car, are manufactured in the plant of the makers of this car. The drive is delivered to a five-pitch, four pinion differential. The gears are chrome vanadium with twenty-one teeth in the pinion and sixty-one teeth in the crown wheel, giving practically a 3 to 1 reduction. The car is driven through the rear ends of the rear springs. This being done to have the starting moment exerted in settling the chassis downward instead of raising it. All the special bolts and cross shafts in the drive are fitted with graphited bronze bushings which are self lubricating.

The emergency brakes are on the rear wheels and have 16 2.5-inch drums into which they expand. The steering gear is a worm and full gear type also worked out in the designer's plant. It has a magnalium housing with a ball thrust. The column is a 2-inch stationary post with three levers, the third being for carbureter adjustment. The wheelbase is optional and the chassis is sold with full electric equipment.

Mitchell in Good Shape After 7500 Miles

PITTSBURGH, PA., Nov. 9—The seals on the Mitchell sealed bonnet reliability car, which finished its 30-day run of 7,500 miles, with the seals intact, were broken on November 4 in the showrooms of the Williams-Hasley Motor Car Co., by F. E. Edwards, technical expert of the Contest Board of the American Automobile Assn.

After his examination of the car Mr. Edwards sent in his report to Chairman Kennerdel of the Contest Board, who approved of it and declared the car a stock model.

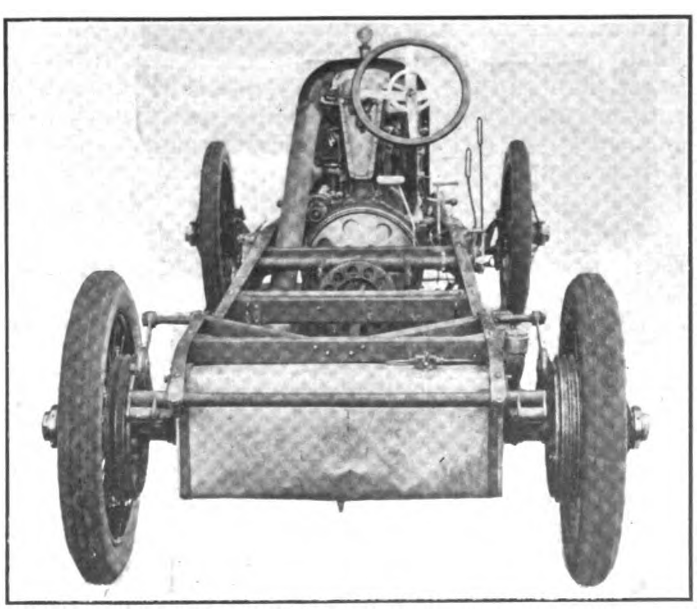
When the seals were broken the engine was gone over and minutely examined. The valves did not need regrinding, having only a very small deposit of carbon; the bearings were snug; the clutch showed no signs of wear and the transmission and rear axle were in good condition. The brakes were shy of two rivets.

When the seals were broken all evidence of the muddy roads which it had traveled was apparent, the drip pan alone containing over 85 pounds of mud and sand.

The car was equipped with a Stewart vacuum gasoline tank, which is now regular equipment on the Mitchell. An average of 15 1-2 miles to the gallon was made for the trip. No record was kept of oil consumption, which was light.

Packard Is Now an All-American Car

DETROIT, MICH., Nov. 5—Vice-president and general manager Alvan Macauley of the Packard Motor Car Co., has announced that all the materials necessary in the construction of Packard cars are now available in America and that the company does not have to apply to any foreign country for any required material. Had the war occurred 10 years ago the company would have had to close down as at that time it was dependent almost exclusively on foreign manufacturers for the following articles needed in the construction of its cars: French cylinder castings, piston and piston ring castings, cone steel for ball bearing races, ball bearings, Fulmen storage batteries, spark coils, magnetos, spark plugs and spark porcelains, high-tension ignition cables, timers, commutators, motor valve forgings, silico manganese gear steel, door locks, door handles, all cloths, laces and silks for trimmings, goat skins for inclosed body upholstery, horns and bulbs.



View of F.R.P. chassis, looking forward, showing large fuel tank in rear, brake drums ridged for cooling, large exhaust manifold, which is a two-part stamping, etc.

The Automobile

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Factory Destruction

AN unfortunate aspect of the present war in France is the destruction of some of the automobile factories in northern France. On other pages of this issue are shown views of one leading French factory that was bombarded and finally burned. Unquestionably this fate awaits other plants in the war zone. To date nothing definite has been given out regarding factories located in several cities that have suffered prolonged sieges.

It is unpleasant to contemplate profiting from the unfortunate experiences of rivals, but this factory destruction points more and more certainly to the situation that will rule when hostilities cease. It is weekly becoming more apparent that many of the continental factories will be in a condition of utter disorganization when the war ends, and that it will take a year, perhaps longer, for them to get on a production basis. Automobiles will be needed and the American market will be looked to in supplying this demand.

At present the war departments are asking for small touring cars. The demand is for a small four-cylinder car. Europe has never been a strong advocate of the six, preferring the small high-efficiency four. The American concerns that hope to profit by the fate of war and its destruction should aim to be ready to supply nearest to what is demanded. The good merchant always has on the counter those goods that are in most demand. This is a good leaf from the book on exporting to keep in mind when developing a new export business after the close of the war.

A Truck Show?

THE National Automobile Chamber of Commerce, Inc., at its regular monthly meeting last week acknowledged in a more or less direct way that there is at least some necessity for a motor truck exhibition, a position in strong contrast with the stand taken by this organization nearly 2 years ago, when it voted to discontinue truck shows.

It is not proposed to have truck exhibits at the New York or Chicago show, but rather that space be set apart for the use of the thirty-three makers of trucks who are members of the association.

This shows a tendency in the right direction, a movement which will serve to bring motor trucks to the attention of the industry during the show circuit. The motor truck is more in the public eye today than it has been since its inception. It is revolutionizing the present war, and, in fact, although in general use at present, gives promise of being utilized in every department of the war.

It is regrettable that more members of the American motor truck industry are not represented in the membership of this national governing body. There are many truck makers who are not members of any organization, but who should be, and who are consequently suffering that loss, which always comes from not being members of such industrial organizations that are for the benefit of the industry.

Organization is one of the best indications of progress. The organization can accomplish what is impossible with the individual. Every movement that aims to broaden the scope of organization is welcomed.

THE AMERICAN MOTOR TRUCK INDUSTRY IS LARGE ENOUGH TO WARRANT SOME COLLECTIVE DEMONSTRATION ONCE A YEAR BEFORE THE NATION. THIS DEMONSTRATION MIGHT BE IN THE FORM OF SOME GREAT CONVENTION; IT MIGHT TAKE OF THE NATURE OF A NATIONAL DEMONSTRATION; OR IT MIGHT ASSUME THE PROPORTIONS OF SOME SUITABLE FORM OF SHOW, OR COMBINED SHOW AND DEMONSTRATION. LET IT BE SOMETHING.

Unfortunately at the present time the American motor truck industry is not a unit as it should be. There are some of the older concerns that apparently do not welcome all the newer companies into the older organizations. At present some of these new concerns are not perhaps following as orthodox methods of merchandising as a few of the older companies. This is one of the prime reasons why closer organization is desirable. The truck industry deserves collection protection, and it is natural to expect that the older members of the industry will bear their share of this burden.

1,600 Good-Roads Delegates in Atlanta

Fourth Annual Convention of American Highway Assn. Sets New Record—Good Roads Making Fast Progress—18,000 Miles of Hard Roads Built in 12 Months

By J. C. Burton
(Staff Correspondent)

ATLANTA, GA., Nov. 9—Fifty years ago the forces of North and South met in Atlanta to decide a question over which there was a decided difference of opinion. Today, the forces of North and South again met in Atlanta to discuss a question of almost equal economic and social importance but one in which each side shares the other's sentiments. Fifty years ago, the forces of North and South assembled under different flags. Today they rallied around a common standard, the gonfalon of highway improvement.

Atlanta Under Siege

Since early yesterday, the historic city has been in a state of siege. In the past 36 hours, more than 1,600 delegates, recruited from all sections of the country, have swept down upon Sherman's base of supplies in 1864 to attend the fourth annual American Road Congress, which opened this morning and will continue throughout the week and which is being held under the auspices of the American Highway Association, the American Automobile Association and the Association of County Commissioners of Georgia.

Never before in the history of national conventions for the purpose of advocating the building of good roads has there been as much enthusiasm shown as is being displayed here. Never before has the American Road Congress attracted so great a crowd of delegates as has the conclave of this week. The cities along the Atlantic seaboard alone sent sixteen Pullmans full of delegates. Even far off California and Washington are represented. Moreover, it is a most representative gathering. All except five or six states of the forty-eight in the sisterhood have sent their highway engineer or commissioner to attend the sessions.

18,000 Miles in 12 Months

In his opening address, Logan Waller Page, director of the United States office of public roads and president of the American Highway Association, reviewed the good road work of the past year to prove that the campaign is nation-wide in importance and one in which every state, county and township now is vitally interested. During the past 12 months 18,000 miles of hard-surfaced roads had been built in this country at a cost of more than $200,000,000.

Speaking of the use of convicts for road work, President Page said:

"An exceedingly important factor that has come into prominence in solving our road problems during the past 10 years is that of convict labor. Many of the states are using their convicts in the building of roads and the preparation of road materials and I congratulate Georgia on her lead of all the states in this respect. Georgia, I understand, now has a great road-making army of more than 5,000 convicts which is rapidly transforming the road system of the state. We have estimated that the total convict labor days on road work throughout the United States will exceed 3,000,000. As indicating the trend of this movement, I might say that during the year the states of Ohio, New York, Wisconsin and West Virginian have authorized the use of convicts in this way, thus indicating that this policy has no geographical bounds to its field of usefulness."

Other speakers were Governor John M. Slaton, of Georgia, Mayor James A. Woodward, of Atlanta, President Austin B. Fletcher, of the American Road Congress, Robert P. Hooper, former president of the American Automobile Association and Lewis B. Speare, president of the Massachusetts A. A.

Cotton Belt Route Proposed

ATLANTA, GA., Nov. 10—*Special Telegram*—Coincident with the Fourth American Road Congress which is being held at Atlanta this week, plans for a new motoring highway to connect Chicago and Jacksonville and to be known as the Cotton Belt route, were born here today. William S. Gilbreath, of Indianapolis, Secretary of the Hoosier Motor Club is sponsor for the project which originated with Carl Fisher, builder of the Indianapolis Motor Speedway and father of the Lincoln Highway.

According to present plans the proposed North-and-South link in the country's chain of motor roads will pass through Indianapolis, Louisville, Nashville, Chattanooga, Atlanta, and Macon giving the motorists an opportunity to visit en route such places of historic and scenic appeal as the Lincoln Farm, the Mammoth Cave, the Blue Ridge mountains of Kentucky and Tennessee and the Civil War battlefields in the vicinity of Chattanooga and Atlanta.

U. S. Army To Test Motor Tractor

WASHINGTON, D. C., Nov. 7—The conclusion has been reached by the war department, at the instance of the army board of ordnance and fortifications, that it would be advisable to have a comparative test of types of motor tractors, with a view of ascertaining or developing a vehicle of such design and manufacture as will make it useful to the army in the transportation of ammunition, supplies and equipment.

More than a year ago the board made an allotment for the purpose of acquiring a French motor tractor, which one of the American military observers found was used extensively and effectively in the French military service. Efforts were made to obtain this vehicle but after much correspondence and several increases in the allotment it was ascertained that the French makers of the vehicle were not willing to sell outright the tractor and the proposal to loan the vehicle for the purposes of experiment came to nothing, the war in Europe intervening to terminate the negotiations.

The suspicion has been entertained that the foreigners were, for some reason, not particularly desirous of sending over any of their vehicles. This circumstance has served to postpone the test which was contemplated and which, it was proposed by the board of ordnance and fortifications, should be conducted by representatives of various branches of the service.

Now it is recommended that the test be conducted of vehicles of American design and manufacture. It was contemplated that the test should be under the auspices of the board of ordnance and fortifications, but the secretary of war has decided that it shall come under the general staff. That body is now gathering information for the purpose of having extensive experiments. In the meantime contracts continue to be awarded by the quartermaster general for trucks.

Recently bids were opened for furnishing two four-wheel-drive motor trucks for the army. The specifications were drawn as a result of tests by the quartermaster corps of various trucks designed for army purposes. The following bids were received: Duplex Motor Co., Charlotte, Mich., $2,200 each; Thomas B. Jeffery Co., Kenosha, Wis., $2,500 each; Driggs-Seabury Ordnance Co., Sharon, Pa., $2,640 each: Four Wheel Drive Auto Co., Clintonville, Wis., $2,380. Contracts will be awarded in the near future.

Stevens-Duryea Sales Total $3,503,500.94

End of Fiscal Year Shows 14,000 Cars Built Since Inception of Company

ATWATER KENT AND HUPMOBILE BUSINESS GROWS

CHICOPEE FALLS, MASS., Nov. 9—The Stevens-Duryea Co. has issued its statement for the fiscal year ending October 31, 1914. In a letter accompanying the statement the company calls attention to its liberal reserves for depreciation, and to the fact that nothing is carried to the credit of the company to cover patents, drawings, patterns or good will. The total sales for the past business year have been $3,503,500.94. Since beginning business the company has sold 14,000 automobiles. The statement is as follows:

CURRENT ASSETS:	
Cash on hand	$84,712.76
Accounts receivable	64,850.40
Notes receivable	7,235.00
Total	$156,798.16
Inventory	$1,230,769.45
FIXED ASSETS:	
Real estate, buildings and equipment	$856,185.53
Tools and machinery	861,576.10
Office furniture	17,414.60
Miscellaneous assets	63,400.00
Total	$1,798,576,23
Total assets	$3,186,143.84
LIABILITIES:	
Current Liabilities:	
Bills payable	$184,000.00
Accounts payable	25,533.77
Accrued taxes	7,993.00
Total	$217,526.77
Capital account:	
Capital stock	$300,000.00
Reserves:	
Reserves for depreciation	594,803.85
Surplus	$2,668,617.07
Total liabilities	$3,186,143.84

Atwater Kent Business Increases 800 Per Cent.

PHILADELPHIA, PA., Nov. 9—A. Atwater Kent, manager of the Atwater Kent Mfg. Works, this city, has just returned from an extended trip through the Middle West, in which the majority of the factories in the industry have been visited. He reports that indications are for a busy season next year in spite of the effects of the war. Present indications would show that more radical and rapid developments are taking place in the automobile industry at present than during the past 6 or 7 years. His company's business has increased 800 per cent. in the last year, and 1915 business will be approximately double that of the present season.

Another Dividend for Creditors of R-C-H

DETROIT, MICH., Nov. 6—At the meeting of creditors of the R-C-H Corp. held yesterday in the offices of referee in bankruptcy Lee E. Joselyn, the latter entered an order directing the Security Trust Co., trustee, to pay a dividend of 25 per cent. to all creditors whose claims accrued after October 25, 1912, the day when the extension agreement was signed. About $80,000 will now be disbursed by the trust company and it is stated that another dividend of 25 to 30 per cent. will be declared within the next 90 days. Last year a first dividend of 5 per cent. was paid.

1,382 Hupmobiles Shipped in October

DETROIT, MICH., Nov. 6—October was the biggest month of business the Hupp Motor Car Co., has ever had in the United States, according to President J. Walter Drake. The total number of cars sold and shipped was 1,382, which, considering the war and other conditions is a most remarkable and encouraging showing. During September and October the Hupmobile business has more than doubled as compared with the same months in any previous year in the history of the company. Most of the cars shipped went to the Middle West, Northwest and Pacific Coast and despite the unfavorable business conditions in the cotton belt a fair amount of business was transacted in that part of the country and reports have been received showing that conditions there are now improving.

Johns-Manville Takes Over Tirenew and Narco

NEW YORK CITY, Nov. 7—The H. W. Johns-Manville Co. has concluded arrangements with the National Rubber Co. whereby it becomes the sole distributor of Tirenew and Narco products.

These goods will hereafter be advertised as J-M Tirenew and J-M Narco products and will be subject to the same guarantee or quality that obtains on all automobile accessories, etc. sold under the J-M emblem.

J-M Narco products are mediums for making tire repairs, re-finishing automobile tops and so forth.

Marked Activity in Rubber Imports

NEW YORK CITY, Nov. 5—During the 7 days from October 16 to 22, inclusive, there reached this port 2,705,900 pounds of crude rubber, a quantity fully equal to the average of last year's imports. Steadier buying also is reported from London, and an upward movement is generally looked for.

DETROIT, MICH., Nov. 6—Within the next few days the Security Trust Co. will mail a second dividend of 12 1-2 per cent. to the creditors of the Disco Co., which made electric starting and lighting systems. This will make a total of 22 1-2 per cent. dividends paid thus far and the trust company believe that a third dividend of approximately the same amount will be paid to the creditors when the estate is finaly closed.

AKRON, O., Nov. 5—The Goodyear Tire & Rubber Co. has declared a 12 per cent. annual dividend on the common stock. This is the same as a year ago.

Final Stages in Controversy Over Horn Patents

NEW YORK CITY, Nov. 10—The latest court action in the controversy which has been carried on in the New York courts between the Lovell-McConnell Mfg. Co., maker of Klaxon horns, and the Automobile Supply Mfg. Co., Inc., maker of Newtone horns, is that Klaxon has been denied a rehearing of the case in the Circuit Court of Appeals, and has been directed to pay the costs of the suits against fourteen dealers selling Newtone horns, together with the costs of the litigation in the Circuit Court of Appeals and also the District Court in Brooklyn, where the earlier arguments were heard.

The bill of complaint of Klaxon against Newtone has been dismissed and also the bills against the fourteen dealers selling Newtone horns. The only remaining course for Lovell-McConnell is to petition for a hearing before the Supreme Court of the United States.

On October 6 the Circuit Court of Appeals denied the motion of Klaxon for a re-hearing, and confirmed the decision of Judge Coxe handed down in that Court on June 8, which held "that the broad claims in controversy of the Hutchison patents are invalid and that the claims which cover specific details, if valid, are not infringed."

On October 15 the Circuit Court of Appeals issued a mandate to the District Court for the Eastern District of New York instructing it that the decision of the District Court in favor of Klaxon handed down by Judge Chatfield January 10, 1914, was reversed with costs of $3,346.13, to be paid by Klaxon. The mandate ordered the Brooklyn Court to dismiss the bill.

On October 20 Judge Veeder issued an order in the Brooklyn Court dismissing the Klaxon bill of complaint and cancelling the bonds given by the Automobile Supply Mfg. Co., Inc., as security for costs. On October 26 an order signed by Judge Veeder fixed the costs of the Brooklyn suit at $1,436.62, and ordered that, inasmuch as this sum as well as the sum of $3,346.13 representing the costs of the action in the Circuit Court of Appeals, has been paid in full by Lovell-McConnell, the bill of complaint be dismissed. Following this, on October 31 Judge Chatfield signed an order in the Brooklyn District Court on motion of the Klaxon counsel extending the term of the court for all purposes of this suit for a period of 6 months from the date of the final decree.

Reorganize Hans Motor Equipment Co.

LACROSSE, WIS., Nov. 7—The Hans Motor Equipment Co., Lacrosse, Wis., one of the largest producers of pressure and capacity gauges, oil pumps and other motor car parts and accessories in the Middle West, is undergoing a financial reorganization under the direction of Dan W. MacMillan of Lacrosse, in favor of whom the concern has executed a trust deed. The company has a current indebtedness of about $18,000, which will be liquidated at once. It moved to Lacrosse and built a new factory with the assistance of the Lacrosse Industrial Assn. about two years ago and the reorganization is meant to place the concern on a sound footing for the future. It is stated that the company is in good condition, having materials on hand valued at $30,000 fully paid for and machinery, tools and equipment appraised at $50,000.

Greatest Year for Long Mfg. Co.

DETROIT, MICH., Nov. 9—The Long Mfg. Co., maker of radiators, has just ended its fiscal year with a 200 per cent. increase in sales over any previous year. The sales of the months of September and October reached the highest mark in the history of this company. The September production was 300 radiators per day and the specifications for spring delivery have exceeded those of any past season.

Voiturette Sold to Winternitz for $100,000

DETROIT, MICH, Nov. 10—The American Voiturette Co., Detroit, Mich., has passed into the hands of the Samuel L. Winternitz Co., Chicago, Ill. The Federal Court in Detroit today confirmed the latter company's offer of $100,000 for the real estate, accounts, notes and cash. It is stated by the Detroit representative of the Winternitz company that the building of Car-Nation cars will be continued. The receiver, the Detroit Trust Co., has requested that creditors offer proof of claims within the next 90 days.

Motor World Buys Motor Field and Merges It

NEW YORK CITY, Nov. 10—*Motor Field*, the monthly publication that has enjoyed such a large middle and far Western circulation since the inception of the automobile industry, has been purchased by the A. B. Swetland Co., New York, and will straightway be merged with *Motor World*.

It was realized that *Motor Field*, being a monthly publication, failed to adequately serve its important dealer clientele as a newspaper. Live dealers must have news of the industry quickly. All of *Motor Field's* dealer circulation will be absorbed by *Motor World*. This big addition of Western circulation to the present *Motor World* strength throughout the territory east of the Mississippi river will present a wonderful merchandising force capable of promoting material advantage both to the automobile accessory dealer and manufacturer.

Until 1 year ago *Motor Field* was published in Denver by the G. A. Wahlgreen Co., and when sold to the Van Sicklen Publishing Co. was removed to Chicago, since which time its circulation has been intensified and its scope of usefulness largely increased.

By the merger with *Motor World* there comes into existence a dominant publication that covers the dealers from ocean to ocean. The A. B. Swetland Co., publishers of *Motor World*, is a unit of the Class Journal Co., owners of THE AUTOMOBILE, *Motor Age* and *Motor Print*.

The advertising department of the Class Journal Co. will continue to represent *Motor World*, assisted by Messrs. Fred W. Van Sicklen and N. H. Van Sicklen, Jr., with Charles B. Shanks as business manager.

Allen Motor Co. Is Member of C. of C.

NEW YORK CITY, Nov. 9—At the last meeting of the Directors of the National Automobile Chamber of Commerce, the Allen Motor Co., Fostoria, O., became a member.

Handley Buys Marion —To Re-Organize Co.

Assets Bring $120,000—Announcement of Plans Soon—Sheldon Has New Axle

THREE NEW APPERSONS—CO. TO SELL NORWALK

INDIANAPOLIS, IND., Nov. 5—The assets of the Marion Motor Car Co., were sold today to James I. Handley, president of the company, for $120,000. Mr. Handley, who has been connected with the Marion company for the past few years, has arranged to surround himself with a good organization and will make a definite announcement regarding the company's policy in the near future.

The affairs of the existing Marion company have been more or less in the courts since October, 1913, when a receiver was appointed for the company. In December of that year the receiver was discharged after the creditors had agreed to an extension of their paper. In July, 1914, J. M. Edsall, the company's superintendent, offered $150,000 for the assets, which offer was refused by the Indianapolis attorney representing a number of the creditors. The sale was also objected to by the board of directors of the Marion company. Soon after this the Marion company distributed $130,000 by way of dividends. The company's matters were kept clear of the courts until recently. The policy pursued has apparently been highly approved by the creditors who are now realizing about $125,000 more than they were offered in July.

Now the Sheldon Axle and Spring Co.

WILKES-BARRE, PA., Nov. 9—In order to link together in its incorporate name both articles that go to make up the bulk of the Sheldon output, the name of the Sheldon Axle Co. has been changed to the Sheldon Axle and Spring Co.

The company has recently completed a number of large additions. The entire axle assembly department has been moved into new quarters and complete equipment of new machinery has been installed in the vacated assembly room, which is devoted exclusively to the worm gear proposition.

In this connection announcement also is made by the company of the bringing out of a new 1,500-pound worm gear driven axle which is now ready for delivery in quantities. This now gives a standard line of Sheldon worm gear drive rear axles consisting of four sizes, namely, 1,500 pound, 1, 2 and 3 ton.

The new size is identical in design with the previous sizes, using ball bearings throughout for both the radial and thrust loads in the worm itself.

Three 1915 Appersons at $1,350 to $1,585

KOKOMO, IND., Nov. 9—The Apperson Bros. Automobile Co., Kokomo, Ind., has three new models for 1915. These are model 4-40, a five-passenger car with 116-inch wheelbase and a 3½ by 5 motor listing at $1,350; model 6-45, a five-passenger car with 122-inch wheelbase and a 3½ by 5 motor listing at $1,485; and model 6-48, a seven-passenger car with 126-inch wheelbase and a 3½ by 5⅛ motor listing at $1,585.

Company Organized To Sell Norwalk Six

MARTINSBURG, W. VA., Nov. 7—A charter has been granted to C. W. Kilbourn, Max Robinson, S. P. Hopkins, of Martinsburg, G. B. Goetz, Charlestown, W. Va., and R. W. Alexander, Baltimore, Md., as incorporators of the Norwalk Distributing Corp.

The new corporation will have the sole distribution of the Norwalk underslung automobiles, and will handle both the domestic and foreign business.

It will market a light six. The general offices will be located in this city, with branch offices in New York City, covering the export department.

In October Charles G. Smith was appointed receiver of the Norwalk Motor Car Co., on petition of an officer of the company. The court granted permission to the receiver to borrow money for operating expenses and to continue the operation of the plant for 2 months, by which time it was believed the company would be reorganized.

September Exports Total 774 Cars

War Cuts Shipments 985 as Compared with 1913—Trucks Gain—Complete Statistics

WASHINGTON, D. C., Nov. 9—In addition to the figures published last week in THE AUTOMOBILE showing the exports of motor cars during September and the 9 months ending September, the following detailed figures, are herewith presented for the benefit of the industry. They are the latest figures compiled by the federal bureau of statistics and give a general idea of what conditions were up to October 1 last.

The total exports of commercial and passenger vehicles for September, 1914, dropped approximately 56 per cent. under those for the same month in 1913. For the 9 months ending September, 1914, the exports dropped only 3 per cent. below those of the same period in 1913. The exportation of parts, not including engines and tires, gained $2,371.

Eighty more trucks were exported in September, 1914, than in the same month of 1913 while the automobile exportation dropped in number 1,065. Both the loss of the passenger vehicles and the gain of the commercial vehicles amounted each to 62 per cent.

Canada was our largest buyer during September with British Oceania next. Canada purchased 260 while British Oceania purchased 219. The United Kingdom bought 136 vehicles. For the 9 months ending September, United Kingdom led with a total purchase of 5,130 vehicles valued at $4,281,026. Canada was next with 3,854 at $4,881,062.

The total value of tires exported from this country in September, 1914, amounted to $266,259 or $55,556 lower than for the same month in 1913. England was the largest buyer, the purchases amounting to $134,801.

Imports of automobiles during September, 1914, amounted to $95,170 as against $79,079 for September, 1913. The bulk of these cars came from Italy, which sent over forty machines. The same country sent only sixty-six for the 9 months ending September.

France sent over seven cars during September, 1914, valued at $24,650. The United Kingdom during the same month sent over nine cars valued at $19,537, just three better than September, 1913. The French imports were six less than the same period in 1913.

Market Reports for the Week

This week's market reports showed no important changes. These were few and small. A few of the markets have shown a lowering demand during the past week, especially the metals. Though tin went up $0.13 per 100 pounds, this metal showed less demand for future positions. Both coppers were held more firmly this week, but the demand was small. Lead remained quiet but steadier in the open market. Antimony, though strong at the beginning of the week dropped on Friday to $0.13 1-2. This product is less active and less strong at the closing. There were no changes in the oils and lubricants markets. An easier tone developed in the rubber markets on Tuesday. This was due to the announcement of the destruction of the German cruiser Emden. The prices were generally 1 to 1 1-2 cents lower for all grades. Up-River Para dropped to $0.65. Trading was quiet in this market. Stocks of rubber at Para and Manaos in first and second hands on November 1 were 1,500 tons smaller, it was stated, that on the same date last year.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.14	.14	.13½	.13½	.13½	.13½	......
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	1.21	......
Besesmer Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	......
Copper, Elec., lb.	.11 1/5	.11 3/20	.11 3/20	.11 1/5	.11 1/5	.11¼	+.00 1/20
Copper, Lake, lb.	.11 3/10	.11¼	.11¼	.11 3/10	.11 3/10	.11⅜	+.00 3/40
Cotonseed Oil, bbl.	5.10	5.27	5.65	5.50	5.30	5.33	+.23
Cyanide Potash, lb.	.25	.25	.25	.25	.25	.25	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	.90	.90	......
Lead, 100 lbs.	3.50	3.50	3.50	3.50	3.50	3.50	......
Linseed Oil	.45	.45	.45	.45	.45	.45	......
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.73	.73	.73	.73	.73	.73	......
Rubber, Fine Up-River, Para	.66	.66	.66	.66	.66	.65	—.01
Silk, raw, Ital.	..	4.25	..	..	4.20	4.10	—.15
Silk, raw, Japan	..	3.23	..	..	3.20	3.20	—.13
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	33.25	34.00	34.13	34.00	34.20	34.38	+.13
Tire Scrap	.05	.05	.05	.05	.05	.05	......

	September				Nine months ending September:			
	1913		1914		1913		1914	
	Number	Value	Number	Value	Number	Value	Number	Value
EXPORTS								
Automobiles:								
Commercial	48	$91,054	128	$294,288	778	$1,351,140	637	$1,066,545
Passenger	1,711	1,466,322	646	597,904	20,175	19,950,718	19,530	17,209,964
Total	1,759	$1,557,376	774	$892,192	20,953	$20,301,858	20,167	$18,276,500
Parts of (not including engines and tires)	.....	$463,134	......	$343,618	......	$4,448,792	......	$4,451,163
BY COUNTRIES								
France	48	41,745	......	....	655	510,331	1,044	625,636
Germany	27	13,504	......	....	858	747,543	1,063	799,552
Italy	7	4,555	2	1,860	259	222,008	231	150,248
United Kingdom	469	310,099	136	154,763	3,900	2,934,237	5,130	4,281,026
Other Europe	94	67,413	12	9,570	1,483	1,263,828	2,390	1,896,217
Canada	253	345,095	260	433,620	5,260	7,050,317	3,854	4,881,062
Mexico	15	33,169	8	8,810	175	321,379	68	79,184
West Indies and Bermuda	48	40,265	42	37,240	370	361,428	394	342,550
South America	126	123,817	24	19,735	2,089	2,372,980	915	742,262
British Oceania	261	219,147	219	155,597	2,418	2,275,226	2,885	2,449,630
Asia and other Oceania	139	145,248	39	38,975	1,770	1,748,083	1,232	1,168,380
Other countries	272	213,319	32	32,022	1,716	1,494,498	961	860,762
Tires for automobiles:								
Belgium	.....	....	......	....	......	98,769	......	301
Germany	.....	235	......	....	......	422,535	......	81,917
England	.....	153,182	......	134,801	......	1,130,284	......	1,071,061
Canada	.....	88,905	......	53,419	......	977,679	......	795,972
Mexico	.....	15,180	......	8,341	......	113,698	......	50,165
Philippine Islands	.....	13,147	......	14,886	......	101,839	......	92,575
Other countries	.....	51,166	......	54,812	......	399,211	......	464,362
Total	.....	$321,815	......	$266,259	......	$3,244,015	......	$2,556,353
IMPORTS								
Automobiles......no dut.	37	79,079	62	95,170	388	$908,799	186	$293,610
Parts of (except tires).dut.	.....	21,105	......	64,573	......	191,436	......	698,624
Total automobiles and parts of	.....	$100,184	......	$159,743	......	$1,100,235	......	$992,234
Automobiles:								
BY COUNTRIES								
France	13	$32,401	7	$24,650	143	$331,311	58	$116,367
Germany	2	8,444	......	....	77	202,931	10	16,556
Italy	14	15,591	40	42,496	68	125,918	66	74,380
United Kingdom	6	19,809	9	19,537	37	112,302	24	51,033
Other countries	2	2,834	6	8,487	63	136,337	28	35,274

Boston's Electric Salon a Success

Exhibitors Well Pleased with Results—Some Sales —Dates for Other Shows

BOSTON, MASS., Nov. 9—Boston's second Electric Automobile Salon ended tonight and all exhibitors reported that they were very well pleased with the results. Throughout the week there was a good attendance, and various features were arranged to attract people who would appreciate electrics. With the $1 admission there was not a throng at any time, and so the visitors had a chance to inspect the machines very thoroughly. Under the rules there was no open solicitation of orders. And when a visitor finished looking over one make the salesman introduced her to the man in charge of the next exhibit. But some sales were closed during the week. President Louis S. Gibbs of the Electric Motor Car Club said that all the exhibitors expressed themselves as well satisfied and that they would be glad to exhibit again if the club has another Salon. So it is now assured that the exhibition will become an annual affair. The club is working hard to remove the restrictions in the down town section relative to traffic and parking of motor cars, and if it is successful the sales of electrics will be very much larger in Boston.

59 Exhibitors at Providence Show

PROVIDENCE, R. I., Nov. 9—The sixth annual automobile show to be held in Providence will open on November 14 and continue until the following Saturday.

The show, which will be held in the armory, will have this year thirty-five passenger car, twelve commercial vehicle and twelve motorcycle and accessory exhibitors. Forty-four separate makes of passenger cars will be shown, while the number of commercial vehicles will be fifteen.

The Providence Dealers Assn. is promoting it, and P. S. Clark, who was in charge of last year's show, will again be general manager.

Milwaukee Show Dates Are Jan. 8-14

MILWAUKEE, WIS., Nov. 7—The seventh annual Milwaukee show, and the fifth to be held under auspices of the Milwaukee Automobile Dealers' Assn., will be held in the Auditorium at Milwaukee, beginning Friday evening, January 8 and closing Thursday evening, January 14. The Milwaukee show opens on the heels of the metropolitan show in New York and practically co-incident with the Philadelphia show, neither of which are near enough to interfere with the local exposition in matter of attendance or securing of exhibits.

No Building Large Enough for Detroit Show

DETROIT, MICH., Nov. 9—The annual automobile show promoted by the Detroit Automobile Dealers' Assn. will be held the week of January 16. No building has as yet been decided upon.

Philadelphia Show Jan. 9-16

PHILADELPHIA, PA., Nov. 7—At a meeting of the Philadelphia Automobile Trade Assn. in the headquarters, it was decided that the 1915 exhibition will be held in the Metropolitan building, Broad and Wallace streets, the same as last year. The dates are January 9 to 16 inclusive.

William P. Herbert, president of the association, will be chairman of the Show committee, and his associates are R. M. Cook, E. C. Johnson, J. E. Gomery, E. B. Jackson and H. Warren Terry, the last-named being secretary of the committee.

Railroad Classification Committee Visits Plants

DETROIT, MICH., Nov. 10—Having expressed the desire for a preliminary conference with the automobile industry through the National Automobile Chamber of Commerce in the matter of automobile loading and weights, the entire Uniform Classification Committee of the railroads visited Detroit last week with the Traffic Committee and Traffic Manager of the N. A. C. C., and devoted 2 days to visiting the factories.

This is of particular importance as the Uniform Classification Committee will rewrite the classification of automobiles and parts as to package requirements, minimum carload weights, articles on which carload ratings will be granted, etc., and their recommendation is likely to be adopted by railroads in Western, Southern and Official classification territories, to take the place of the separate classifications now prevailing.

The dunnage allowance of 500 pounds per carload has been discontinued on all freight, including automobiles, and the railroads now propose to charge $1 per vehicle on automobile carloads, or less than carloads, when labor, materials for blocking and bracing in cars is furnished by carriers.

Nuckols Director in Valvoline Oil Co.

NEW YORK CITY, Nov. 9—Henry W. Nuckols, formerly president of the Columbia Motor Car Co., and now connected with the Packard Motor Car Co., Detroit, has purchased an interest in the Valvoline Oil Co., and will become a director and administrative officer in that company with headquarters at 11 Broadway. He will take up his duties immediately. This company has its refineries at Butler and Warren, Pa., and Edgewater, N. J.

NEW YORK CITY, Nov. 9—L. H. Kittredge, president of the Peerless Motor Car Co., Cleveland, O., sailed last week for Europe, where he is studying the motor truck situation. Sailing on the *Lusitania* with Mr. Kittredge was I. M. Lewis, general manager and treasurer of the Bessemer Motor Truck Co., Grove City, Pa.

Industrial Group to Improve Conditions

NEW YORK CITY, Nov. 6—Last spring the Exhibit of Better Industrial Relations was given under the auspices of the Business Men's Group, which is being reorganized and will hereafter be known as the Industrial Group of the Society for Ethical Culture.

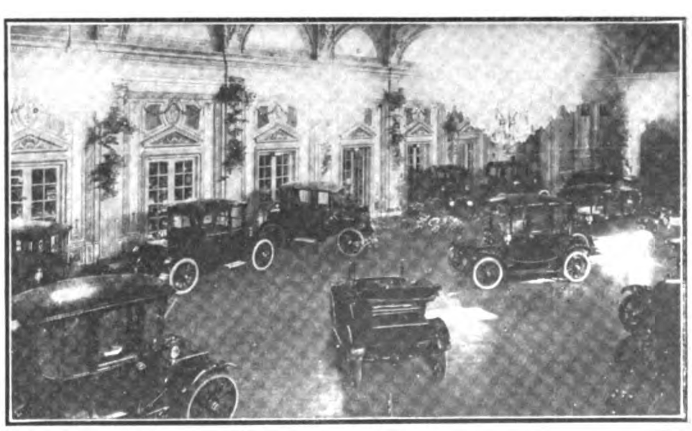
Grant Six with Electric System for $795

DETROIT, MICH., Nov. 11—*Special Telegram*—The Grant Motor Co., Findlay, O., has announced a six-cylinder model to sell at $795. It has 106-inch wheelbase, standard tread and is equipped with a 2 7-8 by 4 1-4-inch block motor.

Other specifications are three-speed gearset, floating rear axle, left drive, center control, cone clutch, cantilever rear spring suspension, unit electric motor generator for lighting and cranking and cowl gasoline tank.

The car carries complete equipment, but if desired, can be had for $45 less without electric cranking and lighting. When so fitted, acetylene lights are furnished. The body is a five-passenger type of sloping lines.

The addition of this car to its output will not interfere with the making of the small four-cylinder roadster at $425, which has up to this time, been the single product of the Grant company since it started in business 2 years ago. It is probable that additions to the plant will be made during the coming year to take care of increased reduction, due to the bringing out of the six, according to the Grant concern.



View of Boston's second electric Automobile Salon

Oldfield Leads in Desert Race

Arrives at Prescott on Second Leg of 671-Mile Contest—Covers 236 Miles in 9:20

PRESCOTT, ARIZ., Nov. 10—*Special Telegram*—Barney Oldfield in the Los Angeles-Phoenix race arrived first at the night control at Prescott at 2:52. His time from Needles, Cal., was 9 hours and 20 minutes, the distance being 236 miles. Olin Davis, who was fourth at the Needles control, arrived second at Prescott in 9 hours, and 32 minutes. Nikrent advanced from sixth position at Needles to third, his elapsed time being 9 hours, 30 minutes. Both Nikrent and Davis arrived at 3:08 p. m.

NEEDLES, CAL., Nov. 9—Barney Oldfield, at the wheel of a Stutz was first at the initial night control in the Los Angeles-Phoenix desert race, completing the 301.4 miles in 8:45:55; R. C. Durant in a Chevrolet was second in 8:51:54; Beaudette in a Paige, was third in 9:14:55; Davis, Simplex, was fourth in 9:19:30; Louis Chevorlet was fifth in 9:24, and Nikrent in a Paige was sixth in 9:25.

Two cars already are out of the race. Pink, in a Thomas, went into the ditch 15 miles out of Los Angeles and the car was driven 100 miles further by mechanician Tom Ely before going out. Sprague at the wheel of a Dietrich also was wrecked but not badly hurt.

On November 10 twelve will start on the second run to Prescott, a distance of 236 miles. The final leg of the race is from Prescott to Phoenix, Ariz., the total distance being 671 miles.

LOS ANGELES, CAL., Nov. 9—Twenty cars were sent away at 5:30 Monday morning, November 9, in the seventh annual Los Angeles-Phoenix road race and for three days their drivers will battle for supremacy over a course 671 miles long, or 132 miles longer than any previous desert race. The starters follow:

DRIVER	CAR	DRIVER	CAR
Beaudette	Paige	Snow	Metz
L. Chevrolet	Chevrolet	Taylor	Alco
Schnack	Ford	Foulke	Metz
Davis	Simplex	Ellis	Buick
Oldfield	Stutz	Sprague	Dietrich
Anderson	Kissel	Burns	Stutz
Carlson	Maxwell	Pink	Thomas
Nikrent	Paige	Bramlett	Cadillac
Wing	Metz	R. C. Durant	Chevrolet
Greenwood	Kincaid Sp.	DuBois	Cole

The course over which this year's race is run is an entirely new one and on the whole better road conditions obtain than was the case last year.

The first part of the race from East Lake Park to San Bernardino is practically all a concrete boulevard and the distance is 61 miles to the first checking station. The first night stop is at Needles, on the banks of the Colorado.

The second night control is at Prescott, Ariz., just 134 miles from the finish line of Phoenix, Ariz. Thence, the road leads by a winding way to an elevation of 7,000 feet and then drops down to Skull Valley, 18 miles out of Prescott. There are two routes from Wickenburg to Hot Springs Junction, the one through Tub Springs being 19 miles in length and the other through the Garden of Allah being 16 miles. Weather conditions will determine which of the two is chosen.

Under almost any weather condition, nearly every variety of roads are to be encountered on the race and though the race is hard enough when the sun shines, the difficulties to be overcome in the event of rain are sufficient to entitle the driver to all the plaudits he wins.

The checking stations together with their distances from the starting point follow: San Bernardino, 61; Victorville, 102; Barstow, 136; Needles, 301.4; Kingman, 368.4; Ash Fork, 479.4; Prescott, 537.4; Wickenburg, 609.4; Phoenix, 671.4.

Pope-Hartford Breaks El Paso-Phoenix Record

PHOENIX, ARIZ., Nov. 9—Beating twenty-eight other starters, and lowering the record for the trip by more than 2 hours, Hugh Miller, at the wheel of a Pope-Hartford, today won the El Paso-Phoenix road race of 533 miles in 14:37. Miller averaged nearly 37 miles an hour. J. T. Hutchins (Buick) was second, in 15:57, and C. W. Tucker (Stutz) was third in 16:40. Miller's performance is all the more praiseworthy because of the fact that his car overturned yesterday near Bisbee. Neither he nor his mechanician were hurt, however.

500-Mile Race Date Is May 29

INDIANAPOLIS, IND., Nov. 7—The Indianapolis motor speedway's 1915 racing campaign will open next week, with the distribution of entry blanks for the next 500-mile race, it is announced today. The date of the race will be Saturday, May 29, Decoration day next year falling on Sunday, and the piston displacement limit will be 300 cubic inches.

Several factories, including Stutz, Maxwell and Mercer, are known to have 300-inch machines already under construction, so that no difficulty in filling the entry list is anticipated. Foreign entrants, of course, will be few, being limited to such drivers as are ineligible for army service or are natives of countries not at war, such as Italy.

Corona Entries to Date Number 11

CORONA, CAL., Nov. 10—Indications are that twenty-five entries will be made for the Corona road race on Thanksgiving. To date eleven entries have been made. These are as follows:

CAR	DRIVER	ENTRANT
Stutz	Klein	W. M. Brown
Stutz	Anderson	W. M. Brown
Stutz	Oldfield	W. M. Brown
Ono		Frank Young
Mercer	Pullen	Pacific Coast Mercer Agency
Mercer		Pacific Coast Mercer Agency
Mercer		Pacific Coast Mercer Agency
Peugeot		Harry Grant
Sunbeam		Harry Grant
Sunbeam		Harry Grant
Mercedes	De Palma	De Palma

Grand Prix Date Changed to Feb. 27

SAN FRANCISCO, CAL., Nov. 9—There will be no 2 weeks' delay between the Vanderbilt Cup and the Grand Prix automobile races that are scheduled as Panama-Pacific International Exposition attractions.

At a meeting of the racing committee of the exposition it was decided to set forward the date of the Grand Prix race to Saturday, February 27, instead of March 6. This will make this international event take place 5 days after the Vanderbilt Cup contest, which is to take place Monday, February 22.

The reason for the change is that many of the racing drivers who have signified their intention of entering the races protested that the time between the original dates was too long and would prevent them from competing in other races about the country. The two automobile classics are expected to attract hundreds of thousands to the course, which is admitted to be one of the best in the country. The best known drivers in America have signified their intention of entering, and the racing committee looks for some very fast time to be made.

Road Race Planned for Oklahoma City

OKLAHOMA CITY, OKLA., Oct. 30—The Southwestern Racing Assn. expects to conduct a road race on Friday, May 1, on a course in the outskirts of Oklahoma City. The course is 9.3 miles in length and the race for thirty laps, or 280 miles. It is to be a free-for-all, and known as the Southwestern Sweepstakes. The prizes are to be as follows: First, $5,000; second, $2,500; third, $1,500; fourth, $750 and fifth, $500.

The course is roughly D-shaped with two legs in the outskirts of the city and the curved part a portion of the boulevard system. It is in the outskirts on the northeast corner of the city. The boulevard section of the course, approximately 5 miles, is 100 feet wide, and in good condition. This road was built by a bond issue and is well maintained. The remainder of the course or the other two legs is on outlying city streets. One leg, known as the south, is a part of the Savannah-Los Angeles cross-country road, and is known as East 23d street in the city. The other leg, known as the west, is a part of the Winnipeg to the Gulf Highway and is about 50 feet wide. There are few houses on these two legs, not more than eight or ten on each.

Overland Stromberg-Equipped Makes 29 M.P.G.

CHICAGO, ILL., Nov. 9—A 1915 Overland Model 80, equipped with a Stromberg carbureter, made a fuel economy and all-around-efficiency test Monday, November 9, in Chicago, under A. A. A. sanction; it went 29 miles on a gallon of gasoline, throttled down to 5 miles an hour and speeded up to 45 miles on high, accelerated to 30 miles from a standing start in 13 3-5 seconds, and climbed Hubbard's Hill from a standing start, finishing at 20 miles an hour. The car with five passengers weighed 3,930 pounds, giving a ton-mileage of 56.84.

PHILADELPHIA, PA., Nov. 8—The Fletcher Cup Run, postponed from last spring, was conducted today by the Automobile Club of Philadelphia, and G. W. B. Fletcher, driving a Buick, was the winner. R. P. Brown in a Packard was second. Eleven cars finished.

Los Angeles Section E. V. A. A. Meets

LOS ANGELES, CAL., Nov. 4—The fourth monthly meeting of the Los Angeles section, Electric Vehicle Assn. of America, was held in the banquet room of the Jonathan Club here this evening. Since the organization of the local branch of the electric body, 4 months ago, the Los Angeles branch has grown to be the fourth largest chapter in the association, with a membership of fifty-four. The meeting tonight was preceded by a dinner which was attended by the entire membership. After the banquet a short business session was held, after which papers on the electric vehicle industry were read.

Radiation Indianapolis S.A.E. Subject

INDIANAPOLIS, IND., Nov. 11—"Radiators and Their Relation to the Motor Car" was the topic discussed at the meeting of the Indiana section of the Society of Automobile Engineers last night. The reasons for overheating of motors and the method of preventing this were taken up. The design of efficient radiators and their construction were also discussed. One of the interesting points brought up was the reason for the V or pointed type of radiator. The paper was given by C. H. Greer, who is chief engineer of the McCord Mfg. Co., Detroit, Mich.

M. A. D. A. Is Reorganized—New Officers

MILWAUKEE, WIS., Nov. 7—The Milwaukee Automobile Dealers' Assn., which promoted the Vanderbilt Cup and Grand Prix races in Milwaukee in October, 1912, and has promoted the annual Milwaukee motor show since the Milwaukee Automobile Club relinquished the management of the exposition in 1910, has been reorganized with Frank J. Edwards, head of the KisselKar Co. and Edwards Motor Co., Milwaukee, as president. All of the old officers have retired, Isaac G. Hickman, president for the past 3 years, having gone out of the automobile business with the establishment of a direct factory branch in Milwaukee by the Ford.

DETROIT, MICH., Nov. 6—At a meeting of the creditors of the Benham Mfg. Co., held yesterday, it was suggested that the Union Trust Co., be appointed trustee of the property and that steps be taken for the disposal of the latter. Final action was postponed until November 13, when another meeting will be held.

Truck Makers to Meet at Shows

Both New York and Chicago Will Provide Ample Space—No Exhibits

NEW YORK CITY, Nov. 9—The Board of Directors of the National Automobile Chamber of Commerce is turning its attention more and more to the commercial vehicle industry. Although there is to be no exhibition of trucks this year it was decided at last week's meeting of the board that in the distribution of space at the National Automobile Shows at New York and Chicago, a sort of business bourse will be established with ample facilities for the meeting and transaction of business of the thirty-one members of the Chamber who make commercial vehicles, and their dealers, agents, prospects, users, etc. This will be in the nature of a hotel exchange or lobby. No exhibits will be permitted but every opportunity will be offered to do business.

Reports of shipments during October were very encouraging. The traffic committee of the Chamber stating that during the month of October, 10,225 carload shipments were made, an increase of 2,531 carloads over the corresponding month of 1913.

In attendance at the meeting were: Charles Clifton, Pierce-Arrow; Wilfred C. Leland, Cadillac; C. C. Hanch, Marmon; S. T. Davis, Jr., Locomobile; M. J. Budlong, Packard; W. T. White, White; E. R. Benson, Studebaker; Hugh Chalmers, Chalmers; John N. Willys, Willys-Overland; H. H. Rice, Waverley; H. O. Smith, Premier; W. H. VanDervoort, Moline, and Alfred Reeves, general manager.

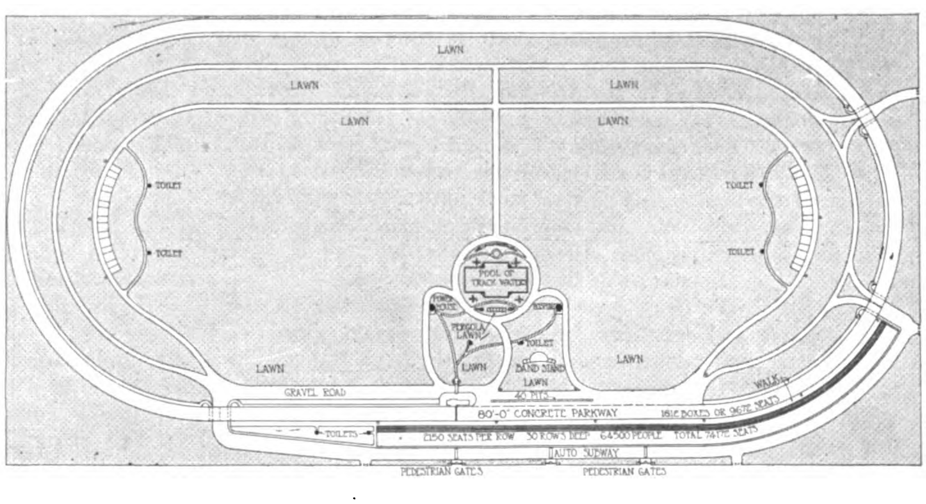
Four Floors for Cars

NEW YORK CITY, Nov. 6—So great has the demand of automobile makers been this season for space at the Fifteenth Annual National Automobile Show in Grand Central Palace, New York, that for the first time four floors of the huge building will be utilized for the display of complete cars. The show is scheduled to open Saturday, January 2, and will continue until January 9. Even with four floors available Manager S. A. Miles and the show committee find that they are unable to accommodate all of the applicants for exhibition space. Heretofore the fourth story of the Palace has been used exclusively for accessory exhibitors, but some of these will be obliged to get along with smaller space than in former years in order to make room for the complete cars.

Already 548 exhibitors are on the list for these two shows, which is an unusually large number and before the doors are open this number will be materially increased. Ninety-two complete car makers are on the list for the New York show and ninety-one for Chicago. Exhibitors are taking over 1,000 square feet more floor space at the New York show this year than last.

Plan of 2-Mile Speedway for Minneapolis and St. Paul

MINNEAPOLIS, MINN., Nov. 7—The new speedway to be built by the Twin-City Speedway Assn., will be a 2-mile platter-shaped track 80 feet wide and having on either side gravel safety zones 32 feet wide. The track will be banked throughout its entire circuit, the banking being 2 per cent. on the straightaways and 35 per cent. on the turns. The radius of the curves will be 2,200 feet. It will be 4.5 miles from the court house in either St. Paul or Minneapolis. It is estimated that the grandstands will seat 76,450 persons and the bleachers an additional 30,000. There will be accommodations within the ground for 100,000 automobiles. The buildings within the oval of the track will be sunk so as not to interfere with the view of people sitting in the parked automobiles around the track.



Holds Headlight Rule Invalid

Milwaukee Judge Decides Ordinance Conflicts with State Automobile Law

MILWAUKEE, WIS., Nov. 9—The city of Milwaukee's earnest effort to curb the dazzling headlight evil has practically been set at naught by a decision of Judge Backus of the municipal court holding the so-called headlight ordinance unconstitutional because it is in contravention to the state motor code.

Early this year the Milwaukee common council asked the Milwaukee Automobile Club to frame an ordinance to prevent the use of brilliant or dazzling headlights within the city limits. This provides that no vehicle may carry a lamp or lamps the main direct rays of which shall strike the roadway more than 200 feet forward from the base of such vehicle on a horizontal roadway. A large number of arrests and convictions resulted. Judge Backus now quotes the state law: "there shall be displayed on the front of every automobile or other similar motor vehicle, while being operated or driven along or upon any public highway of this state, at least one lamp giving a reasonably bright light in the direction in which said automobile or other similar motor vehicle is going * * * and it shall be unlawful for any person to operate or drive any automobile or other similar motor vehicle * * * at such a rate of speed that such vehicle cannot be brought to a complete stop within the distance ahead that the driver or operator thereof can, with the aid of the lights thereon, in connection with the lights from other sources, see an object the size of a person." The state law also provides: "The provisions of this section shall be uniform in operation throughout the state and no city, village, county, town, park board or other local authorities shall have power to enact, pass, enforce or maintain any ordinance, resolution, rule or regulation, requiring local registration or other requirements or in any manner excluding or prohibiting any automobile or other similar motor vehicle, whose owner has complied with the provisions of this section, from the free and unobstructed use of all public highways, driveways and parkways within the state." The Wisconsin Legislature meets again in January, 1915, and in the meantime no efforts will be made to test the decision, as the legislature will take care of the dazzling headlight proposition, according to Milwaukee members.

Municipality Not Liable for Damages

MILWAUKEE, WIS., Nov. 9—A municipality cannot be held liable for damages in personal injury actions based upon accidents caused by motor or other vehicles operated by the fire and police alarm system, according to the opinion and decision of the supreme court of Wisconsin in the case of Engel vs. City of Milwaukee. Engel was injured by being struck by a fire alarm telegraph car and was given damages in the circuit court. The supreme court reverses the decision and upholds the city's contention that the fire and police alarm system is a governmental function. Its apparatus has the same right of way on public thoroughfares as fire apparatus, police patrols, ambulances and United States mail carriers.

Automobilists Win Wheel Tax Test Case

LINCOLN, ILL., Nov. 9—Declaring that a city wheel tax is double taxation and illegal, Judge George W. Patton, of Pontiac, sitting in the Logan county circuit court, set aside the Lincoln city ordinance. His decision held that automobiles, not used for commercial purposes, are exempt from city tax. The law was not questioned in relation to horse-drawn vehicles.

Goodyear Has Made 4,500,000 Tires

AKRON, O., Nov. 9—At the conference in this city, recently, of the Goodyear Tire & Rubber Co., salesmen from all over the country, it was brought out that that company has produced a grand total of 4,500,000 tires in its existence. This company manufactures tire machines in its own plant, which enables it to turn out fifty tires a day per man, compared with an average of five tires a day by hand labor.

Koehler Concentrates on 1-Ton Truck

NEW YORK CITY, Nov. 6—The H. J. Koehler Co. has discontinued selling pleasure cars, having decided to concentrate its efforts in the marketing of the Koehler 1-ton truck built at the Newark, N. J. factory. The truck output should be almost doubled during 1915.

NEW YORK CITY, Nov. 9—Paul Lacroix, Mercedes distributor for the United States, has taken the agency for the Imperial car. His territory includes this city, Long Island, northern New Jersey, southern part of New York State and part of Connecticut, with export rights. The new Imperial agency headquarters will be at the Lacroix showrooms, 3 East 52d street, with a service department at the Mercedes shops, 218 East 54th street.

Stewart Feed Shows 3.4 Miles Gain in Test

DETROIT, MICH., Nov. 7—The Stewart vacuum feed on an Oakland is better than a pressure feed by 3.4 miles to the gallon of fuel, according to an unofficial test made November 9, between Detroit and Ypsilanti, Mich., with a 1915 Oakland Model 37 roadster. On the run toward Ypsilanti, with pressure feed, the car made 25.3 miles on 1 gallon; on the return, with Stewart feed, it made 28.7 miles on 1 gallon. The car and load weighed 2,763 pounds; it was equipped with a Marvel carbureter and Goodyear non-skids.

Dodge Is Streamline Touring Car Selling at $785

(*Continued from page* 883)

vanadium steel and the shafts run on ample ball bearings.

Following the drive back from the gearset, it next goes through a universal of the ring-and-yoke type which is completely inclosed. The propeller shaft is tubular and is inclosed within a torsion tube which takes drive and torque, and which is riveted to the front of the rear axle housing.

The floating rear axle has a pressed steel housing with large plate at the rear giving access to differential and bearings. The differential is carried on the removable front cover portion of the housing. The steel stock used is 3-16 inch thick and the gears are vanadium steel heat treated. Timken bearings are used throughout the axle assembly and in rear wheels. The axle gear ratio is 3.615 to 1.

Mounted on the front cover portion of the housing are the brake shafts and equalizers, allowing the operating rods to run forward to the controls about centrally of the frame. The service brakes contract on the 12-inch rear wheel drums, while the emergency set expand internally. The drum width is 2 1-4 inches.

Chrome vanadium steel self-lubricating springs support the frame, the front set being half-elliptic and the rear three-quarter. They are overslung on the axles. The spring dimensions are: Front, 35 13-16 inches long by 1 3-4 inch wide; rear, 43 inches long by 2 inches wide.

The frame is well-braced with three cross members, and is pressed from 5-32 inch stock into channel section 3 1-2 inches deep. There is a kick-up at the rear to clear the axle, and the front bottle necks, allowing the car to turn in a 40-foot circle.

The steering gear is of the irreversible nut-and-sector type controlled by a 17-inch wheel. The spark and throttle control levers are placed on a sector under the steering wheel.

The round 15-gallon gasoline tank is hung at the rear by forged brackets and the feed to the carbureter is by air pressure maintained by a camshaft pump. The instrument board carries a hand pump for auxiliary air pressure on the fuel in this tank.

Tread is standard 56-inch with the option of 60-inch.

FORD Adds Canadian Plant—By the opening on November 2 of a large and modern assembling and repairing plant at Laurier and DeGaspe avenues, Montreal, Que., the Ford Motor Co. of Canada will have brought the total number of its large branches of this kind in the Dominion to eleven and employment will be given in the plant to about 200 men, most of whom will be Montrealers, though a few more of the expert mechanics will be brought from Ford, Ont., where the Canadian company has its factories and headquarters. The new plant, which faces on Laurier avenue, has been erected at a cost of $300,000 and covers an area of 160 by 150 feet. While the building is at present but four stories in height, it has been so solidly constructed that it will be possible to add six more floors, the structure having been designed with this end in view. A novel feature of the plant is a flat concrete roof surrounded by a parapet for testing the cars after they have been assembled or repaired. The two big freight elevators run up as far as the roof through a tower erected at one corner so as to admit of the automobiles being brought up. Access by rail to the plant has been attained by the building of a spur from the C. P. R., and special facilities have been provided for unloading, dumping coal, etc.

Williams Tire Purchases Land—The Williams Tire Co., Vista, Pa., has purchased 10 acres of land upon which it will erect a plant.

May Start Plug Plant in Rockford—Arthur Bergstrom, inventor of the Bergie national spark plug, may start a manufacturing plant in Rockford, Ill.

New Plants for Aluminum Goods—The Aluminum Goods Co., Two Rivers, Wis., has taken occupancy of two new brick factory buildings erected during the past summer and will increase its capacity from 40 to 60 per cent.

Hartford Rubber Works Resume—The Hartford Rubber Works, Hartford, Conn., which has been running with a small force since the outbreak of the war, resumed, in part, recently. The entire plant is expected to be running full force soon.

Special Machinery for Abbott Ball—The Abbott Ball Co., Hartford, Conn., has perfected special machinery whereby it is able to turn out balls of all sizes, from 1/8 inch to 1/2 inch in diameter, and will later be in a position to furnish all other sizes.

Kelly Truck's New Additions—The Kelly Motor Truck Co., Springfield, O., has awarded contracts for the erection of two large additions to its plant. The additions are necessary because of the rapid increase in the business of the concern. One of the additions will be 260 by 50 feet and the other 100 by 60 feet.

Golden West's New Factory—The Golden West Motors Co., Sacramento, Cal., has erected and equipped a factory 150 by 300 feet and a pattern shop for the manufacture of motor trucks. It will begin the construction of a third building, and is figuring on buying a number of automatic high-speed machinery shortly.

Wayne Tank Working Full Force—That the Wayne Oil Tank Co., Fort Wayne. Ind., has the best of an outlook for the future was the statement of several of the factory officials given out recently. The boiler department and the shipping department are both working their full force 10 hours a day. All of the other departments are working their full force 8 hours per day.

Blodgett Plant Ready for Work—Within a short time the Blodgett Rubber Co., St. Joseph, Mich., will have its plant in full running order. For several weeks the machines to be used in the manufacture of the new process inner tubes for automobiles have been arriving in St. Joseph for installation in the plant. The old plant of the Blodgett company in Warren, O., has been removed to St. Joseph.

J. I. C. Builds Garage—The J. I. Case T. M. Co., Racine, Wis., is building a large garage at its administration building for the exclusive use of the officers and employees of the company. Up to this time officers and employees have been obliged to leave their cars in streets and alleys near the large office building, which is some distance from the main works, throughout the day, winter and summer.

Chevrolet May Add New Plant—Property covering about five city blocks, surrounding the plant of the Chevrolet Motor Co., Flint, Mich., has been purchased by President W. C. Durant, of that company. It is rumored that this purchase was made with the intention of adding a new plant, which is to have more than double the floor space of the present plant, and which will permit in time an annual output of 20,000 cars.

Paint Shop for Maxwell Plant—The Maxwell Motor Co., Detroit, Mich., is enlarging its factory space to make room for the increase in material and manufacturing. A circus tent was set up on the Maxwell factory grounds in Detroit as a temporary paint shop, where only axle housings were painted. The tent is soon to be taken down, however, for beside it has been constructed a mammoth building to be used for painting and enameling work only. The building is 300 feet long and 150 feet wide. It is modern in every way, having steel construction throughout, cement bases and floor, with walls of yellow brick.

The Automobile Calendar

Nov. 9-14........Atlanta, Ga., Fourth American Road Congress.
Nov. 12..........Phoenix, Ariz., Track Race, Maricopa Auto Club.
Nov. 14-21.......Providence, R. I., Show, State Armory, P. S. Clark, Mgr.
Nov. 16-21.......Spokane, Wash., Show, Spokane Chamber of Commerce and the National Apple Show, Inc., G. C. Corbaley, Secretary.
Nov. 17-18-19....Harrisburg, Pa., Second Conference of Pa. Industrial Welfare and Efficiency, State Capitol.
Nov. 26..........Corona, Cal., Road Race, Corona Auto Assn.
Dec. 1-4.........New York City, Annual Meeting of the American Society of Mechanical Engineers.
Dec. 12-19.......Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.
Dec. 14-18.......Chicago, Ill., American Good Roads Congress.
Jan. 2-9.........New York City, Annual Automobile Show, Grand Central Palace.
Jan. 3-10........Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16........Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.
Jan. 11-16.......Buffalo, N. Y., Show, Broadway Auditorium, Automobile Club of America.
Jan. 16..........Detroit, Mich., Show
Jan. 16-23.......Cleveland, O., Show, Cleveland Automobile Show Co., F. H. Caley, Mgr.
Jan. 23-30.......Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 23-30.......Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb..............Portland, Ore., Show, Portland Auto. Trade Assn.
Feb..............Toledo, O., Show, Toledo Auto Show Co.
Feb. 15-20.......Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22..........San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27.......Syracuse, N. Y., Show, Syracuse Auto. Dealers' Assn.; H. T. Gardner, Mgr.
Feb. 27..........San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13........Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 9-15........Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14..........San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
April............Calumet, Mich., Show, Coliseum.
May 29...........Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.

The Week in  the Industry

Motor Men in New Roles

RACING Drivers Retire—"Johnny" Minker, formerly of York, Pa., but for the past 2 years a resident of Richmond, Va., was in York recently and stated that he had decided to give up the automobile racing game. Minker for a number of years has been a well-known driver of racing cars, being connected with the Kline Motor Car Corp. He has resigned that position and opened a garage and service station at Littlestown, Pa., with L. E. Alleman as a partner. George Benedict, well known in automobile racing circles as mechanician for Burman, Teddy Tetzlaff and other racing stars, has retired from the sport. It is a strange coincidence that his former companion, Tetzlaff, has also said farewell to the hazardous pastime.

Paterson Pres. Carriage Assn.—W. A. Paterson, the automobile and carriage builder, has been appointed a vice-president of the Carriage Builders' National Assn., Flint, Mich.

Grant Goes West—Harry Grant, the well-known driver, left Boston recently for the Pacific Coast, where he will drive the Sunbeam in all the big races held in California during the winter.

Fuller Gets Elected—Alvan T. Fuller, who has the Packard agency for Boston, Portland and Providence, was elected a member of the Legislature from Malden, Mass., last week on the Bull Moose ticket.

Paint Expert Promoted — William Rauschenberger, paint and varnish expert of the Studebaker Corp. plants in Detroit, Mich., has been assigned charge of similar operations in the company's South Bend works as well.

Simonds Leaves Maguire — Frank Simonds, for several years in charge of the service station of the J. W. Maguire Co., Boston, eastern Massachusetts agent for Pierce-Arrow cars, resigned last week to go into business for himself in Brookline, Mass.

Graves Cartercar Chief Engineer—H. S. Graves has been made chief engineer of the Cartercar Co., Pontiac, Mich. He has been associated with the company for the past 2 years. Prior to that time he was connected with the E. R. Thomas Motor Co., the Buffalo Gasoline Engine Co. and the Studebaker and Maxwell companies.

Campion Resigns; Joins Marathon—Ed L. Campion, for 13 years a member of the Firestone Tire & Rubber Co. sales organization, has resigned as manager of the Seattle, Wash., branch to accept the position of sales manager of the Marathon Tire & Rubber Co., the offices of which are at Cuyahoga Falls, O. Campion's successor has not yet been named.

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Garage and Dealers' Field

Pillaging Automobiles in Mexican City—The private garages of hundreds of wealthy refugees and other residents of the City of Mexico, Mexico, have been pillaged of automobiles during the last several weeks. Many cars were also confiscated by army officers and Federal employees.

King Agency's New Sales Plan—The King Motor Car Sales Co., Detroit, Mich. distributors for the King cars in the state of Michigan, has recently started selling on time payments. Under the present general conditions it has been deemed advisable to extend time to customers of good standing and thus from 30 to 90-day notes are accepted.

Planning Many Service Stations—In anticipation of a tremendous volume of tourist travel north and south along the Pacific Coast, automobile branches and distributing agencies are laying plans for the operation of a chain of service stations from the Canadian border to the Mexican boundary. Motor touring over the Pacific Highway and the routes from the country east of the Coast range is expected to break all records. The expositions at San Francisco and San Diego, the opening of new highways and the closing of European countries to tourists will combine, it is predicted, to send thousands of automobiling enthusiasts to the Western Slope in 1915.

Auction Co. in Boston—The Boston Auto Sales and Auction Co. has been formed in Boston with J. R. McPherson as president and J. M. Barry as treasurer, and a large building at the corner of Brighton and Commonwealth avenues has been leased, where every Tuesday morning at 11 o'clock automobiles will be sold at public auction. It is the first time that a company has been formed exclusively for this purpose in Boston. All cars will be sold subject to a return in 48 hours if the machines are not as represented by the owners' guarantee. Every owner turning in a car will have to give a written guarantee as to the condition of the car, and the company will have men examine it to see if this is true.

Peerless Establishes Agencies—The Peerless Motor Car Cos., Philadelphia, Pa., and Boston, Mass., have decided to discontinue their branches and hereafter will be handled as agency propositions. In Boston this new plan will mean the discontinuance also of the Rauch & Lang Electric Co.'s branch. The electric company has taken charge of the office there and has sent on its own men from Cleveland to handle the product as a branch. The Beacon Motor Car Co. has been organized to handle the Peerless in Boston, while the Girard Automobile Co. will handle it in Philadelphia at 2314 Chestnut street, in charge of R. W. Cook. The Peerless and the Rauch & Lang will occupy the same building in Boston at 660 Beacon street. J. L. Snow, manager of the branch, will continue at the head of the Beacon Motor Car Co. Sub-agencies will be established throughout New England for the Peerless line.

Motor Bus Lines Thrive in Wash.—The effect of motor bus lines operating in competition with electric interurban systems is shown in a special report filed with the Public Service Commission of the State of Washington by the Puget Sound Electric Co., covering its line between Seattle and Tacoma, a distance of approximately 40 miles. The report shows that the local passenger business dropped from 226.471, handled in August, 1913, to 99,484 during August, 1914, a loss of approximately 125,000. The through passenger business remained about the same. A big fleet of motor trucks of both passenger and freight carrying types is operated from Seattle to the valley points, and it is so liberally patronized that the electric interurbans are losing business. Last June the traction corporation increased its rates between local points, and then sprang up motor bus lines. The result has been that a loss of more than $8,000 in passenger fares in August alone was suffered.

Automobile Agencies Recently Established

PASSENGER CARS

Arizona

Tucson..........Oldsmobile...Shad. Bowyer

Arkansas

Gillette..........Glide.......H. D. Dilday
Little Rock.......Chandler...Butler Auto Co.

California

San Francisco....Chandler....Peacock Motor Sales Co.
San Francisco....King.......Reliance Auto. Co.

Canada

London, Ont......Chandler....Hendricks Garage

Colorado

Denver..........Chandler....A. T. Wilson Auto Co.
Glenwood Springs..Oldsmobile...Dr. G. A. Hopkins
Salida............Oldsmobile...Salida Auto Co.

Connecticut

Danbury..........King.........A. C. Penny

Delaware

Wilmington.......Oldsmobile...Harry R. Loose

Florida

Eustis............Chandler....Harry S. Jones
Miami............Regal.......C. Benton Dean

Georgia

Atlanta...........Chandler....John M. Smith

Illinois

Chicago..........Regal.......G. E. Holmes
Toulon...........Glide.......F. E. Cole
Warrensburg......Glide.......W. W. Albert

Indiana

Auburn............Hercules....Charles Kinsey
Evansville........Chandler....Leo. A. Reitz
Evansville........Mitchell.....Vanderburg Auto Co.
Indianapolis.......Regal.......Peterson-Keyes Auto Co.

Iowa

Baxter............Cole........Hager Bros.
Creston...........Cole........L. M. Butts
Dayton...........Cole........Carl Johnston
Grand Junction....Cole........E. A. Caswell
Nevada...........Chandler....Knudson Auto Co.
Sioux City........Cole........Cole Motor Co.
Waterloo..........Regal.......Peverill Motor Sales Co.

Kentucky

Louisville.........Overland....Overland-Louisville Co.

Accessories for the Automobilist

RED Head Spark Plugs—Two new Red Head spark plugs, Figs. 1 and 2, have been announced by the Emil Grossman Mfg. Co., Bush Terminal, Brooklyn, N. Y. One is designed for modern operating conditions caused by higher speed, higher compression motors. One hundred dollars has been offered as a prize for a suitable name for this plug. The porcelain is a high insulating body of substantial size. Cement is poured into the space between the porcelain and the internal threads of the shell, and the entire plug is then baked by a secret process. No bushings or gaskets are used. The terminal screw is sunk and baked into the porcelain; it cannot be twisted off when pliers are used to tighten the terminal. The sparking points are heat-resisting nickel steel and will not burn away, it is stated. The shell electrode is formed to keep oil away from the sparking points. This plug is made in all sizes and sells for 75 cents.

The other new plug is a priming plug for Ford cars. A plug of this type is of especial service in Winter when the motor requires priming to facilitate starting. The porcelain is straight-sided and will not crack. It is held in place by a large steel bushing which gives ample gripping surface for any wrench. The long body shell overcomes the depression in the cylinder head, the large priming cup allows a free flow of the gasoline, and the heavy meteor wire firing points prevent burning away of the firing points. The price with either porcelain or mica electrode is $1.25.

Braender Non-Skid—The Braender Rubber & Tire Co., Rutherford, N. J., has put upon the market a new and improved non-skid tire.

The new tread, as shown in Fig. 4, is of the combined raised and depressed type. It retains all the advantages of the original Braender Bull Dog Non-Skid with the well-known fishtail cross bars, but has in addition six heavy webs of rubber so placed between the cross bar projections as to give considerably more rubber on the tire, with more tread surface to take the wear.

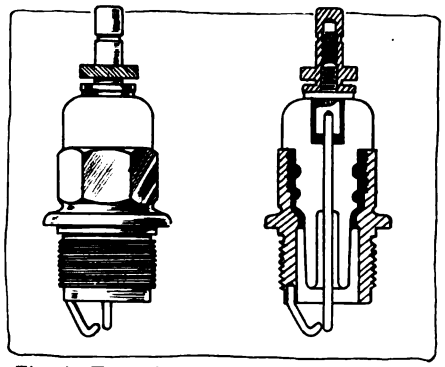


Fig. 1—Two views of new Red Head spark plug for which $100 has been offered for a suitable name

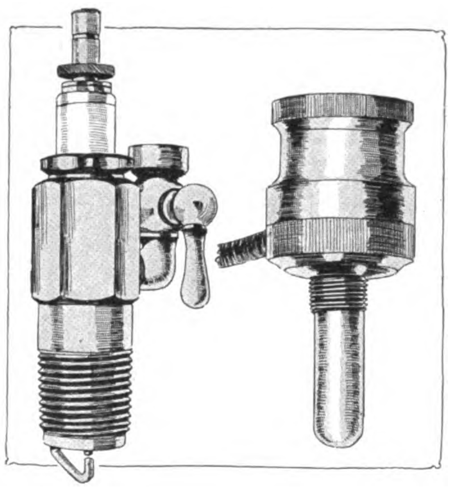


Fig. 2—Left—New Red Head Ford priming plug. Fig. 3—Right—Andersen storage battery regulator

The addition of the webs overcomes any tendency to side skidding on muddy roads or slippery pavements, it is said, and in combination with the cross bars insures a continuous and smooth riding surface, effectually preventing the wear that rounds the edges of ordinary projections while still retaining all the advantages of an efficient non-skid.

The webs, moreover, are so placed as to relieve the strain heretofore borne by the cross bars alone, while strengthening them and distributing the wear evenly over the entire surface of the tread.

Each depression between the bars and webs has a vacuum grip on the road, formed and released by the rolling tire without waste of power or injury to the road.

Fig. 4—Braender Bull Dog non-skid tire

Anderson Regulator—To prevent the injury of the battery by overheating while charging the Economy Electric Co., Economy, Pa., has brought out a temperature regulator, Fig. 3, which reduces the charging rate as the temperature rises above 100 degrees Fahrenheit. The reduction is in proportion to the rise in temperature. Temperatures much above 100 degrees are harmful to a battery and by the use of this instrument this danger is safeguarded. The device, which is known as the Anderson regulator, is guaranteed for 1 year and sells for $3.50. It is simply installed by removing the vent plug. The wiring diagram is shown in Fig. 5.

1915 Mayo Pumps—Two new pumps have been announced by the Mayo Mfg. Co., 60 East 18th street, Chicago, Ill. One is a spark plug pump for Ford cars, Fig. 7, and the other is an impulse pump which is permanently attached to a valve cap, Fig. 6. These pumps will be ready for delivery on Jan. 2. The former is a diminutive spark plug pump built especially for the Ford car and sells for $8 complete. The latter lists at $15.

The Mayo Valve Cap pump requires no fitting other than the drilling and tapping of a 1 3-8-inch hole in one of the valve caps, the screws having 24 threads to the inch. The pump attachment is then screwed into place and the job is completed. It is stated that any machinist

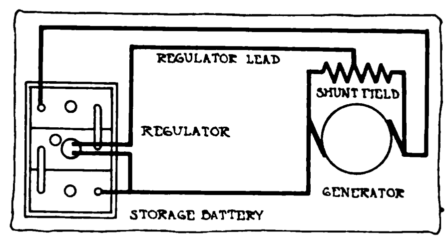


Fig. 5—Wiring diagram, showing installation of Andersen regulator

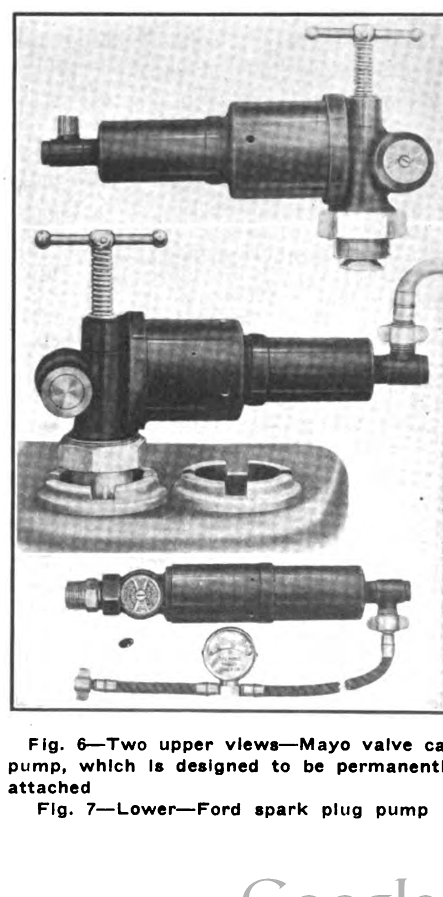


Fig. 6—Two upper views—Mayo valve cap pump, which is designed to be permanently attached

Fig. 7—Lower—Ford spark plug pump

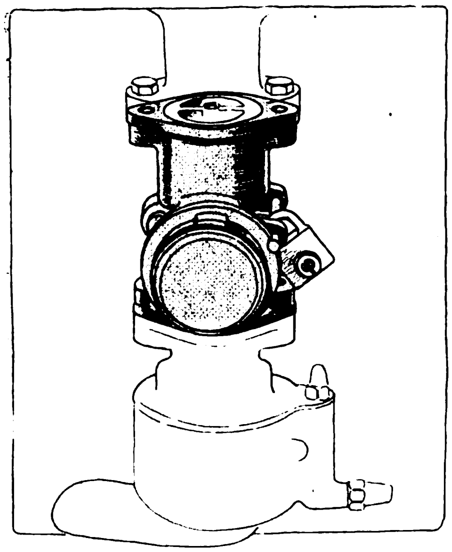


Fig. 8—Kramer self-contained engine governor, which is placed between the carbureter and the intake pipe

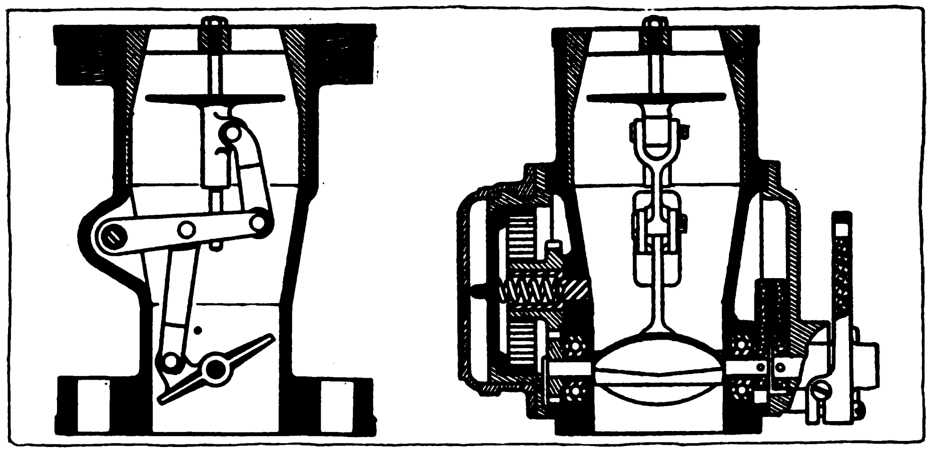


Fig. 9—Sections through Kramer engine governor showing operating disk which is raised or lowered according to the speed of the incoming gases, thus opening or closing the butterfly valve below

can do the work in 1 hour. To operate the pump the handle at the top is depressed and given a quarter turn while the motor is running. This opens the poppet valve shown at the bottom and allows the pump to operate.

A gauge is installed in the hose to indicate the pressure during inflation. A 34 by 4-inch tire can be inflated to 75 pounds pressure in 3 minutes. The maximum pressure obtainable is 150 pounds. The hose may be removed after the tire is inflated, and stored in the tool box.

The Ford pump will inflate a 32 by 3 tire to 65 pounds pressure in 2 minutes and a 32 by 3.5-inch tire to 70 pounds pressure in 3 minutes.

This pump is attached by removing any convenient spark plug, the pump being screwed into its place but not tightened with a wrench. It is furnished with 10 feet of hose and an accurate gauge.

Guide No-Glare Mazda—To eliminate the headlight glare the Guide Motor Lamp Mfg. Co., Cleveland, O., has put on the market a new type of lamp in which the desired end is attained by a special treatment of the upper half of the bulb so that glaring rays from this part are eliminated, the rays being reflected downward and softened. The price of the regular 6-volt, 16-candlepower type is $1.60 per pair. The same price is charged for 6-volt, 12-candlepower Ford lights, and for electric-vehicle work 90-volt lamps of 16 candlepower are furnished for $2.40 per pair. Other candlepowers and voltages may be had on order.

Percama Top Cleaner—A liquid cleaner for mohair tops, seat covers, and similar parts, has just been brought out by the Perkins-Campbell Co., Cincinnati, Ohio, under the name of Percama. It is claimed that substance will remove grease and oil as well as all dirt from seat covers, tops, etc., and will not cause fading of the material. It is sold in quart cans at 25 cents and also in half-gallon and gallon containers.

J. & B. Bulb Carrier—A carrier for extra lighting bulbs is being manufactured by the J. & B. Mfg. Co., Pittsfield, Mass., under the name of the J. & B. It is in the form of a cylindrical cardboard box with a screwed-on cover at each end, the extra bulbs being carried in the covers. The under side of each cover is fitted with a bayonet base, for holding the bulb. The carrier is 5 1-4 inches long and sells for 25 cents.

Bowser Safety Book—A book entitled, Bowser First—Safety Always, has been issued by S. A. Bowser & Co., Fort Wayne, Ind., dealing with the question of safe gasoline storage. Tests of Bowser outfits under various conditions are described and illustrated and accounts of garage fires where these outfits have not been affected by the flames or heat are given.

One test showed the impossibility of exploding the gasoline in a storage tank. A fire was built directly under the tank and kept burning for a considerable length of time. All the gasoline evaporated from the tank but no explosion resulted. In another test the increase in pressure when subjected to heat was determined. A fire was built under a tank full of fuel and the pressure read from time to time. The highest pressure registered was 11.5 pounds, due to the fact that the tank is fitted with an air vent protector which relieves the pressure and acts as a safety valve.

Anti-Freezing Compounds

Horsey Anti-Freeze Solution — The anti-freezing solution made by the Horsey Mfg. Co., 6104 Euclid avenue, Cleveland, O., will not freeze in any climate, it is stated. It will last all season, and in addition to cooling the motor prevents rust and corrosion and lubricates the pump, it is claimed. The color is green in order that a leak may be easily detected. One gallon of the liquid is added to 2 of water. The price is $1 a gallon.

Thermite — The solution known as Thermite, manufactured by the Northwestern Chemical Co., Marietta, O., is guaranteed to remain liquid at 70 degrees below zero when used undiluted. However, under ordinary circumstances it is not necessary to provide for a temperature as low as this, and therefore water may be added, the amount depending on the freezing point desired. A curve, Fig. 10 has been plotted, showing the amount of water to add to give any freezing point between 32 degrees above zero and 70 degrees below. Thus it is a simple matter to make a solution which will meet local climatic conditions. It is stated that Thermite is non-evaporating and that therefore one application is sufficient for all Winter and that it will not injure the cooling system in any way. It sells for $1.25 per gallon.

Jewel Non-Freezing Solution — Denatured alcohol and refined glycerine are the materials used in the solution made by the Wadsworth-Howland Co., Chicago, Ill. This solution is known as the Jewel and is put up in 1 and 5 gallon cans. Water is added to the clear solution, the amount depending on the freezing point desired. For temperatures to 10 degrees above zero 1 quart of the solution is used in 1 gallon of water; to 5 degrees below zero 1.5 quarts to 1 gallon of water; for 20 degrees below zero, 2.5 quarts of solution to 1 gallon; to 34 degrees below zero 1 gallon of solution to 1 gallon of water.

Frezenot—A radiator liquid that will not freeze until a temperature of 54 degrees below zero is reached is made by the Rub-On Mfg. Co., 87 Brayton street, Buffalo, N. Y., under the name of Frezenot. It is sold ready mixed. A barrel costs 50 cents per gallon, and sealed 3 and 5 gallon cans retail at 60 cents per gallon. Only one filling is required all Winter, and it is stated that the liquid will not harm the hose or corrode the metal parts of the cooling system.

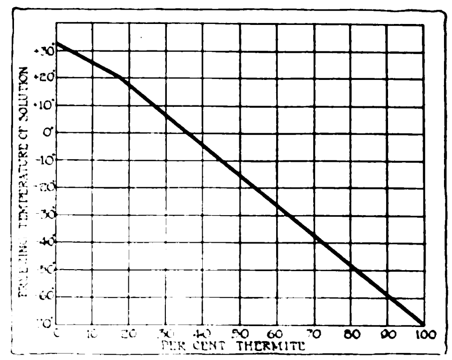


Fig. 10—Curve showing relation between freezing point and amount of water added to Thermite

Vol. XXXI New York—Thursday, November 19, 1914—Chicago No. 21

The Automobile

Fashion Hints on Winter Wear

Part I—In Which Are Reviewed the Modish and Warmth-Giving Garments for Men

Part II, to Appear in an Early Issue, Will Depict Ladies' Automobile Apparel

One of the most comfortable garments provided to meet the needs of men who like to hear the rhythmical hum of a good car over a frozen road and to feel the crisp, cold air sting their cheeks as they spin along. This is an imported double-breasted coat which was manufactured in London. It is warmly lined with sheep's wool and has three large chamois-lined pockets. The bottom is re-inforced with strongly stitched leather and the eight buttons enable the wearer to button it closely about him. A. J. Picard & Co., $42.50. The wool cap shown is of the Rodel type and sells for $2. It is made of soft, warm wool and is very flexible.

NOW that the autumn season is over and the tang of winter is in the crisp sunlit air of the afternoon and the chill of the Arctic regions lurks in the twilight shadows, we find our fall automobile clothes beginning to show a surprising lack of warmth and comfort. So we who are fond of the Big Outdoors and the motor's cold weather hum let our thoughts drift toward supplying our wardrobes with an adequate and suitable line of winter garments for use in the car.

Of course, most men hold style in comparative scorn, holding comfort, durability and other common-sense features in infinitely higher esteem, but, just the same, when a man invests his more or less hard-earned money in an outfit for winter automobiling he wants it to show taste and at least a few becoming qualities. With this idea in mind, experienced representatives of The Automobile have gone over the stocks of a number of the most up-to-date automobile clothing supply houses in New York City and have selected the most comfortable, stylish and sensible garments for illustration and description. The men's coats, caps, mufflers, boots, gloves, etc., are taken up in this issue and the attractive apparel designed for the ladies who delight in winter motoring will be presented in an early issue.

A glance over the styles offered for gentlemen's wear suffices to reveal the same underlying ideas of design which were apparent in the spring modes for the motorist. That is, the designers realize that clothes for the automobilist must be cut differently from the ordinary garments of similar type and that they must be at once conventional and stylish in appearance and also comfortable and adapted to special needs. But see them for yourself.

At the left is a gentleman's broadcloth coat with Persian lamb collar which may be buttoned close around the face if desired. The coat illustrated has muskrat lining but this style also comes in marmot, coney and Jap mink. With Skinner satin yoke lining this coat sells for $45 to $275. The same garment is shown below. The cap in that view is electric seal and sells for $5 to $18. Auto Supply Co.

Above is depicted an Angora wool vest which is warm and comfortable for wear in the car and at the same time offers some striking combinations in colors and patterns. The hues offered are of all shades. Auto Supply Co., $6.50 to $9.50

Combination reversible cap made of army cloth and provided with mackintosh hood which may be used either as an ordinary cap or as illustrated above. The hood folds inside. Auto Supply Co., $3.50.

Mackintosh automobile shirt for gentleman's wear with band collar and cuffs. A vest patch pocket is provided and vent holes at the sleeves. The shirt is offered in either black or tan. Auto Supply Co., $20 to $25.

Above at the left—Gentleman's leather boot lined with the softest fleece to insure warmth. Smith-Haines, $12.

In the center — Fleece-lined leather boots. They do not open like the type shown at the left. Smith-Haines, $9.

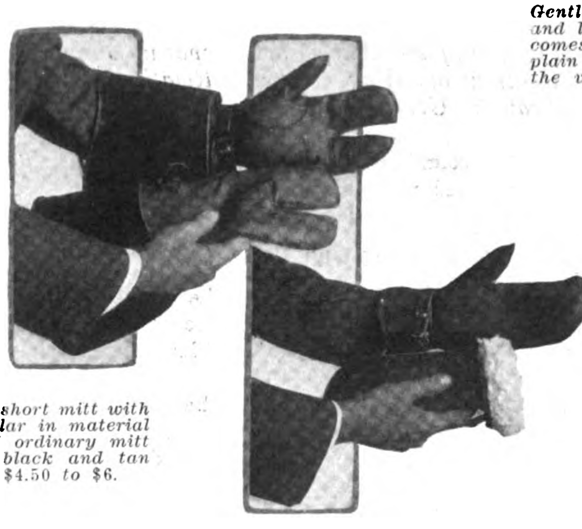
At the right—Men's four-buckle arctics made with cloth uppers and fleece linings. Lowe Motor Supplies Co., $4 to $6.

Below is depicted the single-breasted Jumbo sweater cut in Norfolk style with the usual belt and two lower pockets. The roll collar may be turned up to keep the face and neck warm. Smith-Haines, $8. The wool gloves shown are $2.25 and the Rodel cap sells at the same price.

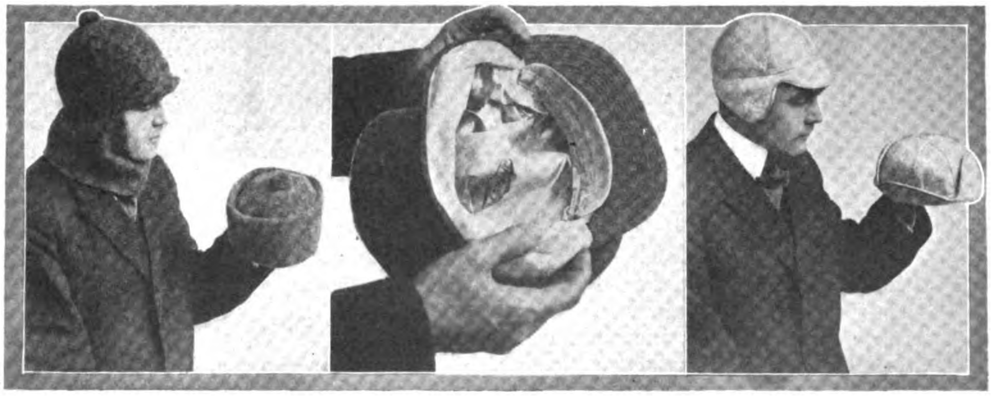
Scotch plaid wool mackinaw in double-breasted form, with belt and three buttons. The mackinaw comes in all color combinations and plain shades and in 36 to 44-inch sizes. Wrist bands are attached. Lowe Motor Supplies Co., $10 to $12. Wool gloves, in gray, navy and black, at $0.50 to $1. Rodel cap, $1 and $2.

Gentleman's automobile coat with set-in sleeves and large patch pockets. This modish garment comes in all combinations of tartan checks and plain colors and a touch of elegance is given by the velvet piping on the sleeves. Auto Supply Co., $32.50 to $47.50.

To the upper right is shown the "Lobster" gauntlet, which gives the warmth of a mitt with the freedom of movement of a glove. It is lined with fleece and sheep's wool and comes in either black or tan leather. Auto Supply Co., $5 to $6.50.



At lower right is illustrated a short mitt with sheep's wool lining very similar in material to the "Lobster" type but of ordinary mitt shape. It is made in both black and tan leather. Auto Supply Co., $4.50 to $6.



Rodel cap in two forms, as worn it is pulled down for protecting cheeks, ears and neck. At right, folded for ordinary use. These caps are of finest wool and come in all colors. Many positions. Lowe Motor Supplies Co., $2.

Gentleman's driving cap with ear flaps. It is chamois lined and is provided with a chamois band for gripping the head, thus preventing the cap from blowing off. It comes in all sizes and colors. Auto Supply Co., $2.50.

Small racing cap of strongly stitched felt. It may be worn in several positions as illustrated. Note the tape binding at the edges to reinforce the material against wear. This cap comes in all sizes. Smith-Haines, $2.50.

Men's great ulster, made to withstand the most icy blasts of winter and to be suitable for all sorts of wear. The garment comes in frizes, chinchillas and worsteds. It is provided with two large patch pockets and is strongly made throughout. Auto Supply Co., $35 to $57.50.

Above is illustrated the Hylo sweater, which may be used either with or without the collar which folds out of sight. It is double-knitted wool and comes in Oxford gray, brown and blue with pearl buttons. A. J. Picard & Co., $8.

At the left are the Night-and-Day goggles, the upper third of the lenses being of amber glass so that lowering the head gives protection against glaring headlights. Leather mounting trimmed with chenille and gold-filled bows are used. A. J. Picard & Co., $3.75.

At the right is shown the Auto-Glas, which, while primarily a gentleman's glass, may also be used by the fairer motorists. It is sold with lenses of smoked, amber or plain glass with gold-filled bows and mountings. Auto Supply Co., $6.

Below is depicted an imported Angora coat sweater which is said to be unusually warm and comfortable for cold weather driving. It comes in all colors. Auto Supply Co., $5. The English cap shown comes in all colors and sells at $1 to $2.50.

Hupmobile Man Sees Fall of Antwerp

Manager of Hamburg Parts Depot in Dangerous Situation on Way to Visit Relatives—Breaks Through German Lines on Third Attempt

M. GASTON MARBAIX, manager of the Hupmobile Hamburg Parts Depot, has arrived in Detroit from Belgium, where he witnessed the fall of Antwerp.

"On the way to see relatives in Belgium," said Mr. Marbaix, "I had to take a round-about route. I first went to London, then to Ostend and from that place to Antwerp. When I reached London my German passports availed me nothing, and it was only through the assistance of Mr. Whiting, Hupmobile dealer there, that I was saved many difficulties.

Refugees in Flight

"At Antwerp I had my first view of the war. It was just before the fall of the city, and with the Germans only a few miles from the town, the inhabitants were in the utmost confusion. Refugees fleeing from destroyed or threatened districts, at first in scattered, straggling groups, and then in solid columns, passed through the town unendingly. Mainly they were afoot, though now and then a farmer's wagon would bulk above the weaving ranks, and it would be loaded with bedding and furniture and packed to overflowing with old women and babies. The majority of fleeing people were peasants, and as more than half of them wore wooden shoes the sound of their feet on the cobbled roadbed was like a battery of guns in action.

Aids Wounded with Car

"I at last located my brother, who was a volunteer in the medical corps in the army, and accompanied him on his rounds among the Belgian lines. We motored from the town to the most outward ring of forts, which was then bearing the brunt of the attack, and picked up whatever wounded we could find, bringing them back to the hospitals, which were already overflowing. The ghastly sights that I witnessed among the dead and wounded have since been the cause of many sleepless nights, for the horrors are unbelievable. Men maimed by shrapnel were literally torn to pieces, and I saw one poor fellow's arm shot away.

Through the Lines

"On the way to Mons I had to pass three times through the German lines. The first two attempts were unsuccessful, and each time I was sent back. At last, however, I hit upon an idea which carried me through.

"I had probably traveled about half the distance between Antwerp and Mons afoot when I stumbled upon a farmer with a load of potatoes who was going to my destination. He was well aware of the presence of the enemy in this vicinity, and he told me that the only way we could safely get through the lines was for me to get at the bottom of his wagon and be buried in the potatoes.

A Dangerous Moment

"The journey took 2 hours over cobblestone roads. We had traveled about 10 miles when I heard a sharp command to halt in a guttural German voice, and I could distinctly hear the conversation which ordered the driver off the wagon as the German soldiers wanted to buy the load of potatoes. I knew the Germans would shoot me on the spot as a spy, and there would be no investigation as to who I was, where I was from, or anything concerning me. I at last made out that the driver was trying to explain that the potatoes were for a German regiment which was some distance beyond, and after showing passports, etc., we were allowed to proceed.

Off for Home

"We finally reached Nimy, and I was very glad to get out and breathe fresh air again. I spent very little time at this place and made all haste to Ostend, where I embarked for London and thence to the United States."

Cars and Trucks on the Firing Line

Fleets of Trucks Needed for Convoys—Use American Machines—Motor Mail to Trenches—German Tire Plant Closed—Design of Armored Cars

By W. F. Bradley
Special Representative of THE AUTOMOBILE *with the Allied Armies in France*

PARIS, Oct. 28—In addition to the purchase of 2- and 3-ton trucks, for service in the French and Russian armies, the authorities are open to take delivery of touring car chassis to be fitted with light van bodies for quick transport work. The reason for turning to America for this class of vehicle is the inability of the French manufacturers to deliver fleets of cars. The French Government has requisitioned from private users all the automobiles it is likely to need for months ahead, and is keeping these machines in reserve at various military garages in Paris and elsewhere.

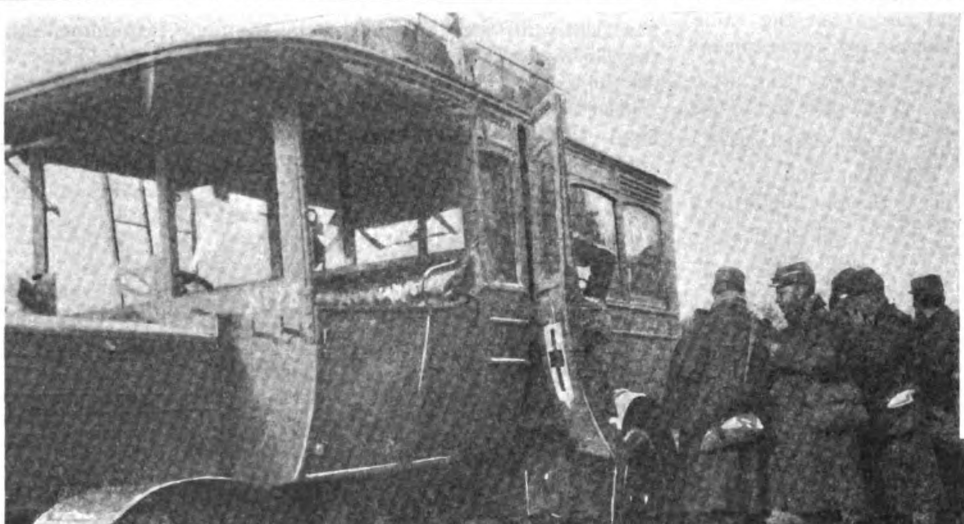
The cars taken from private service are a diversified set only suitable for individual service such as carrying officers. It is impossible to put machines of different make, widely different horsepower and weight, into convoy formation. Experience has shown that cars worked under these conditions are mutually destructive.

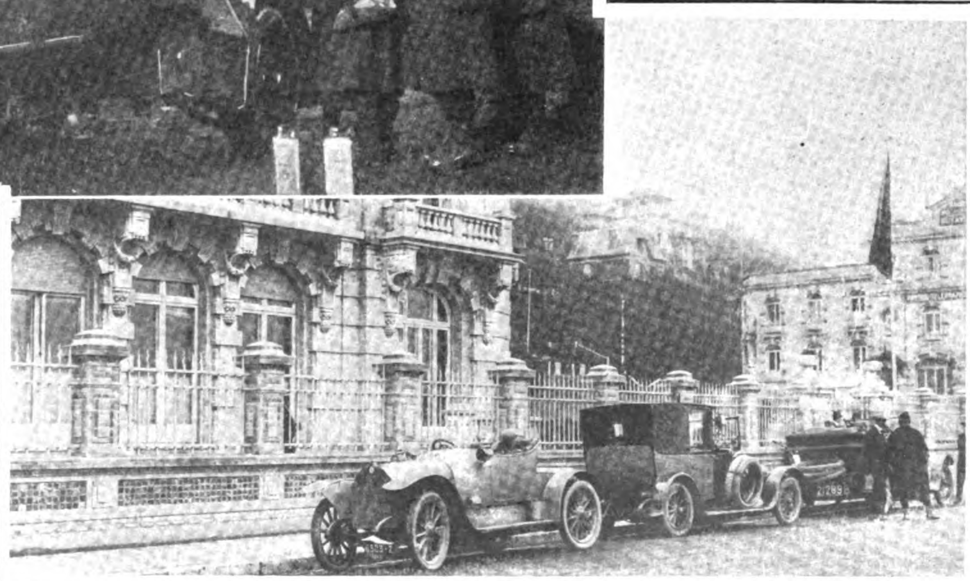
This makes it necessary to apply to manufacturers for fleets of not fewer than twenty uniform cars; but as the French passenger car manufacturers have not kept together sufficient staffs to fulfil such orders, it has been necessary to turn to America. Complete touring cars are not required. Chassis only are being bought, the horsepower being 15 to 20, European rating.

It is intended to fit these machines with very simple van bodies, but in all probability this work will be done in Europe. Detachable wheels, whether wood or metal, are looked upon with approval. Tires should be European millimeter size, for very few American size tires are made in Europe.

Spares Needed

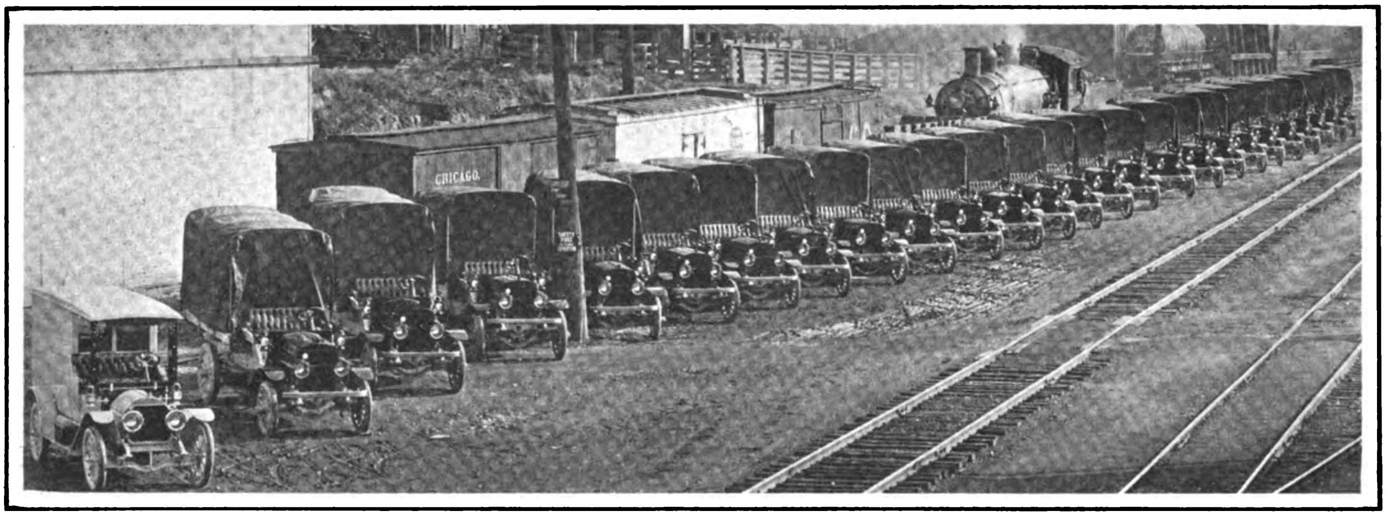
All necessary tools and spares must be supplied with the cars. The necessary spares for active service are as follows: set of spark plugs, set of bolts, nuts and washers, set of gaskets, carbureter float, carbureter jet, magneto parts, one set of brake shoes, one main and one connecting rod bearing, one of each type of ball bearing used on the car, one of each type of screw-down greaser, one valve complete with cup and pin, one set of piston rings, a set of steering gear levers, one fan belt, a clutch leather or set of disks in case of a metallic clutch, a piece of each type of





Above is shown one of the motor ambulances of the German Red Cross Society used in caring for the French wounded. These ambulances are frequently under fire

At the right is the Belgian Ministry of the Interior at Havre, France, where the Belgian Government is quartered



A fleet of Kisselkar trucks recently shipped to Europe for use by the armies of the warring nations

rubber tube for water circulation. With this list of parts the car is prepared for almost any emergency, yet the weight is not sufficient to seriously interfere with the speed or load capacity of the machine.

These parts are those which must be furnished with every truck supplied to the French army. Where a number of vehicles is taken over, as for instance in the case of the 1,100 Paris motorbuses, all of one type, the spare parts are reduced so that the complete set is spread over each group of ten or twelve cars, these ten or twelve working together as a convoy. This plan will be followed, doubtless, for the touring car purchases, so as to reduce the weight of the spares to be carried by the individual cars. At the same time there will be found everything necessary for replacements in each group.

Mail Motors at Trenches

Automobiles have solved the difficult problem of getting mail to the troops in the firing line. The operation is complicated. For military and administrative reasons all letters have first to be sent to the regimental depot, which may be hundreds of miles from the firing line and from which it is known the men were sent away 3 months ago. At the depot the letters are sorted and dispatched to the general headquarters, which is some distance back of the firing line. At this point the automobile service steps in. Most of the Paris postal vans—two-cylinder Delahayes—have been sent to the front and make journeys out from general headquarters to the different batallions. A cyclist accompanies each van, his machine being carried on the top of the automobile, and assists in the final distribution of the letters. Where the men are scattered over a small area it is possible for the cyclist to deliver more expeditiously than the automobile, the car meanwhile making a longer trip and picking up the bicycle on the return.

Parcel Post to Trenches

In addition to the official service, the Automobile Club of France has been carrying out a special parcel post service for the benefit of men at the front. The club has undertaken to deliver to the men parcels of clothing, tobacco and other comforts, prepared by relatives and friends. At first these were delivered direct to the men to whom they were addressed, but of late, owing to the scattered nature of the operations, it has only been possible to take out anonymous parcels, which are handed over to officers at the front and distributed by them to the men most in need of the goods. The club is maintaining a constant service of automobiles throughout the whole of the territory occupied by the French army.

German Tire Factory Closed by Order of France

PARIS, Oct. 28—By order of the French Government, the Continental Tire Co.'s Paris and suburban establishments have been closed and probably will not be allowed to open again under any conditions. The Continental Co. is a German firm with headquarters at Hanover. A French branch was founded as a "société anonyme," under the French laws, some 8 or 9 years ago, but all the stockholders, with one exception, were German. On the outbreak of war the offices and sales department in Paris were closed and practically all the directors of the company left immediately for Germany. The firm's important factory at Clichy, in the suburbs of Paris, was allowed to remain open, under the control of Maurice Echalié, the only French member of the firm. It is probable that the whole of the tires manufactured since August 1 were purchased by the French army. In addition, the whole of the stock of the company was requisitioned.

Factory Used for Spying

Recent revelations of German firms spying and assisting the military authorities of their country with a view to an invasion of France have so aroused the public that it has become necessary to order the closing of German establishments. It is in consequence of this order that the Continental company has been shut down. For at least 2 years there has been an attempt on the part of the leading French tire firm to prove that the Continental establishment was merely a subterfuge to cover an extensive system of spying, particularly with regard to military aviation and automobile matters. Until the outbreak of the war, however, the public refused to look upon this campaign as anything more important than an adroit publicity scheme.

Close American Depots

On account of the war it has been decided to close the Paris branch of the Hudson Motor Car Co. About a year ago it was decided to make a bid for Continental trade. F. O. Bezner, one of the vice-presidents of the company, took charge of the campaign, and had made plans for participation in all the automobile shows this fall. John Olt, general sales manager, sailed for America early in the war. As the fighting seems likely to be of long duration, Mr. Bezner has decided to wind up the French branch.

The Pierce-Arrow Motor Car Co. has withdrawn from the French market. The company has maintained a Paris depot for several years, but on the recent expiration of their contract they decided not to renew. They are now unrepresented on the continent, although a spare parts depot has been established in London.

R. N. Goode, general manager of the Paris branch of the Packard Motor Car Co., is leaving Paris this week for the Detroit factory. It is understood that Mr. Goode has in his pocket a big order for Packard touring car chassis and trucks to be supplied to the French or Russian armies, or probably to both.

Close Terrot Co.

Declared to be backed by German capital, the Terrot Automobile Co., at Dijon, has been closed by order of the Government, an official receiver being put in charge. This firm produced bicycles, motorcycles, and recently placed on the market a popular type of light car. The shutting down of German firms is proceeding apace, but the number of automobile and kindred establishments affected in this way is very small.

News of Race Drivers

Robert F. L. Crossman, lieutenant in the British navy, is officially reported to have been captured during the fighting around Antwerp and sent as a prisoner into Germany. Crossman is a well-known English race driver who will be remembered by Americans as mechanician to Albert Guyot on the Sunbeam car in the 1913 Indianapolis 500-mile race. Before becoming interested in automobile racing Crossman held the rank of lieutenant in the British navy.

Albert Guyot, who drove in the last two Indianapolis races, has been treated in the military hospital for dysentery. As the attack was not very severe, Guyot was not sent back to the military base, but was treated in the field hospital somewhere on the eastern frontier.

Robert Laly, who rode with René Thomas on the winning Delage at Indianapolis this year, has not been heard of since the outbreak of the war. Laly, having but recently completed his military service, was one of the first to be called up and was sent direct to the eastern frontier, where the most bitter fighting took place.

After serving as an artilleryman in a fort at Belfort, Jules Goux has, on his own request, been transferred to the automobile section. Recent reports from the front indicate that the following automobilists on active service are still in good health: Georges Boillot, Charles Faroux, Victor Rigal, Jean Chassagne, Louis Wagner, G. Caillois, Arthur Duray, Rougier, Champoiseau, who for a time was detailed for army Red Cross service with Mr. Bacon, former U. S. Ambassador; Gabriel, and René de Knyff, president of the Sporting Committee of the A. C. F.

Henry Mathyss, mechanician for Arthur Duray on the little Peugeot which finished second at Indianapolis last May, has volunteered for automobile service with the French army and has been accepted. Both Duray and his mechanician are of Belgian nationality and in consequence not under military obligations.

New Paris Buses

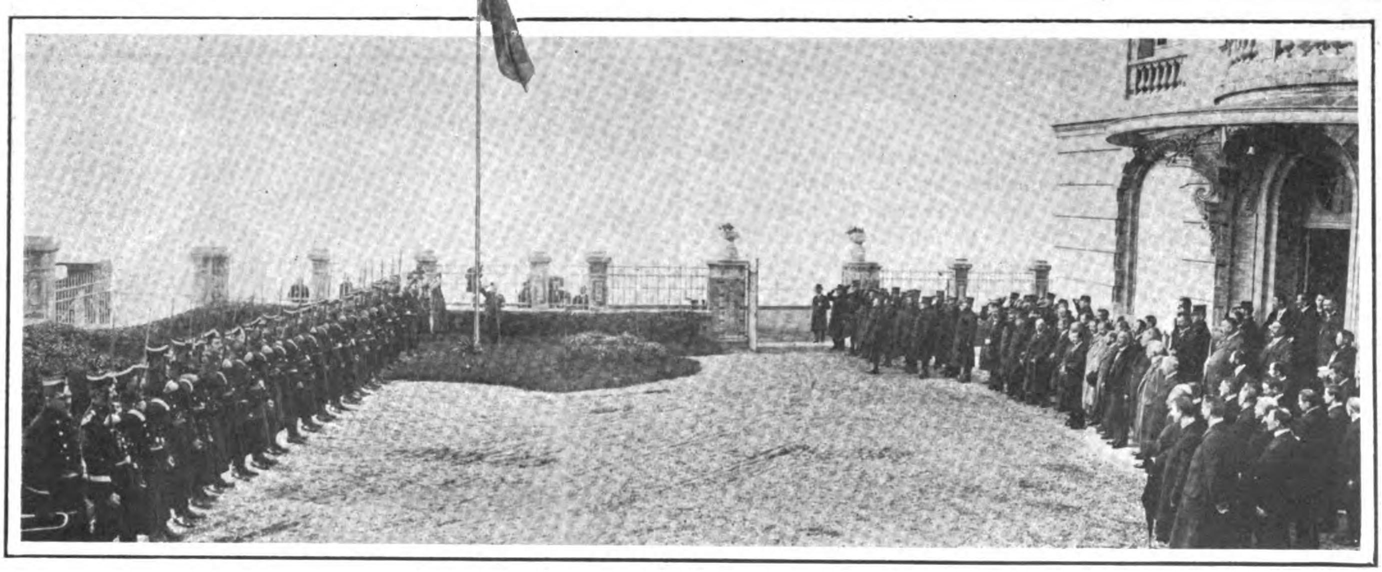
It being anticipated that the 1,100 Paris motorbuses now with the French armies will never again see service on the streets of the capital, arrangements have been made for a new fleet to be prepared. The new motorbuses will be single deckers, with motor under the driver's feet. The width and height are to be increased, while the windows on one side will be fixed. It has been found possible to decrease the weight 1,500 pounds. The acetylene lighting set has been replaced by electricity.

Since the outbreak of the war there has been no bus service whatever in Paris, the whole of the vehicles having gone on their war mission within 24 hours of the declaration of mobilization. The buses have given remarkably good service, mechanical breakdowns being exceedingly rare, whereas private trucks have had to be abandoned by the roadside. There does not appear to be a single case of a bus having gone out of business by reason of mechanical weakness. Naturally some have been lost by reason of shell fire and road accidents, but these had no connection with mechanical breakdowns.

After practically 3 months' hard service, during which they have never been under cover, it has been decided to send the motorbuses back to their base in small batches for a mechanical inspection and the fitting of new tires.

250 Motors Feed 750,000

As meat wagons, in which service most of the Paris buses are employed, it is possible with 250 buses to feed daily 750,000 men. In order to assure absolute reliability, however, 500 buses are made use of for this number of men. Each bus can carry daily about 4,000 pounds of fresh meat to the firing line. This quantity of meat is sufficient for a regiment comprising three battalions of 1,000 men. The daily ration of fresh meat is about 1 1-3 pounds per man. Twelve buses are capable of supplying an entire army corps with fresh meat, but in order to allow for unforeseen circumstances this number is doubled.



A daily ceremony at the Belgian Ministry of War in Havre, France. As the Belgian flag mounts to the top of the pole, the Belgian Guards and officers of the general staff salute it and swear to fight till death in defense of their country

Paris mail van used for delivering letters to men on the firing line

Armored Cars the Allied Armies' Greatest Requisites

PARIS, Oct. 28—Automobiles fitted with machine guns and armor plating for touring cars have proved to be the two greatest requisites of the Allies in this war. It is now evident that the German military authorities had realized the immense importance of possessing guns with greater mobility than can be obtained from the use of horses. On the outbreak of war they had large numbers of cars, each one carrying a rapid firing gun, with complete protection by means of armor plating, by means of which they were able to make rapid invasions into the enemy's country and to inflict enormous damage. There is no doubt that the value of these guns was enhanced 100 per cent. by reason of their extreme mobility. Officers of the Allied forces have declared that again and again their infantry have got within striking distance of the German automobile guns, but have been unable to capture them.

Four-Wheel-Drive in Demand

Although the French had studied this problem of armored automobiles, and had produced a most efficient type, only a very small number were ready to go into active service on the outbreak of war. More attention had been paid to the haulage of heavy guns—about 6-inch bore—by means of four-wheel-drive gasoline tractors, in place of horses. These have given satisfactory service.

Chassis Haul Guns

In England little had been done in the matter of armored cars. Some satisfactory experiments were carried out early this year with hauling guns long distances by means of powerful Sheffield-Simplex chassis. The significance of these experiments is shown at the present time by the appointment of one of the most important financial backers of this company as head of the mechanical transport service of the British army on the Continent. Under the Sheffield-Simplex scheme the guns were merely towed behind ordinary chassis. The experiments proved that guns could be hauled in this way, over medium roads, at an average speed of 30 miles an hour.

With wonderful rapidity the conditions pertaining at the outbreak of the war have been changed so that the Allies doubtless have now more armored automobiles than are possessed by Germany. No figures are available, but it may be stated that hundreds of automobiles have been fitted with guns and encased in plating. One firm alone delivered 200 chassis to the arsenal to be fitted up in this way. So strong is the faith in the automobile gun that certain officers have had guns sent out to them from England, apart from the official channels, and have had them fitted to armored cars. The English and French naval brigades have a particularly strong equipment of these machines.

Design of Armored Car

There is no uniformity in the design of the new military weapon. Two-ton trucks, as well as powerful touring cars on pneumatic tires, are made use of. Various types of guns are fitted. The point is that any gun is rendered immeasurably more useful by being mounted on an automobile. The nature of the armor plating varies from a complete housing, covering the hood, wheels, driver, and forming a turret for the gun, to ordinary trucks with a steel plate along each side, over the top of which the gun is fired.

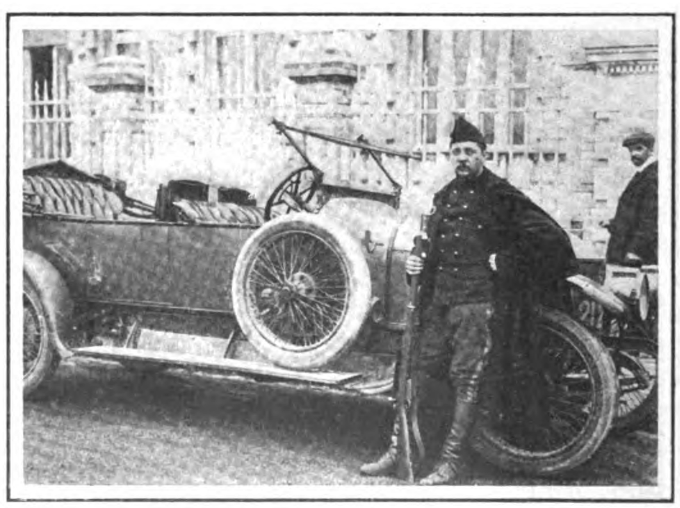
The cooling problem is overcome by hinged doors in front of the radiator, or by steel louvers capable of being operated from the driver's seat. On the lighter type of machine the tires are protected by a front and rear extension of the fenders, special steel being used, and the sides being left unguarded.

The more elaborate of these automobiles have a set of struts, or jacks, raising the entire chassis from the ground and giving it a greater amount of rigidity than it can possess when on its wheels with springs interposed. The rapid raising of the chassis, so as to transform it into a rigid platform, is one of the features and secrets of the vehicle.

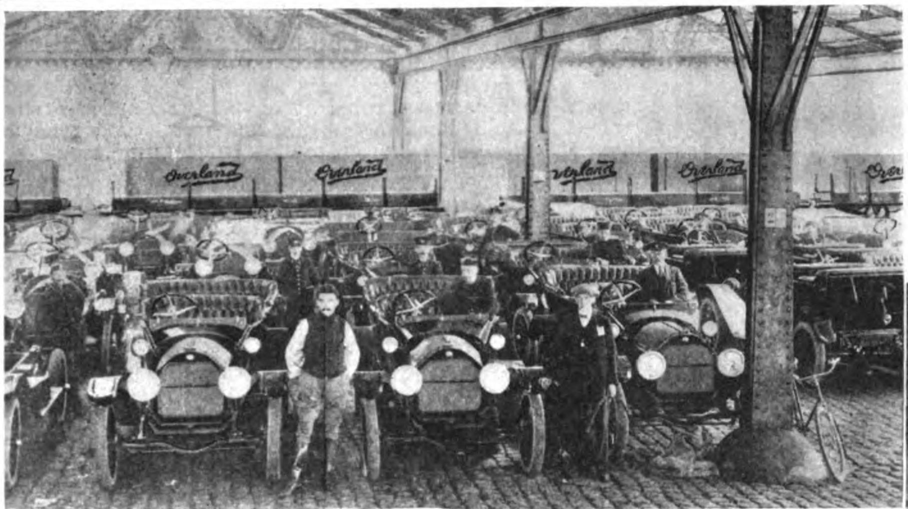
Protect Radiator and Driver

All touring cars in use at the front should have a certain amount of protection, particularly for the driver and for the radiator. Many of the cars which were sent out unprotected have since been transformed in order to give this additional security. This protection need not be of an elaborate nature, indeed it must be as simple as possible in order not to rob the car of any of its usefulness as a rapid means of conveyance. The object is to make the car proof against rifle bullets and splinters of shrapnel. It is obvious that no automobile can be made proof against shell fire and remain a fast vehicle.

The most important feature is the protection of the driver. This has been done in many cases by mounting a chrome nickel steel semi-circular shaped plate on each side of the body, level with the men in front, and slightly above their heads. This gives sufficient protection against side attacks, which are the most common, and is in many cases considered sufficient. In every case the object of an attacking party

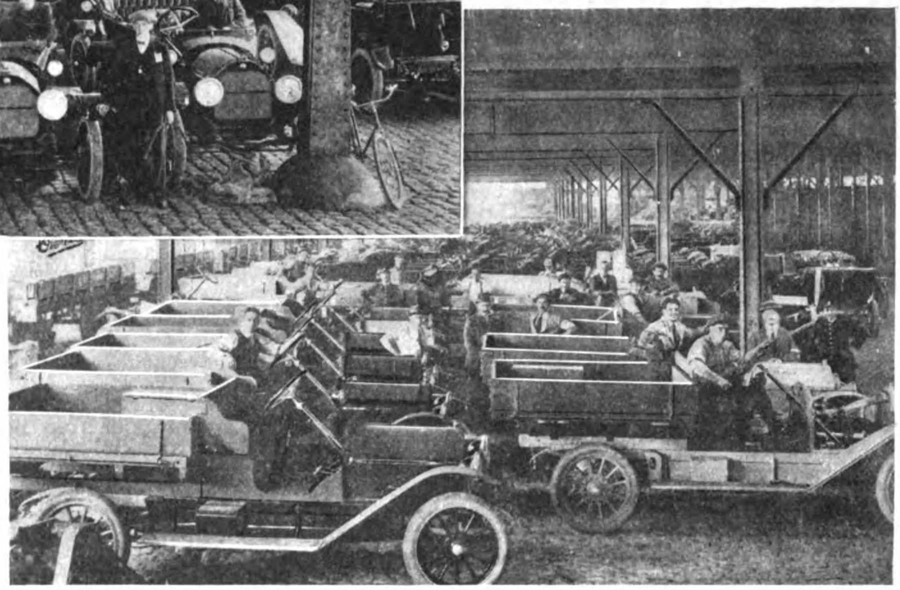


A soldier of the Belgian Guards on duty before the official car of the Belgian Government in front of the provisional headquarters at Havre



At the left are shown some of the 300 Overlands sold to the Belgian Government, before the soldiers had started the work of changing the bodies

Below is a view of the same cars with the roughly constructed bodies used for military purposes. The entire order was filled and delivered with bodies changed in 6 days



is to bring down the driver. If he can be killed or wounded it becomes a comparatively easy matter to dispose of the officers he may be driving.

On more elaborate types the armor plating is continued along the entire side of the car, flush with the heads of the occupants when they are seated low, a protective plate is put along each side of the hood, and a wind cutter of special steel is placed in front of the radiator.

There is some necessity, too, for protection of the gasoline tank, if at the rear, for cases have arisen in which this has been punctured by bits of shrapnel. A gasoline tank under the dash hardly needs any special protection. The tendency is to put as little armor plating on touring cars as possible. If the driver is tolerably safe the other occupants may take the risk.

Reverse Driving

It has been proved that on touring cars serving for reconnoitering purposes a highly geared reverse and a duplicate steering set, allowing the car to be driven stern first, are most valuable adjuncts. On this type of car there are two reverses, a low and a high, and a duplicate set of spark and throttle controls on the emergency reverse steering wheel. For raiding purposes this type of vehicle is invaluable. It can run into positions which the driver of an ordinary car would consider extremely dangerous and can get away again with ease. The amazement of the attacked troops is great on finding that the attacking car can move astern as fast as it has come ahead.

300 Overlands for Belgium

A big squadron of 300 Overland cars is one of the factors in the remarkable resistance being made by the intrepid Belgians against the overwhelming forces of the Kaiser.

The Overlands were used continuously during the retreat from the city.

The cars were purchased shortly after the actual opening of hostilities from the stock of the Willys-Overland, Ltd., London distributor, by a commission of army motor experts headed by Colonel Jammott, chief engineer of the Belgian artillery.

A number of motor cars and light trucks figured in a series of exhaustive tests held to determine the ones best fitted for rigorous service in the field. In the course of the trials an Overland car, equipped with a special military body prepared for the purpose, traversed the long Hampstead Hill in this city, on high speed, carrying a load of petrol approximating 1,900 pounds. The resultant sale was the largest individual order for cars ever placed with a single firm in the history of the automobile industry in England.

Immediately after the tests the Belgians ordered 200 Overlands. Although this was the entire number of cars they had been authorized to purchase for their Government, they found the machines so satisfactory for their purpose that a second order for 100 additional cars of the same make followed shortly after the officers had made their report to headquarters.

Bodies Made in 6 Hours

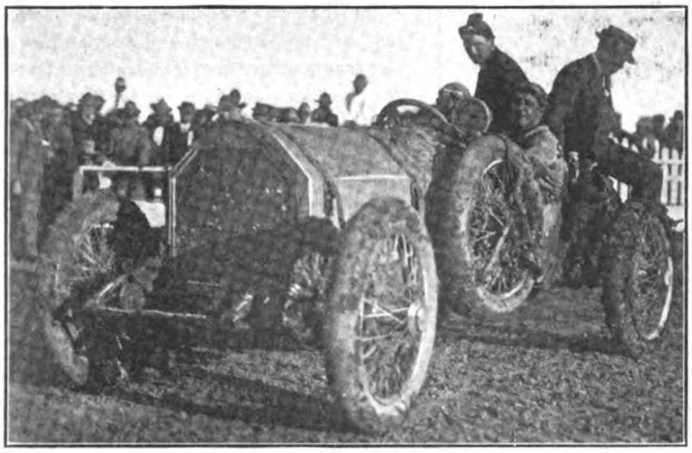
On the same day that the first order was received a prominent London body manufacturer started the construction of bodies for military use, using the specifications laid down by the Belgian engineers. As time was urgent, an extra force of men was kept in the factory night and day until the entire allotment had been finished. Under this pressure the English workmen required but 6 hours to turn out a complete body.

Together with the cars the bodies were shipped to Antwerp aboard a channel boat chartered especially for the purpose. Accompanying them were ten expert mechanicians from the London establishment and a score of men from the body shop.

The touring car bodies were discarded and the hastily constructed military bodies attached to the chassis in their place. In a remarkably short space of time the entire task was completed and the 300 cars were ready.

300 Cars Ready in 6 Days

Within 6 days after the first order was placed the 300 cars, altered and adapted to military service, had been officially turned over to the Belgian army, together with a proper assortment of duplicate parts. The mechanics remained in Belgium for several days after the cars had been placed in service to assist in training the soldiers in driving and caring for the cars.



Barney Oldfield's Stutz as it won the Los Angeles-Phoenix race

Eight Finish in Big Desert Race

Twelve Cars Eliminated by Gruelling Grind—Oldfield, in Stutz, Wins

PHOENIX, ARIZ., Nov. 11—Eclipsing all past revivals of the great desert classic, the seventh annual Los Angeles to Phoenix road race passed into history with Barney Oldfield the winner.

Twenty cars started from Los Angeles Monday morning, November 9 at daybreak. One by one they were conquered by the desert and mountain roads until there were only eight in the running and one arrived at the finish line after the control had been officially closed.

For 3 days, Oldfield in the Stutz racer which was the first American car to finish in the International Sweepstakes at Indianapolis last May, led the field. At Needles, the first night control, Barney had the lead by a scant 5 minutes and 55 seconds. At Prescott, the second night out, the Stutz was 48 minutes ahead and at the finish of the 696-mile battle with the elements, the veteran took first honors over Louis Nikrent in a Paige, by just 35 minutes.

With the first money, Bullock's, Gondolfa's and the Arizona Republican trophies, Oldfield wins the diamond trophy bearing the inscription, "The Master Driver of the World."

By winning the "Cactus Derby" in a tuned racer, Oldfield has wrecked sacred Western racing traditions. Never before has a racing car made good in the Phoenix road race.

The Paige cars which won second and third places in the great race also created a sensation.

The little Chevrolet also made a great showing and the 1911 Cadillac, piloted to fifth place by the veteran Bill Bramlett, was a wonder of the race.

The battery of racers that lined up for the start November 9 included everything from the Ford and Metz to the Simplex and De Dietrich.

At midnight rain began falling. By the time that the first car was to be sent away, at 5:30, the course for the first 61 miles to San Bernardino was positively dangerous. The drivers who had them put on chains.

Ford Led to San Bernardino

The cars were sent away from the line at 2-minute intervals. As far as San Bernardino, they held very close together, several checking in at that point only seconds apart. Earl Schnack of Escondido, Cal., in the little Ford, led the race to San Bernardino by 3 minutes, and was still in the counting, 100 miles out; but the little machine met disaster before the first day's run was over.

The first car out in the race was the Alco driven by Bill Taylor. This car took third honors in the American Grand Prix at Santa Monica last spring and was looked upon as a dangerous contender until Taylor skidded into a telegraph pole, a few miles from the start, and was hopelessly out of the running.

Many cars had trouble in the narrow Cajon Pass. Several skidded over the edge of the road, although with the exception of the Alco and the Metz No. 11, all cars reached Victorville, 102 miles out on the desert.

Durant in the Chevrolet No. 2 and Barney in the Stutz, checked in and out of Barstow not a minute apart, and from that point on across the desert to Needles one of the most spectacular road races ever witnessed took place.

Oldfield in the Lead

Oldfield led. Sometimes the Chevrolet would almost overtake the Stutz. The third car, the Simplex with Olin Davis at the wheel, would come out from behind a jagged butte and all but pass the leaders, then would settle back and hold its own against the rest of the field. At Needles, the Chevrolet and Stutz were so close together that when Oldfield ran over the line he had to back back till the Chevrolet was checked in. While Oldfield had a five minute lead in time, he was second in position at the end of the first day's run by just eight seconds.

The Paige No. 1 finished third followed four and a half minutes later by Davis in the Simplex 4 minutes ahead of Louis Chevrolet in the Chevrolet No. 20 which he had pushed to the limit for the entire 303 miles.

The de Dietrich, KisselKar, Thomas and Ford all went out on the run between Barstow and Needles. This left but fourteen cars in the race and when the start was made the next morning, the Metz No. 14 went out.

Louis Nikrent in the Paige No. 8 finished the first leg of the course 1 minute behind the Chevrolet, but he had stopped outside of the control to fill up, tighten a few bolts and make ready for the start in the morning.

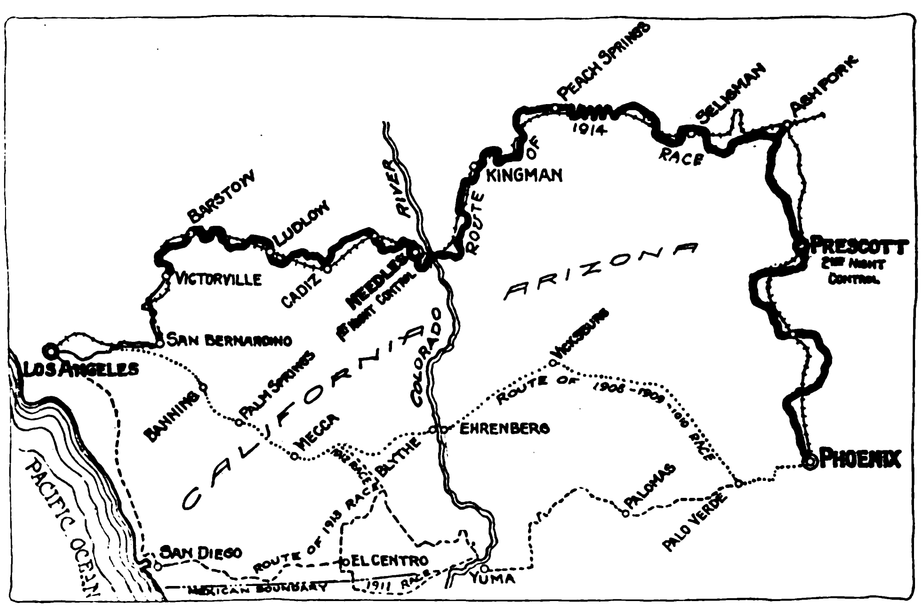
Rain was falling at the time of the start from Needles. The cars skidded from side to side over the muddy mountain roads to the Santa Fe bridge which crosses the Colorado River 17 miles below Needles.

Crossing the bridge, Durant lost 6 minutes making a tire change. Oldfield had trouble getting water in his radiator, having screwed the cap on too tight the night before and he also lost time after the start, giving both Beaudet and Davis several minutes' start.

Nikrent, Carlson and Chevrolet all crossed the bridge together and raced across the roads to Kingman.

The speed of the Simplex came in for a show on the road to Kingman after the dust had been laid and Davis led into the 374 mile control with 8 minutes on Oldfield.

At Kingman Oldfield discarded the wheel with the flat tire which he had driven 11 miles in a losing speed brush with



Map of course followed by contestants in the seventh annual Los Angeles-Phoenix race

Nikrent, and lost more time. Durant also suffered in a duel with the other Paige.

As Beaudet bowled along with Durant chasing him at about 60 miles an hour the Chevrolet struck a rock and the right rear wheel was badly damaged. However, Durant drove into the control only 10 seconds behind Beaudet.

Leaving the Kingman control in second place with several minutes over both Barney and Durant, Beaudet skidded to the side against a bank and sprung a leak in his radiator.

Back to Kingman he drove and while he was patching the hole, Barney and Durant pulled out together and Nikrent went into second place, 5 minutes behind the Simplex.

Louis Chevrolet, Bill Carlson and Du Bois in the Cole, left Kingman close together.

At Hackberry, Carlson broke a wheel on his Maxwell. Teddy Tetzlaff in the Maxwell Press Car overtook him and taking the wheel into Seligman the damage was repaired but when the driver returned to his car at Hackberry, he found it stripped of carbureter, magneto, all tires and the two extra wheels which also carried two extra tires. That ended the game for the Maxwell.

Regular Storm at Seligman

The rain increased until there was a real storm at Seligman, Davis in the Simplex cut a piece of the tread off his left rear tire and stopping to change wheels and buy rubber coats for himself and Redford his mechanic, Barney went through the town and into first place, followed by Nikrent who had also stopped at Seligman to fill up for the hard run over the mountains to Prescott.

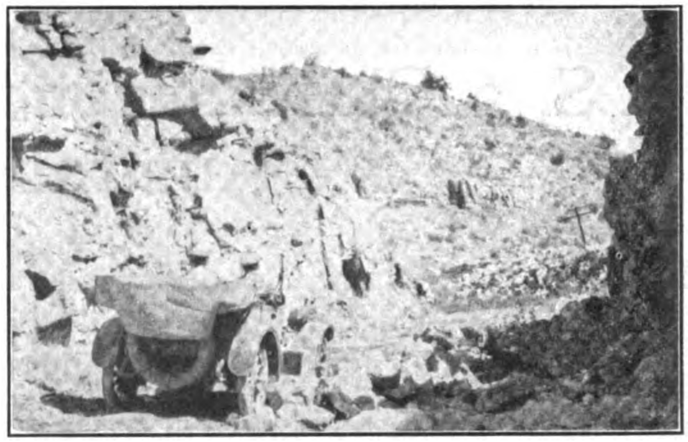
Anxious to assist Chevrolet one of the natives picked up the wrong can and poured 5 gallons of water into the gas tank of the Chevrolet No. 2. This was not discovered, however, and a few miles out, the car refused to move. Marooned in the rain on the desert, Louis was finally overtaken by the crippled Chevrolet No. 2. Taking a wheel off of the waterlogged car, No. 2 was soon in running condition.

Oldfield was first at Prescott, the second night control, with a lead of 48 minutes and 5 seconds over the Simplex. Nikrent held third place, 8 minutes behind Davis.

Eleven Cars Reach Prescott

The eleven cars which reached the 558 mile post at Prescott were all in good condition with the exception of Beaudet's Paige and it was still anybody's race. Another leaky radiator robbed Beaudet of enough time to put him in second place.

At New River, 15 miles out of Phoenix, Barney stalled his motor in the middle of the stream and had to hitch ropes on the car and have spectators and a team assist him through the wet sand. Fifteen minutes were lost at this point and



Rough going through Rocky Canyon on the Los Angeles-Phoenix race course

Barney felt that he had lost the race. Nikrent had passed him and Bramlett in the Cadillac No. 20 had pulled through the stream several minutes ahead of him.

Oldfield's Winning Spurt

Heedless of danger, Oldfield slid from side to side on the road in a mad drive to the tape, hoping that he would win at least second place, but believing that he had lost to Nikrent.

As he came down the road, the car and crew looked like an adobe house on wheels. The cigar in his face had turned to a clay clod and the mask on his face had holes where mouth and nose were hidden.

The first to finish was Nikrent and as the crowd waited for the next car seconds were counted, as each minute counted in the fight for the "Master Driver's" title.

Bramlett in the old Cadillac was the second man to finish. A short distance out of Prescott the Cadillac went over a 12-foot embankment. The rains had made the mountain road so slippery that Bramlett's brakes would not hold. A crowd of spectators assisted the driver and mechanic to get the car back on the road, but the steering arm was so bent that Bramlett could hardly turn to the left and later the arm broke off.

Without a word, Bramlett tore two rails from a fence and giving one to his mechanic, the damage was repaired. Lashing a rail to either side of the front axle, the driver and mechanic steered the last 15 miles to the finish, traveling at about 30 miles an hour, by leaning over the side and rubbing the rail on either side of the tires.

The Simplex was eliminated from the running when a few miles out of Prescott. In second place with an even break for first honors, Davis broke a torsion spring and drive chain, skidding into a bank and retiring from the lists.

Durant and Chevrolet in the Chevrolet No. 2 were making fast time between Wickenburg and Hot Springs Junction when they lost a hub. Taking a wrench, they improvised a hub by tightening and lashing it down with tape. With this makeshift they were only able to make about 20 miles an hour, but they fought to the finish and beat Bramlett out of fourth place by a margin of 34 minutes.

The Buick No. 15 ran in hard luck throughout the race. Just out of Los Angeles the Ellis brothers went into the ditch. They got back into the race and continued on to Daggett where they again went in the ditch. Never able to regain the lost time, the boys finished 2 hours out.

Not willing to give up the race, the Metz No. 9 made the run into Prescott and started out on the last lap of the course with Wing determined to reach Phoenix, which he did at midnight.

The Kincaid special followed along in the wake of Barney in good time until about 60 miles out of Phoenix. A twisted axle stopped its career.

The Cole, entered and driven by Bu Bous of Phoenix, the only Phoenix car in the race, fought to the finish.

The Stutz No. 17 did not get through as well as Barney's No. 5, but the car reached Phoenix after a hard race.

Oldfield did not make the time that Olin Davis in the winning Locomobile did last year; but the course was harder on account of the rains. Davis' time for the run over the 564 mile course by way of San Diego and the Imperial Valley was 31 miles an hour. For the first 300 miles, Oldfield averaged 38.4 miles an hour. The second day he fell back to a 31.5 average and the last lap was below 30 miles.

Time of Cars Finishing in Los Angeles-Phoenix Race

Car	Driver	Los Angeles-Needles	Needles-Prescott	Prescott-Phoenix	Los Angeles-Phoenix	M.P.H
Stutz	Oldfield	8:45	8:18	5:56	23:00	30.2
Paige	Nikrent	9:25	8:35	5:35	23:35	29.4
Paige	Beaudet	9:14	9:58	5:51	25:04	27.7
Chevrolet	Durant	8:51	10:27	6:27	25:46	27.0
Cadillac	Bramlett	10:02	10:38	5:40	26:20	26.2
Buick	Ellis	11:00	10:14	6:44	28:22	24.5
Stutz	Burns	10:17	11:15	8:16	29:48	23.4
Cole	Du Bois	9:44	14:31	7:41	31:56	21.8

Picturesque scenery and Mojave Indians on Los Angeles-Phoenix race course

U. S. a Close Second to Great Britain for Australian Trade

Leads by 1 Per Cent. in Importations of Chassis and Bodies in First 6 Months of 1914—English Imports Worth $455,100 More—European War Depresses All Business in Antipodean Continent

THE European war has made a terrible depression in Australia. From the very day that England declared war, automobile business went flat, and no one had any consideration for anything else except war news.

The country has been in a state of financial nervousness ever since the war started, but it is beginning to show signs of a slight recovery. Just how long the recovery will last it is hard to say at this present moment. What has troubled the country most, has been the disposal of wool, which has stopped, and wheat is being cornered or commandeered by the Government. It is almost impossible to buy any motor trucks, as the military authorities have taken everything. The Government is taking all kinds of steps to prevent monopolies coming in and cornering commodities. As a consequence, the capitalists and speculators are all standing aloof and doing nothing, thus affecting the automobile trade and everything else.

Export Trade Stopped

The stoppage of the export trade has created a natural depression in the factories. This condition is prevailing throughout Australia, but it is not affecting New Zealand so much. The war has come when normal conditions should have prevailed, with the usual run of prosperity, although one or two parts of the Continent have had a rather dry spell.

U. S. Leads by 1 per Cent.

This condition of affairs has affected, particularly, the automobile export business from the United States and the United Kingdom. Both these countries have had a large export trade in automobiles and parts with Australia. In fact, for a number of years it has been a close race between the two for supremacy in that particular trade, the United Kingdom always leading. But in 1914, the United States came to the fore, leading that country by 1 per cent. in the total importations of chassis and bodies and supplying 32 per cent. of the total importation. The value, however, of the English cars was $455,100 more than the American, amounting to $1,491,525; the American, $1,036,425. During the first half of 1913 the United Kingdom led the United States by 5 per cent., or 36 per cent. of the total importation.

During the first 7 months of 1914, 2,587 cars, valued at $2,233,471 were exported to Australia, as compared with 1,873, valued at $1,827,690, for 1913, a gain of 22 per cent.

July Exports Increase

Even the July exports show an increase. Cars numbering 311 and valued at $237,780, were exported, as compared with 277, valued at $240,734, for 1913. These figures would indicate that low-priced cars are gaining a strong foothold there. In speaking about these cars, it may be said that the small European car is most popular in the cities, while in rural sections, the American car is in greater demand.

$8,000,000 in 5 Years

American exports into Australia since 1909 have amounted to more than $8,000,000. This country has shown a most remarkable increase. From the figure of $50,625 in 1908, this value has risen to $1,433,320 or nearly thirty times its magnitude. None of the other countries has made nearly the same progress.

Australia, as an automobile buying territory, has made most astonishing headway in the last 6 years. Agriculture, mining and a variety of industries make that country a territory of considerable buying power. That the automobile industry is getting its share is shown in the importation of $3,996,945 worth of automobile chassis and $703,125 automobile bodies in the first 6 months of this year, a total of $4,700,070.

This country, made up of six states, New South Wales, Victoria, West Australia, South Australia, Queensland and Tasmania, has a population of 4,830,517. Though about one-third the size of South America, American automobile business there in 1914 was thirty times that of South America.

American Bodies Lead

The importation of American bodies has been far ahead of any of the countries, dating as far back as 1911. For 1914, Australia imported nearly $150,000 worth more of American bodies than English. The United Kingdom, however, has always led this country in the number of chassis imported, this year's lead being $98,535. This figure, however, shows that the United States has made a great increase over 1913, the United Kingdom then leading it by $451,110.

Tires Poorly Represented

Though the American importations were second, it may be said that these could have been considerably increased, had attention been paid to tire equipment. A number of the American manufacturers sent their cars over to that country without tires while the European cars were equipped with those guaranteed in Australia. Though some of the American cars were so equipped, no guarantee was given. The reason for this is that only one tire company is represented there. This American company is not nearly as well established as any of the European firms. A number of the European tire companies are building factories to take care of the large trade. The question of tires to the consumer in Australia is a very important one, because of the high import duty.

Greater Increase Than England

The United States showed a better increase in 1914 than England, that is, averaging both the body and chassis imports. The American increase in 1914 over 1913 was 48 1-2 per cent., while that of England was only 6 per cent. The American 1914 increase for body imports over 1913 was 44 per cent., while the chassis import increase amounted to 53 per cent. The English increase in body imports was only 7 per cent., while the chassis imports gained 5 per cent.

New South Wales Buys Most

New South Wales is the largest automobile buying state of Australia. The 1913 imports amounted to $2,581,555 in 1913. These figures include both chassis and bodies, the last named amounting to $358,013. The large demand for bodies is explained as being due to the local demand for low-priced American cars, which are sold for delivery there complete and ready for use. The United States sent chassis valued at $646,038 to that state during 1913. Over $445,000 worth of chassis and over $120,000 in bodies came there from this country during the first 6 months of 1914. England sent over $85,000 worth of bodies and over $470,000 in chassis, leading the United States in the last named. The increase in that state in American cars for the first 6 months in 1914, including both bodies and chassis, was 48 1-2 per cent., while the English increase was 17 1-2 per cent.

Queensland's Increase Best

Queensland, though second to New South Wales in the number of chassis imports, showed the best increase for 1914. This was 37 per cent. New South Wales was next with 33, Tasmania, the smallest state, next with 30; Victoria, 16; West Australia, 10, and South Australia, only .003.

U. S. First in New South Wales

In point of numbers in New South Wales, America takes first place, the Ford registrations totaling 1,043. Overland carries off second place with 434. Third place goes to Europe, the Renault having 345. In the last official report of automobile registrations for this state, the figures show that 79 per cent. of the cars sold have gone into the country districts where farming and pasturage constitute the chief occupations. With this class of population purchasing practically 80 per cent. of the cars, it is not surprising that the low-powered and medium-powered cars should lead.

Canada Leads France

The accompanying statistics show Canada and France well up in the list, the first country leading. France, for 1914, has declined, while Canada has gained almost 70 per cent. over 1913 in chassis imports. Canada also leads France in body imports. France has also declined in body imports.

Information about Australia is constantly coming in, especially through the United States Consulates, established in the various cities. It will be advisable for any manufacturer who desires to export to the Australian continent, to communicate with the Department of Commerce and Labor, Washington, D. C., for information regarding the local conditions.

Plans Trade Tour

BALTIMORE, MD., Nov. 14—The Fidelity Trust Co. has arranged for a 16,130-mile tour around South America, starting from New York City, January 27, and Baltimore, January 29, and lasting 106 days, 52 days of steaming time and 54 in the principal ports of the West Indies and South America. This tour is arranged to enable our bankers, manufacturers, exporters and importers to familiarize themselves with South America.

Automobile and Motor Truck Chassis and Bodies Imported Into Australia in 1913 and First 6 Months of 1914

1914—First 6 Months

BODIES FOR AUTOMOBILES AND TRUCKS

Country of Origin.	N.S.W.	Vic.	Queensland.	S. Aus.	W. Aus.	Tas.	Commonwealth.
United Kingdom	$88,345	$43,650	$14,845	$27,125	$10,450	$8,020	$192,435
Canada	41,630	33,225	17,860	25,815	8,385	7,090	134,005
New Zealand	225	110	...	...	...	...	335
Austria	...	380	...	...	...	...	380
Belgium	550	1,750	395	...	...	...	2,695
France	3,090	5,570	680	1,095	910	60	11,405
Germany	7,880	2,910	405	745	...	280	12,220
Holland	...	180	...	...	...	...	180
Italy	8,070	2,180	...	1,120	2,230	...	13,600
U. S. A.	124,125	57,025	76,740	49,920	22,815	5,245	335,870
Total	$273,915	$146,980	$110,925	$105,820	$44,790	$20,695	$703,125

1914—First 6 Months

CHASSIS FOR AUTOMOBILES AND TRUCKS

United Kingdom	$470,120	$459,810	$94,100	$184,260	$49,030	$41,770	$1,299,090
Canada	207,990	193,195	70,250	94,060	31,575	27,950	625,520
New Zealand	7,745	750	...	...	...	...	8,495
Austria	...	1,560	...	...	...	...	1,560
Belgium	50,850	27,705	5,140	3,755	30	...	87,480
France	86,310	192,140	8,650	31,425	8,605	6,220	333,850
Germany	101,665	117,885	9,500	12,395	195	4,255	250,905
Holland	...	475	...	...	...	...	475
Italy	83,025	84,685	2,995	9,325	5,025	...	185,055
Switzerland	...	3,960	...	...	...	...	3,960
U. S. A.	447,740	253,470	233,255	157,245	83,575	25,270	1,200,555
Totals	$1,460,455	$1,336,635	$423,890	$492,965	$188,035	$105,965	$3,996,945

1913

BODIES FOR AUTOMOBILES AND TRUCKS

Commonwealth	$825	$100	...	...	...	...	$925
United Kingdom	73,470	49,470	$10,795	$22,875	$15,065	$7,720	179,375
Canada	15,565	33,490	3,545	22,990	13,095	360	88,845
New Zealand	275	...	...	...	...	...	275
Belgium	140	1,965	...	905	20	...	3,030
France	10,080	7,550	215	1,710	70	530	20,155
Germany	5,885	6,825	745	1,080	145	130	14,810
Italy	1,740	...	...	...	...	...	1,740
Netherlands	455	...	...	...	...	...	455
Norway	...	6,795	...	...	...	...	6,795
U. S. A.	83,430	55,425	42,125	29,325	14,250	8,310	232,865
Totals	$191,865	$161,620	$57,425	$78,665	$42,645	$17,050	$549,270

1913

CHASSIS FOR AUTOMOBILES AND TRUCKS

United Kingdom	$408,115	$394,350	$131,050	$196,720	$59,160	$43,300	$1,232,695
Canada	96,060	131,790	14,450	93,440	43,220	4,670	383,635
New Zealand	1,700	...	...	...	...	...	1,700
Austria	24,240	...	...	...	...	...	24,240
Belgium	...	53,840	6,155	16,365	1,485	1,760	79,605
France	115,405	157.870	8,380	63,615	1,430	12,225	358,925
Germany	75,760	67,545	2,775	6,825	1,440	860	155,205
Italy	78,210	128,665	...	5,025	...	...	211,400
Netherlands	2,200	...	...	...	...	...	2,200
Sweden	1,700	...	...	...	...	...	1,700
Switzerland	1,200	24.635	3,230	14,935	3,260	...	47,260
U. S. A.	488,290	187,630	142,840	94,450	50,290	18,085	781,585
Totals	$1,092,880	$1,140,825	$308,880	$491,370	$160,285	$80,905	$3,380,150

Russian Imports Gain $184,000

Progress Shown in First 5 Months of 1914

THE accompanying table shows the imports of various kinds of motor vehicles into European Russia in 1912 and 1913 and during the first 5 months of 1913 and 1914 respectively.

The number of automobiles imported was 5,350 in 1913, compared with 3,428 in 1912. The increased imports of trucks and chassis in 1913 may be explained by extensive orders from the Russian War Dept., but the great increase in the total imports is largely due to the Petrograd exhibition held for the first time this year.

Kinds	1912	1913	Jan. 1-June 1, 1913		Jan. 1-June 1, 1914	
	Value	Value	Number	Value	Number	Value
Automobiles:						
With 4 or more seats	$4,863,000	$7,511,000	1,754	$3,161,000	1,816	$3,543,000
With less than 4 seats	324,000	593,000	282	321,000	121	124,000
Trucks and chassis	331,000	717,000	516	352,000	315	280,000
Motor cycles	226,000	298,000	1,145	175,000	1,429	246,000
Total	$5,744,000	$9,119,000	3,697	$4,009,000	3,681	$4,193,000

Weight, Not Volume, of Air and Fuel Determines Proper Carburetion

The Automobile Engineers' Forum

Factory Engineer Points Out That Carbureter Adjustments Are Designed to Compensate for the Effect on the Mixture of Variations in Temperature and Pressure

By Frederick Purdy
Factory Engineer, Findeisen & Kropf Mfg. Co.

CHICAGO.—Editor THE AUTOMOBILE:—Concerning the relative merits of an adjustable and non-adjustable carbureter much can be said, but before going very far in this subject I want to say a few words as to the meaning of adjustable.

It must not be assumed that because there are screws that can be turned, that it is necessary to turn them. A carbureter with any number of adjustable places may be quite as fixed a proposition, after having once been adjusted, as a carbureter with rigid unalterable openings, the size of which is determined at the factory.

The impression seems to prevail that carbureters, which have the means of adjustment, must therefore, be adjusted at frequent intervals, apparently on the ground that nothing shall be wasted.

"If you have shoes, wear them; if you have a hat, put it on; if you have an adjustment, adjust it," seems to be the logic.

Why Motors Vary

It is rarely the case that two motors of the same design and built at the same time, are absolutely alike. Cylinder cores shift slightly and vary the compression space. If the manifold is cast as a part of the cylinder block, or separately, it is not always of the same area. Some present more or less friction to the movement of the air than others, and both compression and intake manifold conditions, influence carburetion. And the influence of the exhaust valves and the manifold must not be ignored.

However much care is exercised, cams are not always alike. This influences the lift of the valves, and in order to make them quiet, road testers will give more or less clearance to the tappet, which not only varies the lift of the valve, but also its timing. All this influences carburetion, so that even if a carbureter may be made for a particular motor, it may require some little variation in the carbureter itself to compensate for the accidental variables in the motor. Hence the necessity for providing these adjustments.

After the carbureter has been adjusted to its particular motor, it may be quite as fixed as though the openings had been drilled at the factory to a definite size, so that an adjustment does not, necessarily, mean something that is to be continually tampered with, but may be a provision for obtaining the highest possible efficiency from any particular motor on which the carbureter may be mounted.

It is not contended that carbureters made without the possibility of adjustment, cannot function properly. It may happen that the carbureter and the motor may be exactly adapted to each other. I said "happen." If they don't happen to harmonize, then the adjustment on the carbureter will compensate for the error. If there is no adjustment, then an inferior performance must be expected, or another combination of motor and carbureter looked for.

A properly-designed carbureter, having been adjusted once to a motor, could have its adjustable parts soldered, and it would then be quite as simple as if it were made without an adjustment at the factory, and if to make his product fool-proof is the aim of the carbureter manufacturer, he would have attained the same end should he have made his carbureters adjustable and adapt them to the motor, and then remove the possibility of further adjustment.

WILL A CARBURETER AND A MOTOR WORK TOGETHER PROPERLY WITHOUT ADJUSTMENT IN ALL CIRCUMSTANCES IN WHICH THEY MAY BE PLACED?

It is the office of the carbureter not only to partially or completely, if possible, vaporize the fuel, but to properly proportion it to the air. The proper proportions, however, should be based on the weight of the air and the fuel and not on the volume. It is the mass, and not the space the mass occupies, that determines its relative value.

To be explicit: A certain weight of gasoline should be mixed with a certain weight of air to produce a proper firing mixture. Unfortunately we are dealing with an incompressible liquid, the volume of which is varied only by temperature, and a gas, highly elastic, the volume of which is varied by pressure as well as temperature.

The Ideal Carbureter

A theoretical carbureter should, therefore, weigh out air and fuel and mix them. Then adjustments would not be necessary to compensate for different altitudes.

With such a device, a car should run as well at Palm Beach, Fla., or Helena, Mont., because, although the air is more rare at Helena, the proportioning device would take in a greater volume of air to gasoline at Helena than it would at Palm Beach.

In either place it would take in as many pounds of air per pound of gasoline, but, unfortunately, the light of present knowledge is not bright enough to show us a way to do this thing without complications and a mechanism so intricate and delicate that its use on a motor car would be absurd.

So, we perforce, resort to mechanisms which proportion by volume rather than mass, and since the volume for a given mass varies at different altitudes for the air, but does not vary for the gasoline, the device that proportions properly in Illinois, will not give the same ratio of air to gasoline in Colorado.

HENCE THE NECESSITY FOR SOME MEANS TO ESTABLISH A DIFFERENT RATIO OF GASOLINE TO AIR BY VOLUME AT DIFFERENT ALTITUDES IN ORDER TO

MAINTAIN A CONSTANT RATIO OF AIR TO GASOLINE BY MASS AT DIFFERENT ALTITUDES.

No other factor than this need enter into the problem because it has been well established that the atmosphere has substantially the same proportion of oxygen to nitrogen at all places and elevations.

Oxygen the Re-creator

The things that make a man feel better in some localities than in others, whatever they may be, certainly do not include the proportion of oxygen to other elements in the air, and it is oxygen, and not the landscape or the service in hotels, that makes the engine run, although these other things may have a big influence on the human motor.

As stated in the outset, there may be one or two or several adjustable places on a carbureter. These may be used to establish the proper relation of the mixing device to the motor at different speeds or with different loads and to provide for acceleration and several other things that enter into the problem of properly feeding the motor. It does not follow, however, that any of them must be adjusted because one travels from Chicago at 600 feet above the sea to Leadville at 11,000 feet above the sea.

Some means must be provided, however, to diminish the proportionate volume of gasoline to air to compensate for the diminished weight of the air as the car ascends from the low prairie to the high plateau.

This is done in some carbureters, notably the Rayfield, by controlling one of the nozzles delivering fuel to the carbureter by a simple mechanism on the dash or the steering post. The other adjustments may as well be soldered tight after the carbureter is once adapted to the motor.

The pressure of air at sea level is 14.6 pounds per square inch: at Leadville, which is about 11,000 feet high, the pressure is about 10 pounds per square inch. In other words, a given volume of air at Leadville will have only two-thirds the oxygen content as the same volume of air at New York.

Therefore, only two-thirds of the volume of the gasoline required to properly impregnate a cylinder full of air at New York can be properly burned in the same cylinder full of air at Leadville, and since all carbureters, without exception, proportion altogether by volume, some adjustment, to compensate for this condition, must be provided, or the carbureter may work well in New York and badly at Leadville, or good at Leadville and badly in New York.

A recognition of this fundamental truth in carburetion would save a lot of misunderstanding, and discredit a lot of flamboyant advertising to the effect, if properly analyzed, that the carbureter advertised is not under the control of natural laws, but possessed of mystic qualities quite supernatural.

So far, I have touched merely on the proportioning of the fuel. It goes without saying that in the lighter atmosphere compression is reduced in proportion to the weight of the atmosphere, and compression is one of the factors which varies the requirements of the fuel.

The Compression Factor

I shall not attempt to say just what relation the compression does have to the proportion of the fuel, it is not necessary to even guess at it. All those who are familiar with motor construction and operation know that the statement is true, and adds another reason for some compensating device under the control of the driver.

It may be stated, with truth, that an automatic device, working on the principle of the aneroid barometer, to cut down the gasoline flow in harmony with diminished atmospheric pressure, would take care of the conditions that require a manual control for different altitudes, and thus do away with the only remaining adjustment after the carbureter had been adjusted to its motor.

To the end that no inventor runs into disappointment, after working hard on the problem, I want to say that several devices of this kind have been worked out and are in the hands of the patent attorney. None of them, however, is an unqualified success, and the present method of control is so simple, and occasion for using it so rare, that there is little reason for adding anything to the carbureter.—FREDERICK PURDY, Factory Engineer, Findeisen & Kropf Mfg. Co.

Recent Court Decisions—Train Damages Car

A RAILROAD company was not negligent for not giving warning at a crossing, as a train on a crossing is warning enough.

In New Hampshire a man hired a car for a night trip. About 11 o'clock that evening the automobile collided with the fourteenth car of a slow moving freight train at a crossing. There were no gates, lights or signals, and there was no flag man at the crossing. The night was dark and foggy and the automobile was being driven at a speed of about 14 miles per hour. The motorist brought suit against the railroad company for injuries, but it was decided that he should not be allowed to recover damages, as, in the absence of a State or Municipal provision, a railroad is not compelled to give warning at a crossing and, as the train was visible 35 feet away, the motorist should have stopped.—*Gage vs. Boston & M. R. R.*, 90 *Atlantic* (*New Hampshire*) 855.

$1,741 for an Eye

The Michigan court decides that a manufacturer must pay damages to his employees, when they are not furnished with a safe place to work.

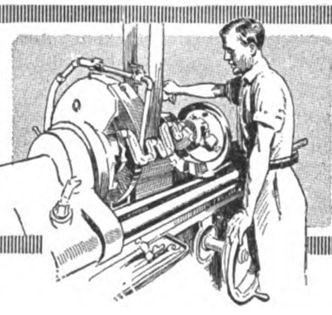
In this case one of the manufacturer's employees was struck by a flying chip from a cast iron frame, which workmen were chiselling and his eye was put out. The accident occurred while he was walking down an adjacent passageway. The employee claimed that there was a failure to provide him with a safe place to work; that the chipping was negligently done, and that there was negligence on the part of his employer in failing to erect screens and coverings, to place barriers, or to notify him of the dangerous work.

The employer, on the other hand, contended that the accident was one which could not have been reasonably anticipated; that it was temporary work which was being done unknown to him, and that the injury was caused by the act of a fellow servant.

The manufacturer was engaged in making automobiles in a large factory in Flint, Mich., and employed over 5,000 employees. It had various departments, superintendents and assistant superintendents. The assembly plant was in charge of a superintendent, and the assembly room proper was 400 feet long and 72 feet wide, with a center aisle from end to end. On the day of the accident workmen were engaged in erecting and fitting steel frames for the chassis of automobiles to rest on while they were being tested. It was found necessary to remove a triangular piece from each corner of the frame and the superintendent told his men to take it off with a cold chisel and a hammer. The man who was hurt entered the building carrying some brass and, while passing, was struck in the eye by a chip cut from the frame by the chisel.

The court held that the superintendent was the vice-principal, that is, he was the holder of delegated powers from the corporation and was not a fellow servant; that it was negligence on his part not to warn the injured man of the flying chips, or to prevent them from flying, and that the manufacturer was not relieved because the work was temporary work, and the employee could not be held to assume the risk, unless there was negligence on his part, because of his failure to notice and avoid the chips.—*Webb vs. Buick Motor Co.*, 148 *N. W.* (*Michigan*) 793.

The Rostrum



This department is conducted for the instruction of the readers and all are at liberty to ask questions. Be sure to give your full name and address in order that we may send you a reply by letter if there is no space in the Rostrum. If you wish to sign a fictitious name to a communication appearing in the Rostrum, sign this name in conjunction with your correct one.

Claims Tendency Toward Two-Cycle in Europe

EDITOR THE AUTOMOBILE:—I notice in the current technical journals there is a general tendency toward the two-cycle type of engine in Europe. There has been cited such concerns as Krupp of Germany, Carrels Fries of Belgium, Schneider et Cie., France, and Sulzer of Switzerland and numerous shipbuilders in Britain who have adopted the two-cycle. There is now a Sulzer 6,000 horsepower land six-cylinder engine in operation, so we have a power range up to 1,000 horsepower per cylinder and a 2 1-2 horsepower motor cycle. Referring to the latter *Motorcycle Illustrated* August 20, 1914, page 24, it says, "Two-stroke motors predominate for motorcycles in England. Thirty-seven out of fifty-five makers have adopted the two-stroke."

In an attempt to improve conditions in an automobile we now see eight cylinders being used to overcome the inherent defects due to cycle and yet there are concerns cited above who prefer to avoid such complication by changing the cycle (automobile engineers take notice). That this is not due to a desire to get better torque conditions and disregard efficiency is, or should be, very evident. Schneider et Cie. have built four cycles for years and after elaborate experiments decided to abandon that type in favor of the two-cycle. It might seem that it is to simplify the engine and make it more readily reversible, that in part is one reason, but Sulzer uses that type for engines of the stationary design also.

Can it be to avoid valves exposed to high temperatures? It would seem not, as all outside of Sulzer still use inlet valves in the head while Sulzer gets along with starting valves in the head and uses inlet and exhaust ports in the cylinder bore preferring to consider the least of two evils, and get an ideal combustion chamber.

A prominent authority says, "To obtain maximum mean effective pressure per revolution the two-cycle must be adopted." He might also have added to obtain maximum horsepower for a given weight and space.

This is an essential in a boat where space and weight is a factor in gross weight receipts. In the automobile, however, there is a desire to develop engines that are heavy and reduce weight by the use of aluminum and pressed steel parts instead of the more logical method of developing engines to produce the same number of impulses with one-half of the parts regardless of any fashion which in other lines changes with the season.

What special objection is there to an engine that has an ideal combustion chamber, no valves exposed to heat, cylinder air scavenged, piston air and charge internally cooled, and will deliver the same number of impulses with 1-2 the number of parts?

Cleveland, Ohio. SUBSCRIBER.

Firing Order of Cadillac Eight

Editor THE AUTOMOBILE:—Will you please explain the firing order used on the eight-cylinder Cadillac?

St. Louis. Mo. A. L. D.

—The firing of the eight-cylinder Cadillac, considering that the motor is made up of two sets of fours each being numbered 1, 2, 3 and 4; beginning at the front and counting towards the rear, is as follows:

Number 1, right—number 4, left—number 3, right—number 2, left—number 4, right—number 1, left—number 2, right—number 3, left.

This may be simply shown by the arrangement below:

Front	Right	1	3	4	2	Rear
of —						— of
Motor	Left	4	2	1	3	Motor

Each diagonal pair adds up to five and this is why this particular firing order is selected as it gives evenly distributed firing impulses about the mass center of the motor.

Differential Locks Cannot Be Attached

Editor THE AUTOMOBILE:—Can differential locks be applied to a touring car? If so, please tell me where they can be procured?

Wasta, S. Dak. A. MATHIAS.

—No. Provision must be made for the differential lock when the axle is designed. Obviously it would be a difficult matter to install a device on an axle already built which would lock the two axle members together and cause them to rotate as one.

A typical differential lock is shown in Fig. 1, where it

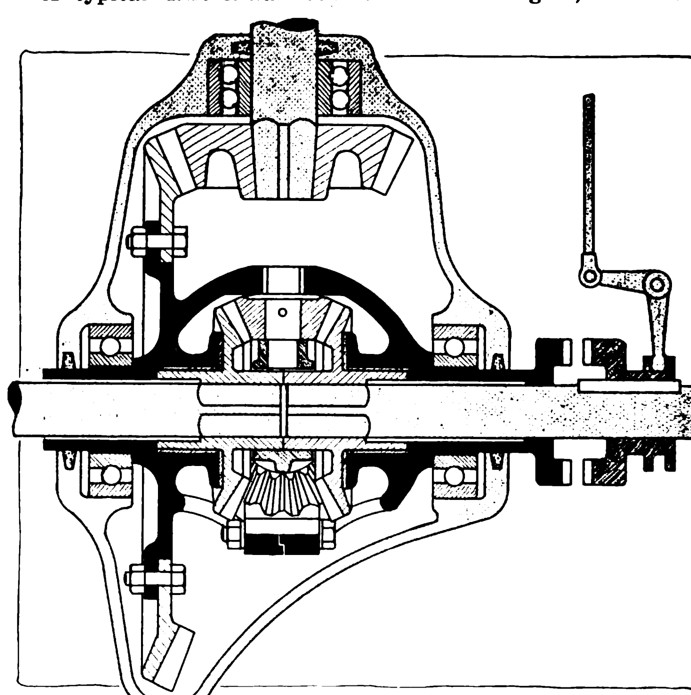


Fig. 1—Differential lock which allows the wheels to rotate together

will be noted that the dog clutch at the right locks the shaft on this side to the differential gear housing and since these two must then revolve together differential action is stopped and the other shaft must move with them.

Claims Water Will Remove Carbon

Editor THE AUTOMOBILE:—In answer to inquiry of M. Chase of Portland, Me., in your issue for November 5, as to whether water will remove carbon by dropping it into the carbureter, will say that I have been using water for removing carbon in my Hudson car for the past 2 years not by dropping but pouring it into the carbureter, a 1-8 to 1-4-inch stream being used.

My method is to open the cut-out, start the engine, allowing it to attain a fairly good speed, and pour water in the air intake, using a .5-gallon oil can with a spout so that it can be handled with one hand. Don't be afraid to pour in the water; you will be surprised to see the power that is generated through the steam that is formed together.

If you have a bad case of carbon use a 5-gallon can and set it at a convenient place near the carbureter, Fig. 2, and use a rubber tube to lead the water into the carbureter, using a stop cock to control the flow. Then start the engine as above stated and let it run for 3 or 4 hours, when you will find the carbon in little chunks back of the exhaust and there will be carbon mud in the base of the engine. After two or three treatments like this you will probably find a quart or more of carbon mud in the base of the engine. It would be a good plan to give this treatment every 1,000 miles.

Daytona, Florida. D. D. ROGERS.

Water a Good Carbon Remover

Editor THE AUTOMOBILE:—In your last issue is an inquiry from a Mr. Chase asking about the use of water through carbureter for cleaning cylinders.

I have a Marmon-32, 1910—Model F. Schebler carbureter and I have tried this with success. I let the engine run until warmed up, then drop rain water into carbureter slowly enough so as not to choke the engine. I put a pitcher full through. I formerly used kerosene, and with water a smoke is emitted similar to kerosene. The engine worked much better, stopped knocking and had improved power considerably.

This method of removing the carbon is so cheap that one is suspicious, but it has done well for me.

Warren, Ohio. T. G. DUNHAM.

Cantilever Spring Much Heavier

Editor THE AUTOMOBILE:—Several friends of mine have had discussions as to the relative strength of semi-elliptic and cantilever springs to carry the same weight. From the reactions, it seems to me that the cantilever spring must be just twice as heavy as the semi-elliptic, the other parts of the car being identical.

Oradell, N. J. A. M. WHITING.

—The cantilever spring is nearly twice as heavy as the half-elliptic. According to the simple beam theory it should need to be twice as strong, but in practice it is found that it is not necessary to make it quite as strong as this.

Here are the opinions of the engineers of some companies which are using this type of spring on the advantages of this spring and its comparative weight.

According to T. P. Chase of the King Motor Car Co., this extra weight is an advantage. He goes on to say, "Springs which we use are considerable shorter and very much wider and thicker than a semi-elliptic spring would be. Our spring is 2 1-2 inches wide and has nine leaves, whereas the semi-elliptic to carry the same load would be about 2 inches wide and have only 8 leaves.

The load carried on the rear axle is applied at the small end of the cantilever spring and when the spring is considered

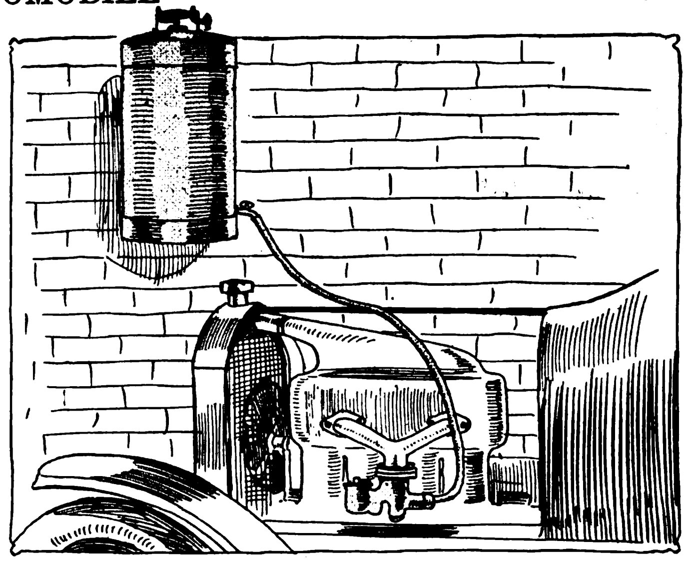


Fig. 2—Diagram showing how water is fed to carbureter by gravity

as a beam, the load at the center of the spring or at the point of attachment to the frame, is very much more than the load on the rear axle and the movement of the spring at this point is considerably less for a given amount of movement of the axle. In the semi-elliptic spring the reverse is true. The load on the axle is applied at the center of the spring and any movement of the axle caused by an obstruction is more at the end of the springs. The cantilever spring also has, what may be termed, a quicker periodicity of movement and the movement of the axle affects the lesser movement of the body for these reasons."

D. B. Webster, Assistant Mechanical Engineer of the National Motor Vehicle Co., states that, "Our experiments show that there is less rebound and side sway with cantilever springs than with the regular three-quarter elliptic. We are not able to give you any figures on this, but our impression is gained from riding in the same car equipped first with three-quarter elliptic and then with cantilevers.

"We also consider it an advantage that the cantilever spring brings the heavy strain further forward on the frame where the section is better able to carry it.

"Our experience shows that we need a stronger spring in about the proportion called for by theory."

H. J. Edwards, Engineer for the Garford Co., maker of the Willys-Knight says: "Both the fixed cantilever spring and the floating cantilever spring such as used on the Willys-Knight cars have to be of heavier section than a similar semi-elliptic spring under same load conditions.

"The fiber stress or the bending moment on the center section of the cantilever spring is without doubt double that of a similar semi-elliptic spring, as is shown by the beam theory. Cantilever springs, therefore, are of a greater section than the semi-elliptic springs. The reason why it does not have to be twice the section is that the spring does not receive the hard service and extreme flexure of the semi-elliptic. In a car with 8 inch clearance the semi-elliptic spring must be bent 8 inches while the cantilever type of spring would be deflected only 4 inches. The spring works within small limits of fibre stress and the allowable working stress in the leaves is correspondingly higher. A cantilever spring 56 inches long is equivalent in riding and springing qualities of a semi-elliptic spring 112 inches long.

"The saving in unsprung weight which is approximately the weight of the semi-elliptic spring adds also to these other advantages and is probably much underrated."

Four by Five Motor for 2,800-Pound Car

Editor THE AUTOMOBILE:—I am rebuilding an E. M. F. car. It will have a full-floating axle with 36 by 4 wheels.

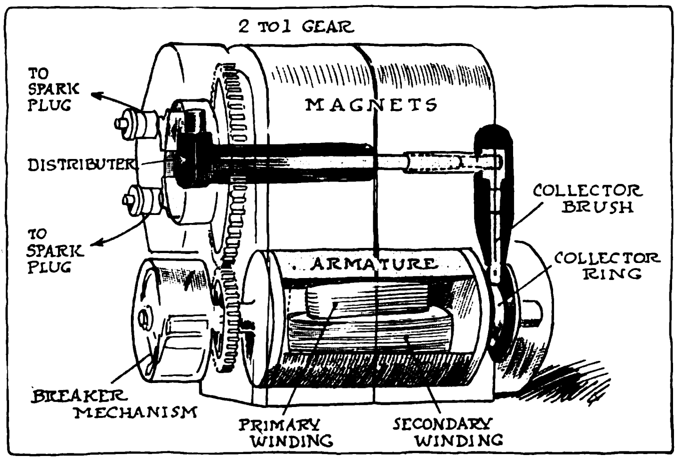


Fig. 3—Phantom side elevation of high-tension magneto

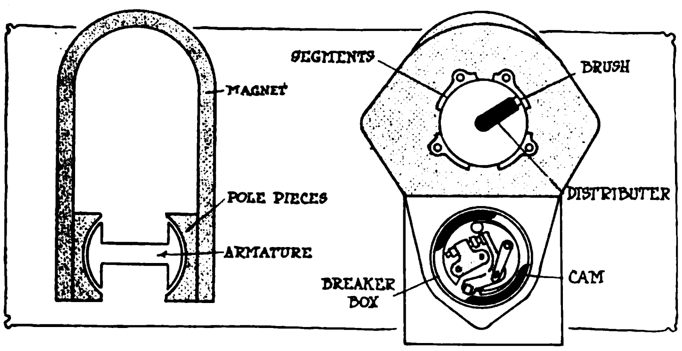


Fig. 4—Position of armature and breaker just before points separate. The armature is rotating in an anti-clockwise direction

Do you think a unit power plant with 4 by 5-inch high-speed motor will give sufficient power with these wheels geared 4 to 1? I estimate the car to weigh about 2,800 exclusive of passengers when complete.

2—If these wheels are too large what size would you suggest, 34 by 4 or 32 by 4?

Broken Arrow, Okla. DR. J. H. LAWS.

—1—This motor should develop sufficient power to make this machine speedy and an excellent hill-climber.

2—The wheels are not too large for the gear selected. Tires of this diameter also have the advantage that they will wear longer and be easier riding due to the fact that the larger the diameter the less the wheels sink into holes.

How To Wire Ford Headlights

Editor THE AUTOMOBILE:—According to your advice to J. M. Harper which appeared in the October 15 issue of THE AUTOMOBILE, on page 714, regarding the wiring of a storage battery and magneto to the headlights would you not obtain only 6 volts when the battery was switched on and 12 volts with the magneto in operation?

In this country I have never seen Ford headlights wired in parallel but always in series with 6-volt bulbs. If your correspondent has his lamps wired in parallel I can quite understand the motor stopping when he switches the lamps on.

Croyden, Surrey. F. V. MILNE.

—In our answer to J. M. Harper's letter nothing was said about voltage and therefore it was taken for granted that the battery furnished 12 volts the same as the magneto and that the lamps were also of 12 volts. Therefore the wiring diagram which we suggested and which is shown in Fig. 5 is correct. There is no reason why 12 volt lamps may not be used successfully, although the 6-volt type may be more common.

If a 6-volt battery were used in this diagram, however, the motor would not operate on the magneto, just as you suggest; because the storage battery would then act as a short circuit.

In order to use a 6-volt battery the lamps must be 6-volt and be connected in parallel on the battery and in series when on the magneto, as is indicated in Fig. 6.

Two double throw switches are used, wired as shown. The handles of the two switches must be connected together so that when one moves to the right or left the other does also. If this connection were not made there would be danger of throwing one of the switches the wrong way.

Seven-Passenger Body for a Five

Editor THE AUTOMOBILE:—1—I would like to replace my five-passenger body with a seven. Do you think the extra overhang on the rear axle would hurt the motor?

2—If a motor is equipped with a high-tension magneto, does each cylinder receive alternately one effective spark and one surplus spark?

New York City. L. J. H.

—1—The extra load will not harm the motor, if it is not allowed to labor on high gear. When it is evident that the car cannot climb a certain hill on high gear, rather than force it up, a shift to second should be made. The same applies when running on second gear and low gear is required. There is more danger of hurting the springs or wearing out the tires. Possibly it will be necessary to substitute stiffer springs. Unless the tires are amply large for the weight they are now carrying, oversizes should be put on, at least on the rear where the greater load is.

2—The ordinary four-cylinder, high-tension magneto only produces sparks when required, that is, at the beginning of the working stroke. Such a magneto produces a spark every half revolution of the armature and therefore by connecting it to the motor so that it revolves at the same speed, just the right number of sparks are generated, since a four-cylinder, four-cycle motor requires a spark every half revolution. These sparks are distributed to the proper cylinders in turn by means of a rotating brush.

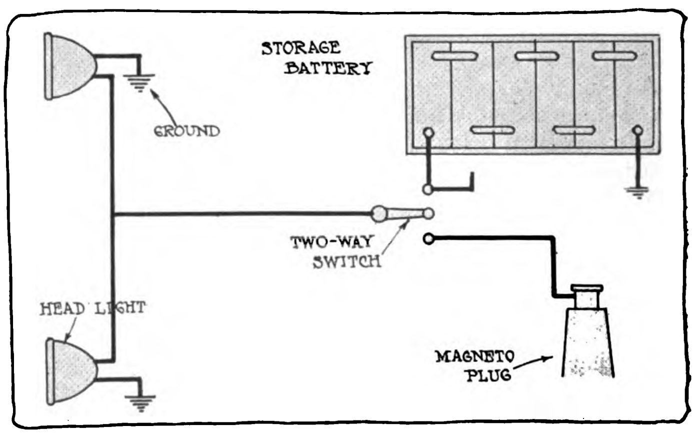


Fig. 5—Ford wiring diagram with 12-volt battery and 12-volt lamps

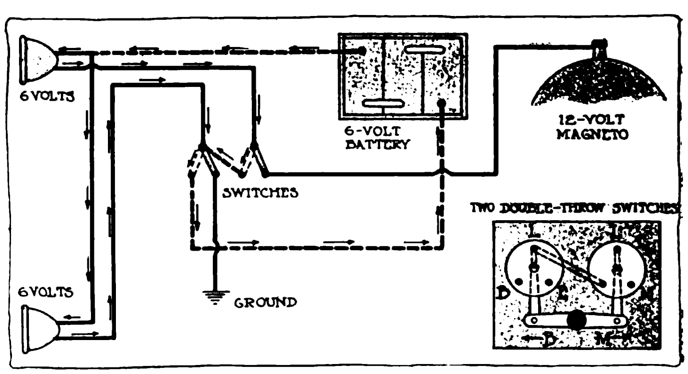


Fig. 6—Ford wiring diagram using 6-volt battery and lamps

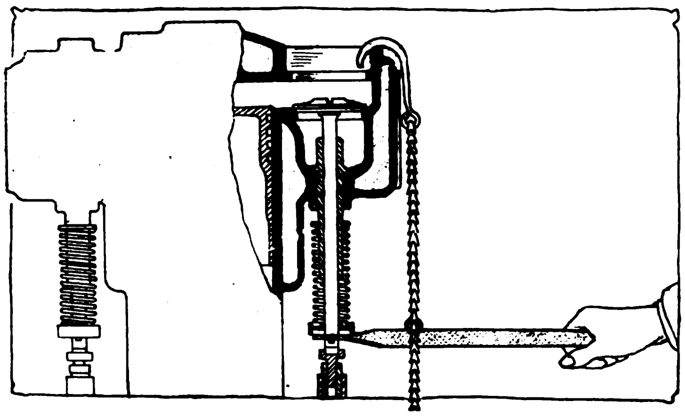


Fig. 7—Pierce motor, showing method of lifting valve spring to remove key holding spring seat

The complete mechanism is shown in Figs. 3 and 4.

The current is generated in the armature which consists of a few coils of wire in the slots of the H-shaped core. The armature core is made of iron and lies between the ends of the large magnets which give the instrument its name. Whenever the armature is in the position shown in the figure a maximum current is being generated in it due to the fact that it is moving, with greatest rapidity, through the magnetic lines of force passing between the iron pole pieces. When the armature is at right angles to this position, the wires of the coil are entirely out of this influence and no current is generated.

With the armature in about the position indicated, the spark is produced when the circuit is broken by the separation of the breaker points. When these points fly apart; impelled by the cam shown, the current dies down in this circuit. This causes a high voltage to be generated in the secondary circuit. The latter has no electrical connection with the former, but is magnetically linked. The primary coil which forms part of the primary circuit is inside the secondary coil which forms part of the secondary circuit. In the magneto shown, the primary coil and the armature winding are one, the secondary coil is directly outside of it and all rotate together.

The current is distributed to the proper cylinder by means of the rotating brush which makes consecutive contact with the four segments which are connected to the high tension wires running to each of the four cylinders. The distributer runs at half the speed of the armature and the two are positively connected by gears. The two are so set that the brush is in contact with one of the segments when the breaker points separate and the spark occurs.

How To Grind Pierce Valves

Editor THE AUTOMOBILE:—1—I have a Pierce-Arrow car and would like to know the best method of grinding the valves.

2.—How should I prime the motor.

Baltimore, Md. JOHN E. BROOKS.

—1.—First remove the valves which require grinding. The ones which probably need grinding are those which do not hold the compression. The compression of each cylinder may be tested by opening the priming cocks on all the cylinders, but this one and noting whether an increasing resistance to cranking is felt as the piston of this cylinder progresses upward on the compression stroke. If not, compression is leaking and the most likely place is past the exhaust valve although the inlet valve may be at fault or possibly there is a leak past the rings.

Having determined those exhaust valves that probably require grinding, the next step is to remove these valves. The valve caps are unscrewed, and then by the aid of a valve spring lifter as shown in Fig. 7 the key holding the spring seat of each valve in place is removed. This is done by installing the valve spring lifter as shown, then by pressing down on the handle the spring seat is raised and the key may be withdrawn with the other hand. It will be easier to do this when the valve is seated, as the spring is fully expanded then and is therefore easier to compress.

The removal of the valve is next. Start it upward by inserting a screw driver between the valve stem and the valve tappet, or else turn the motor over until the valve is fully opened. After the valve is raised off of its seat by either of these methods it may be withdrawn by slipping a piece of string around the head.

Withdraw the valve spring by grasping it firmly with both hands and working it out over the push rod.

You are now ready to begin the grinding operation. Coarse and fine emery powder mixed with enough cylinder oil to form a thin paste may be used as a grinding material or a suitable grinding paste may be procured from any supply dealer.

Apply a small amount of the coarse variety to the seat of the valve, replace it in the motor and using a screw driver rotate the valve back and forth through a small angle several times. Raise the valve from the seat, give it a quarter turn, and then repeat the operation. The valve may be raised by hand or a weak coil spring may be placed under the head so that the moment the pressure of the screw driver is removed the valve flies up.

The object of the grinding is to remove pits in the valve and its seat as shown in Fig. 8. After these have been ground out, the surfaces should be polished by using fine emery or paste. Be careful not to get any of the grinding substance on the stem of the valve for it will wear the guide.

When the grinding is finished, the surfaces must be carefully wiped clean so that every vestige of the abrasive has been removed and then the valve mechanism should be reassembled.

Then clearance between the valve stem and the push rod must be readjusted. The clearance should be sufficient to allow the insertion of a sheet of writing paper. This adjustment is made by turning the screw in the top of the push rod to the right or the left, as the case may be, after the lock nut directly below it has been loosened.

2—Unless you use a special priming device the best way to prime the motor is to inject a small amount of gasoline into each cylinder through the priming cups. A teaspoonful for each one should be enough.

Buick C-25 Sells for $950

It was stated in the October 15 issue on page 715 that the price of the Buick model C-25 for 1915 was $1,050. This should have been $950.

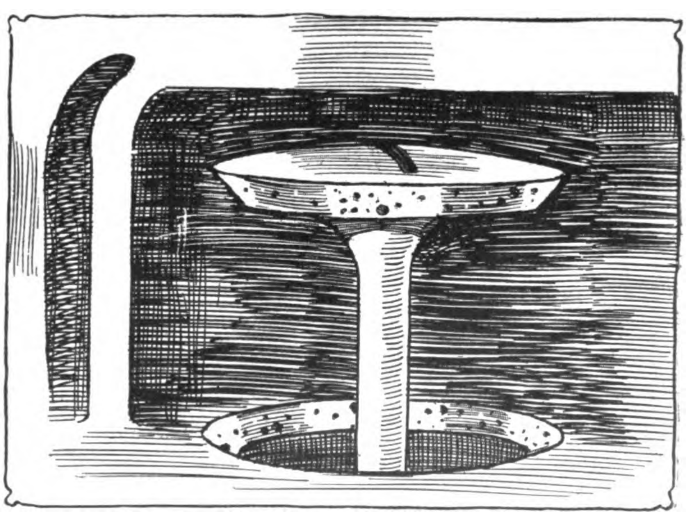


Fig. 8—Pits in valve and seat which cause loss of compression

American Motor Vehicles for the Belligerents

With Special Reference to 1915 Needs of Russia

OFFICIALLY Russia is no longer in the market for American motor trucks or automobiles, having bought all wanted for the present. It is desired to gather some experience first with these vehicles of different manufacture before formulating requirements for further needs, as their suitability for the local conditions cannot be ascertained for some time to come. It is considered very unlikely that it should prove possible to utilize motor trucks to advantage during winter and spring on the poor roads of Galicia, Poland and East Prussia. No adventurous propositions are entertained, as no emergency is recognized. Russia's Commissioner, Baron de Korff, and the military attaché, Colonel Golejevsky, warrant no information of more detailed nature.

Unofficially, the case stands differently. All are at liberty to theorize about Russia's wants and to strive at anticipating them, and it will be desirable for all concerned if any action taken, on this basis, for supplying the wants of the future happens to fall in line with the instructions which the Russian purchasing agents eventually will receive from their government. Communications on the subject will naturally be placed on file in the meantime.

The field is thus open for speculation, and as war time is notoriously liable to sudden changes of conditions, some of the elements upon which a considerable amount of business may depend command a timely and actual interest.

The inaccessibility of Russian ports during the winter almost closes the empire against immediate deliveries. Archangel, the port on the Arctic ocean which is reached by passing north of Norway and Sweden, can probably not be kept open much longer, even with icebreakers. The energetic use of ice-breaking vessels is under consideration, however. Petrograd (St. Petersburg) can receive goods only at great risk so long as Germany controls the Baltic and the precarious definition of contraband makes it difficult to ship through Norway and Sweden.

Odessa on the Black Sea is an inland city unless means are found to pry open the Dardanelles and the Bosphorus for the passage of war supplies. There remain Vladivostok and Port Arthur. The latter is ice-free and under Japanese control. Only in a great emergency could it be contemplated to ship motor vehicles, even unassembled, from American manufacturing centers to San Francisco, thence over the Pacific Ocean to Port Arthur and from Port Arthur over 7,000 miles of Manchurian and Siberian railway to Petrograd. These conditions alone would dictate a waiting policy with regard to the ordering of motor vehicles for the present, but a change in the relations of Turkey and the Balkan states to the war might open Odessa, (a chance much enhanced by Turkey's actual entry in the warfare, which took place shortly after these notes were written), while one affecting Denmark or Sweden or both these countries might open or close the northern route definitely, even after the breaking up of the ice, next year.

From the reports of the war in Belgium and France it seems clear that motor trucks are principally used for the commissary department and for the transportation of ammunition and rapid-fire guns; to some extent also for the hauling of field ordnance, but the trucks used for the latter purpose are mainly of the four-wheel-drive type, which cannot yet be made in large numbers in the United States. The lighter types of vehicles and especially ordinary automobiles in all sizes are employed on a large scale to expedite the movements of troops, not only for getting them from the rear to the front but in ever increasing measure also for effecting tactical changes along the much extended firing lines. In many instances trucks and omnibuses have served to rush troops forward and have afterwards doubled on their tracks to fetch more ammunition and food from the rear. On account of the long battle formations there has been no real rear guard in this war but only strings of detachments for protecting the lines of communication, the railways and the roads, the bridges and culverts.

While it is unlikely that Russia has contemplated the extensive use of ordinary automobiles for the purpose of gaining strategic advantages through a great rapidity in the movement of soldiers or for saving them from fatigue, there is no doubt that her generals have been at a disadvantage in this respect and that motor vehicles would be so used, if they could be had. But staff officers, aides and couriers have absorbed the supply of automobiles on hand. The winter campaign must be fought without more extensive use of them, but Russia is fortunate in being able to put two men in one place rather than one man in two places and thereby make up to some extent for her shortcomings in this feature of transportation equipment. The massing of enormous numbers will do for defense, but for offensive operations a high degree of mobility is required, and if the lessons in latter-day warfare taught so far are accepted it can therefore be taken for granted that Russia, if she can hold her own, will want just as many automobiles and trucks in the spring as she can get.

All Sizes Needed

The question of their weight and capacity is paramount and intimately connected with the road conditions. The German and French view, greatly favoring the large unit—very substantial, large and heavy, yet limited to an axle load of about 6,000 kilograms maximum—seems still to be shared in Russian official circles, and it is in accordance herewith when military representatives place great emphasis on the avoidance of skidding, which is far more serious for heavy than for light vehicles, but the lessons of the present war on Belgian and French soil do not go in the same direction except where the traction of heavy ordnance is involved. On the bad roads of the eastern country the light vehicles will necessarily prove even more indispensable for mobility than they have proved in the summer season on the western arena whenever macadamized roads had to be left behind. The saving in drivers' wages which operates so strongly in commerce to keep the capacity of vehicles up to the largest which the roads will support, is of course entirely eliminated. In the military operations drivers can be had in plenty and a sufficient number of men is always on hand to help a vehicle out of any temporary predicament to which it may become subject or to ease it over an impassable piece of territory, provided the vehicle can make up for the trouble by the speed it makes possible under average conditions.

It is apparently not quite the correct idea that the 1 1-2 ton truck is coming into demand for these reasons in preference to the 3-ton and the 5-ton trucks. The lighter type of truck is still too heavy for meadows and wet ploughfields, and for good roads the heavier truck is preferred, but in Russia the light truck will no doubt be demanded for all transportation work among the reserve forces and most when fitted with a stake platform which affords handholds for soldiers and can be readily adapted to many different purposes. Nearer to the battle formations, however, all results point now to the additional need of much smaller units; to the great superiority of five or six chassis rigged up to carry from 1-2 to 1 ton, each, of either dead or live load in any helter-skelter manner as compared with a corresponding load capacity in the form of one or two 3-ton or 5-ton vehicles—especially as the latter have plenty of work elsewhere. Such chassis, which can be turned out in great quantity in this country on short notice, have the most advantageous contact area of the wheels with the ground, to secure traction, and can be helped out of a difficult spot in a jiffy by its occupants, while the more numerous occupants of a heavier vehicle cannot find spots enough for applying a boost proportioned to its weight.

An Austrian lieutenant acting as despatch bearer in the Galician and Polish campaign relates how his little car, of the Wanderer model, proved to be the only one of all the motor vehicles of the army corps which remained in commission in the broad zone of forests and bogs at the Galician frontier. Writing on September 16 he relates: "After the first three weeks I had learned to be glad when I was only required to drive through a potato field. Morasses, quicksand, forest bottom with tree stumps, roads with an endless succession of holes in which the wheels sank to the hubs, now on the right side and now on the left, and again on both sides at the same time, made it impossible for days on end to change from the low to even only the second speed." Finally a Russian shell demolished the car after five weeks of service. (From October 10 issue of *Allgemeine Automobil-Zeitung.*)

It is plain that the theories relating to military motor vehicle service which had been formed on the basis of antebellum maneuvers have been profoundly changed and widened through the actual war tactics, in which the protection of the artillery against flank attacks plays an enormously important part, necessitating a new sort of mobility parallel with the lines of intrenchment extending for hundreds of miles, nearly at right angles with the direction of advancement or retreat.

Only automobiles, in the smallest possible units, and bicycles render this mobility practicable, while the use of the same class of light vehicles for the general transportation work of the armies is scarcely secondary to that of the larger motor vehicle units and the railways. The whole military motor vehicle field is suddenly found to have been greatly extended.

To the American automobile industry this condition, which has barely reached official notice as yet or been fully appreciated in its practical consequences, may soon result in extraordinary activity, as no other country can produce small motor vehicle units with anything approaching the rapidity of production which can here be realized. But it stands to reason, perhaps, that the runabout chassis which may be demanded in large numbers, at almost any time from now on, should be protected against the severities of the service to which they may be exposed. Probably the springs should be strengthened and lengthened (so as to retain all their flexibility) and provided with rebound checks. Probably simple platforms should be provided instead of the ordinary bodies. Perhaps the tires should be solid and anti-skidding.

The possibilities for shipping the vehicle parts unassembled, with an assembling crew to put them together at their destination, also form an interesting subject for speculation on which the foreign purchasing agents may be able to give pointers as soon as their governments are ready.

A boom in second-hand vehicles is not excluded. If the demand should come with the suddenness and insistence that is foreshadowed by the events, an organization able to place thousands of inspected and classified small motor vehicles at disposal on short order would be entitled to a hearing.

As an example of the conditions in Russia which should make the use of motor vehicles of almost any description highly desirable, it may be mentioned that nearly all of the Russian railways have tracks which are 3 1-2 inches wider than those of the Prussian and Austrian railways with which they connect, so that unloading and reloading are required at the frontiers, and that even such towns in Russian Poland as Lomsha, with 22,000 inhabitants, and Pultusk, with 16,000 inhabitants, have no railway facilities whatever. With regard to the transportation of troops and military materials, the Russian preparations have been for a defensive and not for an aggressive campaign.—M. C. K.

British Army Truck Efficiency

By J. M. C. Rowley

HAVING referred in last week's issue to the German armored cars which I saw at Ostend, I should add that their capture from the enemy may have been due to the poor protection they afford the driver against a flanking fire. They are, however, quite formidable looking and dash about through quiet villages, their three great headlights terrorizing the inhabitants. The radiators did not seem to be protected in any way, but there is a powerful buffer to protect them from impact. One or two radiators were perforated by bullets, although I could not get near enough to trace the passage of the bullet and find whether it had vitally affected the motor. One thing was plain. An armored car of the German description is very easy to make from an ordinary touring body. In British service several Ford cars are being fitted with ambulance bodies and they are doing excellent work in this connection.

I have just met some motor transport drivers and learned many interesting facts regarding the work of motor transports. Motor transportation back of the firing line is exceedingly well organized, the vehicles supplying the troops with food, clothing and ammunition. The constant supply of the latter to the artillery corps insures the incessant continuance of artillery attacks which has characterized the present war.

Formerly the connection of a long line of troops was made by railroad, but today the motor bus enables the whole army, soldiers and transport, to move together as a unit. The railroad is not by any means dispensed with, and so far as it goes, is used for the transportation of all kinds of material and supplies. In the present campaign, the railroad, however, is not the governing factor in the movement of troops. The supplies are removed from the trains to the 3-ton motor wagons, and these follow the troops wherever they go. In this way the army is kept constantly supplied with rations, the soldiers having 2 days' food supply, and the trucks carrying supplies for 2 days more. All the movements of the trucks are in strict accordance with schedule arranged by the army service corps. The motor trucks meet the trains and the motors are in turn met by the horse wagons, which convey the supplies direct to the firing zone.

In conversation with one driver who had been several times in the fighting zone with his motor truck, he said: "I carried ammunition and distributed it to the artillery corps, ranged on a slighter elevation over against the German trenches and earthworks. Practically all the time my truck was under fire, but the marksmanship was poor and although one or two stray bullets and pieces of shell hit the truck the steel plates were not damaged. I passed through safely and returned to the point from where I started by another route away behind the firing line." The truck driven was a regular war-office machine painted gray and with stout metal defenses around the whole motor and body. The ordinary motor suffers a great deal under fire if it is not protected in any way. I have seen huge masses of débris, wheels, smashed bodies, crushed motors, bent axles, etc., along the roads over which I passed. It seems that in many cases motors have been purposely destroyed. A truck perhaps forming one of a long convoy goes wrong, and the enemy is close behind. There is no time to repair the trouble and rather than allow the machine to fall into the hands of the foe it is destroyed as quickly and as thoroughly as possible.

Perhaps this will be known in history as the great motor power war.

Zenith Tests on Dynamometer Set

Complete Laboratory Equipment Devoted to Carbureter Trials

THE newly equipped testing laboratory of the Zenith Carbureter Co., Detroit, Mich., is located in one end of the new plant, and includes a complete Diehl electric dynamometer outfit. This apparatus is very similar in principle to the A. C. A. testing apparatus in New York, and could be used for just as accurate and exhaustive testing.

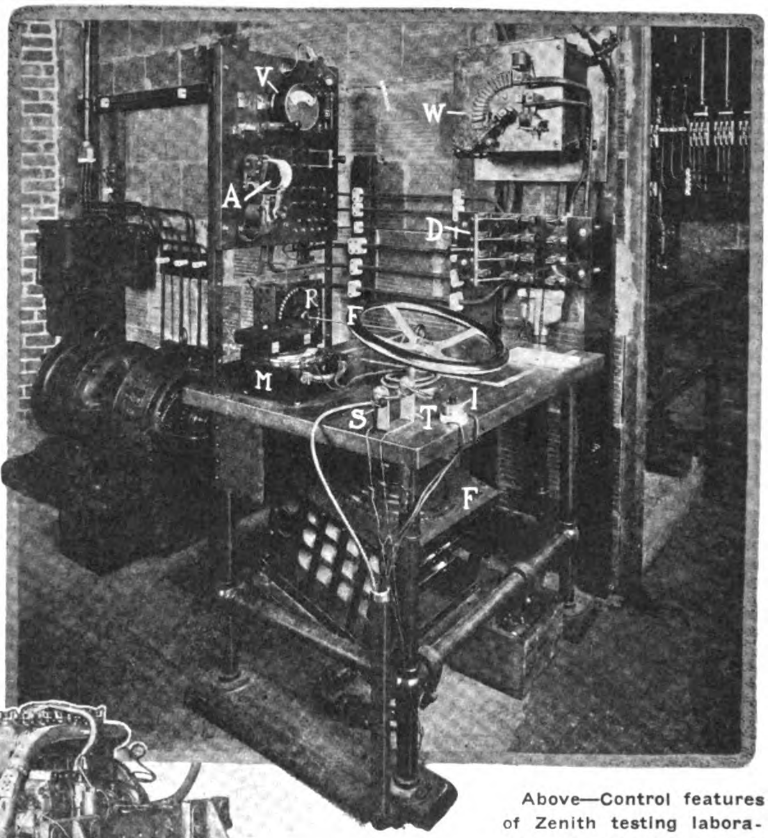
Of course, for carbureter testing, such an equipment acts only indirectly, in that the dynamometer records the power output of the gasoline engine to which it is connected, and its power output is in turn dependent to a large extent upon the carbureter furnishing it with fuel.

The gasoline engine connects directly to the armature of the electric dynamometer, and when the latter is driven by the engine, the armature tends to revolve the field, or outer part of the electric machine along with it due to the magnetic attraction between the two parts. The field portion is free to turn on its bearings at either end, and it is separately excited by the current from a transformer set which is a part of the equipment because the dynamometer requires direct current whereas the city supply is alternating. But the field of the dynamometer is attached by a link connection to scales, and the force necessary to prevent its revolving with the armature is thus measured by the scales, and is an indication of the power being put into the machine by the gasoline motor, the force, speed and so on being taken into consideration in figuring the horsepower by formula.

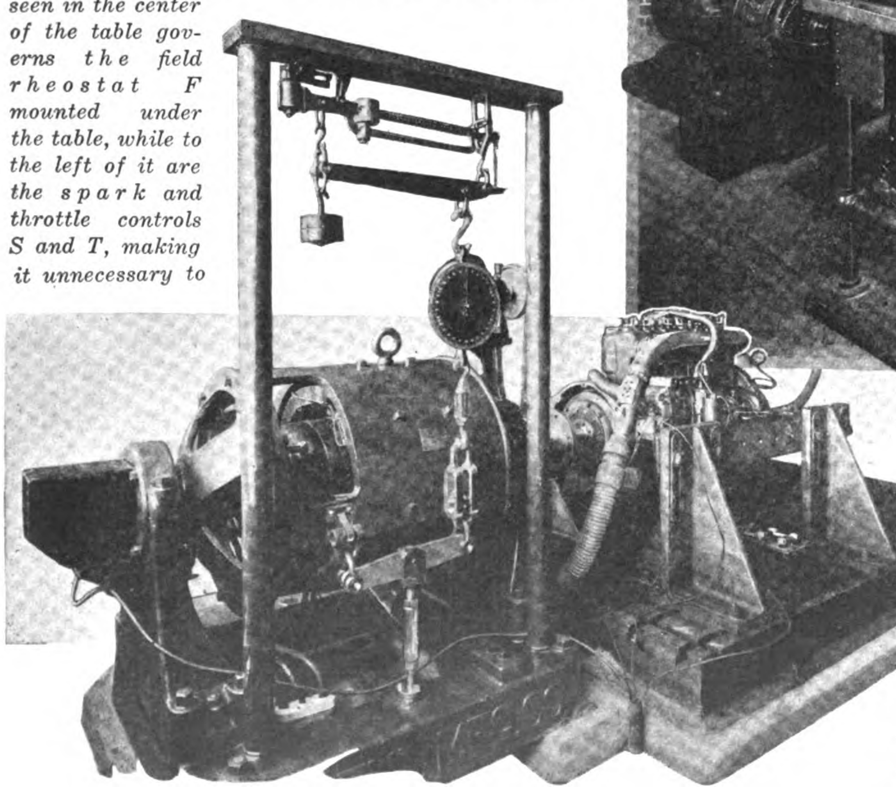
In one of the illustrations is shown the grouping of the various controlling and indicating apparatus on the table and on the wall and switchboard to the right and in front of the table. The hand wheel F seen in the center of the table governs the field rheostat F mounted under the table, while to the left of it are the spark and throttle controls S and T, making it unnecessary to step over to the motor to regulate them. Just in front of the wheel is a switch I which may be used to shut off the ignition current. An electric tachometer M records the dynamometer speed.

Without moving his position, the operator may also regulate the supply of cooling water to the engine, while at his right is the main double-throw switch D which, in one position, sends current into the armature of the electric machine so that it may be operated temporarily as a motor for starting the gasoline engine, while in the other position it loads the armature by sending the generated current into the resistance coils, the machine then acting as a dynamometer. Above this is the starting switch W for starting the dynamometer as a motor after the main switch is thrown in.

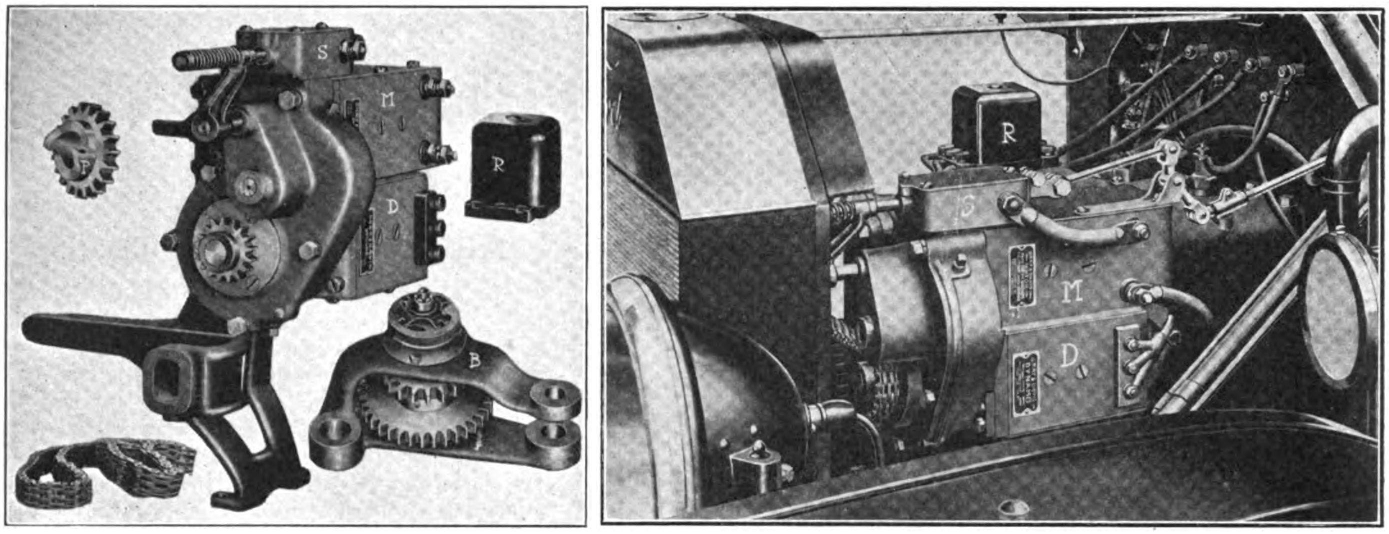
On the switchboard is a rheostat R for adjusting the transformer set voltage. The board also carries the voltmeter V, dynamometer circuit breaker A, etc.



Above—Control features of Zenith testing laboratory. A, automatic switch which cuts in when double throw switch D is swung to dynamometer position. F is the field rheostat and the wheel F is hand control for same. W is the switch starting the dynamometer as a motor. S and T are spark and throttle controls. I is the ignition switch, M the tachometer and V indicates the voltage of the transformer set, which is adjusted by rheostat R.



Right-Left—Motor mounted for testing by Diehl dynamometer in Zenith carbureter plant.



Gray & Davis starting and lighting system for Fords. Right—System mounted on Ford. Left—Details of system. R is regulator, P the driving sprocket, B the bracket, M the motor, S the switch and D the dynamo

Gray & Davis Ford System

Two Units in One Case —Drive by Silent Chains —6 Volt, Single Wire

A COMPLETE starting and lighting system for Ford cars has been brought out by Gray & Davis, Inc., Boston, Mass., as was announced briefly in the Nov. 5 issue of THE AUTOMOBILE on page 872. The complete outfit, including starting motor generator, battery and wiring sells for $110. The system is a 6-volt, single wire type, and the starting motor and electric generator are distinct units, although mounted in one casing, the motor being placed above the generator. The whole device is very compact, the regulator and switch being carried on the top of the main unit. Connection to the crankshaft is made by silent chains. By pressing the starter pedal or button the switch is closed and the motor is cranked at a speed of 75 to 100 revolutions per minute depending on the condition of the motor, the viscosity of the oil, the temperature, etc.

Voltage regulation of the generator is accomplished by means of inserting resistance in the field circuit as the speed increases. This is done by means of a solenoid which operates on two resistance coils, the one being brought into circuit at medium speeds and both being switched on at high speeds.

60 Ampere Hour Battery

The storage battery is a 6-volt, 60-ampere hour of Willard make. It is charged by the generator at speeds above 12 miles per hour. Below this speed the cutout regulator automatically breaks the circuit, thus preventing the battery discharging. Below this speed the generated voltage is less than the battery voltage and therefore current would flow from the battery through the generator windings, operating it as a motor if the circuit were not broken by the cutout.

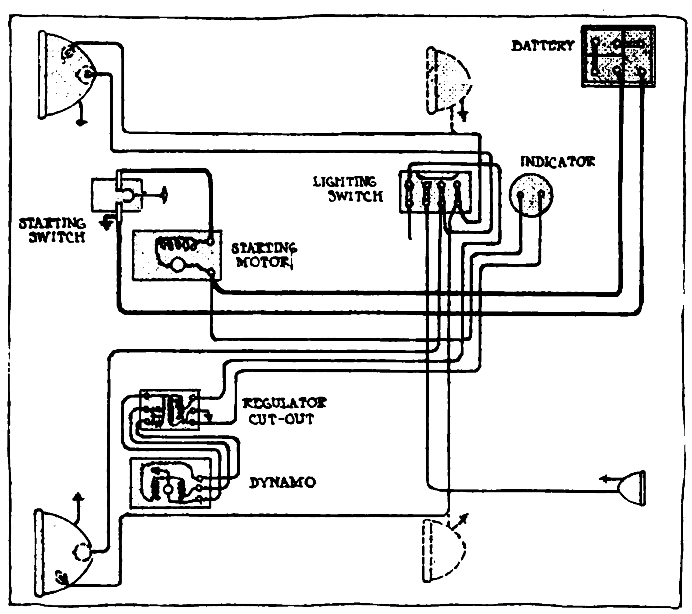
To go with this system the company has brought out a set of headlights which sells for $11 per pair and a tail light which retails at $2. The headlights give 15 candlepower while the tail light is equipped with a 2-candlepower bulb.

The attachment of the system requires little or no fitting, and the removal of very few parts. The radiator, the fan and bracket, the starting crank and the fan driving pulley are the main members that must be removed.

Then the driving sprocket is mounted on the crankshaft and the starting crank attached. The first and third cylinder head bolts are taken off and the raised part of the casting is chipped to the level of the machined surface of the hole to provide a seat for the upper bracket support. The third and fifth crankcase bolts are taken out and a place is similarly made of for the lower bracket support. The starting and lighting units are then put in place.

The horizontal chain may be adjusted by turning an eccentric bushing at the left side of the sprocket holder, while the vertical chain may be taken up by turning the adjusting screw on the under side of the bracket.

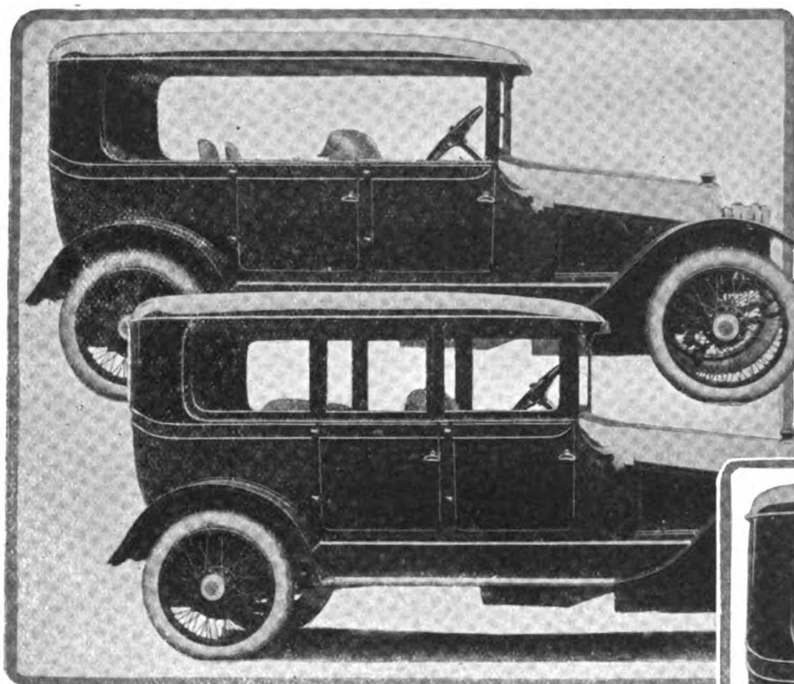
In the diagram herewith the wiring of the starting circuit is indicated by the heavy black lines. This part of the circuit is of the double-wire type, but the remainder of the system which comprises all the lighting circuits is wired singly, the return connection being through the frame. When the dynamo is in operation current flows from it to lighting switch and from thence to the lamps but when it is not, the cutout regulator breaks the circuit, and current is furnished by the battery.

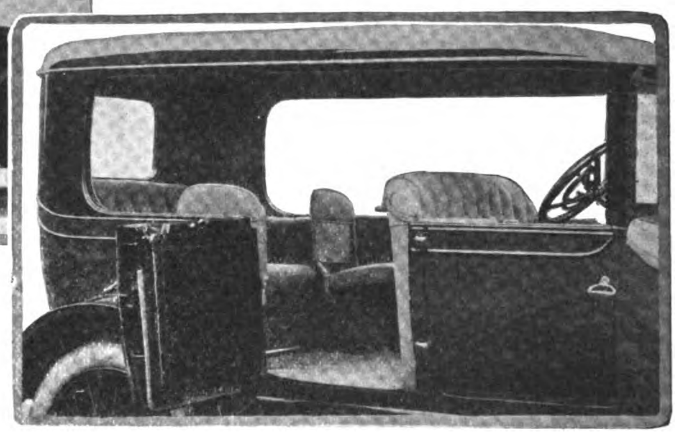


Wiring diagram of new Gray & Davis Ford system

Convertible Body with Permanent Top

New Springfield Design Built in All Styles—Resembles Previous Models Otherwise





Upper—Springfield convertible body with sides down. Lower—Body with sides up giving full protection against the weather. Right—Detail showing seating arrangement and upholstery

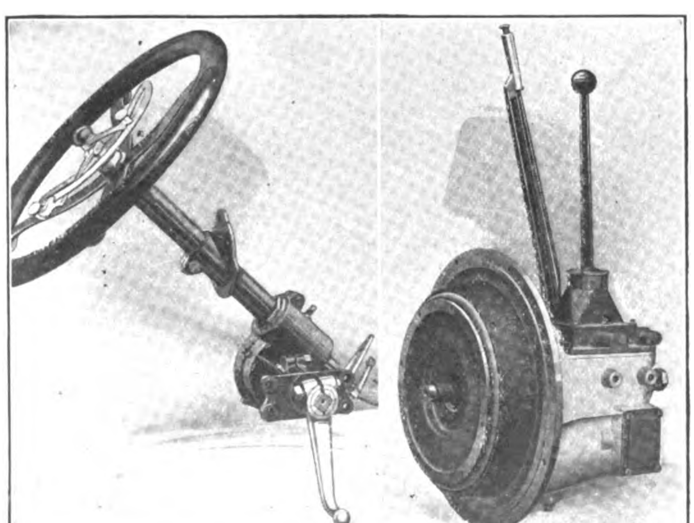
A CONVERTIBLE body with permanent top is the latest product of the Springfield Metal Body Co., Springfield, Mass. This departure in design was due to the fact that there are a great many people owning convertible bodies and open touring cars who never lower their tops. To these people this new design will appeal as it obviates the trouble of raising or lowering the top. The top, since it is permanent, provides a strong support for the sides, and it is a simple matter to change the car from an open to a closed type or vice versa, without leaving the car. All the advantages of the open touring car are obtained because with the sides down the view is unobstructed and the flow of air is unrestricted, yet when the sides are put in place protection against the coldest weather is afforded.

The permanent top may be had on any Springfield convertible body; the two-door sedan type; four-door; five-passenger, and the four-door six or seven-passenger. The list prices of these bodies, mounted, are: $975 for the two-door sedan type; $1,400 for the four-door five-passenger, and $1,500 for the four-door seven-passenger machine with this type of body.

Warner Gearset and Steering Gear for 2,400-Pound Cars

TWO new parts have recently been brought out by the Warner Gear Co., Muncie, Ind., for cars weighing around 2,400 pounds. One is a selective gearset known as model T 39 and the other is a steering gear model S 10.

The gearset is a three-speed and reverse type with cone clutch and center control and designed for a unit power plant construction. The control levers may be mounted directly above the case or at the rear as desired. The shifting mechanism is carried in a separate casting which forms the cover of the case. This is readily removed and gives easy access to the gears and bearings. An interlocking arrangement positively locks the gears in and out of mesh.



Warner steering gear and gearset for cars of about 2,400 pounds

The gear case is of aluminum. The gears are three and one half per cent. nickel, forged steel, 6-8 pitch and .625-inch face, mounted on alloy steel shafts. The main shaft is of the four spline type, thus holding the gears rigidly in position when in mesh. Annular bearings are used in mounting the mainshaft while the countershaft is keyed to the gears and rotates on plain bearings.

The control lever is a one piece forging, of the ball and socket type, with the lower end acting directly on the shifting forks with no connecting parts between.

The clutch is a leather faced pressed steel cone, spring cushioned to give gradual engagement and avoid grabbing.

Clutch Spinning Prevented

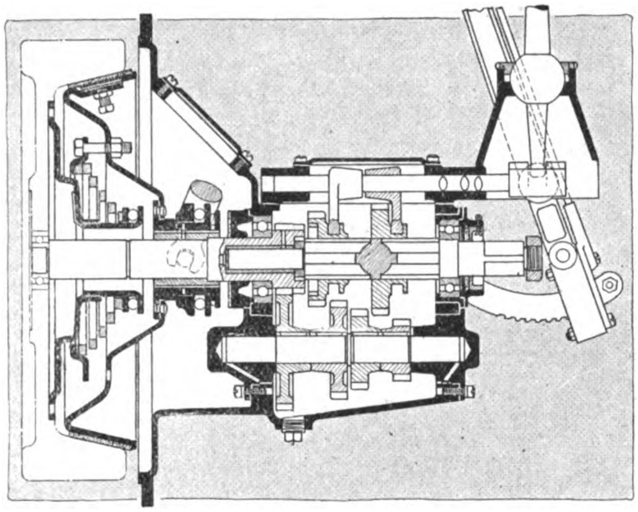
The light construction used insures against clutch spinning and this is further prevented by use of a brake mounted on the clutch shaft. Thrusts are taken on ball thrust bearings, and all wearing parts are hardened to insure durability.

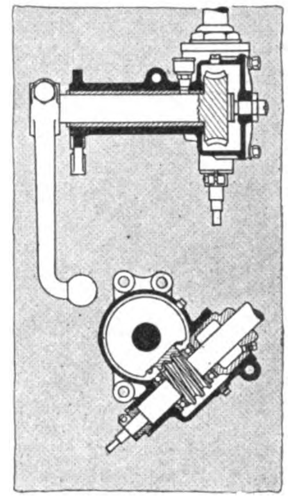
The clutch is run dry and allowance for oiling the bearings from the gear chamber is provided by a hole drilled through the center of the clutch shaft.

The Steering Gear

The steering gear is of the fore and aft steering type. It is a worm and full gear design, with allowance made for outside adjustment to take up the wear between the worm and gear.

Both worm and gear are of heat-treated steel, accurately ground to size.





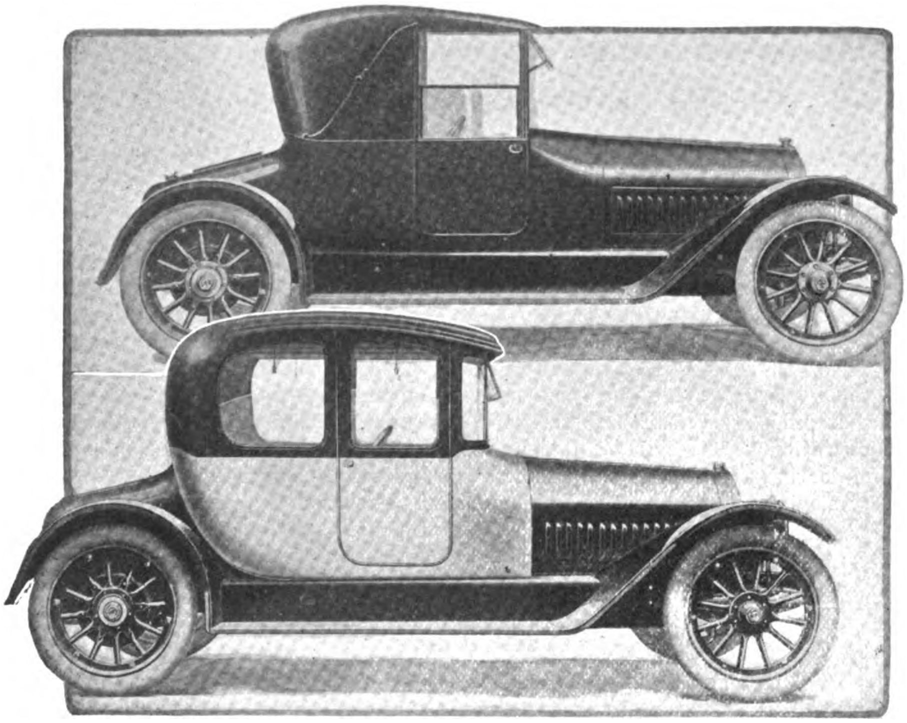
Left—Section through new Warner gearset. Right—Plan and elevation of Warner steering gear

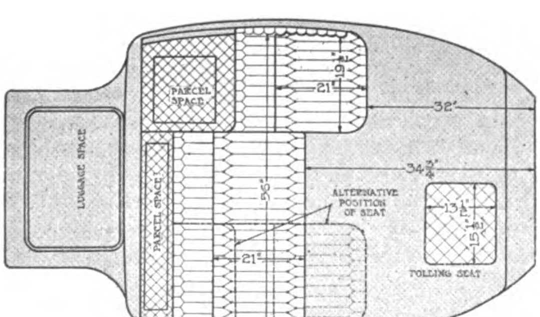
The thrust of the worm is taken at both ends upon ball thrust bearings, thus insuring ease of action.

The finish is black enamel, with the controls mounted on the wheel in nickel.

A large hard rubber electric horn button is mounted centrally above the control levers. A 17 inch stained rim is used on a black enameled malleable spider. Sections and exteriors of both the parts described are shown in the illustrations.

National Has New Coupé and Cabriolet Bodies





Top—1915 National cabriolet on Series AA chassis. Below — Four-passenger coupé. Bottom —Diagram of optional seating arrangement in the latter

INDIANAPOLIS, IND.—Two 1915 closed car models, both of which are constructed on the standard six-cylinder chassis, have been announced by the National Motor Vehicle Co. of this city.

The coupé is a real four-passenger car being considerably larger than the usual coupé body. It lists for $2,850 complete. An option of seating arrangements is offered, as illustrated by the accompanying diagram. Three passengers are carried on the main seat which, if desired is arranged in a staggered fashion, the center seat set back of the others, similar to the style adopted by some of the electric makers.

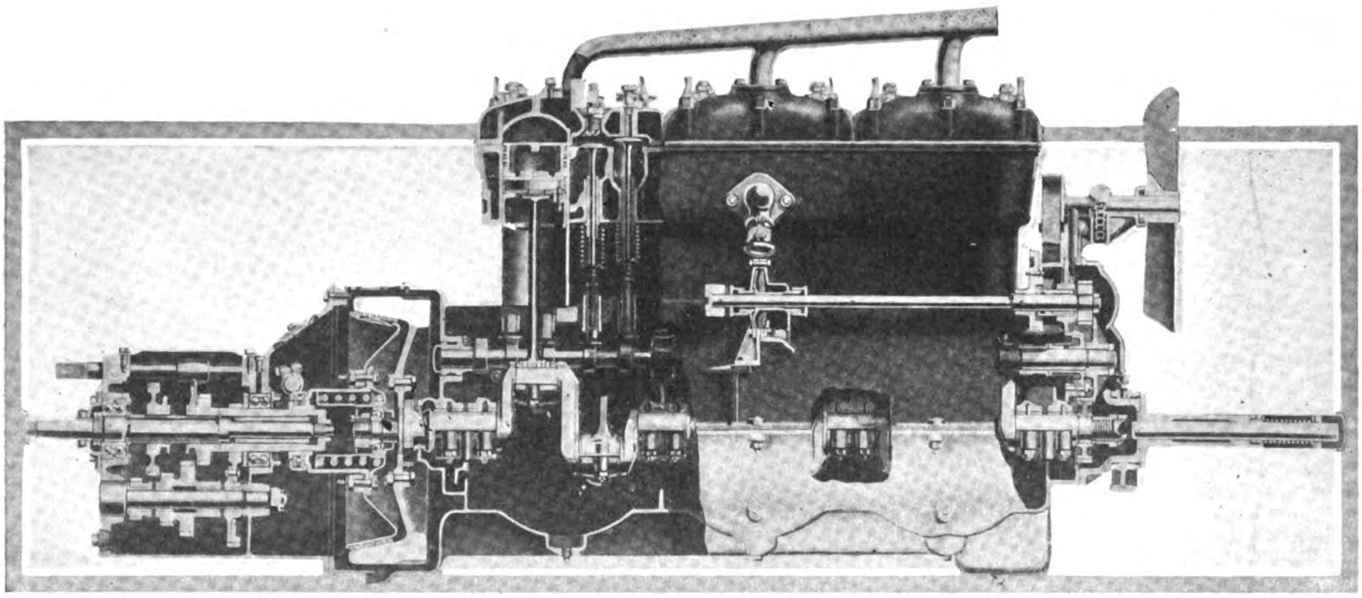
An idea of the seating arrangements possible with the coupé may be gained from an inspection of the diagram at the bottom of the illustration. The dotted lines show the alternative position of the seat at the right. The diagram is placed immediately below the coupé in such a way that one may see just how the body fits on the chassis.

Two package compartments are provided inside and a large luggage space is accessible from the outside. Choice of color, finish and upholstering is offered without any extra charge.

The National cabriolet is constructed on the series AA roadster chassis and lists for $2,700. It accommodates three passengers.

The upper part of the body is of genuine leather, especially finished to withstand the weather. According to the company, it is absolutely waterproof and does not crack.

The top folds back easily, and the glass of the doors lower into the lower half. The top part is inclosed with a neat covering, giving the car the appearance of the regular six roadster.



Part sectional view of Northway unit power plant used in the new Paterson six. The bore and stroke of the motor are, respectively, 3 1-2 and 5 inches. Note detachable cylinder head

Paterson Adds $1,495 Six—Reduces Four

Smaller Model Cut to $1,095—New Block Motors 3½ x 5—Detachable Cylinder Heads—Floating Rear Axle—Only Chassis Change in Four—Electric Starting and Lighting

THE W. A. Paterson Co., Flint, Mich., has added a six-cylinder touring model at $1,495 and is continuing its low-priced four-cylinder car at a reduction from $1,197 to $1,095. Last season only the four-cylinder chassis was supplied, on which either a touring or a roadster body could be had, but manufacturing policy of specialization has led to the abolishing of roadster models, only the two touring bodies being listed.

The Improved Four

In the continued four, the motor has been somewhat redesigned to give more power due to higher speed of operation, and a floating rear axle replaces the former semi-floating construction. The body lines have been improved by sloping the bonnet into the cowl.

The four has a wheelbase of 112 inches and is equipped with 33 by 4 straight-side tires, and the six wheelbase measures 124 inches and its tires, also straight sided, 34 by 4.

Northway Motor Used

Motors are of the latest type and conform to the same features of construction, the six being larger and stronger wherever necessary to accommodate the two additional cylinders. Cylinder heads are detachable and the cylinders cast in blocks of L-head form with valves on the left.

Much the same outward appearance on a larger scale is given the new six, which like the four has a Northway motor. The cylinder dimensions of both are 3 1-2 by 5 inches and practically the same general lines of design are adhered to throughout in both machines. They use the combination Delco cranking, lighting and ignition unit, unit power plants, left drive and center control, floating axles, three-speed gearsets and drive through torsion tubes.

PATERSON FEATURES

Four-Cylinder Model $1,095		Six-Cylinder Model $1,495	
Redesigned Motor	3½ by 5	Motor Size	3½ by 5
S. A. E. Horsepower	19.6	S. A. E. Horsepower	29.5
Valve Openings, Clear	1⅝	Valve Openings, Clear	1⅝
Wheelbase	110	Wheelbase	124
Straight-Side Tires	33 by 4	Straight-Side Tires	34 by 4
Rear Axle	Floating	Rear Axle	Floating
Starting and Lighting,	Electric	Starting and Lighting,	Electric
Gearbox	Three-Speed	Gearbox	Three-Speed
Fuel Feed	Gravity	Fuel Feed	Vacuum

Four-Cylinder Car Features

TAKING up first the design of the four-cylinder motor in detail, the detachable cylinder head is in one piece and is held in place by a number of specially heat-treated steel bolts with a copper gasket interposed between head plate and cylinder block to make a tight joint. The cylinders and the upper part of the crankcase are cast together, whereas the lower part of the crankcase, with which the oil reservoir is cast as a unit, is made of aluminum. The standard method of supporting a unit power plant in the frame is adhered to in that the two rear supports are integral with that part of the crankcase housing the flywheel and extend to the side rails, whereas the front center of the case rests upon a frame cross member.

Although this motor is the same in dimensions as that used last year, having a displacement of 192.4 cubic inches, it is so designed as to give more power due to a greater maximum speed, to lightening the reciprocating parts and to increasing the clear opening of the valve from 1 9-16 to 1 5-8 inch. The S. A. E. horsepower rating is 19.6. On the block it delivers as 37 horsepower when operating at 2500 r.p.m. This is quite high speed as compared with average domestic practice.

Modern practice prevails throughout this Northway design. There is no alteration in the three-bearing crankshaft over last year, but the pistons have been crowned which gives them maximum strength along with light weight. The pistons are fitted with nine thin carbon steel rings each, three to each ring slot. This is a growing tendency and has the advantage of making the leakage of gases past the pistons more difficult than with the older method of using three large rings. The gases must go past nine ring joints to escape instead of three, and further, the rings soon lap themselves into the cylinders due to the small wearing surfaces.

Drop-forged connecting rods have strap ends bolted in place. The camshaft is a drop forging with integral cams and is carried on three bearings. Spiral timing gears drive the camshaft as well as the pump shaft on the right side.

Tungsten Alloy Valves

The valves are constructed of the latest alloy which is said to be proof against pitting. It is a tungsten steel composition which has the property of remaining hard at high temperatures. The valves and springs are well covered by two plates, and breathing from the crankcase is by the vents in these covers so that there is communication through the tappets from within the engine to the outside air.

The motor is fitted with a Stromberg carbureter attaching to a two-branch manifold coupling to the cylinder openings below the exhaust header. The feed is by gravity.

Constant-level splash lubrication has the oil pumped from the reservoir into the crankcase by a small plunger pump operated by the camshaft. The amount of oil pumped is regulated by an adjustment which controls the stroke of the pump. After reaching the crankcase, the lubricant is distributed equally from basin to basin by small troughs cast on the inner side of the oil pan, which troughs run down from one basin to another. The troughs receive a part of the oil splashed up by the dipping of the rod ends into the basin, so that the system is of a distributing type which keeps the oil level constant in all the basins regardless of the angle of the engine.

Cooling is by centrifugal pump driven by a shaft on the right. It delivers the water into the center of the jacket, and the design of the water connections is such that free flow is allowed to go on unhampered.

Delco Unit Employed

Back of the water pump and driven by the same shaft is the Delco combination electrical unit which takes care of all electrical functions of lighting, cranking and ignition. The ignition distributor is vertical and in unit with the motor-generator proper. This Delco apparatus is the latest model and is much improved over its predecessors. The principal change is the current control which is connected with an automatic spark advance arrangement—another new feature. This current controlling device is purely a mechanical affair and consists of an arm wiping a brush over a coil wound so as to cause maximum current output at low car speeds. The main advantage gained is that when the car is running at average low speeds of from 10 to 15 miles an hour, the battery is being properly charged. As to the automatic spark advance, this consists of a centrifugal form of governor which automatically advances the spark when the speed of the engine increases within a certain range of the position of the hand spark lever on the steering wheel.

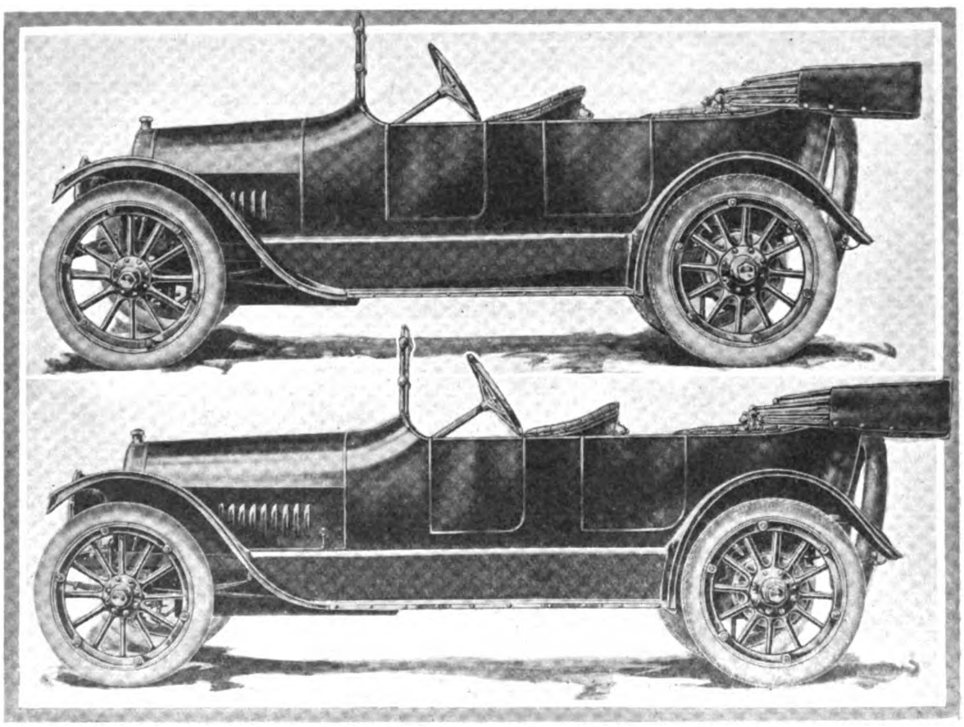
The familiar gear connection to the teeth in the flywheel face is used for cranking, the motor-generator then being temporarily and automatically transformed into an electric motor. The gear train which shifts into mesh with the flywheel teeth is completely and compactly housed within a case which is integral with the flywheel housing at the right rear supporting arm. For performing starting duty, the operator presses a pedal, which meshes the gears and sends current from the storage battery to the unit. When not used for starting, none of these gears is in mesh which saves wear as well as eliminates noise. The reduction in these gears is about 25 to 1, that is, the electric motor works about 25 times as fast as the crankshaft.

The system is of the 6-volt, single-wire type and the battery is mounted on the right side of the gearbox, between it and the frame.

Inclosed Cone Clutch

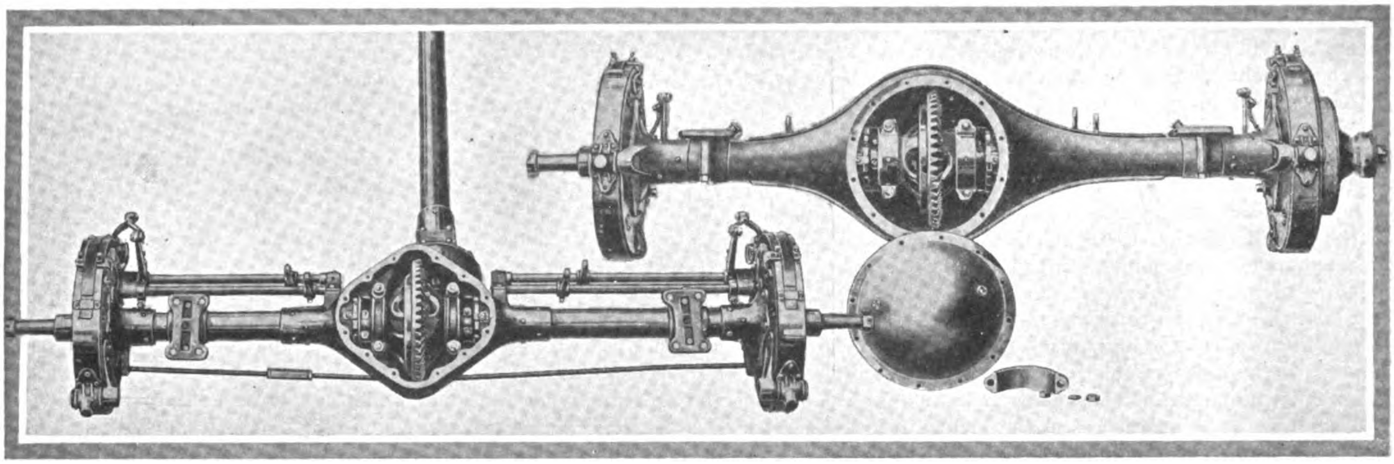
The bell housing at the front of the gearbox bolts to the flywheel housing, so that the cone clutch is completely inclosed. This clutch is faced with leather and easy engagement is provided for by the placing of springs under the leather. There are six of these springs.

The gearset a standard three-speed type has shafts and



Above—Four-cylinder Paterson for 1915, which sells for $1,095 fully equipped and fitted with Delco electric starting, lighting and ignition system. Tires are straight-sided, 33 by 4. Fuel feed is by gravity. The car has a new Northway motor, 3 1-2 by 5, and the only chassis change is the introduction of a floating rear axle

Below—Six-cylinder Paterson, listed at $1,495 with complete equipment. This car uses a motor similar in design to that in the four and with the same bore and stroke. Three-speed selective gearsets are used in both models. Tires on the six are 34 by 4. Fuel feed is by the Stewart vacuum system



Left—New floating rear axle used in Paterson four-cylinder model with cover plate removed. Note inclosed propeller shaft and arrangement of brake rods. Right—Floating axle used in the six-cylinder

gears made of nickel alloy steel, heat-treated and tempered. The gear ratios are: Intermediate, 1.76 to 1; low, 3.36 to 1; reverse, 4.32 to 1. Center control is not changed, the gear-shifting lever and the emergency brake lever bolting as an assembly to the rear of the gearcase.

The drive back of the gearset is not changed. The peculiar torsion tube construction surrounding the propeller shaft is very efficient. The front end of the tube houses a thrust bearing on the drive shaft. Thus the drive is taken by this bearing.

Practically the only chassis change is the substitution of a floating axle of demountable type in place of semi-floating construction. This axle is fitted with a cast housing of compact design. Wheels and differential run on Hyatt roller bearings, and New Departure ball bearings are used to support the pinion shaft. The axle shafts and gears are of nickel steel, and due to the floating construction, axle main shafts, differential gears and bevels may be removed without disassembling the housing.

Internal and external brakes acting on the rear wheel drums are fitted. Springs are three-quarter elliptic in the rear with scroll ends. The frame is pressed from 3-16 inch stock, of bottle-neck design and there is a rear kick-up to take care of axle movement. Standard 56 inch tread is used.

The Six-Cylinder Model

THE Northway six-cylinder motor used is practically the same in design as that already described. The cylinders are in a block, but instead of using a single detachable cylinder head plate, there are three of these, each covering two cylinders. Of unit power plant form, the engine is very compactly arranged, and in it practically the same improvements are found as in the four.

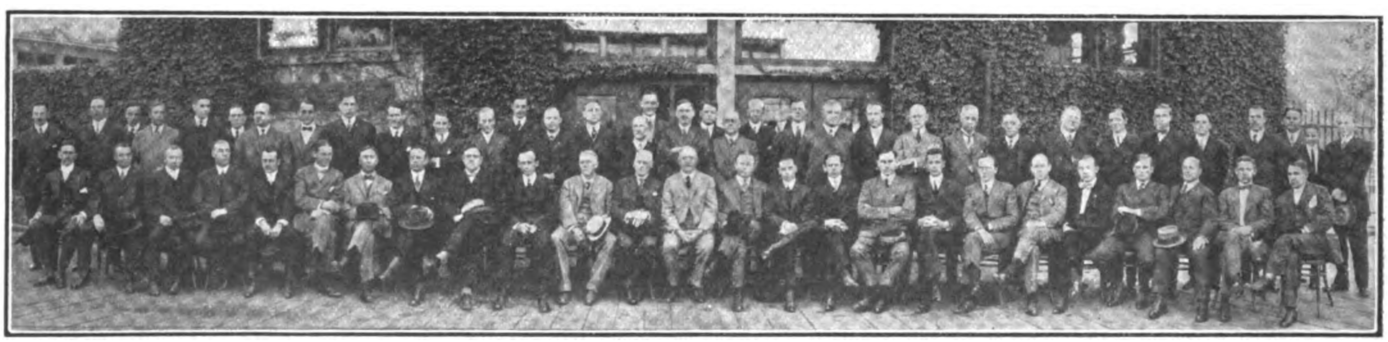
The S. A. E. rating is 29.5 horsepower. With the same dimensions as the four, it has a displacement of 288.6 cubic inches.

The casting of upper half of crankcase with cylinder block, the use of nine thin steel rings per piston, and the fitting of the same Delco unit as the four carries are proofs of the standardization which the Paterson company has adhered to. The Stromberg carbureter is used.

Like the four the six has cone clutch, three-speed selective gearset and inclosure of the propeller shaft within a torsion tube with the same distinctive thrust bearing design. The rear axle is somewhat different from the new axle of the four. The six axle uses a pressed-steel housing and Hyatt and New Departure bearings as in the other. The reinforcements of the housing make it extremely rigid.

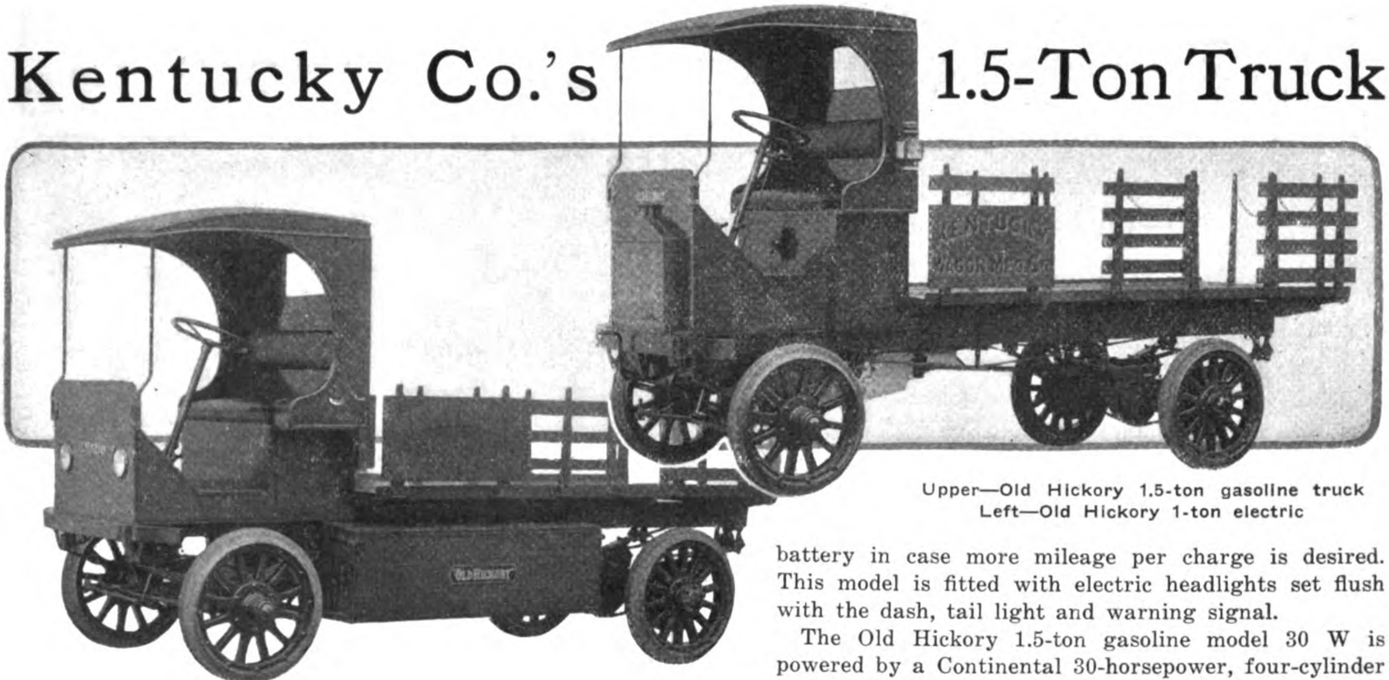
Stewart Vacuum Feed

The Stewart vacuum system of fuel feed is fitted to the six only. The tank is mounted on the end of the exhaust manifold and high enough to give gravity feed to the carbureter. This vacuum tank is of standard Stewart make, drawing the fuel by suction from the supply tank into its upper portion and then allowing it to flow into the lower part as needed, the latter part being open to the atmosphere. From this lower part it flows to the carbureter.



Pierce-Arrow Salesmen's Convention held recently at Buffalo, N. Y. Top row, left to right. H. G. Groesbeck, Cincinnati, Ohio. J. W. Maguire, Boston, Mass. W. H. Welker, Grand Rapids, Mich. J. S. Williams, New York, N. Y. W. G. Shortal, Buffalo, N. Y. K. G. Kaffenberger, Buffalo, N. Y. A. E. Raffauf, Milwaukee, Wis. J. T. Stewart, 2nd, Omaha, Neb. Howard Klein, Buffalo, N. Y. F. J. Bailey, Buffalo, N. Y. J. C. O'Rourke, Buffalo, N. Y. H. W. Smith, Salt Lake City, Utah. S. A. Stephens, Denver, Colo. Charles Walters, Cincinnati, O. R. V. Law, Buffalo, N. Y. Charles Hanauer, Cincinnati, O. W. B. Newlin, Buffalo, N. Y. J. W. Dunlap, Chicago, Ill. J. L. Martin, Titusville, Pa. Geo. W. Shroyer, Dayton, O. G. B. Wuestefeld, New Haven, Conn. J. W. Downs, Pittsfield, Mass. H. Paulman, Chicago, Ill. R. O. Patten, Buffalo, N. Y. H. J. Sturdevant, Baltimore, Md. H. D. Sisson, Pittsfield, Mass. S. A. Miner, Hartford, Conn. A. A. Ledermann, Utica, N. Y. F. N. Prendergast, Washington, D. C. J. W. Bowser, Providence, R. I. E. C. Ulrich, Wilmington, Del. W. M. Ladd, Buffalo, N. Y. O. L. Weaver, Cleveland, Ohio. Two stenographers. Seated, left to right. Elliot Ware, Boston, Mass. C. R. Culver, Springfield, Mass. Wm. Grant, Toronto, Canada. W. S. Smith, Toronto, Canada. T. H. Mullen, Indianapolis, Ind. P. R. McCurdy, Pittsburg, Pa. W. H. Ellis, Newark, N. J. C. W. Cady, New York, N. Y. D. A. Odell, Minneapolis, Minn. G. H. McLin, Chicago, Ill. J. Elmer Pratt, Buffalo, N. Y. Charles Clifton, Buffalo, N. Y. Henry May, Buffalo, N. Y. E. B. Morgan, Philadelphia, Pa. R. E. Broatch, New Haven, Conn. F. P. O'Brien, Indianapolis, Ind. E. G. Broomfield, Philadelphia, Pa. J. H. Fassitt, Philadelphia, Pa. G. F. Bradshaw, Philadelphia, Pa. Edward Leu, Providence, R. I. Hamilton Barton, New Orleans, La. E. C. Wiley, Dayton, Ohio. R. B. North, Newark, N. J. Webb Mason, Davenport, Iowa. E. G. Mertens, Troy, N. Y.

Kentucky Co.'s 1.5-Ton Truck



Upper—Old Hickory 1.5-ton gasoline truck
Left—Old Hickory 1-ton electric

Also Announces 1-Ton Electric—Known as Old Hickory Models—This Marks Entrance Into Gasoline Field

TWO new models have been announced for 1915 by the Kentucky Wagon Works, Louisville, Ky. One of these is a 1.5-ton gasoline model, a departure for this company which heretofore has made electric trucks only; the other is a 1-ton electric. These two models use the one running gear. With the four carried over from last year, this makes a total of six models for the coming season. The two new models are to be known as Old Hickory, and they are to sell for $2,000 complete with stake body and cab for the driver.

The models carried over and their prices are as follows: 1,500-pound, $1,500; 1.5-ton, $1,900; 2.5-ton, $2,500, and 4-ton, $3,000.

A departure from previous practice is noted in the use of worm drive which is employed on both the new models.

The Timken, David Brown gear drive is used and Timken roller bearings support the worm and worm gear while the rear wheels revolve on the same type of bearings on a floating rear axle.

The steering wheel is on the left side on both models with control lever on the electric car and gear shift lever on the gas car at the left hand.

Battery Capacity for 45 Miles

The Old Hickory electric 1-ton model 20W is fitted with a battery of ample capacity to drive the machine 40 to 45 miles to a charge. The battery is carried on a steel sub-frame on each side and by removing the side covers all battery cells are accessible so that the gravity of the electrolyte can be taken without disconnecting the wires or removing the cells. The electric motor is suspended well forward between the battery compartments and is connected to the worm shaft, a propeller shaft equipped with two universals. This shaft is in a direct line with the motor and worm shaft when the truck is loaded.

The controller giving the various speeds forward and reverse is under the seat connected directly to the control lever and is readily accessible by removing the seat panel. The balance of the space under the seat may be used for extra battery in case more mileage per charge is desired. This model is fitted with electric headlights set flush with the dash, tail light and warning signal.

The Old Hickory 1.5-ton gasoline model 30 W is powered by a Continental 30-horsepower, four-cylinder motor with sliding gearset in one unit. It is equipped with an integral circulating oiling system and with both battery and magneto ignition, the Heinze dual system being used.

An enclosed cone clutch transmits the power to the gearset which is mounted on roller bearings and gives three speeds ahead. The gear shift lever is at the driver's left.

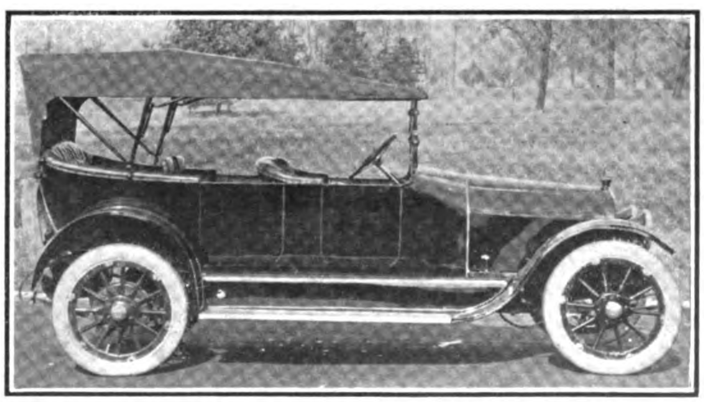
Clutch Operates Emergency Brake

The clutch pedal operates the emergency brake if operated with the service brake or while the service brake is applied. The gasoline tank is under the seat and feeds by gravity through a short copper pipe to the Holley one adjustment carbureter.

The Old Hickory Model 30W gasoline truck is fitted with oil side lamps, tail lamp and horn.

The double set of brakes are both directly on the wheel drums. Both the service and emergency brakes are operated by pedals and are fitted with equalizers.

To give added strength without detracting from its flexibility all frames are trussed on each side in exactly the same way as a railroad car. The springs are long, broad and flat, no troublesome shackles being used. The bronze wearing plates at the rear end of the springs, allow the necessary movement and also act as shock absorbers, deadening the rebound on rough roads.



The Moon model 6-40 at $1,575 is now being built in six-passenger type, as illustrated. To accomplish this, the wheelbase has been lengthened to 122 inches, and the frame increased in size, and notwithstanding this, the weight of the six-passenger is identically the same as the five-passenger, namely, 2,950 pounds. Model 6-40 is equipped with a 3½ by 5 six-cylinder Continental motor, unit power plant, Delco starting and lighting system, etc.

Vacuum Air Valve in Browne Carbureter

Position of Air Valve Determined by Vacuum at Nozzle —One Size for All Motors

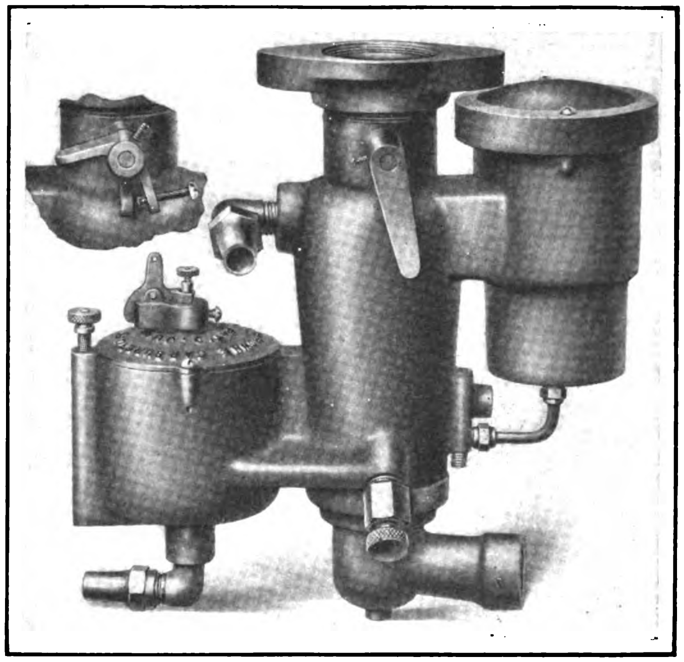
THE feature of the new Browne carbureter, for which the Holt-Welles Co., 1790 Broadway, is the selling agent, is the vacuum-controlled, auxiliary air valve by which, it is stated that a constant ratio between the fuel and the air is maintained at all speeds and throttle openings.

One Size for All Motors

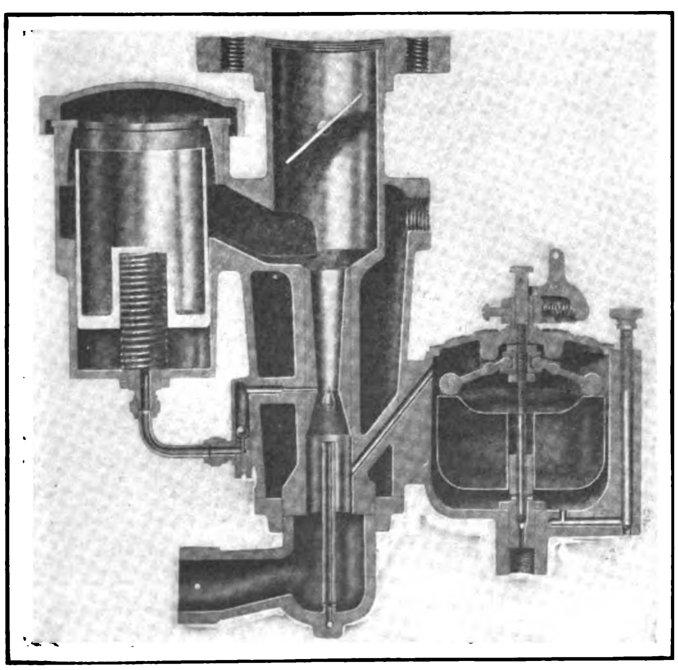
Only one size of carbureter is manufactured for all motors, and the only change for different motors is to put in a new bushing which surrounds the auxiliary air valve, and controls the area of the auxiliary air opening. Large motors use bushings with more sharply outcurving surfaces than small motors.

The same venturi construction is used regardless of the motor size. The throat area is small, insuring sufficient velocities to atomize the fuel at even the lowest speeds, it is stated. Friction at this point is reduced by giving the venturi a 30-degree approach and a 7-degree discharge.

The main air inlet is at the bottom whence the air passes up through the venturi where it mixes with the gasoline. Additional air is supplied by the auxiliary air valve at the left. This valve is an aluminum piston whose position is determined by the amount of vacuum in the chamber under it. This chamber is connected with the venturi, the opening of the passage being at the same point as the spray nozzle. The result is that the vacuum acting on the fuel and on the piston valve is exactly the same, and for a definite amount of vacuum, the valve must assume a definite position, therefore, for a certain rate of fuel flow, which is determined by the vacuum, the valve must take a certain position. There is a bushing, as previously noted, with a curved surface which surrounds the upper edge of this valve so that as the opening of the valve increases the area through which the auxiliary air may flow becomes greater. The curve of this surface is so calculated that for a given position of the valve, as determined by the vacuum at the spray nozzle, the amount of air to give a correctly proportioned mixture is obtained. For a wider throttle opening the vacuum increases, the rate of fuel flow becomes greater, and the valve takes a new position. Due to the curved surface of the bushing the new area of the auxiliary valve allows enough added air to give a perfect mixture, for this throttle opening, it is stated.



Exterior of Browne carbureter showing arrangement of parts



Section through Browne carbureter. The auxiliary valve is at the left. Note the dashpot control

Fluttering Prevented

Fluttering is prevented by means of a small ball which is held slightly off of its seat in the passage leading from the throat of the venturi to the air valve. When the air valve is depressed the ball offers no resistance but when the valve attempts to close a certain resistance is interposed to prevent fluttering. This arrangement also serves another purpose. When the throttle is suddenly closed there is a tendency for the fuel to keep on flowing at the same rate due to inertia. Were the air valve to close as suddenly the mixture would become too rich. The air valve is, however, retarded by the ball in the same proportion as the fuel flow is continued, thus maintaining constancy of mixture during this period.

A hot waterjacket is fitted and the main air inlet is finished so that a hot air pipe may be attached.

Easy to Get At

Accessibility is a feature. The carbureter may be taken entirely apart without removing it from the motor. The auxiliary valve may be lifted out after the dust cap is removed. The float mechanism may be inspected or removed after taking off the cover to the float chamber. Dirt from the seat of the float valve may be dislodged by means of the milled head on the upper end. The fuel nozzle may be cleaned by unscrewing and withdrawing the needle valve and inserting a piece of fine wire or a hat pin. The float chamber may be drained by loosening the needle valve at the extreme right of the sectional view.

Priming of the carbureter for starting is accomplished by pulling the priming lever on the top of the float chamber. This raises the needle valve and allows gasoline to flow into the float chamber until the level has raised sufficiently so that fuel runs down the diagonal passage into the main air passage.

New Stromberg Has Dashpot Type Control

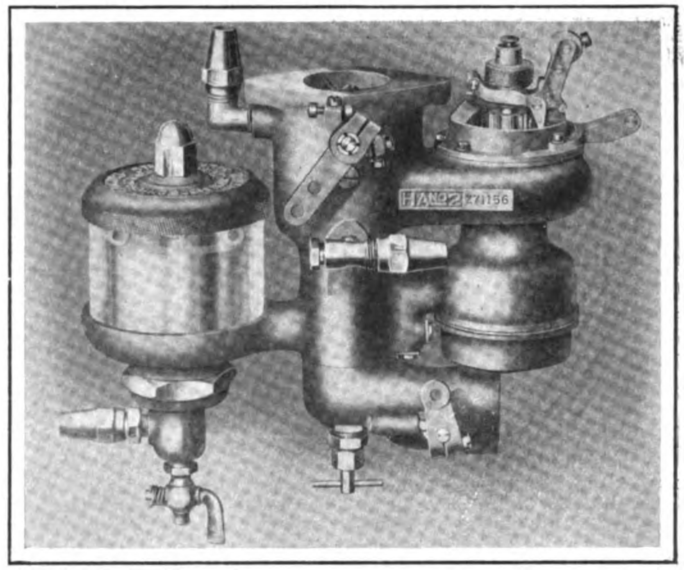
Secondary Jet and Air Valve Regulated by Dashpot— Horizontal and Vertical Flow Types

THE Stromberg Motor Devices Co., Chicago, Ill., has brought out a new type of carbureter embodying the dashpot principle in the control of the secondary fuel jet and air valve. This carbureter appears in three forms all of which adhere to former Stromberg practice of using separate low and high-speed functions, the former being by a set nozzle and the latter by the expanding carbureter portion of new construction. The three models are the H, a vertical type unwaterjacketed, the HA the same carbureter with waterjackets and the HB the horizontal type unwaterjacketed. The latter is exactly like the H with the exception that the mixing chamber is horizontal instead of vertical.

In the new Strombergs the motor is fed the proper mixture below 25 miles per hour from the low-speed jet with air from the primary intake and above that speed the auxiliary air valves come into action and with it the secondary nozzle, which is interconnected with the air valve.

When the car is running less than 25 miles per hour the low-speed nozzle only feeds the fuel and above that speed the dashpot comes into play. The piston shown is .01 inch smaller than its chamber and the fuel entering must work its way around the piston. Integral with the piston is a sleeve to which is attached the air valve. Within the sleeve is the secondary needle, which rests upon a seat shown and has at its upper end a button. The spring within the sleeve holds the needle in position. Should the air valve open, it carries with it the needle and at the same time forces the piston downward against gasoline pressure. However, the needle travels only through the distance AB. This is true because movement downward of the air valve carries the needle but, as soon as the button strikes the nut B, it will stop. While the needle is held stationary the valve may continue to move and so move the seat away from the valve.

In action the piston compensates for lag in the fuel. That is when the throttle is opened the air valve is not allowed to open quickly and thus cause poor carbureter action but instead acts against the fuel in the chamber and opens slowly.

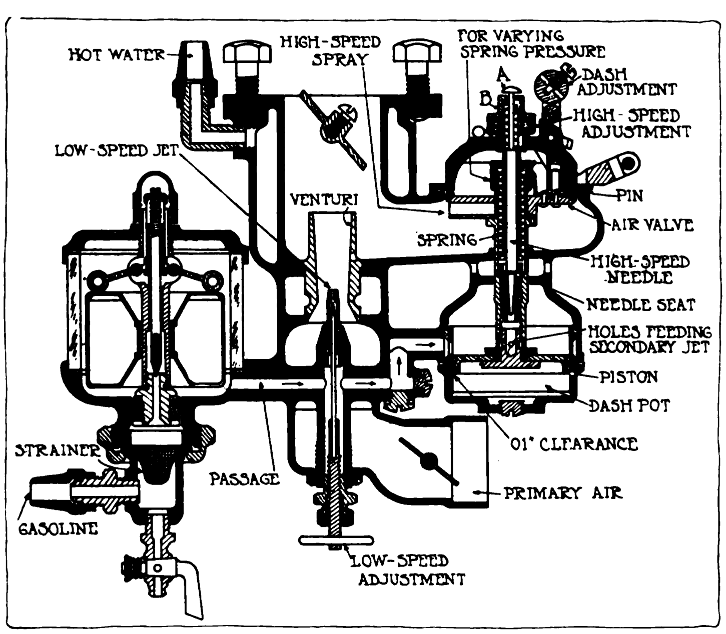


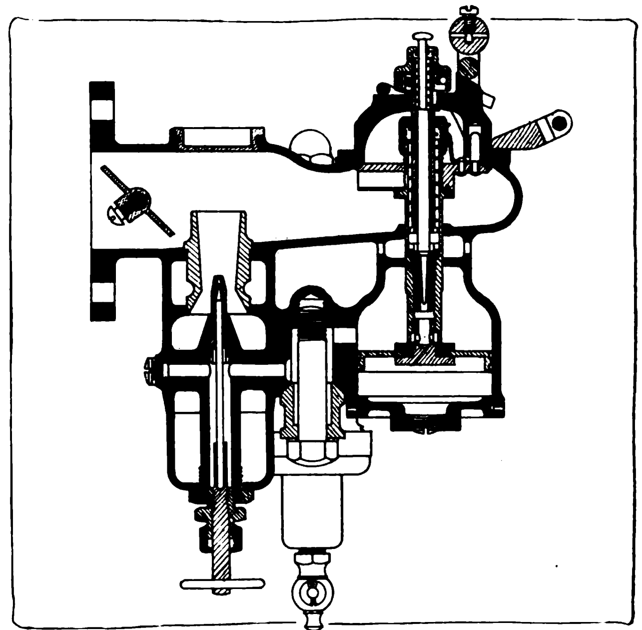
Exterior of Stromberg model HA, with dashpot control

When the fuel is in the chamber and the secondary air valve is opened by increased suction, fuel makes its way up through the holes at the top of the piston and thence through the sleeve to the tube integral with the air valve. The fuel leaving this tube is carried away with inrushing auxiliary air and forms the high-speed mixture. One important feature of this carbureter is right in this construction which prevents the secondary fuel spray from touching any metal as it leaves the tube and also getting better mixing by having the fuel meet the air which is at high velocity.

The primary nozzle adjustment is in the form of the handle shown and the secondary by means of the knurled nut at the top of the air valve. The dash adjustment, a series of levers, not only lifts the secondary needle from its seat but also locks the auxiliary air valve, so that on starting the engine gets a good mixture with the air supply shut off entirely, provided the primary air intake is closed by the butterfly valve.

In these new Strombergs the glass chamber and float construction are practically unaltered.





Left—Stromberg vertical type with the different parts designated. Right—Horizontal type, similar except for position of flange

The Automobile

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From Report to Reality

SIXTY miles per hour in a stock touring car, with top and windshield up and with a load of five passengers, is no longer confined to the realm of conjecture or salesman's arguments but has become an official reality, by the Marmon speedway test in which a registered stock car traveled over 62 miles in the hour on the brick speedway. This performance is the best attribute to progress in automobile engineering in America and is one of the most applicable answers to those critics who ask, "How permanent has been the progress of the last 5 years?"

It is scarcely that long ago that a prize was offered for stock touring cars with load and windshield up that could travel a mile in 60 seconds going one direction on the speedway or road and then travel in the opposite direction and make 60-mile-an-hour pace for a distance of 1 mile. The makes of cars then foremost in the racing world tried but made signal failures. Today, while but one make has officially performed the feat of not only going 1 mile but 60 at a sustained speed, there are doubtless several other makes that could show a sustained speed of over 60 miles per hour.

Sustained speeds of this rate show that improvements have been at work in many parts of the car in lightening, balancing, tires, etc.

The Reward of Genius

FORD'S annual statement for the last fiscal year showing an increase in the surplus during the 12 months of more than $20,000,000, and a total surplus of over $48,000,000, is epochal. Never before in the motor industry has such a balance sheet been revealed, and very rarely in industrial lines is it exceeded, save by a few of the large corporations.

This annual statement coming from an industry not more than 15 years old partakes of the nature of a prodigy, a condition considered impossible 5 years ago in the automobile industry by the most sanguine.

Most phenomenal in connection with this statement is that such enormous profits are the outcome of production facilitated to the final syllable of perfection. Ford proved, as his year's progress shows, that perfected production methods do not necessarily mean greater physical and mental strain on the workmen, but rather the elimination of the un-essential, the un-necessary. His factory assembly method has been renovated, and by his new system of locomotive assembly, the endless-chain system, the workman is relieved of every possible burden, and is left free to confine his efforts to useful productive work.

That such profits and such a continued growth can come from the manufacture of so cheap a car but once more indicates the lines along which genius so often travels. It again demonstrates the strength of the masses as opposed to that of the classes. When Henry Ford first presented his four-cylinder car at the show in New York, in response to the object he had in designing a cheap car the answer came, "I have set out to build a car good enough for an American to ride in."

Here is the reward of genius and consistent endeavor. Genius mapped out a field undreamed of by others; and annual balance sheets disclose the reward.

The Maelstrom

IT is to be hoped that the floating axle patent litigation which has at last been started will not permeate the entire industry and while it will not have any deterrent effect on the purchasing powers of the country. It is bound to create more or less division in the industry as well as unrest among the many companies that own patents, that they believe to be valid and which they could bring out of their strong boxes and use to the discomfiture of other makers, if they so desired.

The unfortunnate aspect of patent litigation is that so much money and energy are expended in this work that could be expended in improving production methods. Ford estimates his patent assets at a few thousand dollars and yet his annual statement shows a profit of over $20,000,000. Production with him has been more valuable than patents.

There are more than 1,000 different patents referring to the automobile that are owned or controlled by the car and accessory makers. What if suits were brought on all these?

Road Congress Ends Big Session

Over 3,000 Delegates, Representing Every State in Union, Demand Federal Aid in Trunk Line Building

By J. C. Burton
Staff Correspondent

ATLANTA, GA., November 14—"Uncle Sam, Road Maker" reads the sign that soon will be dusted off and nailed to one of the white pillars of the national capitol at Washington.

This is the prediction emanating from the fourth American road congress which closed the most successful session in its history here today. More than 3,000 proponents of highway improvement, representing every state in the union, are the authors of such a prophecy. They also will be prominent agents in its fulfillment. They have called upon the federal government to act and to act immediately. They have demanded the passage of a bill in congress that will provide for federal aid in the construction of main trunk lines throughout the United States.

Within the past 6 days, the American road congress has developed a backbone. For the first time in the history of the organization, it has made demands, definite demands, and back of these demands is a determination to push them until they are complied with. The polite verbiage in which the demands are clothed is but a kid glove over a mailed fist. Legislators, who pay no heed to the recommendations of the road congress, probably will find that out very soon.

Federal Aid for Main Routes

Federal aid in highway construction was the keynote of the 1914 congress. Monday's session, in charge of the American Automobile Assn., was devoted entirely to the subject of national legislation and the two principal speakers of the day, Senator Hoke Smith of Georgia and Representative W. P. Borland of Kansas, each promised to work for the passage of a bill that would make federal appropriations for highway construction possible. The resolutions committee, the official mouthpiece of the congress, gave the subject of federal aid the place of prominence on its list of recommendations, the resolution reading as follows:

"Resolved: That the American road congress emphatically endorse the principle of federal co-operation toward the construction of main highways and thus assist the several states to build the main market roads on the one-half of country devoted to agriculture and to build through main roads in the one-half of country which is not predominately agricultural but whose prosperity depends upon mining, the raising of live stock and the presence of the healthseeker and tourist."

"Federal aid for roads and not for the pork barrel" was the slogan of the congress. One delegate, President Kenyon of the Indiana Good Roads Assn. expressed the sentiment of the 3,000 and more proponents of highway improvement in attendance when he declared, "Shake your fist under the nose of your congressman and tell him that if he is not in favor of federal aid, you are not in favor of him."

Commission to Spend Money

The plan which the federal government should pursue in aiding road construction, as generally outlined by the dozen or more speakers who addressed Monday's session of the congress, is to have whatever funds congress might appropriate placed in the hands of a competent commission, which shall select the locations for the expenditure of the money. It was argued that to appropriate good roads money in "pork barrel" fashion, as much as it would boost the stock of individual congressmen back home, would result in little practical or lasting improvement of the highways. Such a procedure would merely smear an insufficient fund thinly over a large territory.

It is the belief, however, that the commission empowered to dispense the fund should place the money only after a most careful study of conditions in each and every state. Thus trunk roads would be built where they are most badly needed and most used. The plan of the road congress is that the states and not the national government shall bear the expense of the general upkeep of the highways and it is further contemplated that the states through which federal aid roads are to be built shall appropriate proportionate amounts for the construction of feeder roads.

Money for Main Routes

Representative Borland of Missouri, who led the successful fight on the Shackleford post roads bill in congress last year, was the champion of the American road congress' plan for federal aid.

"I will not vote for a bill which spreads money over a large territory," he declared. "I want the money centered on some special mileage where it can do some real good whether a cent of it is spent in my county or not. We want a system of roads that will open our country up, but in their construction, we've got to follow a system. First, build the main trunk roads; then the provincial or county roads; after that the little by-roads will come.

"Building wagon roads is like building railroads. The railroads build their main trunk lines first, not their switches and small feeders. But there are congressmen and senators in Washington who in our highway construction would have us reverse the system of railroad building.

"The big highways cannot be consistently built and maintained by local districts. We must have a general and special fund for this with proper supervision of its distribution. The smaller roads are legitimate objects for local operations. We can't have a blanket law to build 250,000 miles of road. We have got to start somewhere on some specific road. We have got to realize that. It is folly to think that we can accomplish anything any other way.

"There is no division of interest between city and country on the point of good roads. The business of the country is the foundation for the business of the city. The national government should build highways through Georgia and Kansas for the same reason as it appropriates millions for the improvement of harbors of the ocean shipping points. It is just as important to get the cotton or wheat to the port as from the port."

The American road congress will fight any measure introduced in congress that does not provide for the appropriation of money for main trunk lines, roads that will rival the national routes of France, the imperial highways of Germany and the inter-county roads of England. In the past 3 years, 140 bills, providing for the use of federal funds for highway construction, have been introduced in House and Senate. Not one passed. They were too limited in scope or impractical, the majority of the measures carrying appropriations for the construction of special or insignificant roads. Of such a type was the Shackleford post road bill of the last session of congress, a measure that if passed would have spread $25,000,000 over a vast amount of territory and resulted, it is claimed, in the temporary building of highways largely in isolated districts.

New National Organization

The delegates to the congress are confident that such a federal aid bill will be passed. In order that all the forty-eight states will be in a position to enjoy the benefits accruing from such a bill when it finally is passed, the state highway officials in attendance formed a national association on Thursday. One of the chief aims of this organization will be to bring the building of roads under the supervision of state officials in the eight states that have no state highway departments—Georgia, Indiana, North Carolina, South Carolina, Tennessee, Arkansas, Florida and Texas. It is the belief that the federal aid bill will provide for the disbursement of the fund and the construction of the roads by the several state highway departments and unless these eight states obtain state highway departments, they will be ineligible to share in the national benevolence.

The national association of state highway officials will hold a meeting in Washington, D. C., December 12, when the organization will be perfected, officers elected and a bill, embodying a plan for federal co-operation in road construction and to be presented to congress, will be drafted. The new association also will attempt to make all state highways uniform.

Besides stating definitely the stand of the American road congress on the question of federal aid, the resolutions committee, in its report, made several other important recommendations. It urged the formation of state highway departments in all states as essential to secure efficiency and economy in the construction and maintenance of roads, commended the Lincoln Highway Association for its voluntary efforts in building a transcontinental route from the Atlantic to the Pacific, deplored the frequent number of accidents on the highways and asked the authorities to enact necessary rules and regulations to insure the public safety, and called upon the government to build highways across all Indian and forest reservations and all other federalized areas.

For the past 6 days, Atlanta has been a great clearing house for the exchange of sound, sane, practical ideas on highway construction, improvement and maintenance. Since Monday, the city from which Sherman marched to the sea 50 years ago, has been a vortex of good roads enthusiasm. The attendance at the 1914 congress broke all records. More than 3000 delegates registered. Morover, it was a most representative meeting. Men from the North and South, men from the East and West, came here to teach and learn. Each of the forty-eight states in the American sisterhood sent state, county, township, commissioners and engineers and good roads proponents to the congress. On the eve of the general exodus from Atlanta, the feeling prevails that an epochal chapter in the history of American highway development was written at Atlanta.

Dixie's Great Chance

Fortunate indeed was the selection of Atlanta as the 1914 meeting place. The south is a most fertile field for the sowing of the good roads seed and during the past week, the army of delegates to the convention have scattered it far and wide with the result that Dixie eventually should harvest a crop of highways as valuable as its more famous cotton crop. Moreover, Atlanta and Fulton county are excellent laboratories in which can be seen the results of good roads experiments. Atlanta can boast of municipal street improvements that are the equal of any in the other metropolises and the county roads in the vicinity of the city are model types, rivaling the noted highways of Wayne county, Michigan and Milwaukee county, Wisconsin.

The delegates also had an opportunity to study the results of the convict road system at first hand and at its original source, for Georgia took the initiative in the movement to employ its prisoners on the highways, a movement that has spread rapidly within the last decade until now it has no geographical bounds.

Varied Program

The program for the fourth American road congress was all-embracing in scope. Monday's session was devoted entirely to the all important subject of national legislation and federal aid. State legislation was the topic for Tuesday morning and the merit system in road administration was discussed by speakers at the afternoon session. Problems in construction and maintenance were considered Wednesday and Thursday's session was a sort of pot pourri in which several topics, including system in road management, street construction and maintenance, convict labor, road making by the army and contract work, were discussed.

Valuable as the addresses in the large Taft hall were, it was evident that the impromptu discussions of highway commissioners and engineers in the hotel lobbies and around the machinery and material exhibits were even of greater value. Here the man from Georgia learned of a system from the man from Michigan that would solve his road problems. The engineer from Indiana discovered that the engineer from California had used a particular grader or scarifier and found that it was both efficient and economical and that it would give as good service on Hoosier roads as it had on the highways of the Pacific coast.

Road Machinery Exhibit

There were a larger number of exhibitors of road machinery and materials at the Atlanta convention than at any of the previous meetings of the American road congress and the United States government and the state of New York had two notable exhibits that attracted a great deal of attention. Uncle Sam sent to Atlanta a series of road models—to be shown at the Panama-Pacific exposition—which showed the evolution of road building for 2,000 years and included the Appian Way of 300 B. C., the early French roads of Napoleon, the English macadam highways built during the reign of George IV and the several types of modern roads. Father Knickerbocker sent a replica in papier-mache of Old Storm King, the mountain along the Hudson where engineers of the Empire state are constructing a new trail, 2½ miles in length and with an average grade of 7 per cent., at a cost of more than $500,000.

The American Highway Association, which, with the American Automobile Association, forms the American road congress, held its annual meeting Thursday evening when the following officers for 1915 were nominated: President, Fairfax Harrison of Virginia, president of the Southern railroad; vice-president, Logan Waller Page of Washington, D. C.; treasurer, Lee McClung of Washington, D. C., former treasurer of the United States. The following directors were nominated for a term of 3 years: A. G. Batchelder, New Jersey; Bryan Lathrop, Illinois; Leonard Tufts, South Carolina; W. Tom Winn, Georgia; C. E. Blaney, California; W. D. Sohier, Massachusetts, and S. E. Bradt, Illinois. These officers and directors will be formally elected at a meeting of the executive committee to be held soon.

At the annual meeting of the congress several cities put in a bid for the 1915 meeting, but it is probable that the invitation of San Francisco will be accepted since such a selection will give the delegates an opportunity of visiting the Panama-Pacific exposition.

Shaw Motor Incorporates for $1,000,000

PRAIRIE DU SAC, WIS., Nov. 14—The Shaw Motor Co., Chicago, Ill., which recently selected Prairie du Sac, on the Wisconsin River, as the site for its permanent factory, has filed articles of incorporation and a statement to do business in Wisconsin as a foreign corporation. The capital stock is $1,000,000 and the Wisconsin interest is given at $30,000. Contracts were awarded late last week for the machine shop, office and assembling building, to be 60 x 108 feet in size, 19 feet high, with saw-tooth roof. In addition, the company has the use of the former Kahn foundry for producing its light castings. It is hoped to start operations by Feb. 1, 1915.

$1,000,000 Company to Make Tire Machine

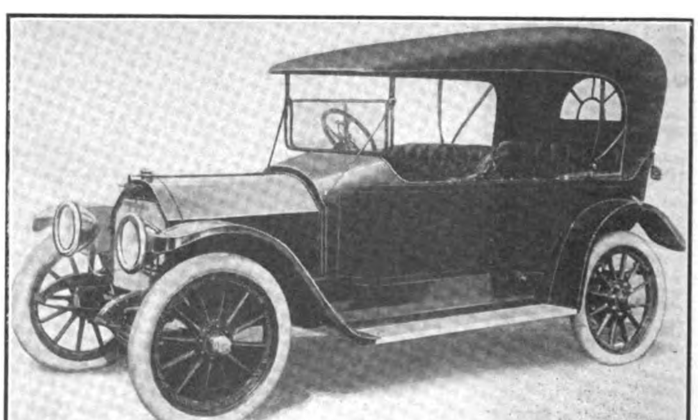
INDIANAPOLIS, IND., Nov. 14—The Dickinson Tire and Machine Co. has been organized and incorporated with an authorized capitalization of $1,000,000 at Indianapolis to manufacture a tire weaving machine invented by Fred S. Dickinson, of Bedford, Ind., and New York. The new machine will weave a tire in a solid piece, of the proper dimensions. The fabric will be woven bias to give maximum strength.

McIntyre Brings Out Six for $1,275

AUBURN, IND., Nov. 16—A six-cylinder car for $1,275 has been announced by the W. H. McIntyre Co., Auburn, Ind., for 1915. The car is fully equipped even to a one-man top. Power is produced by a six-cylinder 3.5 by 4.5 motor with cylinders cast in a block. The clutch and gearset are a unit with the motor. The clutch has twenty-one 10-inch disks and the gearset affords three speeds forward. The wheelbase is 120 inches and 35 by 4-inch tires with demountable rims are used.

LIMA, O., Nov. 16—The Willys-Overland Co. will manufacture at the Gramm plant in Lima only 1,350-pound delivery wagons. The force will be increased to an extent where five of the delivery wagons will be turned out daily.

John N. Willys, head of the company, recently deposited $100,000 in the Lima banks to take care of obligations against the Gramm plant, assumed when purchased from the former company several years ago. This was done in order to ease the money market of Lima.



New McIntyre six selling for $1,275 with full equipment, top, etc.

To Eliminate Non-Resident Registration?

Supreme Court Hears Arguments on Test Case—Washington Motorist vs. State of Maryland

WASHINGTON, D. C., Nov. 14—Is it legal for any state in the Union to require a motorist living in another state to take out a non-resident license for his car before driving in states in which he does not reside?

This question was brought up in July, 1910 by a Washington, D. C., motorist who was required to carry a Maryland license before he was allowed to drive his car in the state. The owner decided to make a test case of the matter and this case finally came before the Supreme Court of the country where it was argued last week. It is expected that a decision will be handed down in a couple of months. Should a favorable decision be received, motorists believe that the non-registration clause in all our states would be void and illegal.

Question Is Important

The test case is that of J. Tilghman Hendrick vs. the State of Maryland involving the question of whether or not Maryland has the constitutional right to impose a tax upon motor car owners in the District of Columbia who use the Maryland highways. In the argument for the Supreme Court this week, the validity of the tax was upheld by Attorney General Poe and Attorney Enos S. Stockbridge, while Hendrick's contention was presented by Osborne I. Yellott, counsel of the Automobile Club of Maryland and Jackson H. Ralston, of this city. The question is one of great interest to motorists throughout the country and the court's decision, which will be rendered within the next 2 months' will be anxiously awaited. Hendrick is a Washington man and refused to pay the tax in order to test the law. The main argument of his attorneys was that the Maryland act was a discrimination against the District of Columbia in favor of other states in that residents of other states in the union were not assessed for the license fee when they used the Maryland highways; whereas motor car owners of the District of Columbia are. They also contended that the act imposing a charge upon District motorists is a regulation of commerce beyond the jurisdiction of Maryland to impose. The Maryland law is a revenue act and not within that class of laws under which States are allowed to demand compensation for the use of works of public improvement. This follows, it was contended, since the tax on the District motor cars is imposed without regard to the extent of the use of the improvements. It was pointed out that there are 10,000 motor cars in Washington, 6,000 of which are barred from going into Maryland by the license tax.

Charge Big Salaries Are Purpose

Attorney Ralston also charged that the chief purpose of the tax on District motorists was to help pay big salaries to the members of the Maryland motor car commission. "The only reasonable purpose for which a District motorist using the roads of Maryland could be compelled to pay a tax," he declared, "would be that of affording proper police identification and should not in that case be more than $1. But instead of a logical fee of that sort, the charges on District motor cars run from $5 to $25. District motorists are obliged to pay not only an identification fee, but also for the enforcement of all the laws of Maryland roads affecting motor cars and the large salaries of the motor car commission, as well."

Not a Violation of Interstate Act

Attorney General Poe contended that the license tax was not a violation of the interstate commerce act on the grounds that "a state is justified in requiring those who elect to use on its highways a mode of travel that is abnormally destructive to that road to compensate it for such use. Let us direct attention to the results aimed at by this law," he continued, "bearing in mind that we are dealing with regulations of high-powered machines capable of causing great injury and destruction of life and property and a consequent difficulty of detection unless plainly and at all times distinctly marked. It is, of course, apparent that this law seeks to protect person and property by requiring the automobile to be registered, so that in case of damage and injury the owner may be located. All of these purposes are clearly within the police powers of the state and are among the primary objects of that power.

"What bearing does this, then, have on residents of the District? The court will take judicial notice of the geographical location of the District to the borders of Maryland; that the District contains a large and populous city; that it is limited in area and that therefore users of motor vehicles necessarily are forced to go frequently into the adjoining states. The court will also take judicial notice of the fact that there is no large city in any other state so situated with respect to the borders of Maryland."

Denies Right to Discriminate

Ralston denied the right of the state to discriminate against District motorists in favor of motorists who are residents of other states. He assured the court that there is nothing in the law to sustain the claim of Attorney General Poe that the state has the right to make a special discrimination against the District because of its proximity. He argued that such a premise is without valid foundation, as it includes all federal districts and territories.

Several questions relative to certain phases of the case were asked from the bench. The court particularly inquired about the charge that the law is a gross discrimination and why the District is put in the same class as Alaska.

Attorney General Poe's answer to these inquiries in general was made in an explanation that the District is of small area and having thousands of automobile owners who constantly make use of Maryland roads, the state is entitled to exact payment for the use of its highways and in the manner prescribed by the law now being attacked. He contended that the law is in keeping with former supreme court rulings bearing on similar cases.

The opening argument for Maryland was made by E. S. Stockbridge, who was followed by Attorney Yellott, for the District, who contended that it is the right of all citizens to go where they please by any proper means of transportation without being subjected to any tax. The argument extended over 2 days and was closely followed by the court.

Fight Anti-Glare Ordinances

PHILADELPHIA, PA., Nov. 7—Automobile headlights are prohibited in Fairmount Park after November 15, the Park Commissioners having issued an announcement to that effect. The question of the responsibility of car drivers in cases of accident caused by the use of only dim side lights has been raised by frequent users of the park drives, who, in opposing enforcement of the new regulation, claim that the dangers of collision will be more numerous than ever before. At a meeting of the Quaker City Motor Club in the Hotel Walton President Huyette appointed a committee to make observations at night in the various driveways in the park as to conditions existing along poorly lighted roadways, and have the data presented to the Park Commissioners with a view to having the order modified to permit searchlights on certain driveways as being necessary to the safety of the public.

SEATTLE, WASH., Nov. 14—Motor car owners of Seattle, backed by the Automobile Club of Seattle, have started a fight on the anti-dazzling headlight law recently put into effect in this city. The ordinance prohibits glaring headlights of any kind within the city limits, the district not being confined to the business section. As a result of the law a number of accidents have occurred in the residence districts.

DENVER, COL., Nov. 13—About 200 motorists have been summoned into police court during the last week to explain their failure to meet the requirements of the new law prohibiting glaring headlights. Many others have been stopped and warned by the police.

ST. LOUIS, MO., Nov. 14—Joseph L. Norris, a chauffeur, was convicted of "felonious wounding" and sentenced to a year in the St. Louis Workhouse. This was the first conviction by a jury on the charge which became a local law about 2 years ago. Norris ran over and injured a 9-year-old boy 3 months ago, and witnesses testified he was driving his machine at about 25 miles an hour and that he did not sound an alarm. After striking the boy the car ran about 250 feet before Norris could bring it to a standstill.

Floating Axle Patents in Suit

Patent-Holding Company Alleges Car Maker Infringes—N. A. C. C. May Take Hand

CHICAGO, Nov. 11—Suit was begun here today in the United States district court before Judge Landis by the Kardo Co., Cleveland, against the Studebaker Corp., Detroit, alleging infringement by five patents which the Kardo Co. holds and which the suit alleges that the Studebaker cars infringe. The major patent in this suit is that of a floating axle construction, one of the patents which the Kardo organization controls. This patent was originally issued to Louis P. Mooers, and has been re-issued with some additional claims. It covers rear axle construction in which the drive shafts of the axle can be withdrawn and further in which the differential unit can be adjusted with reference to driving pinion on the rear of the propeller shaft.

It has been anticipated for some time that the Kardo company would sooner or later begin suit against some of the motor car manufacturers, although no information was given as to against what company the suit would be filed. Since its organization some months ago the Kardo company has made many overtures to car manufacturers with the apparent intention of having them take out licenses to build axles on a royalty basis. Up to this date none of the manufacturers have taken licenses. The license arrangements offered to some companies were on a royalty basis of $2.50 per car, this to cover the Kardo patents so far as referred to rear axle construction. This figure was reduced according to the quantities in which cars were to be manufactured.

Chamber of Commerce May Fight

It is anticipated that the National Automobile Chamber of Commerce will take up the fight of this patent against the Kardo company, although no official announcement has been made to this effect. The N. A. C. C. has, through its legal and patent departments, been conducting an exhaustive investigation on the Kardo patents, and it is expected that this report will be furnished soon. The N. A. C. C. has during its existence aimed at reducing patent litigation to the minimum, and with this object in view purchased for the protection of its members the cork insert patent governing the use of cork inserts in clutches and brakes, and more than 2 years ago purchased for the protection of its members privileges under the Dyer patents governing sliding gear transmissions in motor cars. Up to this time it appears that the Kardo company has not made any advances towards the national body with reference to the patents it controls.

The N. A. C. C. today issued the following official statement regarding the present suit against the Studebaker Corp.

Official Statement Issued

"Officials of the National Automobile Chamber of Commerce believe that makers as a unit are opposed to any effort on the part of the Kardo Co. to extract tribute from the automobile industry on the eight or nine patents which it has secured from inventors with a view solely to secure revenue and not with the thought of protecting its product.

"The N. A. C. C. has made a comprehensive search in preparation for any aggressive movement of the Kardo company and from expressions of the members and directors it would appear that the entire industry is united to support any of its members that are attacked and to defend them in every way. The ablest counsel has been retained for this purpose, including Frederick P. Fish, of Fish, Richardson, Herrick & Neave, Boston, Mass.

"There are ninety-three motor car makers in the N. A. C.C. who have looked with disfavor upon the incorporation and purposes of the Kardo company, which was formed as a patent-holding company of an offensive nature, with a view to demanding royalty from motor car builders, which counsel has declared are of doubtful validity, and the payment of any royalties on which would be of no benefit whatever to the inventors. At this stage of the industry, with manufacturers endeavoring to give as great value as possible in automobiles, they do not feel that an additional royalty charge against the public is desirable."

Readers of THE AUTOMOBILE will recall that the Kardo company was incorporated some months ago by representatives of three companies, the Peerless Motor Car Co., Cleveland, the American Ball Bearing Co., Cleveland, and the Packard Motor Car Co., Detroit.

The patents involved in the Studebaker suit are:

No. 705,304 to C. T. Brock Sangster, July, 1902.
No. 753,168 to Walter C. Baker, February, 1905.
No. 792,690 to Alanson P. Brush, June, 1905.
No. 832,991 to L. P. Mooers, October, 1906.
No. 1,013,450 to Chas. Schmidt, January, 1912.

Of these patents that of Louis P. Mooers was assigned to the Peerless company; that of Mr. Brush to the Baker Motor Vehicle Co., and that of Chas. Schmidt to the Packard company.

The present action claims that these are all infringed by the Studebaker Corp. It is supposed that the Studebaker case will be a test one, although there are no indications that the Kardo company may not begin suit against other manufacturers.

The most important patent of the group is the Mooers one, which provides for a floating axle construction, with removable axle drive shafts and adjustments between the differential driving member and the driving pinion on the propeller shaft.

The Schmidt patent refers to a rear axle type of gearset at present used by the Packard company.

The Brush patent relates to the mounting of the differential and driving pinion of the rear axle for adjustments.

The Baker patent refers to a bevel gear rear axle in which adjustments can be made in connection with the differential without opening the housing.

Hand Horn Claim Is Sustained

WASHINGTON, D. C., Nov. 14—A new factor was injected into the present patent litigation on hand-operated horn when the Board of Appeals in the Patent Office affirmed a decision made by the patent examiner that Emanuel Aufiero is entitled to his claims on the flywheel construction in hand-operated horns and that G. F. Long, who was granted a patent on this construction, is not. Mr. Aufiero is connected with the engineering department of the Automobile Supply Mfg. Co., to which company his patents belong. According to Patent Office procedure Mr. Long has until December 4 to take an appeal to the Commissioner of Patents in the case.

The flywheel construction in hand-operated horns refers to the use of a heavy flywheel which is started to rotate when the horn handle is operated. Once this flywheel is rotating it will continue for some time, due to its weight. The rotation of the flywheel accomplishes the vibration of the diaphragm.

In the present case Mr. Long was granted a patent, No. 1,090,080, last March, embodying this form of construction, but it now appears that the patent examiner has ruled that Aufiero's claims are valid and not Long's. Mr. Long's patent is assigned to the Gottfried Piel Co.

Bosch Denies Magneto Patent Infringement

NEW YORK CITY, Nov. 16—The Bosch Magneto Co. has filed its answer to the bill of complaint filed against it by the Splitdorf Electrical Co. charging infringement of patent No. 1,074,416, and denies infringement, averring that the patent in suit is invalid.

The Bosch company admits that the patent was duly issued to John M. Dinkins, Franklin B. Hays and William L. Taylor, all of Indianapolis, Ind., September 30, 1913, but denies that the patent is valid and that it was granted in accordance with the then existing statutes of the United States. It further denies that it has infringed or threatened to infringe said patent and that it has received any gains or profits by any infringement of the patent or that it has caused the plaintiff any damage. The defendant further claims that John M. Dinkins and Franklin B. Hays were not the original inventors of any material part of the thing patented, but that every part thereof was in use prior to the alleged invention or more than 2 years prior to the application for the patent. In proof of this assertion the defendant cites French patent No. 342,209 to Adolph Clement and Marcel Masson; French patent No. 357,769 to Rudolf Rickmann; German patent No. 170,055 to Josef Gawron; German patent No. 45,161 to Paul Winand, and *The Automotor Journal*, Vol. 12, No. 20, pages 667, 668 and 669.

Asserts Prior State of Art

The Bosch company also asserts that the state of the art of magneto ignition systems at or before the time of the alleged invention of the patent was such that there was nothing new or patentable in such an alleged invention and that, therefore, this invention was not patentable under the laws of the United States. The defendant declares that it is ready and willing to prove this state of the art. The Bosch company submits to the court that the plaintiff has no right to any further answer to its bill of complaint or any part thereof, and it prays for dismissal of the suit.

The patent in suit, No. 1,074,416, as stated in THE AUTOMOBILE for November 5, covers means in a magneto ignition system for changing the polarity of the armature to coincide with the polarity of an external current during the time that the primary winding on the armature is coupled with the external source of current. The object of this system is to use a battery and a coil in connection with the primary winding of the magneto to produce a sufficient current for ignition purposes for easy starting at low cranking speeds. This is commonly known as a duplex system.

The suit is brought in the United States district court for the southern district of New York.

Ford Increases Surplus by $20,702,859.39

Total Surplus Is Now $48,827,032.07—Liquid Assets Increase Over 100 Per Cent in Past Year—Cash on Hand $27,000,000

DETROIT, MICH., Nov. 13—The Ford Motor Co., during its fiscal year ending December 30, 1914, increased its surplus over $20,000,000, the actual figures being $20,702,-859.39. The company started its fiscal year with a surplus of $28,000,000, so that this added to the profits of the present year gives the company a present surplus of $48,827,-032.07.

During the year, the liquid assets of the company have increased more than 100 per cent, liquid assets being meant cash on hand and accounts receivable. A year ago the cash on hand was over $13,000,000, today it is over $27,000,000. Last year the accounts receivable were half a million, this year they are over $3,000,000, a fact no doubt explained by the great increase in the number of accounts during the past year.

Factory Values More Than Doubled

But during the year other aspects of the Ford business besides the liquid assets have shown enormous increases. Factory values have more than doubled. A year ago, the buildings and building fixtures were estimated close to $4,500,000. This year they are nearly $10,725,000. These figures are not exactly accurate, the actual ones being given on the balance sheet being reproduced herewith.

Looking at the real estate aspect of the company, it has shown a very healthy growth during the year, increasing from $1,500,000 to $2,225,000. The factory equipment has increased from a little over half a million to one and one-half million. The investment in machinery has risen from $2,000,000 to nearly $4,000,000.

The present surplus of nearly $49,000,000 is not only the biggest among all the automobile manufacturers of the world but one of the biggest among all industrial or manufacturing concerns in the United States. It is all the more conspicuous because during the past 9 months of the fiscal year the profit-sharing system of the factory has been in operation, 82.5 per cent. of the employees sharing in this plan.

When the vice-president of one of Detroit's oldest banks was asked to what he attributes the remarkable financial showing of the Ford company, he said, without allowing his name to be quoted: "Not only is the Ford company the most conspicuous automobile factory in the country, but it has one of the greatest business organizations in the world. To be able to make the showing it has just announced, when business conditions the world over have been none too good for many months and with the installation of the profit-sharing plan, which turns into the pockets of the employees a very important part of the profits, the company must have not only captains of industry but of finances, men such as there are few to be found in our days, who know how to run a big business end and not only from the manufacturing end. That is what is lacking in all industries; men with sound business judgment, men who will not risk, who will not take too big a chance and ruin a concern to fulfil their ambition. In the automobile business this has been in most cases the cause of many concerns going to the wall."

Big Success on Specialization

Although the Ford Motor Co. started in business in June, 1903, it is only since 1908, when the policy of manufacturing only one chassis was put into effect, that the success of the company started on a scale which until then was entirely unknown in the automobile world. An official of the company stated that if the old policy of building several types of cars, fours and sixes, with chassis of various sizes, had been maintained that the Ford company would not have been able to become the big concern it is to-day.

The general outlook of business is satisfactory to the Ford officials. Conditions throughout the country are reported to be greatly improved over what they were several months ago.

In three years the total assets of the company have almost tripled, totaling $20,815,783.63 in 1912, $35,033,919.86 in 1913 and amounting to $61,632,257.16 in September, 1914.

The total of the surplus for the last three years was near the hundred million mark last September, the exact figures being $91,696,301.32.

FORD BALANCE SHEET

Assets	1914	1913	1912
Cash on hand and in banks...	$27,441,468.79	$13,225,710.82	$ 6,400,100.66
Michigan municipal bonds at cost	1,330,546.84	1,283,943.59	1,075,051.48
Accounts receivable	3,233,582.73	448,233.93	230,912.17
Merchandise inventory at cost	9,284,449.26	9,046,171.68	6,629,533.83
Outside investments	9,200.00	7,433.32	7,772.04
Prepaid expenses	437,089.77	215,259.29	44,591.07
Real estate	2.227,567.88	1,540,483.42	820,636.97
Buildings and building fixtures	10,714,928.45	4,615,156.82	2,596,115.61
Factory equipment	1,661,155.23	676,589.49	371,110.90
Furniture and fixtures	105,263.95	77,357.60	58,059.39
Machinery and power plant...	3,821,465.38	2,832,907.33	1,843,967.02
Tools	1,199,779.11	824,901.04	566,510.17
Patterns	105,992.30	92,710.13	66,884.06
Patents	59,767.47	57,224.27	51,793.96
Machinery, tools and equipment at branches	....	89.837.13	52,746.30
	$61,632,257.16	$35,033,919.86	$20,815,785.63

Liabilities	1914	1913	1912
Accounts payable	$3,335,139.01	$3,049,586.86	$2,261,026.63
Contract deposits	1,452,622.82	....	....
Accrued pay rolls	537,489.70	191,940.70	149,166.45
Accrued salaries	44,229.95	24,169.30	12,327.45
Accrued expenses	218,140.50	266,119.43	178,766.10
Contract rebates	621,381.12	25,960.00	58,350.00
Reserve for depreciation of fixed assets	1,935,440.07	1,061,805.25	742,626.89
Reserve for depreciation of patents	59,767,47	57,224.27	51,793.96
Fire insurance reserve	43,934.45	34,059.63	11,900.40
Reserve buyers profit-sharing.	2,557,080.00	....	....
Reserve for employees' bonus..	....	134,999.96	242,033.80
Reserve for bad debts	....	3,510.55	3,655.04
Reserve for unearned profits—branches	....	60,370.23	284,043.34
Reserve for refunds to take care of reduction in price...	....	....	75,000.00
Capital stock	2,000.000.00	2.000,000.00	2,000,000 00
Surplus	48,827,032.07	28,124,173.00	14,745,095.57
	$61,632,257.16	$35,033.919.86	$20,815,785.63

Reo Ends 1914 Season—Big Gains

LANSING, MICH., Nov. 14—Four days ago the Reo Motor Car Co. shipped the last of its 1914 models.

"This has been a big and good year," said sales manager R. C. Rueschaw, "and from all indications next year will be even better. All departments except the paint and trimming departments are working with their full force, which means that 1,800 men are at work. Just as soon as the necessary raw material is on hand the two other departments will be also working and then we will have a force of 2,200 men and women on the pay roll.

"Conditions have greatly changed in the automobile business. In years not so far distant the trade gradually dropped off from August to January, when the new season started. This year August, as far as we are concerned, was a bigger month than July, while September and October were very good indeed."

National conference of salesmen of Goodyear Tire and Rubber Co., held recently at the factory in Akron, O. There are 1,000 men in the picture;

To Make Armored Truck with Gun Turret

Will Mount Bodies Made by an Armor Plate Firm on Federal Truck Chassis

NEW YORK CITY, Nov. 17—For the purpose of turning out an armored truck mounting two machine guns in a revolving turret, the Armored Motor Car Corp. has been formed by J. H. Allen, 2 Rector street, this city, eastern representative of the Elyria Iron & Steel Co. It is incorporated for $6,000. Mr. Allen has a patent covering the application of the revolving turret to a motor truck.

The steel bodies will be built on contract and will be mounted on a 2-ton Federal chassis; the body will weigh 3,000 pounds, leaving a margin of 2,700 pounds for the two guns, operators and ammunition. The first car will be completed in about 3 weeks and will be displayed in the salesrooms of the Federal Truck Co., 146 West Fifty-second street.

Twelve chassis comprise the first order. The bodies will be made by an armor-plate company and shipped to the Federal plant in Detroit where they will be mounted on the chassis. The vehicles will be manufactured for the United States government as well as for governments of foreign countries.

Counselman Retires from Active Service

DETROIT, MICH., Nov. 14—Lee Counselman, who has been vice-president and general manager of the Chalmers Motor Co. during the last few years, has retired from active service. Lee R. Olwell, who was assistant general manager, is now general manager, and Treasurer Clarence A. Pfeffer has been made assistant general manager and continues as treasurer. Mr. Counselman continues his connection with the Chalmers company as one of the vice-presidents and a member of the board of directors.

S. A. E. Standards Committee in Session

NEW YORK CITY, Nov. 18—With more than thirty-five in attendance the convention of the standards committee held in the rooms of the Society of Automobile Engineers opened yesterday. The work scheduled for the 3 days' session includes the reports of fourteen divisions as listed in THE AUTOMOBILE for November 5, page 864.

The schedule for yesterday called for the reports from the divisions on commercial car wheels, truck standards, motor testing, electrical equipment and miscellaneous fittings. Reports were submitted and the work outlined for the remaining period before the annual meeting of the society which takes place January 6 and 7 at the Engineering Societies Building in this city.

The custom of advancing mileage to the members of the standards committee from out of town was inaugurated at this meeting and the result was an augmented attendance. Those attending on the first day of the conference were the following:

Joseph Bijur, Bijur Motor Lighting Co.; Leonard Kebler, Ward Leonard Electric Co.; R. J. Nightingale, Willard Storage Battery Co.; Henry Souther, Ferro Machine and Foundry Co.; Alexander Churchward, Gray & Davis Co.; Russell Hoopes, Hoopes Bros. & Darlington; H. G. Osburn, National Metal Molding Co.; R. L. Morgan, Consulting Engr.; H. H. Buswell; Henry B. Coleman, F. S. Lee; Chester E. Clemens, Perfection Spring Co.; C. B. Williams, Mott Wheel Company; Alden McMurtry, Consulting Engr.; J. G. Perrin; R. S. Bryant, Standard Welding Co.; C. J. Welch, U. S. Tire Co.; A. H. Ehle, Baldwin Locomotive Works; W. P. Kennedy, Consulting Engr.; R. McA. Lloyd; C. T. Meyers, Mechanical Engr.; T. V. Buckwalter, Pa. R. R.; E. R. Whitney, Commercial Truck Co.; W. H. Conant, Gould Storage Battery Co.; W. S. Gould; H. W. Harper, Howard Miniature Lamp Co.; C. M. Bunnell, Edison Lamp Works; H. D. Church, Packard Motor Car Co.; V. G. Apple, Splitdorf Electrical Co.; A. D. Libby, Splitdorf Electrical Co.; B. B. Bachman, Autocar Company; and J. J. Aull, Lunkenheimer Co.

Metropolitan S. A. E. To Discuss Eights

NEW YORK CITY, Nov. 18—At the monthly meeting of the Metropolitan Section of the Society of Automobile Engineers, to be held at the Automobile Club of America, November 24 at 8 p. m., the subject of eight-cylinder motors will be discussed.

A paper on this will be presented by D. McCall White, the designer of the Cadillac eight and a number of engineers prominent in the trade have been invited to take part in the discussion following the presentation of the paper. Preceding the meeting there will be an informal dinner at the Automobile Club of America.

Miller Rubber Earns 10 Per Cent. on Common

AKRON, O., Nov. 13—Stockholders of the Miller Rubber Co. today re-elected the retiring officers. General Manager W. F. Pfeiffer's report showed sales for the past year exceeding $2,500,000. The net profits amounted to $528,000, sufficient to pay 7 per cent. on the preferred and 10 per cent. on the common stock, and allowing for depreciation on buildings, machinery and tools and crude and finished products.

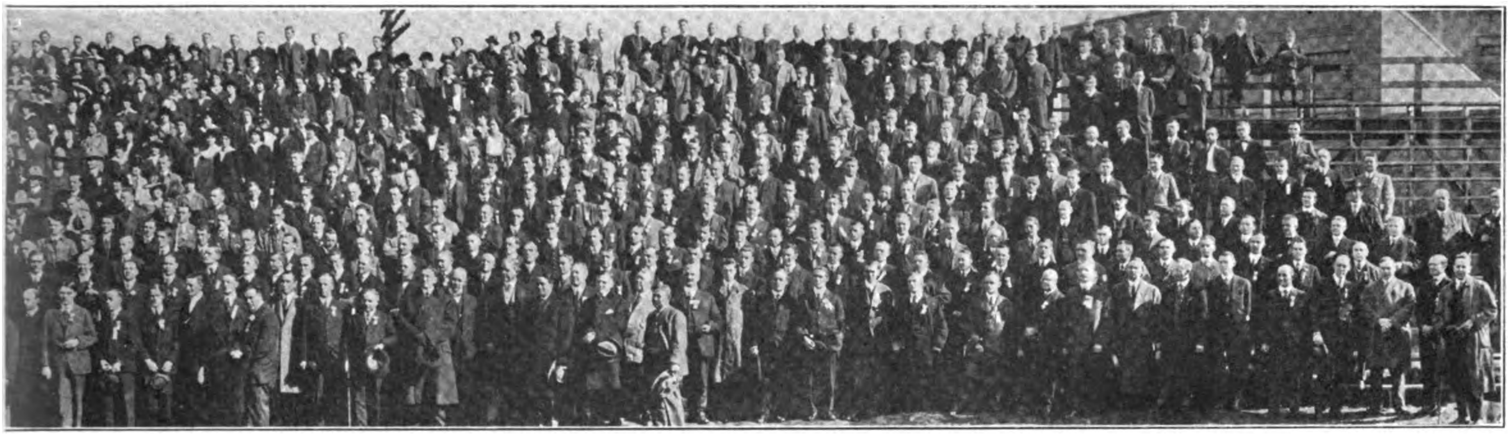
The officers are as follows: President, Jacob Pfeiffer; vice-president, C. T. Grant; treasurer, F. B. Theiss; secretary and assistant treasurer, W. F. Pfeiffer. They, with J. M. Doran, comprise the board of directors.

Fighting Financial Problems

DAYTON, O., Nov. 17—Upon the application of J. I. Baker, president and general manager, T. W. Baker was appointed receiver for the Dayton Electric Car Co., of this city. The company has been manufacturing electric automobiles for some time.

President Baker claimed that he was surety on notes aggregating $20,000, of which $19,000 was past due, and since other creditors were demanding payment it was thought best to petition for a receiver. He declared that the assets would not be sufficient to meet all of the claims against the company if an attempt were made to do business as formerly. The company has a large number of electric automobiles, buggies and carriages on hand. A request has been made to sell the property and distribute the proceeds.

MILWAUKEE, WIS., Nov. 9—The Universal Machinery Co., 1916 St. Paul avenue, Milwaukee, formerly a producer of



550 salesmen, branch managers, etc., including part of the Canadian organization; the remainder are members of the reception committee

Universal motor trucks and more recently a builder of small gasoline engines for motorcycle, cyclecar and light car purposes, has filed a voluntary petition in bankruptcy. The assets are given as $68,352 and liabilities as $59,957 at the present time.

Crescent Motor Liabilities $485,590.32

CINCINNATI, O., Nov. 14—Listing liabilities at $485,590.32 and assets at $428,968.45, the Crescent Motor Co., bankrupt of this city, yesterday, through its president, W. T. Hunter, filed its schedules in bankruptcy in the United States District Court.

The plant of the company is located at Carthage, where it occupies a 10-acre tract. This is listed as having a value of $170,445. It is the main item in the assets. The stock on hand is appraised at $159,159 and the machinery at $68,044. Other personal property belonging to the company is listed as worth $22,425, and the debts due to the company aggregate $5,865.

The secured debts amount to $211,126 and the unsecured to $189,604, while there is liability also on bills and notes of others to the amount of $82,794.

DETROIT, MICH., Nov. 17—The Detroit Electrical Appliance Co., manufacturer of Deaco starters, was adjudged bankrupt on November 16 in the Federal Court, this city. Schedules have not been filed.

PORT HURON, MICH., Nov. 16—The Havers Motor Car Co., this city, was today adjudged bankrupt in the Federal Court, Detroit, Mich. Schedules have not been filed.

DETROIT, MICH., Nov. 17—An added 4 per cent. dividend, making a total of 45 per cent., is to be paid creditors of the Grabowsky Power Wagon Co. This will total about $880,000. Also, another 3 or 4 per cent. dividend is in prospect.

Overland Adds 17 Acres of Floorspace

TOLEDO, O., Nov. 18—*Special Telegram*—Although additions to the plants of the Willys-Overland Co., embodying 25 acres of floorspace have just been completed. It is announced today that two additional buildings will immediately be erected. The first of these, which is believed will be one of the largest factory buildings ever constructed, will be 1,000 feet long and 200 feet wide and have two stories and basement. The other will be 200 feet square. The additional floorspace will approximte 17 acres, swelling the total at the Toledo plants to 79 acres. With these additions Overland will have the largest aggregate space of any motor car plant in the world, it is claimed.

The largest of the new structures will be devoted to painting and upholstering departments and repairs and body assemblies. The other addition will join on to the just completed body assembly and machine work plant which now measures 200 by 400 feet, and therefore the latter is scheduled for an enlargement of 500 per cent. Reasons given for these tremendous additions are only that the growing demand has required the expansion. October was the biggest month the concern ever experienced, the sales representing more than $5,000,000. It is interesting to note that the largest of the above additions will have an area more than twice as great as that of the entire original Toledo factory when it was purchased by John N. Willys a little over 5 years ago.

Curb Market Opens with Renewed Activity

NEW YORK CITY, Nov. 16—Renewed activity, with considerable strength here and there, characterized the official resumption of trading in the curb market today. The curb market, however, was unofficially opened on November 12. Most of the securities were fairly steady. Kelly-Springfield tire retained its firmness, selling at 52 and 53, as compared with the previous day's high of 53. A market was established for Willys-Overland common stock at 68 and 70, but no sales in this issue were reported. Transactions in Maxwell Motors common stock took place at 14 and 14¼, off, in the last case, ¼ point from the close. Trading in Standard Oil issues today was in moderate volume, with price changes erratic. Vacuum oil was steady at 180 and 185.

Market Reports for the Week

Few changes occurred in this week's market reports. Those that did occur were mostly in the metal markets and were unimportant, with the exception of lead which went up $0.20 per 100 pounds, closing at $3.70. This product was very strong at the closing. The American Smelting & Refining Co. advanced the prices 10 points for shipment from the West in 50-ton lots. There were few customers to be found on Tuesday for copper. Electrolytic has been selling at higher prices with considerable buying at the early part of the week. But on Tuesday, few buyers could be found and the tone was less strong and prices more or less nominal after the feverish excitement and large sales. Tin was dull and lower with scarcely any demand even for nearby positions. There were no changes in the oils and lubricants markets.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.13½	.13½	.13½	.13½	.13½	.13½	......
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	1.21	......
Bessemer Steel, ton	18.50	18.50	18.50	18.50	18.50	18.50	......
Copper, Elec., lb.	.11 3/10	.11 7/20	.11⅖	.11⅝	.11⅝	.11¾	+.00 9/20
Copper, Lake, lb.	.11⅖	.11 9/20	.11½	.11⅝	.11¾	.11⅞	+.00 19/40
Cottonseed Oil, bbl.	5.39	5.30	5.35	5.38	5.30	5.20	—.19
Cyanide Potash, lb.	.25	.25	.25	.25	.25	.25	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	.90	.90	......
Lead, 100 lbs.	3.50	3.60	3.60	3.60	3.60	3.70	+.20
Linseed Oil	.47	.47	.47	.47	.47	.47	......
Open-Hearth Steel. ton	18.50	18.50	18.50	18.50	18.50	18.50	......
Petroleum, bbl., Kans, crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.73	.73	.73	.73	.73	.73	......
Rubber, Fine Up-River, Para	.65	.65	.63	.63	.63	.67	+.02
Silk, raw, Ital.	..	4.10	..	..	4.10	..	......
Silk, raw, Japan	..	3.15	..	..	3.15	..	......
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	34.00	33.75	33.50	33.00	33.25	32.75	—1.25
Tire Scrap	.05	.05	.05	.05	.05	.05	......

Official Time of Marmon 41 in Tests

Miles	Lap Time	Lap M.P.H.	Elapsed Time	Aver. M.P.H.
2.5	2:23.52	62.8	......	...
5.0	2:23.88	62.6	4:47.40	62.6
7.5	2:24.09	62.5	......	...
10.0	2:23.50	62.8	9:34.99	62.7
12.5	2:23.15	62.9	......	...
15.0	2:23.06	62.9	14:21.20	62.8
17.5	2:24.14	62.4	......	...
20.0	2:24.62	62.2	19:09.98	62.6
22.5	2:22.52	63.2	......	...
25.0	2:23.45	62.8	23:55.95	62.8
27.5	2:23.15	62.9	......	...
30.0	2:23.92	62.5	28:43.02	62.7
32.5	2:22.89	63.0	......	...
35.0	2:23.80	62.7	33:28.71	62.8
37.5	2:22.56	63.2	......	...
40.0	2:23.53	62.8	38:13.80	63.4
42.5	2:22.29	63.4	......	...
45.0	2:22.60	63.2	42:58.69	62.9
47.5	2:23.84	62.7	......	...
50.0	2:23.24	62.8	47:44.77	62.85
52.5	2:22.87	63.1	......	...
55.0	2:22.40	63.3	52:30.04	62.9
57.5	2:22.01	63.4	......	...
60.0	2:22.66	63.2	57:14.71	62.9

Marmon 41 Makes 62.89 Miles in 1 Hour

Stock Touring Car with Five Passengers and Top Up Electrically Timed

INDIANAPOLIS, IND., Nov. 12—A Marmon Model 41 registered stock touring car traveled 62.89 miles in 1 hour on the Speedway today, carrying five passengers, and having top and windshield up. The test was under sanction of the American Automobile Association, and was directly supervised by F. E. Edwards, technical representative of the Contest Board, and C. S. Ricker, Speedway representative. The timing was recorded electrically.

This speed will constitute new stock car records in America for a car with five people and weighing with load 5,310 pounds and without load 4,570 pounds. The wind-resisting area of the car measured 40.8 square feet. The motor is a six-cylinder one, 4 1-4 by 5 1-2 and during the test it was operating at a crankshaft speed of 2,032.9 revolutions per minute. The gear ratio in the rear axle was 3.46 to 1 and 36-inch tires were used.

In addition to the test constituting a new record for 60 miles, the records are also claimed for intermediate distances and application made to the Contest Board of the A. A. A. for formal declarations of these records. The intermediate records are:

Distance	Time	M.P.H.
10 miles	9:34.99	62.7
20 miles	19:09.98	62.6
30 miles	28:43.02	62.7
40 miles	38:13.80	63.4
50 miles	47:44.77	62.85
60 miles	57:14.71	62.9

After the test was completed the engine was dismantled for the purpose of determining to what extent the parts had worn, the report simply stating that no appreciable wear of parts was disclosed.

Speedway Wants 1,000-Mile Fuel Test

INDIANAPOLIS, IND., Nov. 14—The Indianapolis Motor Speedway has applied for an A. A. A. sanction for November 18 and 19 to conduct a 1,000-mile test on a gasoline substitute known as synthetic fuel and which was recently tested in this city. The test is to be 500 miles each day and will be conducted by A. A. A. officials. The new fuel, it is claimed, can be manufactured at 2 cents a gallon, and is the invention of John Andrews, McKeesport, Pa. At the recent test in July a six-cylinder National, weighing 3,800 pounds, made 12.5 miles on a gallon of this fuel, in contrast with 15.2 miles per gallon of 64 gravity gasoline. In similar tests a Marmon six made 12.2 miles per gallon on the synthetic fuel, and was later run 100 miles on the road after which the valves did not show any special carbonization.

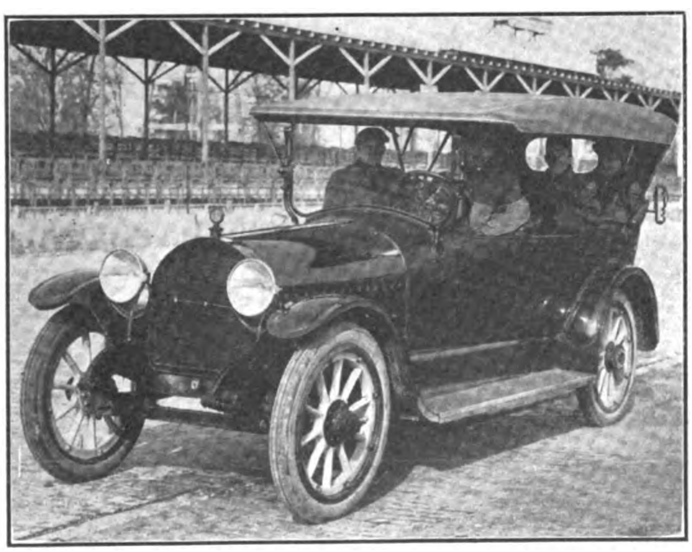
Earl Cooper Stars at Phoenix Track

PHOENIX, ARIZ., Nov. 16—Earl Cooper, winner of the Corona road race, was the star of the race meet held at the Arizona fair grounds track Thursday, November 12. Cooper and his Stutz won the principal event of the day, the 50-mile, in 47:59. The previous 50-mile record for an Arizona track was 50:53, set by Teddy Tetzlaff in his Fiat Cyclone a year before.

Barney Oldfield and the Cyclone were leading in the 27th mile, when a broken water connection put Oldfield out of the race. From that time on it was a struggle between Cooper and Art Klein, in the King. Each made one stop for tires. The little Maxwell, driven by W. W. Carlson, went to the finish without a stop but finished on one flat tire. These were the only cars to finish. Oldfield's Stutz, driven by George Hill, went out in the first 5 miles. Klein's time was 48:13 and Carlson's, 53:05.

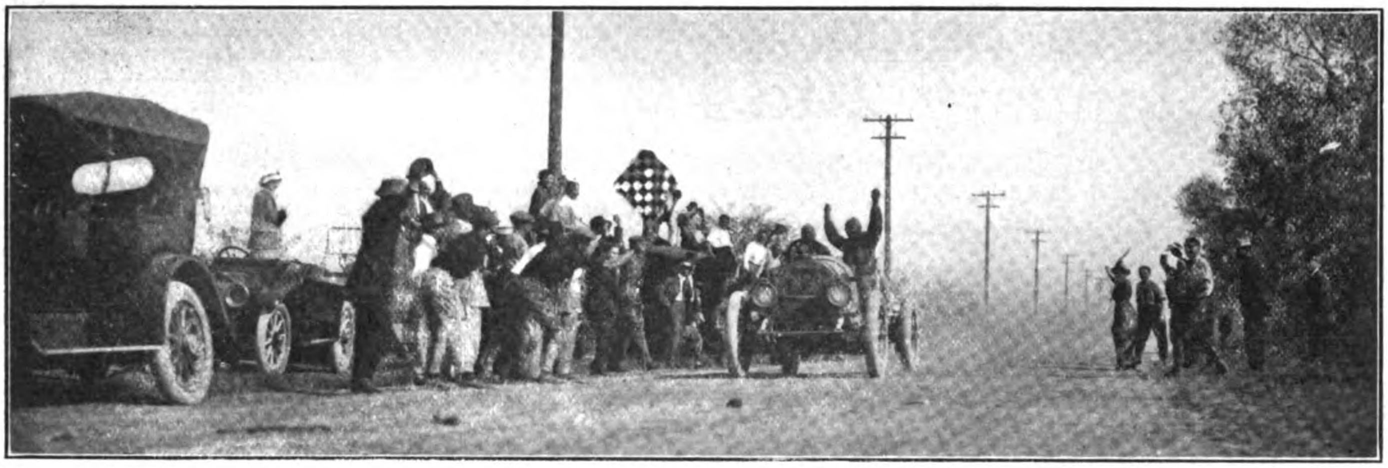
There were two events exclusively for the cars that participated in the road races from Los Angeles and El Paso, and Oldfield won both easily. His time for the 15-mile event open to all cars that participated in the desert races, was 14:54. Jack Smith, Buick, was second in 15:05; Hugh Miller, Pope, third, 15:21 2-5; Lew Gasser, Stutz, fourth in 15:22 3-5. All except Oldfield were in the race from El Paso.

The race for cars finishing first and second in the desert races was limited to 5 miles. Oldfield was first in 4:59; Hugh



Marmon 41 stock touring car which made 62.89 miles in 1 hour in official tests held at Indianapolis Speedway. Note five passengers and top and windshield raised

Electrical timing device used in Marmon 41 trial. Left to right, officials are: F. E. Edwards, A. A. A.; C. S. Ricker, Speedway; Theodore Myers, Timer; H. E. Glover, assistant



Winning the El Paso-Phoenix race. Miller's Pope-Hartford with Ed. Orr driving crossing the line

Miller, Pope, second; John Hutchins, Buick, third; Louis Nikrent, Paige, fourth. The summary:

50-MILE

Car	Driver	Time	Car	Driver	Time
Stutz	Cooper	47:59	Maxwell	Carlson	53:05
King	Klein	48:13			

15-MILE

Car	Driver	Time	Car	Driver	Time
Stutz	Oldfield	14:54	Pope-Hartford	Miller	15:21 4/5
Buick	Smith	15:05	Stutz	Gasser	15:22 4/5

5-MILE FOR CARS FINISHING 1 AND 2 IN DESERT RACE

Car	Driver	Time	Car	Driver	Time
Stutz	Oldfield	4:59	Buick	Hutchins	—
Pope-Hartford	Miller	—	Paige	Nikrent	—

Pope-Hartford Won El Paso-Phoenix at 50 M.P.H.

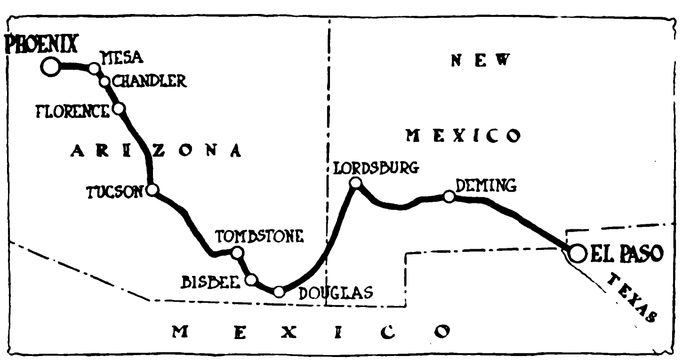
PHOENIX, ARIZ., Nov. 13—It was at over 50 miles an hour and with one rear wheel wobbling about on cracked and splintered spokes that Ed. Orr in Hugh Miller's Pope-Hartford finished winner of the El Paso-Phoenix race, as reported in THE AUTOMOBILE for November 12. He had no engine trouble and changed only two tires in the 533 miles but his car turned turtle on a sharp curve 12 miles west of Bisbee, the night control, throwing Orr and Miller out and cracking the spokes in a rear wheel. The car was righted with poles and won the race.

J. T. Hutchins, who finished second in a Buick, had little trouble but changed tires several times. Tom Brewer, who drove a Marmon to third place, changed twelve tires and those on which he finished were worn through the fabric. Fourth place went to L. E. Cornu, whose Palmer-Singer went out at Lanark, N. M., with engine trouble, and who finished in a Stutz. Of the twenty-seven starters, only ten reached Phoenix. Nine went out the first day.

Winners Divide $5,600 Purse

The four winning cars divided a purse of $5,600, the Pope-Hartford, first, taking $2,800; the Buick, second, $1,400; Marmon, third, $840; and Stutz, fourth, $560. In addition, the cities of Bisbee and Tucson gave $1,000 and $500, respectively for the cars making the best time to these points. The Pope-Hartford and the Buick took first and second places straight through. Brewer's Marmon was third at Phoenix and Bisbee. Cornu's Stutz was fourth at Phoenix, third at Bisbee and fourth at Tucson. Leonard's Buick was fourth at Bisbee.

The times of the winning cars were: Pope-Hartford, 14:35:48; Buick, 15:57:01; Marmon, 16:37:28; and Stutz, 16:41:34. The average time of the winner was 37.3 miles per hour.



Map of course followed in El Paso-Phoenix race

RUNNING TIMES IN EL PASO-PHOENIX RACE

Car	Owner	Driver	Town	Running Time to Bisbee Night-Control	Running Time El Paso to Phoenix
Pope-Hartford	H. B. Miller	H. B. Miller	Phoenix	7:31:03	14:35:48
Buick	J. T. Hutchings	J. T. Hutchings	Alamogordo	8:09:14	15:57:01
Marmon	Tom Brewer	Mrs. W. G. Shanley	Globe, Ariz.	8:48:00	16:37:28
Stutz	S. W. Sales Co.	L. E. Cornu	El Paso	8:21:22	16:41:34
Mitchell	J. F. Heimback	C. G. Miller	Tuscon, Ariz.	9:02:19	17:34:15
Stutz	Crowl & Gasser	Lou Gasser	El Paso	9:32:26	20:40:56
Halladay	D. F. Deemer	D. F. Deemer	Las Cruces	11:13:45	20:53:05
Oldsmobile	G. V. A. Stage Co.	H. D. Thomas	Globe, Ariz.	9:52:22	21:13:07
Buick	W. G. Dunn	George Leonard	El Paso	8:37:03	Broke axle at Chandler. Arrived Monday night.
Ford	Tri-State Motor Co.	E. E. Wiseman	El Paso	10:10:41	Reached Phoenix Monday night.
Buick	J. C. Jones	H. A. Joseph	Tucumcari	9:22:29	Hauled in
Kissel	D. Moore	D. Moore	Tuscon	9:34:09	Out near Tucson.
Buick	Borderland Garage	Floyd Turner	Las Cruces, N. M.	8:57:14	Engine trouble near Empire Ranch.
Fiat	F. Ballard	Billy Adolph	Los Angeles	9:46:36	Engine trouble near Empire Ranch.
Velie	M. L. Naquin	M. L. Naquin	El Paso	9:49:03	Broke wheel near Empire Ranch.
Simplex	Horace Murphey	W. E. Deuel	El Paso	11:02:16	Broke down after leaving Tombstone.
Buick	Johnson Bros.	Johnson	Carizozo, N. M.	12:58:00	Withdrew after Bisbee.
Cadillac	W. A. Bradford	W. A. Bradford	Lowell, Ariz.	....	Broke down
Pope-Hartford	W. Tremaine	W. Tremaine	Phoenix	....	Hit wire fence out of Lordsburg.
Fiat	Tooley & McNary	Ray Harrell	El Paso	....	Engine trouble near Tombstone.
Metropole	C. Chesterfield	E. E. Cater	Morenci, Ariz.	....	Out at Rodeo
Ford	M. L. Miller	M. L. Miller	Douglas, Ariz.	....	Broke down near Douglas.
Buick	S. W. Carb. Co.	Jack Smith	Phoenix	....	Broke down near Douglas.
Beaver Bullet	C. F. Keene	C. F. Keene	Beaver Falls, Pa.	....	Driver taken ill.
Lozier	J. D. Bukey	R. E. Lester	El Paso	....	Engine trouble after Douglas.
Palmer-Singer	C. C. Rossi	Ben Turner	El Paso	....	Broke down.
American	Fred Fay	La Salle	Globe, Ariz.	....	Scratched.
Krit	S. W. Auto Sales Co.	R. Peak	El Paso	....	Scratched.
Buick	G. M. Dubois	L. J. Freeman	Phoenix	....	Out at start.

Importers' Salon January 2 to 9

More Exhibitors Expected Than Ever Before—More Accessories at N. Y. Show

NEW YORK CITY, Nov. 14—The Automobile Salon, as the exhibition of foreign built motor cars held annually in New York, is known, will be held January 2 to 9 in the Grand Ball Room of the Astor as heretofore.

The 1915 Salon will be conducted as usual by the Automobile Importers' Alliance, of which E. Lascaris is president, T. E. Adams, vice-president, and Stefan J. Kjeldsen, secretary. Mr. Kjeldsen, who managed this annual event for many years past, will again serve in the same capacity.

From present indications the 1915 Auto Salon promises to have a larger list of exhibitors and to be more of a success generally, than any of its predecessors. Many of the foreign automobile factories are continuing in operation, on government work, and they have been able to complete the special chassis and finished cars, which they began to build before the war started. These special jobs are comparatively few in number, and not adapted to army use, so that there will be no difficulty in getting them over in time for the show.

Providence Shows 44 Cars and 15 Trucks

PROVIDENCE, R. I., Nov. 14—Rhode Island's annual automobile show opened this evening at the State Armory, at Providence, and it was thronged by an eager crowd. There was much interest centered in such cars as the new eight-cylinder Cadillac, the Dodge car, the Briscoe, the small Peerless, the four-cylinder Stearns-Knight, the new Overland Six and the new five-passenger Hupmobile, all of which made their debut for show purposes in the East. The show will continue all next week. On Wednesday there will be a double attraction when the price is increased, for it will be combined Society day and Governor's night. Many of the Boston dealers are here to spend the week, and a large number of dealers who are located in Southern Massachusetts will be prominent at the various spaces.

The show is not wholly a passenger car exhibition, for in the basement there are fifteen different makes of trucks. Scattered about are thirteen different accessory dealers, making a total display of some seventy-two exhibits in the building.

Multibestos Men Hold Convention

FRAMINGHAM, MASS., Nov. 13—At the recent sales convention of the Standard Woven Fabric Co., of this city, manufacturers of brake lining, technical questions which came up in connection with brake-lining sales were covered by E. E. Waite, factory manager of the company, in his talk on "Multibestos Compared with Other Brake Linings." Mr. Waite took the representatives through the factory and explained each manufacturing process. He then gave the engineering data on a number of brake lining tests which he himself had made, and also of tests which had been made by several automobile manufacturers.

General Manager Burdick gave a talk in which he traced the history of this company's success. According to his report business has been doubled in the past year.

Although the convention was decidedly of a business nature there was also a social side. One evening was spent at the Framingham Country Club with Mr. Burdick as host.

Another convention is planned for January, when representatives from the Chicago and San Francisco offices will be present.

Dealers Organize Association in Boston

BOSTON, MASS., Nov. 14—The Massachusetts Automobile and Accessory Dealers' Assn. was formed in Boston today as a result of several meetings at which more than 100 dealers have aired their views on the trade in motor accessories. The new organization starts off with about seventy-five members and it is expected that this number will be doubled within a short time when the dealers in other cities can be brought in. George P. Brophy has been chosen president and Joseph Everett, secertary. At the next meeting a board of directors will be elected, and also other officers.

G. M. C. Directors and Officers Re-elected

DETROIT, MICH., Nov. 18—At the annual meeting of the General Motors Co., the retiring directors were re-elected. The directors re-elected the officers. The board of directors consists of Thomas Neal, chairman, Joseph Boyer, E. W. Clark, W. C. Durant, R. F. Herrick, J. H. McClement, E. D. Metcalf, C. S. Mott, M. J. Murphy, C. W. Nash, J. J. Storrow, Albert Strauss, N. L. Tilney and Jacob Wertheim. The officers are as follows: President, C. W. Nash; vice-presidents: E. W. Clark, W. C. Durant; secretary, Standish Backus; J. T. Shaw, treasurer; and comptroller, W. H. Alford.

Packard Paris Manager Sees Business Opportunity

DETROIT, MICH., Nov. 17—*Special Telegram*—Manager R. N. Goode, of the Paris branch of the Packard Motor Car Co., is here for a short business stay. He says business conditions are improving in France and England, and Paris business men who had left the city when the Germans were so near it, are now returning and reopening their stores. American manufacturers could do big business now in countries at war and they should receive assistance from the American government which should show them how to get that business. There is a very big waste of automobiles among the French because so many cars are driven by incompetent men.

Maxwell Representatives Meet in Detroit

DETROIT, MICH., Nov. 17—A convention at which sixty district representatives and salesmen of the Maxwell Motor Co., was held at the main offices of the Maxwell company yesterday and today. The men came from the Middle Western, Eastern and Southern states for the purpose of becoming more familiarized with the general Maxwell business methods and policy and get first hand knowledge about the construction of the Maxwell cars. Yesterday the visitors were given talks by Walter M. Anthony, comptroller of the Maxwell company, who spoke on financial matters; C. E. Stebbins, sales manager, who spoke on salesmanship; J. A. Vail, chairman of the board of directors, on business conditions, C. R. Newby, zone supervisor, on starting and lighting systems. Informally many other subjects were discussed. Today the zone or district supervisors conducted the men from their respective zones or districts through the factory acting as their guide and instructor.

NEW YORK CITY, Nov. 14—Applications for show space still continue to pour in on the National Automobile Chamber of Commerce for both New York and Chicago shows. Following is a list of those companies who secured space during the past week:

Additional Accessory Exhibitors for New York and Chicago Shows

AT BOTH SHOWS

Atlas Automatic Jack Corp........New York City
Brown Trafilog Co................Cleveland, Ohio
Curtis Pneumatic Mach. Co........St. Louis, Mo.
Hydraulic Pressed Steel Co.......Cleveland, Ohio
Massnick-Phipps Mfg. Co...........Detroit, Mich.
A. J. Picard & Co................New York City

NEW YORK

American Die & Tool Co.............Reading, Pa.
Ashley Steel Bldg. Co.............New York City
Atlas Automatic Jack Corp........New York City
Auto Air Appliance Co............Baltimore, Md.
Eugene Bournonville Welding Co..Cleveland, Ohio
Brown Trafilog Co..............Cleveland, Ohio
Curtis Pneumatic Mach. Co........St. Louis, Mo.
General Rim Co.................Cleveland, Ohio
Gerhart Motorcycle Co...........Harrisburg, Pa.
Hydraulic Pressed Steel Co......Cleveland, Ohio
Hydraulic Oil Storage Co.........New York City
Lane Bros. Co..............Poughkeepsie, N. Y.
Massnick-Phipps Mfg. Co..........Detroit, Mich.
Metal Specialties Co................Chicago, Ill.
Micro Piston Ring Co............New York City
A. J. Picard & Co...............New York City
W. S. Sheppard..................Newark, N. J.
Universal Car Equipment Co........Detroit, Mich.

CHICAGO

Atlas Automatic Jack Corp........New York City
Brown Trafilog Co..............Cleveland, Ohio
Currier-Koeth Mfg. Co..........Coudersport, Pa.
Curtis Pneumatic Mach. Co........St. Louis, Mo.
Gould Storage Battery Co.........New York City
Hydraulic Pressed Steel Co......Cleveland, Ohio
Massnick-Phipps Mfg. Co...........Detroit, Mich.
A. J. Picard & Co...............New York City
Positive Supply Co..............Davenport, Iowa

Factory Miscellany

FORD Plant for Buffalo — The Ford Motor Co., Detroit, Mich., has bought four large parcels of property in Buffalo, N. Y., extending northeasterly from Main street and the New York Central Belt Line, along Main street to Rodney street, to Halbert street, to within 150 feet of Jewett avenue. The property has a street frontage of over 900 feet and nearly 470 feet of frontage on the Belt Line. It is the intention of the company to build in the spring a four-story building on practically the entire site. The structure will be of reinforced concrete. It is estimated that the land, building and development of the site will represent an investment of fully $500,000.

Ward Co. Erecting—The Ward Motor Vehicle Co., Mt. Vernon, N. Y., will erect a factory 162 by 301 feet.

Blair Truck Adds—The Blair Motor Truck Co., Newark, O., will erect a factory building on Sixteenth street, Newark.

Davis Co.'s Plant—The A. R. Davis Motor Co., 2034 Euclid avenue, Cleveland, O., will erect a two-story plant, 50 by 170 feet.

Hess-Bright's Addition—The Hess-Bright Mfg. Co., Philadelphia, Pa., has just broken ground for a three-story addition to its plant, 38 by 200 feet.

Vulcanizing Products Co. Builds—The Haslop Vulcanizing Products Co., Johnstown, Pa., has purchased a site in Coopersdale, a suburb, and plans to erect a new plant.

Milwaukee Company Piston Maker—The Central Foundry Co., 705-723 Park street, Milwaukee, Wis., has established a department for the production of pistons, piston rings and cylinder castings.

Philadelphia Company Adds—The Auto Sales & Service Co., Philadelphia, Pa., will erect a two-story addition to its plant at Third and Chestnut streets.

Maher to Manufacture Accessories—The Maher Mfg. Co., Libertyville, Ill., will establish a plant for the manufacture of lighting fixtures and automobile accessories. N. L. Maher is interested.

Manhasset Co. Building—The Manhasset Mfg. Co., manufacturer of tire fabrics, Putnam, Conn., has begun the construction of a two-story addition to its plant having 10,000 square feet of floor space.

Will Manufacture Carbureters—Williams & Co., 58 Parks street, Niagara Falls, Ont., will install machinery for the manufacture of carbureters and complete equipment for general garage and automobile repairs.

Service Station in Burlington—The Lane Mfg. Co., Montpelier, Vt., the general distributor for the Cole car and the Kissel truck, will on December 1 open a branch salesroom and service station at Burlington, Vt. C. A. Ni[illegible] will be in charge as sales manager.

Federal Employees' Club—A "Federal Rubber Goodfellowship Club" has been organized by the employees of the Federal Rubber Mfg. Co., Milwaukee, Wis., the purpose being to accumulate a fund which, about Christmas, will be used to bring good cheer into the homes of the needy.

Burnox Co. Carbon Remover Manufacture—The Burnox Co., West Allis, Wis., has been organized by Theodore Mueller, Paul Hunt and Charles E. Kubicek to manufacture and market a chemical compound for removing carbon deposits in internal combustion engine cylinders. Headquarters are in West Allis, Milwaukee county.

Overland Buys More Land—For the purpose of squaring a tract of land owned by the Willys-Overland Co., Toledo, O., back of Central Grove Park, that company has purchased a small strip, approximating about 1 acre. No immediate use is to be made of the purchase, but, like the tract to which it is to be attached, it is to be held for future development.

To Manufacture Valve Grinder—Forrest E. Devine, of Madison, Wis., inventor and patentee of a gang grinder for reseating valves in poppet-valve engines, by means of which all of the valves of a multiple-cylinder engine may be ground at one time, is preparing for a large production of the appliance, having secured the co-operation of one of the largest motor supply houses in Chicago in the direction of marketing the goods.

Auto Body Plant Nearly Completed—The Auto Body Co., Lansing, Mich., has nearly completed a new addition to its plant, the addition being for the purpose of housing the woodworking machinery and making it more convenient to caring for the rough timber stuff that is used in the manufacture of its bodies. The addition will give the company a plant a block long and with an L half a block long. The company has shown a remarkable growth in the decade elapsing since its organization on a capital of a few thousand dollars for the manufacture of automobile and buggy bodies.

The Automobile Calendar

Nov. 14-21........Providence, R. I., Show, State Armory, P. S. Clark, Mgr.
Nov. 16-21........Spokane, Wash., Show, Spokane Chamber of Commerce and the National Apple Show, Inc., G. C. Corbaley, Secretary.
Nov. 17-18-19....Harrisburg, Pa., Second Conference of Pa. Industrial Welfare and Efficiency, State Capitol.
Nov. 26..........Corona, Cal., Road Race, Corona Auto Assn.
Nov. 26..........Harrisburg, Pa., Economy Run, Harrisburg Motor Club.
Dec. 1-4..........New York City, Annual Meeting of the American Society of Mechanical Engineers.
Dec. 12-19........Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.
Dec. 14-18........Chicago, Ill., American Good Roads Congress.
Jan. 2-9..........New York City, Annual Automobile Show, Grand Central Palace.
Jan. 2-9..........New York City, Automobile Salon, Grand Ball Room of Astor Hotel, Automobile Importers' Alliance, E. Lascaris, Pres.
Jan. 3-10.........Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16.........Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.
Jan. 11-16........Buffalo, N. Y., Show, Broadway Auditorium, Automobile Club of America.
Jan. 16...........Detroit, Mich., Show
Jan.16-23.........Cleveland, O., Show, Cleveland Automobile Show Co., F. H. Caley, Mgr.
Jan. 23-30........Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 23-30........Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 25-30........Buffalo, N. Y., Show, Broadway Auditorium, Buffalo Automobile Dealers' Assn., J. J. Gibbon, Sec.
Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb...............Portland, Ore., Show, Portland Auto. Trade Assn.
Feb...............Toledo, O., Show, Toledo Auto Show Co.
Feb. 15-20........Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22...........San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27........Syracuse, N. Y., Show, Syracuse Auto. Dealers' Assn.; H. T. Gardner, Mgr.
Feb. 23-27........Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.
Feb. 27...........San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13.........Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 9-15.........Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14...........San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
April.............Calumet, Mich., Show, Coliseum.
May 29............Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
Sept. 20-25.......San Francisco, Cal., International Engineering Congress.

The Week in  the Industry

Motor Men in New Roles

REID Anderson Sales Manager—The Anderson Electric Car Co., Detroit, Mich., has appointed T. C. Reid to the position of manager of sales for Detroit and Wayne county. Mr. Reid has been with the Anderson company for the last 6 months, and during the previous 18 months was connected with other electric vehicle interests in this city.

Oley Now Manager—W. S. Oley has been appointed manager of the Maxwell-Metz Motor Co., Portland, Me., to succeed B. H. Gettis, who has returned to Detroit.

Sessions Sales Manager—The Porto Metal Garage & House Co., Thirty-seventh and Burnham streets, Milwaukee, Wis., has appointed R. N. Sessions as sales manager.

Rose in England—C. B. Rose, chief engineer of the Velie Motor Vehicle Co., Moline, Ill., is now at the Hotel Cecil, London, England, investigating the truck industry in army circles.

Pelletier Writing Reo Advertisements—E. LeRoy Pelletier will write the advertisements for the Reo Motor Car Co., Lansing, Mich. He will write no other gasoline automobile copy.

Benjamin Residing in Detroit—C. Arthur Benjamin, sales manager of the George W. Houck Co., Buffalo, N. Y., has become a resident of Detroit, Mich., where he will take care of the sales.

Jardine Returns from England—Robert Jardine, who has been in England and on the Continent for the past 6 months in the interests of the Rich Tool Co., London, S. W., has returned to the States.

Potter Leaves Oxford—M. H. Potter has resigned as chief engineer and factory manager of the Oxford Motor Cars & Foundries, Ltd., Montreal, Que. His plans for the future are undetermined, but he will no doubt remain in Canada.

Cartwright Heads Body Co.—The Commercial Automobile Body Co. has opened offices and sales rooms in St. Louis, Mo. Hugh Cartwright is president and general manager. He was for 17 years vice-president of the Banner Buggy Co. there.

Little Gets New Appointment—W. C. Little has been appointed representative for Michigan and Ohio by Brandenburg & Co., manufacturers' representatives of New York, Chicago and Detroit. Mr. Little's local headquarters are at 1311 Dime Savings Bank Building, Detroit, Mich.

Wittstein Knox Efficiency Engineer—H. L. Wittstein, who for the past year has held the position of supervisor of records for the Knox Motors Co., Springfield, Mass., has been appointed efficiency engineer of that company. Mr. Wittstein is a graduate of Sheffield Scientific School.

Bradfield Resigns—H. C. Bradfield, who has been connected with the Cole Motor Car Co., Indianapolis, Ind., for 4 years, in publicity work, has resigned. During the past 2 years he has been special traveling representative of the company in the West. A. S. Blakely succeeds Mr. Bradfield.

Garage and Dealers' Field

Howard Makes a Move—The F. S. Howard Motor Car Co. agent in Worcester, Mass., for the Mitchell and Chevrolet lines, has moved into new quarters at 746 Main street.

Milwaukee Company a Klaxon Dealer—The Western Motor Supply Co., 408-410 Jefferson street, Milwaukee, Wis., has been appointed Wisconsin distributor of Klaxon horns.

Ford's $100,000 Cotton Purchase—The Ford Motor Co., Detroit, Mich., has joined the bankers' pool recently organized in the South to help the cotton growers and has subscribed $100,000. This represents the purchase price of more than 3,300 bales of cotton.

Philadelphia Stevens-Duryea Moves—The F. Winsor Eveland Co., distributors of the Stevens-Duryea car, formerly located at Nos. 202-204 North Broad street, Philadelphia, Pa., has removed to Ridge avenue above Broad street. The company has taken over the business from the former agents, A. G. Spalding & Bros.

Twombly Taxi Service in Philadelphia—The Stoever-Hannold Co., Motor Mart, No. 605 North Broad street, Philadelphia, Pa., local representatives of the Twombly car, announce the early inauguration of a new Philadelphia taxi service, which is to use the company's underslung taxi. The maximum charge for use of the new taxi is to be 25 cents a mile, a considerable reduction in present rates.

New Marathon Tire Distributors—The appointment of additional territorial distributors has been made by the Marathon Tire & Rubber Co., Cuyahoga Falls, O. Within the past 2 or 3 weeks the following appointments have been made: Turner Electric Supply Co., Birmingham, Ala.; E. L. Taylor Co., Inc., Richmond, Va.; Frank Bros., Baltimore, Md.; Peerless Rubber Tire Co., Seattle, Wash., and the Denmead Auto Supply Co., Akron, O.

New Wilmington Bus Line—The Postles Auto Brokerage Co., of Wilmington, Del., has decided to inaugurate a daily automobile service from Wilmington to points in Kent and Sussex counties, chiefly for the handling of passengers, with a view to including freight if the demand is sufficient. A sixteen-passenger steamer will be first used, but later there may be five five-passenger cars instead, which would divide the territory.

Peerless Agency in Providence—Following the change in Boston whereby the business of the Peerless Motor Car Co., Providence, R. I., was turned from a factory branch to an agency, the business in Rhode Island has also been transformed. At Providence there was a sub-branch identified with the Boston one, and now this has become an agency. J. W. Breese, who was manager, having bought out the business on his own account. He has moved the ouarters from 37 Chestnut street to 27 Snow street, where he shares salesrooms with the J. C. Tucker Co., with service station in the rear.

Recent Incorporations in the Automobile Field

New York

NEW YORK—P. J. Durham Co.; capital, $10,000; motor cars. Incorporators: Percy J. Durham, 255 W. 55th street; Henry A. Maslin, 1122 Finlay avenue; Frederick C. Wulf, 707 Gates avenue, Brooklyn.

NEW YORK—Elite Taxicab Co.; capital, $10,000; Incorporators: Anna M. Dwyer and John F. Dwyer, both of 1080 Bryant avenue; Frank J. Dwyer, 418 West 14th street.

NEW YORK—Famous Packard Auto Renting Sorporation; capital, $5,000. Incorporators: Charles J. Clavin, 317 West 44th street; Theresa V. Moore and Joseph Clavin, both of 668 8th avenue.

NEW YORK—Goodyear Tire & Rubber Co.; capital, $1,000; to represent the Ohio corporation in Eastern United States and deal in its products. Incorporators: James W. Hobbs, 1972 Broadway; George Morris and Francis K. Raynor, both of 115 Broadway.

NEW YORK—Holt-Welles Co.; capital, $50,000; motor car supplies, etc. Incorporators: Calvert Holt and Edward H. Stickels, both of 1790 Broadway; Paul Welles, 463 West street.

NEW YORK—Monmouth Garage; capital, $10,000. Incorporators: Henry R. Wohlers, Franklin J. Griesbeck and John S. Johnston, all of 140 Broadway.

NEW YORK—Overland Service Station; capital, $1,000; general motor vehicle business. Incorporators: John Q. Bachman, 293 Webster avenue; George V. Harriman, 355 West 56th street; Edward F. Stoeckle, 354 West 56th street.

NEW YORK—Reliable Tire & Supply Co.; capital, $5,000. Incorporators: Bluma Sekoson and Estelle Sekosen, both of 934 East 179th street. Louis H. Lax, 429 West 30th street.

NEW YORK—Shears Selling Organization; capital, $20,000; motor cars. Incorporators: James E. Taylor, Theodore C. LeFevre and M. H. Briggs, all of 30 Church street.

NEW YORK—Spar East Co.; capital, $60,000; motor car supplies, etc. Incorporators: Alec H. Seymour, Roy E. Hallock and William H. Natter, all of 27 Pine street.

Ohio

AKRON—Akron Tire & Tube Co.; capital, $10,000; to manufacture tires, tubes, etc. Incorporators: L. L. Hunsicker, L. E. Hunsicker, W. C. Diemer, C. E. Smith and J. Diemer.

CELINA—National Mutual Automobile Insurance Association. Incorporators: L. M. Murlin and others.

CLEVELAND—Cleveland Electric Motor & Mfg. Co.; capital, $10,000; to manufacture electric motors, etc. Incorporators: W. K. Stanley, Samuel Horowitz, G. R. Brown, P. A. Prentice and J. R. Jewitt.

JEFFERSONVILLE—Jeffersonville Auto Co.; capital, $8,000; to deal in motor cars. Incorporators: W. W. Williams, F. E. Wilson, J. C. Creamer, G. E. Straley and M. F. Hudson.

SPENCER—Spencer Mfg. Co.; capital, $50,000; motor cars. Incorporators: C. R. Aldrich, J. J. Christy, J. H. Firestone, P. J. White and G. W. Hartman.

Oklahoma

OKLAHOMA CITY—Oklahoma Overland Motor Co.; capital, $20,000; to deal in motor cars. Incorporators: Sam Johnson, Edgar C. Johnson and J. Rooney, all of Oklahoma City.

Accessories for the Automobilist

OAKES Beartone Horn—A new horn has been brought out by the Oakes Co., Indianapolis, Ind., called the Beartone combination fan and horn. The horn, Fig. 1, is of the regulation diaphragm type and is mechanically operated. The diaphragm is fastened to the central portion of the cooling fan assembly and rotates with it. Inside of the fan support is placed a stationary piece which causes the diaphragm to vibrate when it is brought in contact with the latter. This stationary part is operated by a small lever shown at the back of the fan bracket. A button or small lever on the steering column is sufficient to operate the horn. The horn has several unique features. It cannot be operated by mischievous children when the car is standing if the motor is dead. The tone may be varied by the pressure of the button—strong on the country roads and low in the city.

Sly Tire Holder for Ford Cars—A tire holder, Fig. 2, combined with a lamp and license pad holder, and which is equipped with a lock has been announced by the New Era Spring & Specialty Co., Detroit, Mich., for Ford cars exclusively. The material is pressed steel. The license pad support is a cross piece at the top and the tail light support takes the form of an extension at one side. The attachment is simple and can be accomplished in a short time. No drilling is required as the device is held in place by clamps. The illustration shows rods running to the top holder, but this construction is not entirely necessary, as the concern supplies another means of attachment which fastens under the rear spring center bolt. For wire wheel carriers an offset cross piece is necessary to clear the wheel hub.

The price of the double holder for 30 by 3½ tires is $5, and for 31 by 4, $6, both being for rear attachment.

Beers Lantern—A lantern, Fig. 3, for use about the car has been brought out by the Beers Sales Co., Bridgeport, Conn. It uses a dry battery as its source of current and it is stated that it will give 50 hours of light on one cell, which costs approximately 25 cents. It sells for $2 with black rubber finish, $2.50 with polished brass and $3 with solid brass, nickel plated.

Van Sicklen Speed-Meter—Two speedometer models will be offered for 1915 by the Van Sicklen Co., Aurora, Ill. One of these is for cars in the Ford class and the other, Fig. 4, for larger cars. The former sells for $12 and the latter for $20. The Ford model is a bracket type and is adaptable to any machine with a 30-inch wheel. The larger model may be had in either flush or bracket designs and may be driven from the rear of the gearset or the front wheel, as desired.

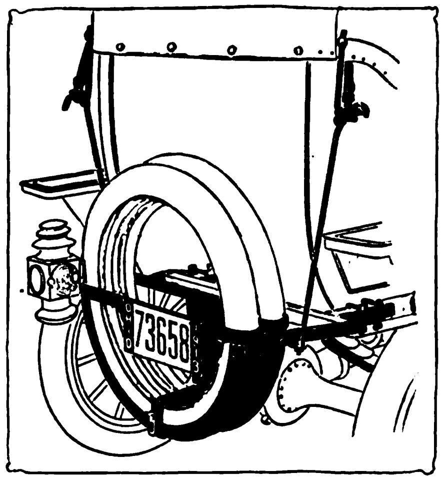


Fig. 2—Sly tire holder for Ford cars

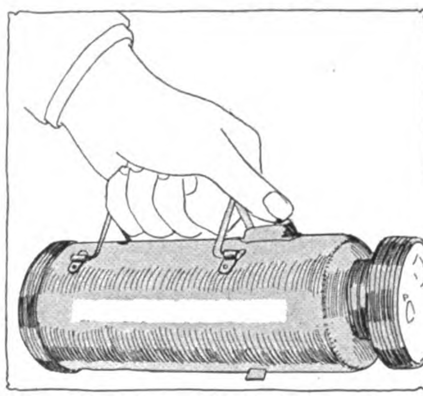


Fig. 3—Beers lantern which uses a dry cell

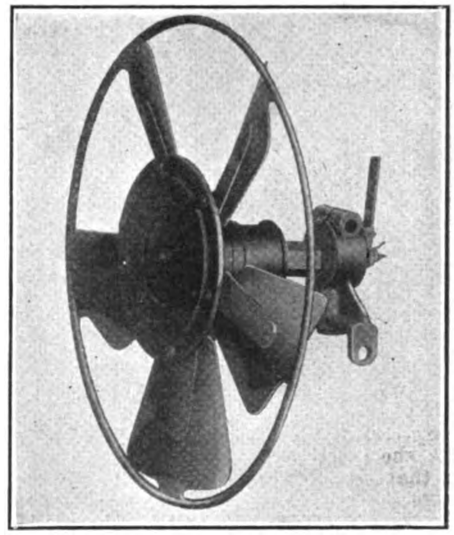


Fig. 1—Oakes Beartone fan horn

No mechanical changes have been made in the Van Sicklen, which operates by air, but several changes have been made in the exterior. The size of the figures on the dials has been increased and a broad collar has been added to the larger instrument which allows it to be mounted flush. The season odometer registers 100,000 miles and the trip 100 miles.

The feature of the new Ford design is the driving gears. Crown type gears are used and these allow perfect meshing even when the wheel is out of true. It is said that they will not clog with mud and will not rattle or grind.

Where the front universal is exposed, drive is taken from this point, a specially designed and deeply grooved hobbed pulley locking positively to the member to which it is applied. The hobbing in the drive and driven pulleys is of the same pitch as the coil of the endless wire belt used and allows no slippage, it is said.

Hoover Shock Absorbers—To meet the demand for a shock absorber for cars up to 1,500 pounds, the W. H. Hoover Co., New Berlin, Ohio, has put on the market the device shown in Fig. 5. It is similar to the ordinary Hoover shock absorber except that it is smaller and instead of a buckle the straps are held by a small bolt. The price per pair is $5. The leather straps are guaranteed not to be affected by heat, cold or moisture and are said to be very durable.

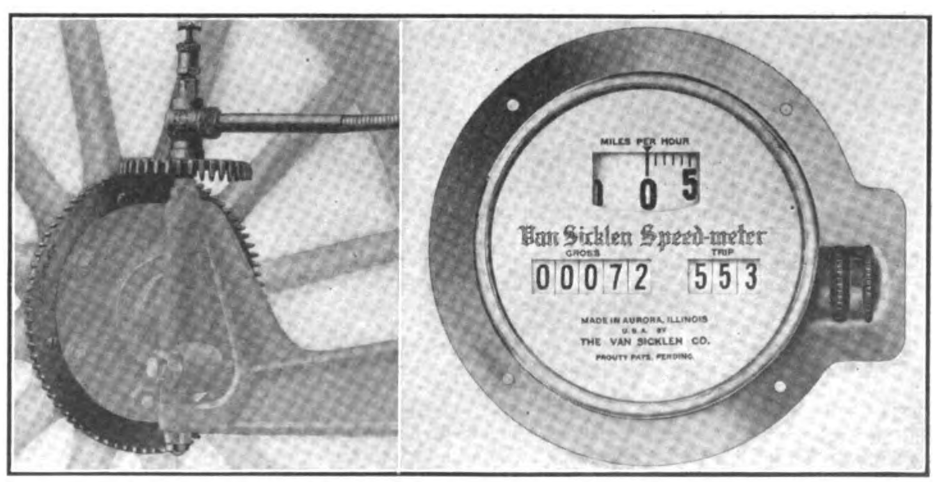


Fig. 4—Left—New Van Sicklen speedometer gear drive. Right—Flush type Van Sicklen speedometer

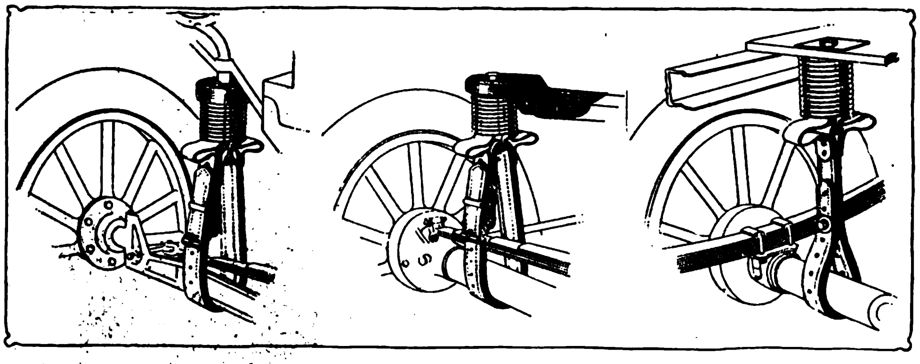


Fig. 5—Left—Hoover shock absorber for Ford cars showing special fittings to make attachment easy. Right—Shock absorber for cars up to 1,500 pounds

Special fittings are now furnished with the shock absorber made for Ford cars so that attachment is simplified. At the front the shock absorbers are attached to the lamp brackets and at the rear to the frame. These cost $7.

Sword Piston Ring Remover—A simple piston-ring remover which prevents breakage of the rings is being manufactured by the McKay-Lees Co., New Haven, Conn., and sold for $1. This tool, shown in Fig. 6, has two jaws at its end, these coming into engagement with the ends of the ring. Then by bringing the handles together the ring is spread so that it may be slipped over the piston.

Gray & Davis Ford Lamps Are Extra—In the description of the Gray & Davis starting and lighting system for Ford cars, appearing in THE AUTOMOBILE, November 5, pages 872 and 874, some readers gained the impression from the last paragraph that the electric head and tail lights were sold as a part of the complete equipment, which was not intended. The complete equipment, as stated, includes a dynamo, motor, 6-volt battery, wiring and the necessary connections. The lamps are extra.

Popp Co. to Market Welding Outfit—The M. L. Popp Auto Repair & Mfg. Co., 316 Thirteenth avenue, Milwaukee, Wis., has perfected a portable welding and cutting outfit of the oxy-acetylene type and is now arranging to market it. The outfit consists of a 40-gallon oxygen tank, a 3-gallon oxy-filter tank; an oxygen generator, gasoline furnace for heating the generator, and a Prest-O-Lite tank, the whole being mounted on a roller platform. The apparatus lists at from $45 to $125, depending upon size and capacity.

Vitalite Tires—Rubber tires which are guaranteed for 5,000 miles are made by the Vitalite Rubber Co., Woolworth Bldg., New York City. The particular feature which gives long life in this tire, it is claimed, is the vitalized rubber used in the tread. The tread stock is a compound from which nearly all the sulphur has been eliminated. This compound will vulcanize before the duck and friction are injured by the high heat.

Cutler-Hammer Dimming Switch—Fig. 7 shows a new headlight dimming switch with flush plate, developed by the Cutler-Hammer Mfg. Co., Milwaukee, Wis., and which supersedes this company's former combination of three gang switch used for series-parallel dimming control.

This new series-parallel switch is smaller and gives the two combinations as follows: Headlights bright and tail, and headlights dim and tail. Pulling out one button gives the dimmer combination, connecting the two headlights in series

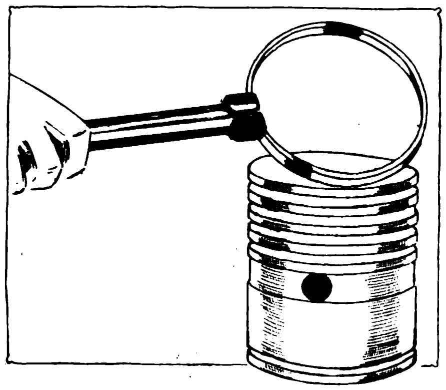


Fig. 5—Sword piston ring remover

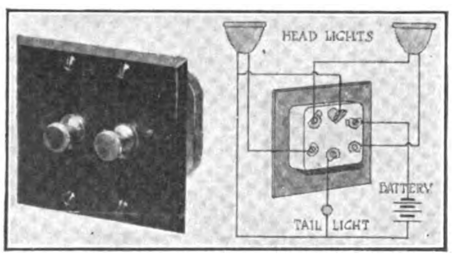


Fig. 7—Cutler-Hammer dimming switch

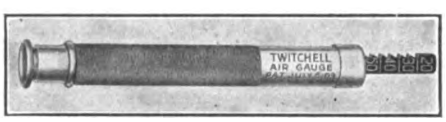


Fig. 8—Twitchell positive tire pressure gauge

and tail light individually across the battery or generator terminals. Pulling out the second button connects the two headlights in parallel, the tail light remaining connected as before.

This switch can be used on 6-volt circuits or on 12-volt, three-wire circuits using 6-volt lamps.

A quick-make and quick-break type mechanism is used and easily wired cupped washers are provided for making the terminal connections on the rear. The cupped washers prevent vibration from loosening the connections and where stranded wire is used all strands are held permanently in place. The switch mechanism is enclosed in a dustproof metal case and terminal connectors are mounted on a quarter-inch block of Pyroplax—a fireproof insulator.

Flush plates can be furnished in a number of finishes. The plate in the illustration is dull black which has proven a very popular finish. When the push-and-pull buttons are in the normal position, as shown, the switch is open. To close the circuits the buttons are pulled out. There is no danger of running down the battery by accidentally closing the circuit in the daytime when the lighted lamps would not be noticed. The position of the button, whether in or out, can be readily detected by the fingers alone when the switch is installed out of sight. Where desired this new series-parallel switch can be connected with other switches controlling side lights, speedometer and license lights.

Twitchell Tire Gauge—The new gauge, Fig. 8, made by the Twitchell Gauge Co., 1200 Michigan avenue, Chicago, Ill., has an indicator bar which automatically locks at any point of pressure, making inaccurate reading impossible. The gauge is very simple, consisting merely of a leather packed plunger attached to the indicator bar and moving in a small metal cylinder. The outward movement of the plunger is resisted by a coil spring. When this gauge is placed over the valve stem of the tire the piston is forced out and the rod indicates the correct pressure, the rod being held in this position by saw-tooth notches which catch in the edge of the casing. After the pressure has been read, the tooth of the indicating rod which is holding it in place is pushed out of engagement and the rod flies back. The gauge is guaranteed for 1 year and sells for $1. It is easily read because the figures are large and white on a black background. On account of its peculiar base the new valve may be held at any angle. In the dark it may be read by counting the notches.

Hoyt Pocket Multimeter—A new instrument, Fig. 9, comprising a voltmeter and ammeter in a single case, the face of the ammeter being on one side and that of the voltmeter on the other, has been announced by the Hoyt Electrical Instrument Works, Penacook, N. H. The whole device is only 2¼ inches in diameter and 1¼ inches thick, and it permits of both voltage and current measurements being made simultaneously but without the trouble of two instruments.

The instrument is of the moving coil type, jewel bearings being used. The prices vary from $10 for the 10-volt, 15-ampere type to $24 for the 40-volt, 40-ampere type. Practically all ranges and combinations may be had.

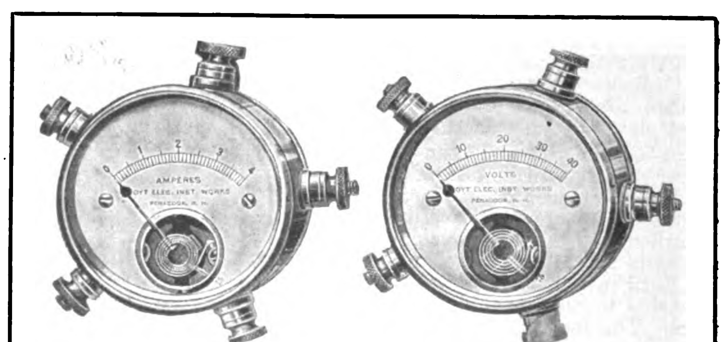


Fig. 9—Hoyt pocket multimeter, showing ammeter on one side and voltmeter on the other

VOL. XXXI NEW YORK—THURSDAY, NOVEMBER 26, 1914—CHICAGO No. 22

The AUTOMOBILE

Army automobiles and Belgian refugees on the main road into France not far from the scene of actual fighting

On the Belgian Frontier

Military Cars and Trucks in Endless Lines—Private Traffic Abolished—Rigid Regulations—Ruined Roads

By W. F. Bradley
Special Representative of THE AUTOMOBILE
with the Allied Armies in France

ON THE BELGIAN FRONTIER, Nov. 5—Over deserted highways we sped through Normandy, charmingly beautiful in its autumnal cloak. Automobiles are too useful to be allowed to expend their engeries haphazard; they are too dangerous to be given full liberty.

The military authorities have sought to abolish all private automobile traffic, and as ours was a civilian mission we had first of all to be put through the double sieve of a military and civil interrogation. When the police inspector ushered us out of his private office the little he did not know about us was hardly worth knowing. But this was not sufficient to give us the freedom of the road. Two hours later we had to appear, hat in hand, before a military board of five officers who questioned and cross questioned us as if anxious to worm out some of the hidden secrets of our lives. Then were we free to travel over some of the deserted highways of France.

The author, W. F. Bradley, driving a Belgian officer near the firing line

Train Service Off

Motors are not the only restricted means of locomotion. When the train service is needed by the army the public has to wait—or walk. Thus, in a certain quiet township a farmer begged a lift to his home 20 miles away. When we had been assured that there were no military posts on this portion of the road, he was taken aboard. He got out on the outskirts of the town, so as to avoid passing before the guards, for however honorable he might be, it was forbidden for him to ride in a car without a special military permit. In half an hour he had covered a dis-

At the left are shown some of the French and Belgian soldiers on the road near Furnes, Belgium, near the firing line

At the right is a German automobile wrecked by Belgians on the canal side near Dixmude

Below is shown one of the Red Cross motor ambulances after it was struck by a shell

tance which would have necessitated 6 or 7 hours steady tramping. At a railroad grade crossing we came upon the cause of the suppression of his ordinary means of travel: a troop train, drawn by two powerful American engines, and carrying English horses and men to be flung into the great battle line on the northeast frontier.

At nightfall shelter was sought in a second-rate hotel of a small French town. The law forbade us as civilians to travel after sundown. The occupants of three military cars dined, lit their lamps and went forth into the darkness while we climbed a narrow staircase to an old-fashioned bedroom.

War's Miseries

Poets sing of the glory of war; travelers along the highroads see little but its misery. Climbing a hill into a big village square we came upon hundreds of refugees and scores of long, lumbering farm wagons filled with household goods, old men and women and children. They were Belgian peasants who had fled from their quiet farms and peaceful villages as the German hordes swept in.

There were few valid men among them, for the army had claimed them. They told pitiful tales of their houses razed before their eyes, their cattle driven away, members of their community driven off as hostages, of long marching, of nights spent in barns, or sleeping in their wagons by the roadside. French gendarmes had taken in hand these human derelicts and were passing them on from town to town to districts where they could find employment and the necessaries of life.

Devious Routes Followed

By devious routes, so as to avoid the main roads which might have been congested with army convoys, we worked our way towards that northeast corner of France where British, French and Belgians were endeavoring to drive back the innumerable forces of Germany. A village street was filled with women wending their way to church; they were all in deep mourning and not a man among them. There were more villages, deserted by all but women and children; valleys and hillsides were as quiet as the grave. Of military preparations there was not a sign.

Into the War Zone

Suddenly, from a thicket by the roadside a soldier stepped forth, raising his rifle with a meaning that could not be mistaken. We had entered the area occupied by the French and Belgian armies. The pass was examined carefully, the photographs it bore being compared with our features before we were allowed to pass into the war area. At various intervals, which might be from .5 to 3 miles, the same operation was gone through. French soldiers gave way to Belgian guards, then to Frenchmen, then again to Belgians. We were in the level dyke country, cut up with canals along which clumsy barges were towed by men and sometimes by mere girls. The roads were crowded with Belgian soldiers—the remnants of a gallant army which had been sent to the rear to reform for more desperate resistance.

The Three Armies

We had plenty of opportunities of judging the temper of the three nations united in their stand against the forces of the Fatherland. The English were authoritative, their officers haughty; the French were suspicious, their officers studiously correct; the Belgians were kindly, their officers hearty.

At one of the posts Belgian soldiers barred our path. The sergeant in command frankly stated that he was not satisfied as to our right to be in the military area; but he put his objections in such a gentlemanly manner, he was so courteous, that it was a pleasure rather than otherwise to be questioned by him.

10 Days in the Trenches

A few miles further on, at a turn of the road where our direction seemed doubtful, we came upon a group of four Belgian soldiers and two gendarmes. Two of the men being sick, we offered them a seat in the car, and at the same time took over the rifles and kit of the others, promising to deposit all at the next village. After 10 days in the trenches, without being able to lie down to sleep, never a wash, with food passed on to them at night, our two passengers looked more like scarecrows than soldiers. They were both volunteers, mere youths, whose homes had been wrecked, whose parents had been scattered, and who were fighting with the desperation of men who had nothing more to lose and everything to gain.

War's Steel Bands

Travelers, whether on foot, drawn by horses or propelled by gasoline, could not get into the important frontier town of A— until they had been individually examined. To get out again was even more difficult and probably we should have been there still had it not been for the kindly intervention of the Belgian authorities who gave all necessary passes to travel through the small portion of their territory still withheld from the enemy.

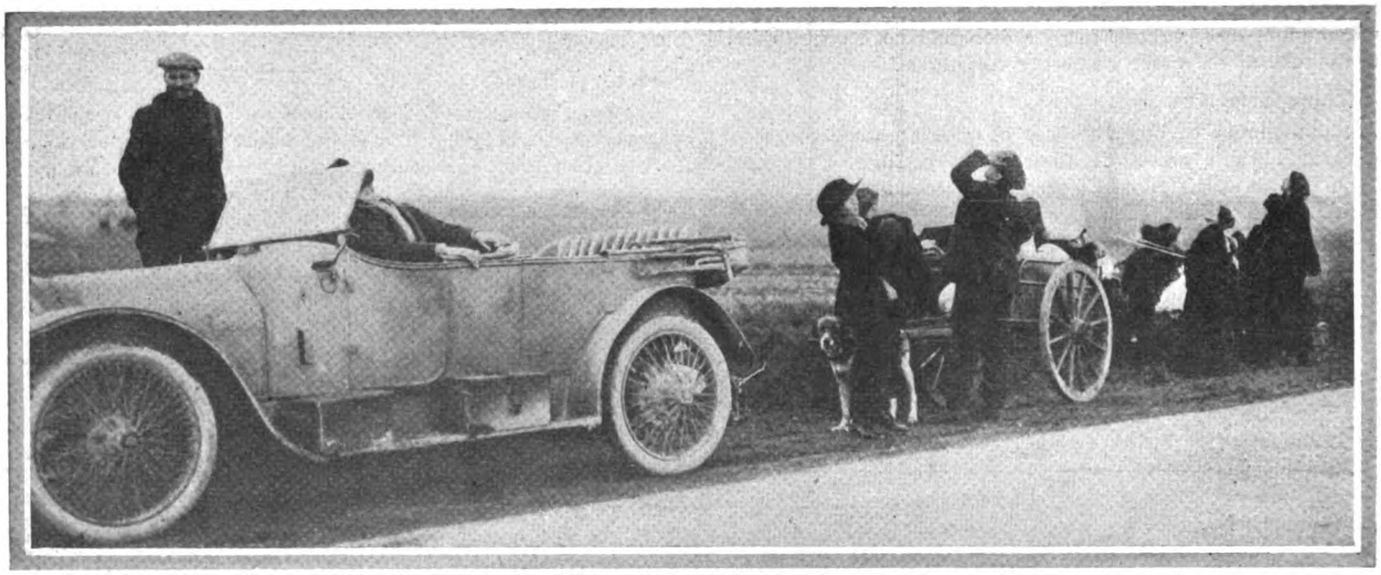
The Ruined Road

It was a Sunday afternoon. On the immediate outskirts of the fortified town well dressed burghers were making a pious pilgrimage to the cemtery and were depositing wreaths in memory of many who lay in unknown graves. To the

Above is illustrated a Belgian signalling car and German bicycles abandoned in the battle of the Yser

At the left a scene on the road outside Furnes. The Belgians have a little lamb

Left—A Belgian armored car on the battlefield near Ypres, Belgium. Right—A Belgian armored car in the battle of Yser



Belgian refugees on the road from Furnes to Dunkirk, watching a German aeroplane maneuvering above the frontier

northeast the steady boom of the cannon could be heard. On the main road running by the side of the canal there was such a variegated collection of human beings, of animals, of vehicles, of material, as only war can produce. It had once been a well-kept highway. But war material had rumbled along it, thousands of hoofs had loosened its surface, thousands of feet had trampled it into a bed of mud. Along the center the going was fairly good, but this passage was barely sufficient for two cars, and on each side were mud bands with holes from a few inches to a few feet deep.

Endless War Line

The procession of military automobiles was unending. As they passed one another they skidded and swerved in the mud baths, rocked ominously, but kept on their course. The war found Belgium without any great number of motor trucks, but with a good stock of touring cars. These machines have been taken and put to the most widely different tasks. Handsome limousines built by Van den Plas and D'Iteren carried staff officers; equally handsome cars were filled with raw meat, packed to the roof with bread loaves, carried fodder for the horses, saddles, ammunition, oil and gasoline—everything which can be useful in war.

A wayside meeting—French and Belgian soldiers chatting with the representative of THE AUTOMOBILE

Take the automobiles on Fifth avenue, New York, when traffic is most intense, leave a few of the best cars untouched, set a band of ruffians to work on the others, bespattering them with mud, breaking the lamps, smashing the mudguards, tearing the hoods, delving the panels, smearing the upholstery, and you will have some idea of the state of the cars used in the Belgian army.

Such a condition of affairs is only a natural consequence when one considers the fact that these cars and trucks are most often driven by men who are not only unfamiliar with the construction and operation of the vehicles they are called upon to handle but many of whom are volunteers absolutely without experience in work of this character. It is greatly to be regretted that such is the case as there are plenty of men shouldering rifles, digging trenches, etc., who have had ample experience which is now absolutely wasted. The British army has attacked the problem in a more systematic way with the result that its motor transportation is much more efficient and much less wastefully administered than is the case in the other armies.

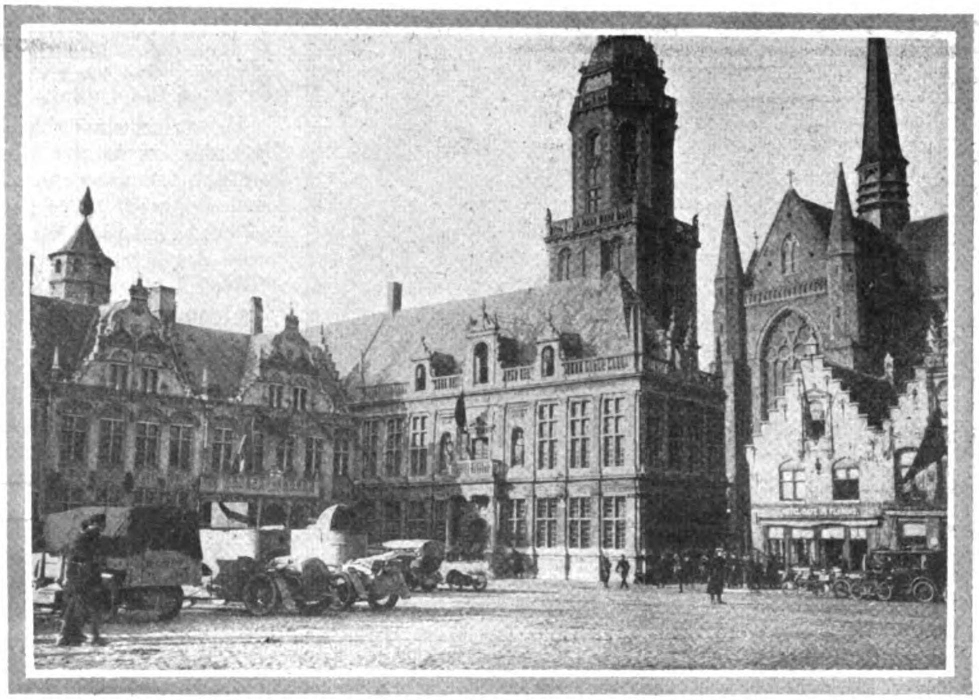
American Cars Used

Evidently the Belgian supply of cars has not been sufficient for the army's needs, for dozens of Overlands were noted in the convoys, occasionally a Maxwell was seen and staff officers occupied a Packard. It is obvious that touring cars are not the best vehicles for the various services to which they were put, but it was remarkable to note with what success the cars built for passenger carrying work were doing duties as varied as carrying King Albert and transporting barbed wire to the front.

England, France and Germany have special types of cars for special kinds of work, each machine being the result of careful thought and study. Belgium, plunged into a defensive war with no warning and little preparation, has had to rely on her touring cars —and has reason to be proud of them. King Albert's army has lost most of its cavalry, it has few transport horses, but it is feeding itself and moving itself in a wonderful manner by means of touring cars.

Belgian Armored Cars

There is another use to which the Belgians have put their more powerful touring car chassis. Minervas, Savas, Excelsiors and Pipes, in particular, have been fitted with a machine gun and armor plating, and have done excellent service in the recent operations. There is nothing at all special about the chassis, and even the armor plating is not a difficult matter. Steel plates of not less than 5 millimeters thickness are built around the chassis, forming a single compartment in the center of which the gun is pivoted. In some cases a revolving turret is fitted, while others merely have a shield in front of the gun, and of course revolving with it. The driver occupies the most central position in the machine and is practically immune from attack except on the complete destruction of the vehicle. He has a view straight ahead through a hinged shutter and in addition has a small port on the right, level with his head.



A scene on the historic market place at Furnes while the Belgians were in possession

In Bombarded Town

Germans were bombarding the town of Furnes when we ran onto the beautiful and historic marketplace. It was a curious situation; the weather was ideal; the big square was filled with armored cars, touring cars, and light trucks; French and Belgian soldiers marched through from time to time; officers came and went in cars; American and English newspapermen, driven out by the French and English, found shelter in the Belgian town and marched up and down with camera in hand; refugees with their scanty belongings on bicycles, on wheelbarrows, on frail carts drawn by a dog or a donkey, hastened westward; idlers stood at the street corners—and suddenly a shell burst over the town, coming from nobody knew where.

King Under Fire

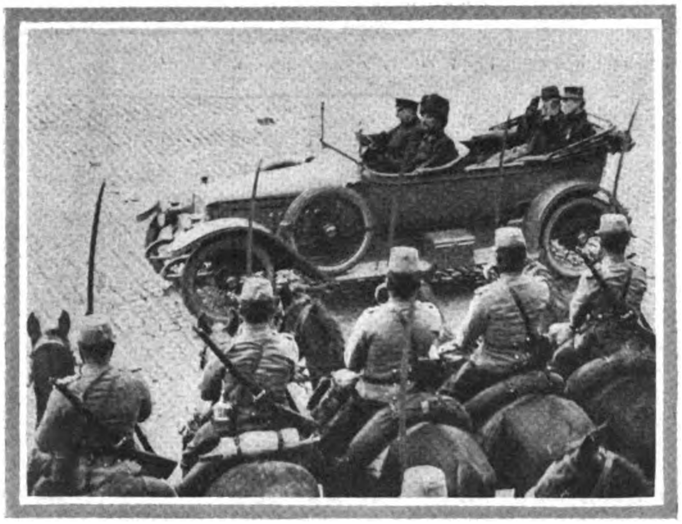
The aim was indifferent for a couple of hours; then the Germans seemed to get the range, for a shell fell on the roof of one of the houses, within 20 yards of where King Albert was standing.

At the top of the tower, built in 1628, and which was being used by the Germans as a target, observers finally got the location of the battery. A force was sent out and within a couple of hours the guns had been silenced and sixty German prisoners were being marched across the square escorted by Algerian cavalry. The guns had been hidden in a farm when the enemy was forced to retreat and a small force had moved forward to operate them until ammunition was exhausted. The soldiers were captured and the civilians who had allowed the farm to be used were shot.

The Retreat

As evening closed in we ran back to French territory over a road blocked with every kind of traffic. Belgian artillery was being sent to the rear, and hundreds of refugees were taking advantage of the gun carriages to set their various bundles on them and walk by their side. Every class of society was represented, from the peasant in rough sabots carrying some clothing tied in a dirty bed sheet, to the comfortable bourgeoise in furs and jewelry. There was no

Moving forward—Belgian automobilists and cyclists on the main road to Ypres in the forward movement of the Allied armies



President Poincairé and the King of Belgium reviewing the Franco-Belgian Army

whining or complaining. A man with a big black trunk on a wheelbarrow, his wife bending under a heavy bundle, and each of his four children carrying some domestic article, stopped to relate to a group of soldiers how he had decided to move when a shot had gone right through his house.

Injured Cars and Trucks

French long range artillery moved forward at a brisk trot, accompanied by their ammunition wagons surmounted by jet-black African soldiers who looked cleaner than most of the Europeans and certainly displayed more boyish glee. A wrecked German touring car lay directly across the bank with its radiator but a couple of feet from the canal. It had attempted the previous evening to get through to French territory. One of the new French four-wheel-drive tractors had taken fire and was being stripped by the mechanics of all the parts which might serve for companion machines. Cattle were being driven rearwards by Belgian soldiers who advised the motorists to "charge right in at them." In the country left and right of the road barbed wire obstructions had been erected, there were deep trenches behind, then further to the rear more trenches completely covered over.

Sleeping is always a delicate problem at the front. After some difficulty we discovered an attic with two beds in it, a window about a foot square and a roof so low that we could hardly stand upright. The furniture consisted of a broken chair and a dirty comb. As we examined it dubiously the landlady remarked, "Can't you be satisfied with one of the beds?"

All Cars Confiscated

During the night an order was posted in that town that all automobiles, of whatever kind, and without a single exception, must be presented to the gendarmes within 24 hours, under pain of confiscation. We decided to flee from that town. But there was no gasoline to be obtained. Without any warning the military authorities had confiscated the entire stock. After a thorough search we were able to pick up a gallon which a garage proprietor declared he had found in a touring car and to discover a gallon of benzol at a grocery store.

Just after crossing the frontier station into Belgium there was an imperative shriek from a Klaxon and a dozen handsome cars came round a bend of the road at a fast clip, driving all other users into the muddy side tracks. The cars carried King Albert of Belgium, President Poincairé, the French and Belgian ministers of war, Lord Kitchener and staff officers of the various armies. Shells had ceased falling at Furnes but were coming down 5 miles to the east. Even this was sufficient to bring many of the peasants back again to their fields and their houses.

Deserted Caterpillar

It was reported that the road was cut up by shells, so we left the car in the village apple market and moved ahead on foot, following the coast road, the possession of which was still disputed. Wreckage was plentiful. By the side of a cobble paved road lay a German motor truck which had been used for bringing infantry forward. In one of the partly flooded fields was a German caterpillar tractor used for hauling guns across country. It was of the same type as some of the machines used by the French farmers for plowing. The Belgians had opened their dykes and even the caterpillar had become embedded in the mud.

The hiss and clap of shells greeted us at frequent intervals, but such is modern war that there was nothing to indicate where they were coming from or what they were being fired at. When the branches of trees began to fall 30 yards away we thought it best to retire.

While we were doing so some of the famous French heavy artillery came up drawn by their four-wheel-drive gasoline tractors only introduced about a year ago. A couple of miles further back a score of Paris motor buses rumbled past, each one carrying forty men. Running past one of the French encampments near the Franco-Belgian frontier, we had an example of the extreme mobility made possible by the use of automobiles. A driver hailed us and proved to be a friend in the automobile business. Two days before he had been at the other end of the battle line, 200 miles away. Reinforcements were required at the North sea end and within an hour hundreds of cars and trucks had been sent out with officers, men, guns and ammunition.

The Rescue

The gasoline problem was becoming acute when luck intervened. A Belgian officer approached the group of which we formed a part and asked if any car was going back into French territory. We seized the opportunity, volunteering not only to carry him into France but to his final destination, about 50 miles away. With a military order the gasoline was forthcoming immediately, and in much less than 2 hours we had brought the captain a distance which it would have required 10 or 12 hours to cover by train.

It takes little to disorganize a railroad, while it is practically impossible to disorganize an automobile service.

That run gave us an opportunity to examine some of the London motorbuses in war paint. Daily newspapers long

Belgian cyclists resting on the roadside in their advance on the German lines ago worked up the story of a Hendon bus going into action with its "Glad Eye," "Come over Here," and other advertisement signs. Unfortunately for the newspaper men, the stories were released before the buses had got across the Channel. When they did come over they were hardly recognizable, for every word of advertising matter had been removed, they had been painted in a dull gray, the windows had been replaced by boarding, and the only decoration was a bouquet of flowers hung up by some Tommy where the service number usually appeared.

Automobile Corps for Canadian Guards

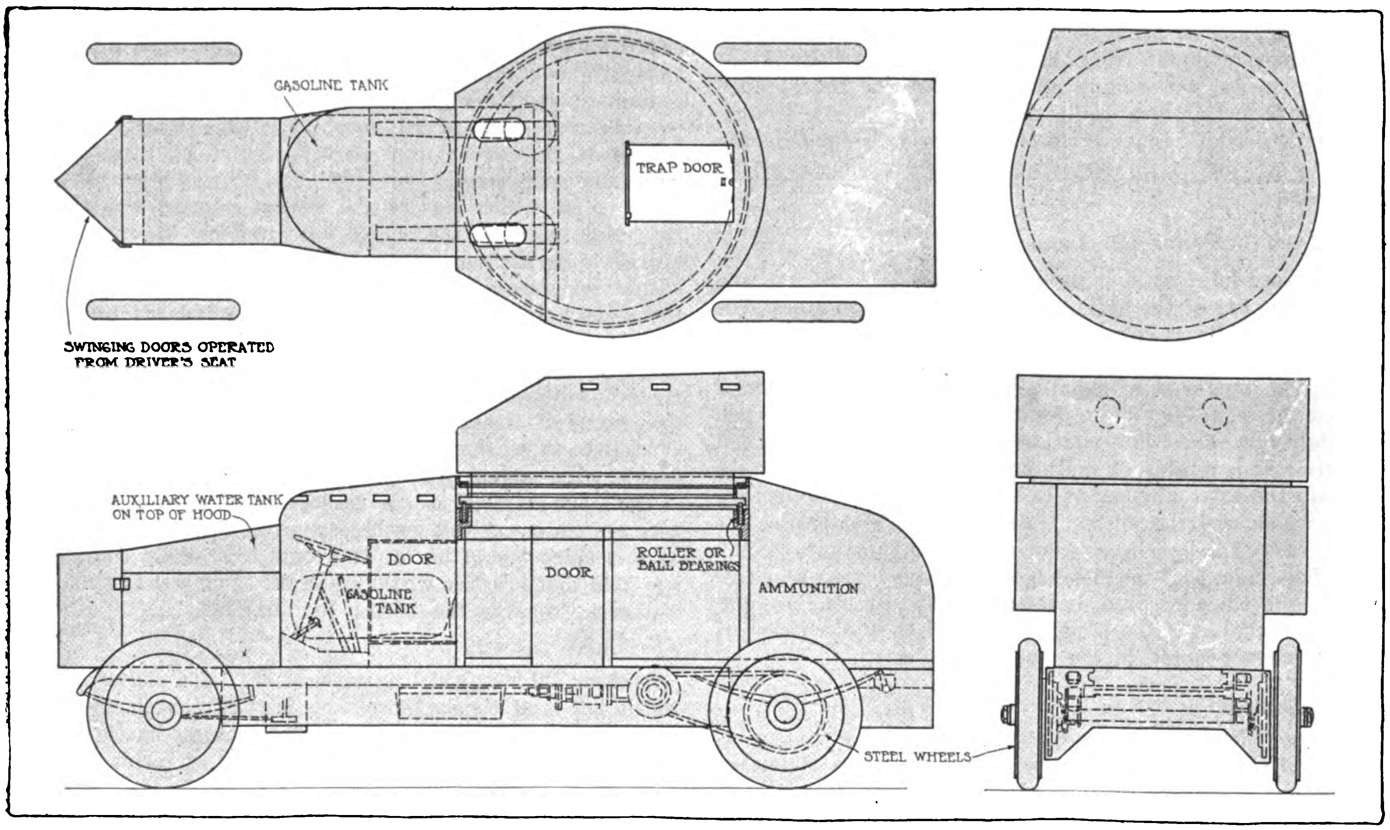
MONTREAL, QUE., Nov. 20—More than 1,000 automobiles are to be equipped by the Automobile Club of Canada to form a battalion in conjunction with the Home Guard. The club, taking into consideration the prominent part that automobiles have played in the war, yesterday proposed to J. N. Greenshields, chairman of the organization committee of the Home Guards, the formation of such a corps in the Province of Quebec. The committee, formed of H. W. Pillow, president of the club, Eugene Tarte, vice-president and A. McNamee, secretary, had an interview with Mr. Greenshields yesterday, and their proposition was enthusiastically received. A number of automobile owners of this city have already offered the use of their cars, and have also promised to equip them with machine guns, ammunition, medical apparatus or other supplies.

Ready for Border Raid

It is thought that with a thousand cars, the Home Guard could be transferred rapidly to any point at which the enemy might appear in force, especially should a raid be attempted from across the border. Plans have already been prepared for any contingency of this nature, although, naturally, they will not be made public. The directors of the club expect that their call will be met with a prompt answer from automobile owners in the city, and that by the end of the week the total number of cars registered will be over 1,000, ready for any emergency.

That aliens of enemy nationality who are to be interned as prisoners of war in Canada, should be put to work, breaking stones or doing other things necessary for building good roads was the suggestion made to General Hughes by an Ottawa delegation representing the Motor Assn. The suggestion was favorably received, but a definite answer was not given. The whole plan of what to do with such people is being reported on by General Otter.

An Armored Truck with Revolving Gun-Turret



As reported in THE AUTOMOBILE *for November* 19, *the Armored Motor Car Corp. has been organized and incorporated in New York City for the purpose of producing an armored truck mounting two machine guns in a revolving turret. The illustration gives a side elevation, plan and rear views of the truck and a plan of the turret, showing the various constructional features.*

J. H. Allen, organizer of the concern, has a patent pending covering the application of a revolving turret to a motor truck. The steel bodies will be built on contract and mounted on 2-ton Federal chassis. The two guns which are to be mounted will probably be Maxims firing 600 *shots per minute.*

Mr. Allen, in speaking of the field for such an armored truck, pointed out that under modern war conditions cavalry forces are practically useless for actual work on the battlefield or in reconnoitering under fire, as they are unable to withstand the terrible effects of high-power artillery and rifles. On the other hand, an armored car could not only pass practically unscathed through a withering rain of rifle bullets, etc., but could also do great execution with its machine guns. The revolving feature of the turret permits the fire of these guns to be directed against the enemy, irrespective of the direction in which the truck is traveling. The radiator is protected by swinging doors of armor plate.

Eight Cylinders Analyzed by S.A.E.

Nine Reasons for Success Advanced in Paper by D. McCall White—Standards Committee Hears Division Reports

NEW YORK CITY, Nov. 24—At the meeting of the Metropolitan. Section of the Society of Automobile Engineers held here tonight D. McCall White, of the Cadillac company read a paper on the high-speed, high-efficiency, eight-cylinder V-type engine. In it he divides cars into two classes, those used as a means of locomotion and those in which comfort and pleasure are as great in importance as infallibility.

Nine requirements of a successful design are advanced by the author; size, proportion, cooling, carburetion, lubrication, accessibility, simplicity, durability and manufacturing possibilities.

As regards size the eight is compared favorably with the four. The length is stated to be the same and the width but 2 inches greater. When these proportions hold true the power of the eight is 70 against 50 for the four. For the same power 50 per cent. more length is said to be needed for the six. The weight of the Cadillac eight is given as 50 pounds less than the previous four.

Better cooling efficiency is claimed because the distance of the rearmost cylinder from the radiator is less than in the six, thus giving the cooling advantages of the four. Each block of four cylinders is handled separately. As regards carburetion, one carbureter is claimed to give equal distribution when placed in the V, midway of the length of the cylinders.

Force Feed for Bearing Surfaces

Force-feed lubrication is used for all bearing surfaces and the average life of the bearings is given as 30,000 miles. The same accessibility is offered as for the four, all ordinary fittings and adjustments being reached by simply raising the hood. The argument of simplicity which has been advanced against the eight Mr. White disposes of by stating that when roadability is taken into consideration the difference is not material; and, insofar as main bearings are concerned there are only the same number as in a four. Durability depends on vibration and the author claims that in eliminating the latter, long life has been secured. As for manufacturing costs, he admits that the six is less expensive but as an offset mentions the cheaper crankshafts, camshafts, etc., on the eight.

The remainder of the paper is devoted to a discussion of the practices adopted in the Cadillac eight.

Paper Discussed

R. McA. Lloyd opened the discussion by stating that in his belief the Cadillac eight is a step in advance in American engineering practice. He pointed out that in this motor only 4 cubic inches per horsepower are used against 7 or 8 heretofore. But Mr. Lloyd doubted the necessity of such an amount of power.

Regarding gasoline economy, Mr. White stated that he had secured as high as 22 miles to the gallon with the eight and that it seemed to be better in this respect than the four.

A. F. Masury of the International Motor Co., who has had some experience in the manufacture of eights said that he believed difficulties might be found in the want of intelligent handling of the eight in the repair shop by men who were unfamiliar with the timing, etc. Henry M. Crane of the Crane Motor Car Co. expressed himself as not sure that the European trend of motor design is best.

In response to questions put by various members, Mr. White stated that the weight of the reciprocating parts was less than in a four of corresponding displacement, that the balance in practice worked out to the almost total elimination of vibration and the corresponding life of the motor was thereby increased.

The discussion was closed by David Beecroft who pointed out the broader meaning of the field of the eight. He stated that he did not feel that there should be a landslide towards the eight. but that it would be always with us to fill its particular niche in the industry, just as the four would fill its place.

Fourteen Divisions Report at Standards Convention

NEW YORK CITY, Nov. 19—Materially advancing the standards work which will be reported to the meeting of the Society of Automobile Engineers at their winter session in January, the standards committee 3-day convention closed here today. During the meeting the reports of fourteen divisions were heard and seventy-six members of the committee registered at the S. A. E. headquarters. The meeting was open to all members of the society and the standards discussions were participated in by them as well as by the committee.

The topic which was of the utmost interest was that of the single wire vs. the double wire systems for use in connection with electric starting and lighting installations. It will be remembered that at the summer meeting at Cape May the society as a whole as well as the standards committee was deadlocked regarding the advisability of advancing the single wire installation with grounded return as recommended practice. This discussion was again taken up and the results of investigation made by the division showed that more than twice the number of cars that are fitted with the double wire system will have a grounded return. In view of the large majority of car makers which favored the single wire system it was felt by the committee that the best method of procedure would be to let events take their course. It was held that practice would reach the same end as standardization as regards the wiring installations.

Headlights Discussed

Another subject, which in view of the wide discussion and legislation is of timely interest, is that of non-glaring headlights. The division dealing with this subject has appointed a sub-committee to investigate the opinions of various municipal and state authorities as to what constitutes glare. It was felt that in view of the chaotic difference of opinion which now prevails it would be far more wise to really determine what were the objectionable features of the so-called glaring headlights before attempting to adopt means of eliminating the rather vague quality of glare.

In the opinion of the division there are at present three successful methods of reducing glare. These three methods have been taken from the basic ideas of the various devices which have been presented to the society for testing purposes at the various section meetings and also those which have been widely advertised. Probably the most prominent of these methods is that in which the light is streamed so that the intensity of the rays is diminished either altogether or in the line of direct vision. Again there is the method of reducing the amount of illumination by some such means as double bulbs, a resistance in the lighting circuit or series-parallel switches. The third method is that in which the light is deflected without affecting the total number of illuminating units.

Measuring Glare

It is the intention of this division to work towards a standard method of determining the quantity of glare. It has been reasoned that if it would be possible to standardize a method of measuring the amount of glare upon some standard form of lighting diagram, it would be possible to measure all lights according to this diagram and then ultimately to incorporate the legal amount of permissible glare in the laws dealing with this subject. This would give a definite standard to which lamp manufacturers could work and would also tend to form a desirable uniformity in lamp legislation.

Another suggestion of this division is in the nature of the nomenclature of lamp parts. To avoid the confusion which undoubtedly exists between the terms lamp and bulb the division proposes the following definitions:

Bulb—That part of the detachable electric light-giving unit comprised of a filament and its glass envelope and base.

Lamp—The fixture for mounting and utilizing the light of the bulb.

The work of reducing tire sizes was also continued at the meeting. The pleasure car wheel division submitted a report at the last summer meeting in Cape May in which the number of tire sizes was cut to eight regular sizes. It was suggested that the 36 x 5 size be added to the list and considerable discussion hinged upon this point. The matter was finally dropped and will be brought up again for discussion at the winter session. The stumbling block that the division has now discovered on this part of the work is whether or not the oversize tires should also be published in the list of standard tire sizes.

It was argued that the ordinary sizes are proper for all ordinary purposes and that the oversize is only required where some exceptional work is anticipated. Some of the members of the committee on this account took the stand that the makers would begin fitting these tires as regular equipment owing to the fact that they could procure them in quantities almost as cheaply as they could the smaller size and this would deprive the purchaser of his option of larger tires. The bad result of this is that it would force the user to use larger tires than he needed for ordinary work with the resulting poor efficiency in gasoline consumption and to waste power in driving the heavier wheels without gaining additional benefit.

Standardize Inflation

The pleasure car wheels division is going to have something to say in a short time on tire inflations. A standard table of inflations for tires of different sizes will be adopted and in this table will be given what the committee deems the desirable inflation for all-around work. While the table has been compiled it is still under consideration and will not be acted on at present. The tire sizes that the division is now working on are as follows:

SIZE	OVERSIZE	SIZE	OVERSIZE
30 x 3	31 x 3½	34 x 4	35 x 4½
30 x 3½	31 x 4	34 x 4½	35 x 5
32 x 3½	33 x 4	36 x 4½	37 x 5
32 x 4	33 x 4½	38 x 5½	39 x 6

In addition to these there is a 36 by 5 with the 37 by 5 1-2 oversize which has not yet been agreed upon.

Considerable attention was given to the tires for commercial vehicles. Owing to the fact that wheel trouble has been experienced by commercial car makers it has been found necessary to alter the dimensions of S. A. E. felloe bands. The discussion brought out that a number of makers felt that the trouble was due to the thin band which offered insufficient support for the wooden felloe. An increase in the band of from .25 to .375 inch was considered desirable.

The discussion which followed this suggestion brought out that in the larger tires, for instance where 6-inch dual tires and over are used there is some question as to the advisability of increasing the thickness of the felloe bands as much as 1-2 inch. The amount of metal which it would be necessary to add in order to effect this change would so seriously increase the weight and the cost of manufacture that it would be almost as cheap to buy an entire metal wheel instead. The discussion hinged about the technicalities of wood wheel manufacture and brought out that there are often imperfections in the design and manufacture of these wheels. The point at which fault was found was in the bad connection between the spoke and felloe band. In order to make a proper connection at this point the spoke should be flared in order to cut down the amount of unsupported overhang.

The electric vehicle division is now operating in conjunction with the Electric Vehicle Assn. of America. The work upon which the joint committee is engaged has centered itself particularly along the line of proposed standards for electric motors of 60 and 80 volts. When the work is complete it is proposed not only to give the standard dimensions of these motors but also to issue charts showing the electrical characteristics of the motors.

The matter of electric vehicle speed and mileage ratings was also gone into by the electric vehicle division. Two standards were recommended in conjunction with these ratings. That on speed states that the rating shall be based on continuous operation with one-half load over hard even and level roads or pavements at the actual average of battery voltage. The rating covering mileage states that it shall be based on the rated 5-hour discharge capacity of the battery and the continuous run under the same conditions as those laid down for the speed test, that is, one-half load over hard roads at the actual average battery voltage.

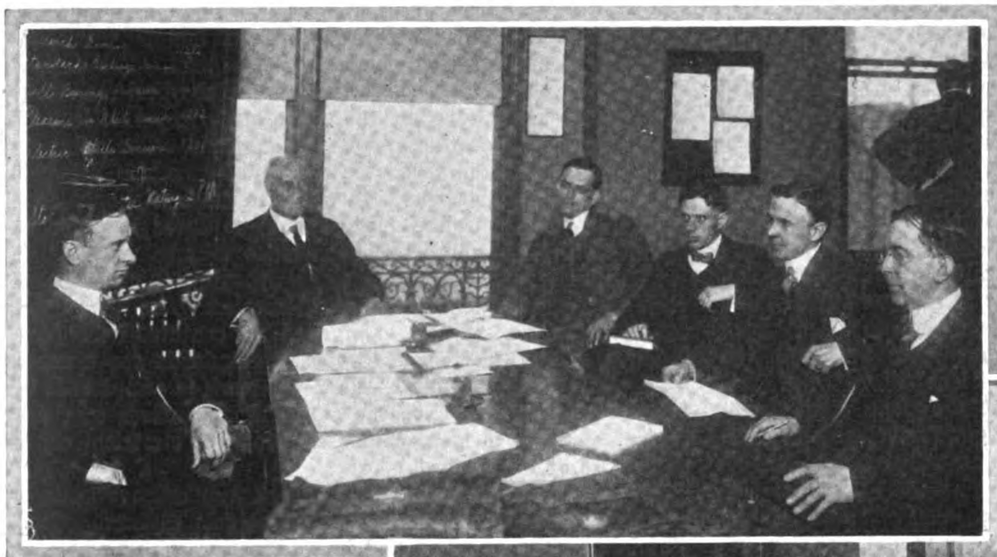
Exchanging Standards

A phase of the standards committee work which has made gratifying progress is that taken in hand by the standards exchange division. This newly appointed committee which has for its object a harmonizing of S. A. E. standards with those of other engineering bodies, has announced that the American society for testing materials had created an automobile steels committee which had under consideration the adoption of the entire list of S. A. E. steels as they stand. The same progress is being made in the way of spring steels.

A useful feature in the work of the standards exchange division is that in connection with unit power plant. The division is studying the shapes and dimensions of the bell housings used by motor and gearbox manufacturers with a view towards adopting standards so that it will be possible to connect any make of gearbox with any make of motor. If this could be effected it would be a boon to the manufacturers of assembled cars because it would enable them to secure parts and avoid delays which frequently occur in the delivery from other than the usual factories in case of an unexpected demand for particular units.

J. M. Hill, representing the promotion interests of the Panama Pacific Exposition in San Francisco attended the standards committee meeting for the purpose of pointing out the importance of having the Society of Automobile Engineers well represented at the coming exposition. He particularly emphasized the need of having competent automobile engineers to supervise the work of erecting the buildings, etc., to be used in connection with the housing of the exhibits and tests. It will be remembered that at the summer meeting it did not seem probable that a majority of the members would favor a meeting of the society next summer on the Pacific Coast. The reason which appeared to be advanced was that there would not be as good an attendance as would be the case were the meeting held in the middle west.

S.A.E. Standards Men in Session



Left—Research Division, Left to Right—D. L. Gallup, R. C. Carpenter, J. A. Moyer, C. B. Veal, D. Roesch, W. T. Fishleigh

Right—Spring Division, Left to Right—W. T. Norton, Jr., W. M. Newkirk, J. G. Utz, C. E. Clemens, R. L. Morgan

Pleasure Car Wheels Division—H. L. Barton, Henry Souther, R. S. Bryant, E. R. Hall, C. C. Carlton, C. B. Williams, C. J. Welch

Right—Electrical Equipment Division, Left to Right—H. G. Osburn, T. L. Lee, Alex. Churchward, C. M. Bunnell, R. J. Nightingale, Alden L. McMurtry, H. W. Harper, J. G. Perrin, Leonard Kebler, Joseph Bijur

Left — Electric Vehicle Division, Left to Right—Standing, E. J. Ross, Jr., W. S. Holland, J. R. C. Armstrong, W. P. Kennedy, C. A. Ward. Sitting—A. J. Slade, F. A. Whitten, H. S. Baldwin, E. R. Whitney, G. W. Wesley, W. H. Conant

Right—Ball and Roller Bearing Division, Left to Right, F. G. Hughes, F. M. Germane, C. H. Clement, B. D. Gray

Below—Truck Standards Division and Commercial Car Wheels Division, Left to Right—Russel Hoopes, C. J. Welch, H. B. Coleman, E. R. Whitney, T. V. Buckwalter, C. E. Clemens, A. H. Ehle

Canadian-American Firms to Make 36,000 Cars in 1915

Six Plants of This Character Now Operating, One Being a Truck Firm—Other Plants in Preparation—Large Proportion of Output Exported—Liberal Inducements for Plants

DETROIT, MICH., Nov. 2—Thirty-six thousand automobiles will be made in 1915 in the Dominion of Canada by Canadian-American automobile manufacturing concerns, or Canadian companies building or assembling cars of American origin.

Six Canadian-American Plants

There are now only six automobile manufacturing concerns in Canada which make or assemble American cars, or cars having an American name. These concerns are the Ford, Studebaker, Reo, McLaughlin-Buick, Hupp and Gramm companies.

The R-C-H, Olds and Keeton plants have been discontinued. The plants of the Willys-Overland and Regal companies are not yet in operation. The Maxwell company has only general headquarters in Canada for distributing purposes.

Of the six concerns making or assembling cars, the Ford Motor Co. of Canada, Ltd., Ford, Ont., is by far the biggest. While during 1914 the total production will be 18,000 cars, the schedule for 1915 calls for 30,000. About 1,400 is the average number of men employed, but, this year, owing to the war, only 800 are on the payroll.

Established in 1904 with a capital stock of $125,000 fully paid up, this capitalization has been increased to $1,000,000 in 1911, and, like the parent company in Detroit, Henry Ford is the president and James Couzens the vice-president of the company.

Ten years ago the plant had 40,000 square feet of floor space, while today the total is 375,000 square feet.

The Ford officials of Canada are not very optimistic as to the business outlook in Canada. They say that under ordinary circumstances the outlook would have been splendid, but, under the present war conditions, which affect business in general to a great extent, one cannot make any predictions as to whether business will be good or bad next year. At the present time it is quiet.

1,600 Studebakers in 1914

Next to the Ford comes the Studebaker Corp. of Canada, Ltd., Walkerville, Ont., which was established in 1909 with a capital stock of $400,000 which has remained at that figure ever since. In 1914 about 1,600 Studebaker cars were made in Canada and for 1915 the schedule calls for at least 2,000.

The Studebaker officials are not only optimistic about the future of the Canadian automobile business, but, they believe that, as a matter of fact, 1915 will be the best year since the automobile was introduced in Canada.

Speaking on the subject one of the officials recently said: "Despite the disturbed condition of finances because of the European war, there is every indication that there will be more cars placed in Canada next season than ever before. Canada, being largely an agricultural nation, is already feeling the effects of the higher prices farm produce is demanding, and farmers are buying more freely than they have for several months."

The Hupp Motor Car Co. of Canada, Ltd., Windsor, Ont., started in business in 1911, the plant then having a total floorspace of 2,500 square feet. The output that first year was 175 cars made by a working force of fifty-six men.

In 1912 the shop men totaled 140 and 300 cars were made. In 1913 the production totaled 450 cars and 200 men were in the plant's employ. This year fifty men were added to the force and 550 cars were turned out. For 1915 the schedule calls for 600 cars and 250 men.

"In general, the business outlook is fair," said an official of the company. "It would have been a very good year without the war. People are very conservative and are spending money only for actual necessities and they keep the balance in the banks. While there will always be buyers of automobiles there is no doubt that the purchases by Canadians will not be heavy next year if the war lasts till spring. In some sections of the Dominion the outlook is better than in others, reports from Manitoba and Ontario, for instance, being fairly satisfactory thus far, while those from St. Johns are not as good."

Reo's Real Factory

The Reo Motor Car Co. of Canada, Ltd., located in St. Catharines, Ont., started in business in 1909 with a capital stock of $40,000 and a factory having an area of 26,000 square feet. Since then business has steadily increased and at present the plant occupies 71,000 square feet of space and the capital stock has been increased to $200,000.

This plant is as completely equipped as the Reo plant in Lansing to take care of the manufacturing, from the raw material to the finished product.

Speaking about the business in Canada at the present time and the outlook for the future, general manager E. E. Turnbull said: "At the present time conditions are undeniably unsettled owing to the war in which Great Britain is involved. This is chiefly noticeable in the falling off in fall business, of which there is usually a very good proportion, and we think that bettering of present conditions largely depends on the success of the allied forces in the present war. Should they be able to bring the war to a conclusion, say early next spring, undoubtedly confidence will be restored and business generally will quickly assume its former standard. On the other hand, if the war is prolonged late into the coming year we are inclined to think that it will have a somewhat depressing effect on business and realize, of course, that possibly this will be even more emphasized in our line of business."

Buicks Assembled at Oshawa, Ont.

A concern which is much more Canadian than American is the McLaughlin-Buick Co., also known as the McLaughlin Carriage Works, Oshawa, Ont. This company has been assembling the Buick cars in Canada for many years, and, while the frames and power plants come from the home plant in Flint, Mich., they build the bodies and otherwise complete the cars.

This year, it was stated by one of the Canadian dealers handling the car, 1,200 cars were made while from 1,600 to 2,000 are to be built in 1915.

One Truck Company

The Gramm Motor Truck Co. of Canada, Ltd., Walkerville, Ont., built about 100 trucks in 1914 and expects to have an equal production in 1915.

"Anyone telling you that the war is not affecting the whole automobile business in Canada, either does not know what he is talking about, or does not wish to tell of the real conditions," said one of the Gramm officials. "While Canada is only indirectly involved in the war, its effects are being felt in all lines of business. The people are spending money only when absolutely necessary and are investing less in automobiles, passenger or commercial cars, than at any time during the last 5 years. This refers however only to the last 3 months, since the war began."

Willys Not Started

The Willys-Overland Co., which purchased the former Schacht plant in Hamilton, Ont., last January, has not started to build there, but is using the factory as Canadian selling and distributing headquarters. The present European conflict has further delayed the company's original plans.

The Olds Motor Works operated a plant in Canada for some time but have discontinued it, finding it more practical to transact all their Canadian business from the plant in Lansing, Mich.

The Regal Motor Car Co. of Canada, Ltd., which started a plant in Berlin, Ont., about 6 months ago, is not yet operating it, that is, building cars there. Present conditions will still further delay its operation.

The plants of the R-C-H Corp. and of the Keeton Motors, Ltd., were discontinued last year.

The Maxwell Motor Co. of Canada, Ltd., was organized in 1913 in Windsor, Ont. No cars are either built or assembled but the finished product is received from the Detroit plant for distribution, the company being the general headquarters for Canada. However, with its increasing business it is not improbable that the time may come soon when a plant will be operated in the Dominion.

Whatever the conditions will be in Canada in 1915 these conditions will probably not have an important bearing upon the motor car manufacturers, as they will be able to dispose of their output to the British Colonies and to most all other foreign countries as it is a fact that quite a large percentage of the cars made in Canada are exported annually.

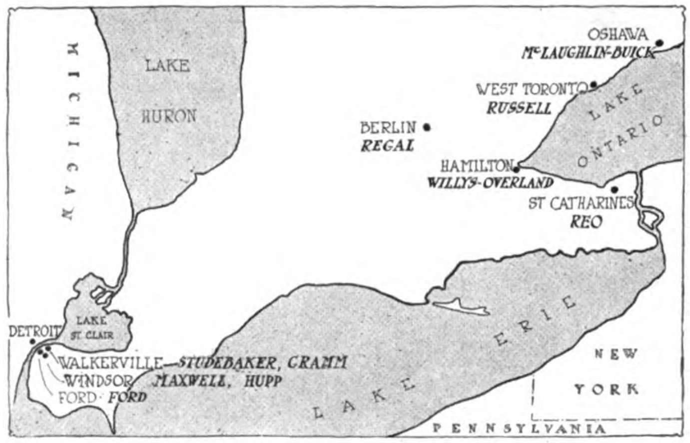
It was stated by a customs official that the Ford company exported fully one-third of its 1914 production, which would make a total of 6,000 cars. The Studebaker Corp., it was also stated, shipped a large percentage of its output to foreign lands.

As this happened under normal business conditions throughout the world, when all those countries where motor cars are made were at peace and exporting a large percentage of their output, it is quite reasonable to assume that now, when those countries are at war, when their export business is nil, it will mean a very large increase of the export business of the Canadian motor car makers.

Canadian Maker

The biggest Canadian automobile manufacturing company is the Russell Motor Car Co., Ltd., West Toronto, Ont. Its plant is located on a 27-acre site, covers 10 acres of ground and has about 8 acres of manufacturing floorspace. It is stated that over 1,500 men are employed on an average throughout the year and that the 1915 output will be about 1,500 cars. This company makes the Knight type motor.

The company has its inception in the consolidation of the various interests of the H. A. Lozier Co., the Gould Bicycle Co., the Massey-Harris Co., and the Welland Vale Mfg. Co.



Map of part of Canada, showing the locations of Canadian-American automobile manufacturing concerns, that is to say, Canadian firms building or assembling cars of American origin. There are six of these firms in operation, five of them producing passenger cars, while the other builds trucks. Two of the companies included in the map have not yet started active operations in the plants indicated. One other is a distributing station, while the remaining one is a purely Canadian firm

all being consolidated in one factory at West Toronto, operating under the name of the Canada Cycle & Motor Co., Ltd.

Several cars were developed but until 1904 little was accomplished. At that time the plant consisted of about five buildings whereas at the present time it comprises nineteen.

The company has seven branches in the principal cities of Canada as well as many service depots. A large business is done with Australia and New Zealand, directed from a branch depot in Melbourne.

The present capital stock of the company is $2,000,000.

One of the principal reasons why American automobile manufacturers have established factories or are assembling cars in Canada is due to the liberal inducements offered by the municipalities. In Windsor, for instance, the city grants tax exemptions, free light and free water for 10 years to any new industrial concern employing 25 or more men. This rule is however not strictly adhered to and several companies have started in business with less than 25 men and have been given all the exemptions and other privileges.

The city-owned land is sold to the firms at the original cost. There are two factory districts. In district No. 2, the price paid by the city for its land was $850 an acre. It has been appraised at from $2,000 to $2,500 recently, yet the land is sold at no increase.

All concerns establishing a factory in Canada must get a Dominion charter, which costs about $50.

Chicago Garage Storage Charges Unprofitable

CHICAGO, ILL., Nov. 21—The Chicago Automobile Trade Assn. finds that it is unprofitable for dealers along the row to store cars or bodies for a rate less than $7 per month for the complete cars or $5 per month for bodies, either closed or open. The committee that has been investigating has found that the expense of replacing stolen equipment, such as electric horns, speedometers, tail lamps and similar parts is unusually severe. The retrimming of limousine bodies when they have become moth-eaten even under the most minute care, is another item that is very burdensome.

The labor and bother in checking off the stripping from a car, such as carpets, rugs, toilet cases, watches, tires, gloves, chauffeur caps, maps, etc., also must be taken into consideration. The expenses of porters in washing cars and bodies left in storage and constant brushing and cleaning and cost of naphthaline or other moth-preventives among carpets, also is another item that the committee has found to be very expensive.

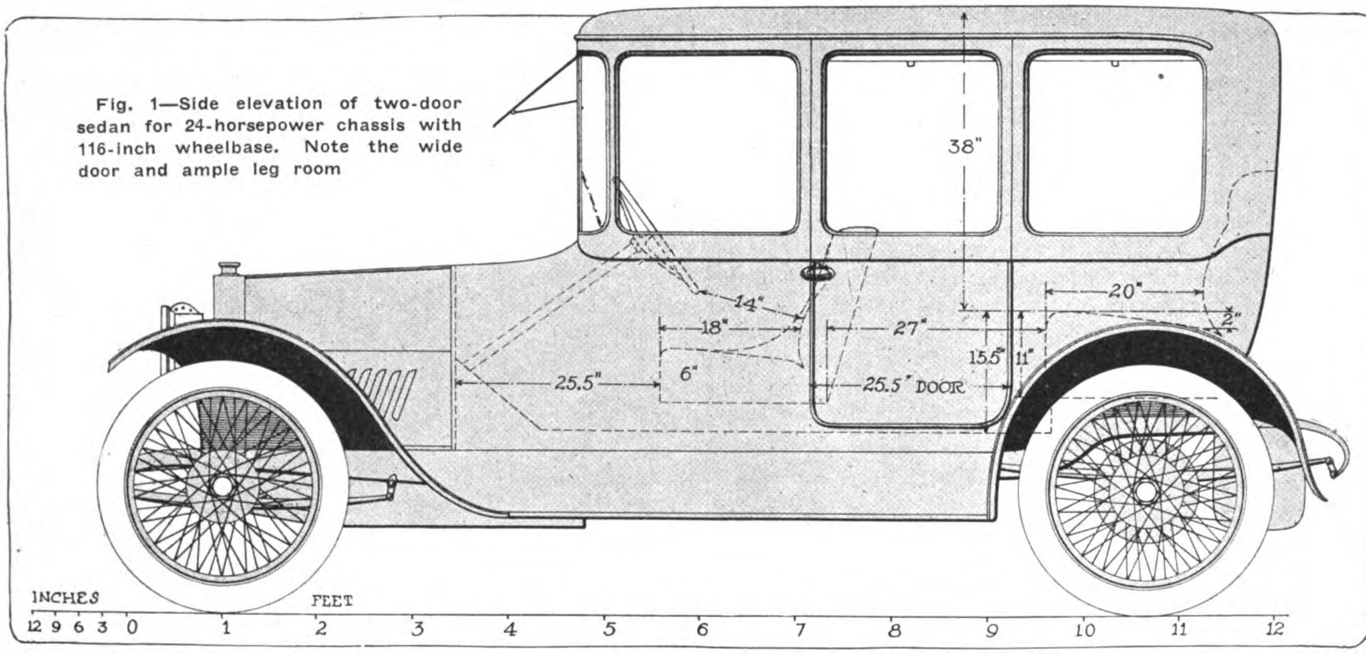


Fig. 1—Side elevation of two-door sedan for 24-horsepower chassis with 116-inch wheelbase. Note the wide door and ample leg room

Two-Door Sedan with Separate Front Seats

A Design which Gives the Car a Low, Compact Appearance—Metal Panels on Wood Frame — Construction Features

By George J. Mercer

ONE of the most pleasing inclosed single-compartment body designs that has been brought out this season is illustrated and described herewith. As illustrated, it is mounted on a 24-horsepower chassis with a wheelbase of 116 inches and having wire wheels, 32-inch tires, three-quarter elliptic rear springs and a sloping type of hood.

The sedan body having a single door in the middle on each side is well adapted for a short chassis, as the door can be wide without cutting the lower corner. As shown in Fig. 1 it is 25.5 inches and this allows all the windows on the side to be spaced equally. The door opens direct to the rear seat and the 7-inch passage between the front seats, Fig. 3, allows the two occupants to get in and out.

Front Seats Are Individual

These seats are individual and are fastened permanently to the floor, the backs are concaved to make them comfortable and the front of the cushions are rounded off to allow passing the change lever. It is possible to put the gasoline tank under these seats or under the cowl or at the rear, as illustrated.

The steering wheel column has the runabout rake and this enables the cowl to be long and the distance from the front of the seat to the dash for leg room is also generous. In Fig. 3 the width of the front and rear seats is shown and in Fig. 1 are the height from the floor to seat and from that to under the roof. These dimensions are standard and the slope of the rear cushion of 2 inches from front to back is less than former practice. Today, however, the public is not calling for the sloping cushion. The rear cushion is 11 inches thick and the front ones are 6 inches.

The low, compact look of this body is partly due to the rounded roof and round front corners. Fig. 3 best illustrates the rounded front as well as the near-flat look of the sides. The taper of the body from back to front is very slight, as the width across the outside of the body is only slightly greater at the rear seat than at the front.

In Figs. 1 and 2 the round front corners are shown formed by curved glass. These corner glasses are permanent and the framing to which they are fastened on their front edge is of metal and narrow, while the front windshield is 34 inches wide. This, with the rounded corners, gives the driver a more unobstructed vision than any other style of body. In addition, the round corners and roof give the body non-wind-resisting features. The front glass is divided, the upper swinging outward to form the storm visor and the lower part swinging inward to provide ventilation. All the side glasses are made to drop and, with the exception of the one on each side at the rear of the door, drop their full length. In Fig. 4 the rear glass is shown. This is large and stationary. The rounded corners of the window openings conform in design to the rest of the body.

Metal Panels on Wood Frame

The construction of the body is with all-metal panels over the customary wood framing, the entire outer surface being metal covered including the roof. The sheets forming the cowl and the body's lower sides, including the doors and the lower back, are of 16-gauge aluminum. The skeleton upper part of the doors, the windows forward of the doors and the front are aluminum castings, but the upper back, side panels and roof can be either all steel or steel and aluminum.

Joints will have to be made where the roof and back panels meet, and, as there are no mouldings to cover the joints except the side drip moulding, which terminates at the rear window, the joint across the roof must be flush finished. This

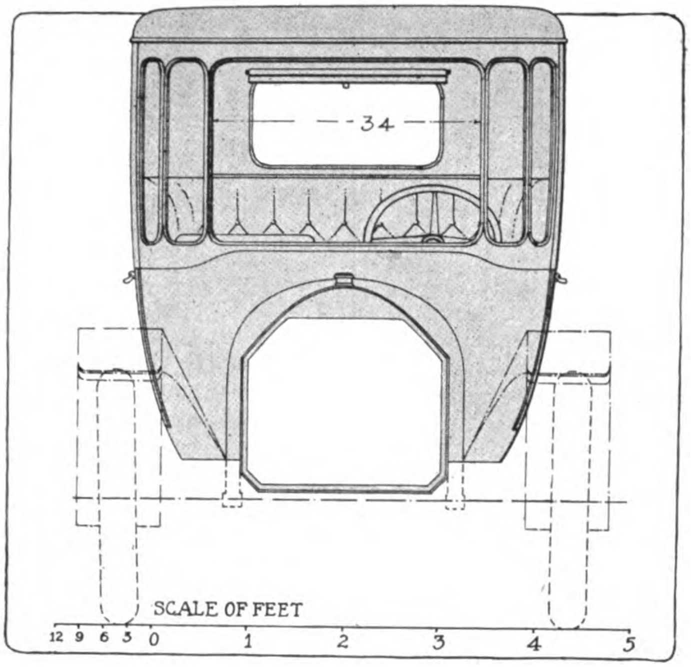


Fig. 2—Front view of sedan, showing how the cowl blends into the body lines

can be done, whether the metal used is steel or steel and aluminum, by fastening the edges of the metal with wood screws to the wood framing, first putting under the joint a steel strip wide enough to lap under both sheets. Then, after the outer sheets are secured with screws, the joint is filled with solder, the steel strip underneath helping to hold this permanently.

Method of Applying Panels

All the panels are assembled on the body without mouldings to cover the joints, the upper side panels being put on over the top edge of the lower panels. The metal of the upper panels is turned under and hooked over a steel band bolted through the wood framing. This is a standard form of construction and while it costs a little more, it gives the body a clean finish that is well worth the difference.

When the roof is made of metal, as here specified, it requires that the under side must be well backed up with deadening in the shape of wood and felt to prevent the bell sound or synchronizing of the metal ring.

The roof and window lines are straight until they flow into the rounded corners. This is accentuated by the flat sides caused by the width of the body being nearly the same across at the back and front and by the cowl, which blends easily with the body lines and gives a long appearance to the hood.

It is not considered so objectionable today as formerly to make chassis changes, such as changing the hood or the rake of the steering column or the mudguards, in order to accommodate a special design of body. In fact no opposition is offered by the dealer if the change in the chassis will make the assembled car a harmonious whole. Fortunately no changes from the standard chassis, provided it has the runabout rake to the steering column and runabout guards, will be required in order to fit the design here illustrated. The dash is made integral with the body which will require a little re-assembling and the gasoline tank will perhaps have to be re-located. The rear guards also will have to be either fitted to the body or re-made, but this is generally necessary in all new closed bodies. This design calls for a small wheel house as indicated in Fig. 4 by dotted lines. This is simply a flattening of the round or bulge of the panel and will not call for extra framing inside.

Two Combination Lamps

Two light combination lamps are used at the front, no pillar or dash lamps being included, while inside there are two dome lights centrally located and possibly a small finder light under the cowl to read the instrument board. A few cars have had a glass panel let in at the top of the cowl to light inside, but this has not found much favor as it is not often seen. This body is for winter use and therefore the trimming should be luxuriously thick. On the rear seat, arm rests are used on the sides and the seat is wide enough to have a division in the center. This can be made removable when a child or small person is crowded in as a third occupant. Arm holders should be used if a middle division is not installed, and these are made on a rod to slide to the desired position.

Choice of trimming material should lie between the imported silver-gray Bedfords and the slightly darker mixed goods, if the car is to see rough usage. The darker material will last longer without showing soil marks. The entire inside of the body should be trimmed, and the only wood finish be the garnish around the windows. This can be any of the woods commonly used and it should be richly stained to bring out the grain and to protect it from being injured by moisture.

The Finishing Touches

The frameless glass is raised by lift straps of broad lace and these are now put in so that the end is dropped into a slot back of the trimming, the top entrance to which is through the garnish rail. This does not mar the trimming line, except at the door, where it is necessary to have fasteners to hold the glass in different positions. These fasteners are nickel or silver finished to match the dome light metal and the toilet articles as well as the rod on which the arm holder slides. Less lace is used now than formerly and in some cases the broadlace is eliminated except for the window lifts.

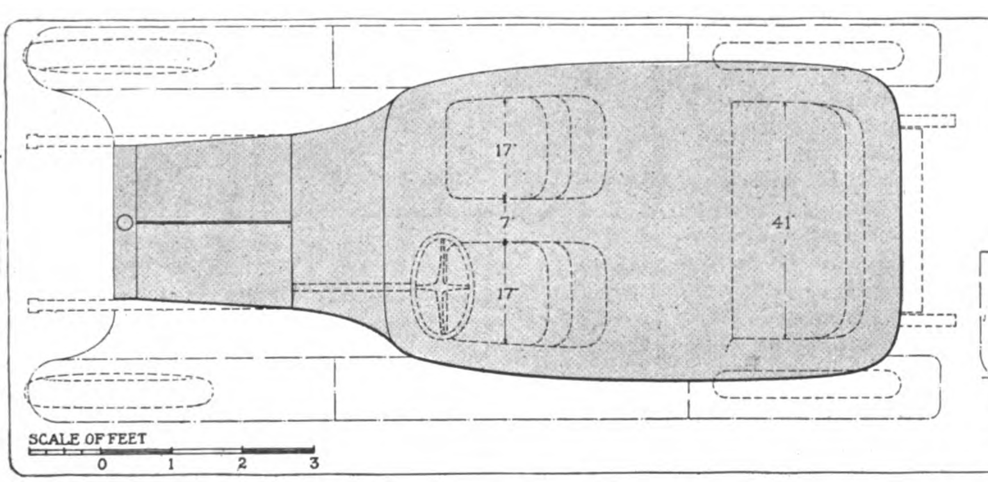


Fig. 3—Plan view of sedan, showing cowl and body lines and seating arrangement.

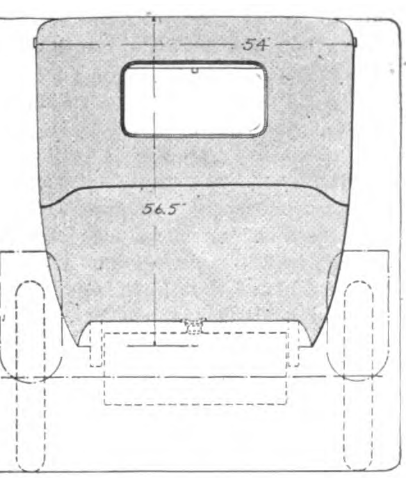
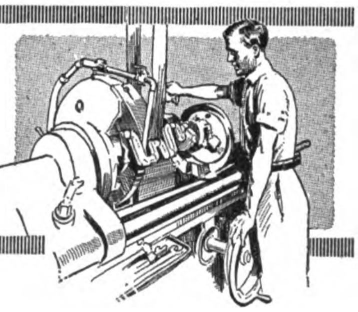


Fig. 4—Appearance of the sedan from the rear

The Rostrum



This department is for the instruction of the readers and all are at liberty to ask questions. Be sure to give full name and address that we may send you a reply by letter if there is no space in the Rostrum. If you wish to sign a fictitious name, sign it, also sign your own.

Wind Resistance to Reduce Back Pressure

EDITOR THE AUTOMOBILE:—An interesting method, which I noticed recently, of reducing back pressure on a racing machine is that adopted by the Chevrolet company on its two racers. As shown in Fig. 1, the device consists of a straight exhaust pipe about 4 inches in diameter, at the end of which there is a large funnel-shaped piece which catches the onrushing air due to the speed of the car and forces it through the opening. This undoubtedly has a strong ejector action and sucks the exhaust out with it. Since the area of the mouth of the funnel is several times that of the exhaust pipe, the speed of the air through the funnel must be 200 or 300 miles per hour when the car is running at 60 or 80.

Detroit, Mich. O. R. H.

Where to Buy Paper Covers

Editor THE AUTOMOBILE:—Please give me the name and address of the firm that manufactures paper automobile covers. These paper bags, as some call them, will entirely cover a car and are intended for storing a car during the winter.

Belding, Mich. JOHN W. ZINDLER.

—According to the Automobile Trade Directory there are two concerns making these bags: the Safepack Paper Mills, 411 Court street, Brockton, Mass., and the Seinsheimer Paper Co., York street and McLean avenue, Cincinnati, O.

Compressor Objectionable for Racer

Editor THE AUTOMOBILE:—What is the objection to compressing the intake gas on a racing-car motor to develop more power?

By intake gas I mean the mixture of gas and air, after passing through the carbureter and before entering the cylinders.

For example: Suppose the intake gas is held at a uniform pressure of 2 pounds. Increase the cylinder clearance so as not to bring the compression over 80 or 85 pounds. Strengthen the pistons, connecting rods, cylinders, etc., if necessary.

Why would not the power of the motor be greatly increased especially on small motors? If a failure, why?

San Gabriel, Cal. E. H. BUCHNELL.

—It is not likely that increased power would be obtained. Let us understand the conditions first of all. Consider a high-speed racing motor 4 by 7 inches. Its compression would possibly be 120 pounds gauge and its clearance approximately 18 per cent. of the displacement of a single piston. Suppose we double the clearance so that twice the charge may be taken in. In order to maintain the compression at 120 pounds, it is necessary to supply the intake air at a pressure of 25 pounds per square inch.

Although twice the charge is taken in, the explosion pressure will be no greater, because the clearance space is double. However, the expansion curve will not drop in pressure so quickly as the piston moves out because there is more gas to be expanded in the same piston displacement. Therefore, the pressure during the working stroke will be generally higher, or in other words the mean or average pressure will be increased. But with this increased power has come a greater consumption of power by the motor, so that it is doubtful whether there is any net power gain. It takes power to overcome the friction losses in the compressor, and it takes power to compress the extra amount of gas. Furthermore, the compressor mechanism, since it must handle large volumes of gas, is bulky and adds considerable weight, which still further cuts down the effective power output. Possibly the space the compressor requires necessitates the lengthening of the chassis, which adds still more weight. Therefore it is seen that little would be gained by adopting your suggestion.

An increase of 2 pounds in the pressure would make little difference.

Wants Radiator Design Data

Editor THE AUTOMOBILE:—If you have any information on radiators for internal combustion engines, giving rules for the radiating surface, generally allotted per horsepower, and the proper relative proportions between cross-section area of air passages and their length, etc., I would highly appreciate it.

Waynesboro, Pa. G. ANDERSON.

—We have no data on this subject. The amount of radiating surface depends on the speed of flow of the water, the rate at which the air is sucked through and the construction of the water passages. It is impossible to give exact rules except for a given radiator design. We would suggest that you select the type of radiator you wish to use and ask the manufacturer's advice as to the size of radiator, size and speed of pump and fan, giving him the details as to the motor.

Should Fit New Springs

Editor THE AUTOMOBILE:—My car is a 1911 model with three-quarter elliptic springs in the rear, the small bottom leaves of which have given trouble from within a few months of purchase, new, by first flattening and then cracking in a clean, straight line, not at the bolt hole, but at the front end of the spring bed-plate which is welded to the axle. I prolonged the breaking periods by inserting extra leaves, but

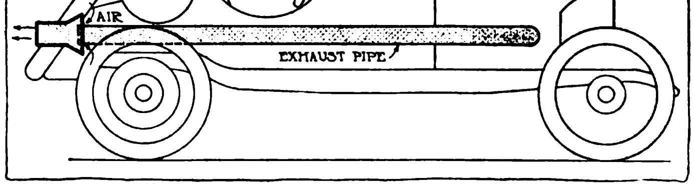


Fig. 1—Chevrolet racer, showing method of reducing back pressure

they finally gave way also; therefore I am wondering whether these breaks are caused by the fact that the car is not equipped with radius rods, that is, a short rod on each side of the car, having a knuckle joint where it is connected to the frame and a simple joint where it is attached to the rear axle by a collar, the same as I have seen on some models of the Buick?

Honesdale, Pa. BENJAMIN H. DITTRICH.

—Radius rods will not help you out of your difficulty. The best remedy is to obtain a new set of springs from the factory. Radius rods take the driving strain, that is, the forward thrust, but not the twisting strain. Possibly you meant a torsion rod instead of radius rods, as the torsion rod is for the purpose of taking torque reaction due to the rotation of the wheels. However, it would be very difficult to attach such a rod, and it is doubtful whether it would prevent the breaking of the springs.

In the beginning your spring trouble may have been due to overloading the car or to a defective set of springs. Since then you have repaired these springs from time to time as the leaves broke. Probably the repairs were made with spring leaves at hand instead of new ones from the factory.

These springs have now seen at least 4 years of service and are probably worn out, and therefore it would be best for all around satisfaction to obtain a new set.

How to Install Ammeter

Editor THE AUTOMOBILE:—Please explain fully by diagram how to wire up an ammeter on the Delco System used on 25-B Buick 1914 model?

Cuba, Kan. L. M. BRIGHAM.

—First cut the strap A connecting the two terminals, as shown at the left in Fig. 2. On some machines this strap is on the inside of the frame as shown at B, in which case it is necessary to remove the motor-generator from the car and disassemble it.

When this is done, a tap is made on the wire from the upper terminal and a wire run from the negative side of the ammeter to the lower terminal.

The meter should be of the center-zero type, reading at least 10 amperes discharge and 20 to 30 amperes charge. The meter will then indicate the current charging the battery and what is discharged from it with the exception of the cranking current. For example, if the lights and ignition are using 6 amperes and the generator is delivering 12 amperes the meter will indicate 6 amperes charge.

Caring for Batteries in Winter

Editor THE AUTOMOBILE:—Will you kindly advise me the best way to care for the storage batteries during the winter?

Goshen, Ind. WILBUR RIDEMOUR.

—Keep them fully charged, filled with water and of proper gravity.

The electrolyte of a cell that has been fully charged should be about 1.300. While the gravity of the battery will change with age to a certain extent, it will give good service between the densities of 1.250 and 1.300. When, after testing with a hydrometer, it is found that the gravity is above 1.300 with the battery fully charged, pure water should be added to reduce it to the proper amount. If the addition of the water raises the level more than a .5-inch above the tops of the plates some of the electrolyte must be removed. Low gravity in a cell is caused by lack of charge, the acid being combined in the plates as sulphate; through acid being spilled; through a cracked jar, and through the accumulation of sediment in the bottom of the jars.

Do not add acid until sure that the battery is fully charged and that there is no appreciable amount of sulphate in the plates. For example, if the electrolyte in the cell should be adjusted to 1.275 when 50 points of acid remained in the plates, the gravity would come up to 1.325, if the cell were afterward charged to its maximum. Therefore it is important to first raise the gravity as high as possible by charging during a period of at least 24 hours at one-half the finishing rate. Then remove the electrolyte down to the tops of the plates and replace with 1.300 electrolyte.

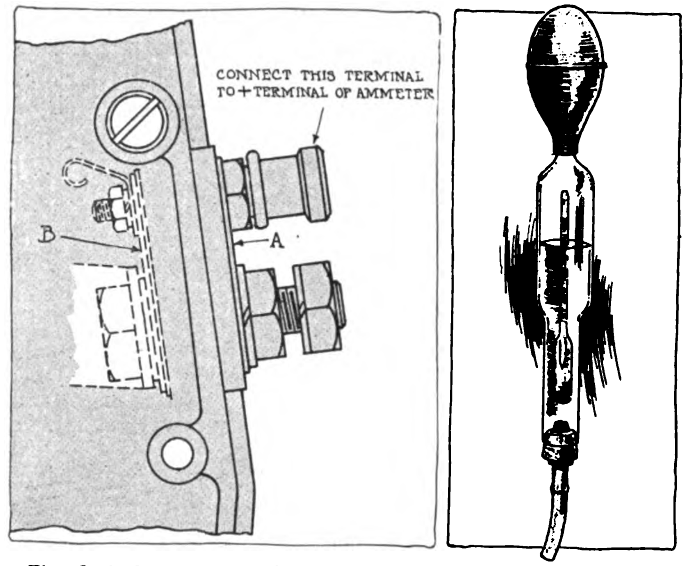


Fig. 2—Left—Diagram showing attachment of ammeter to 1914 Buick Delco system. Fig.—3—Right—Syringe hydrometer for testing the gravity of the electrolyte in storage batteries

The density of the electrolyte is told by means of a hydrometer, which is a glass float, weighted at the bottom to hold it vertical and with a graduated scale on the upper end to indicate the gravity. The heavier the liquid, the further out from the surface it extends. Therefore the scale reading at the surface gives the specific gravity of the liquid. Evidently with this type of instrument some of the electrolyte must be removed from the cell and placed in a convenient vessel. To obviate this difficulty the hydrometer syringe shown in Fig. 3 was devised. The liquid is drawn into the syringe, in which is contained a hydrometer and in which the hydrometer is floated. It is seen that the syringe makes a more convenient containing vessel for the liquid. There is no danger of spilling the acid during the operation, and it is much quicker and simpler than the other method. Care must be taken in using the syringe not to allow the hydrometer to touch the sides of the syringe, as the friction might alter the reading. For this reason the syringe should be held vertical when it is read.

It is well to note that the gravity of the cells under normal conditions is an indication of the state of charge, and when the gravity has dropped 100 or 150 points it is evident that recharging is required.

Two Ways to Store

There are two methods of storing batteries. One for periods of less than a year and the other for more than this time. The former is known as wet storage and the latter as dry storage. Dry storage is also used where a battery is to lie idle for less than a year but is in such a condition as to require dismantling for cleaning or repairs at the end of this period.

The wet storage method is very little trouble. The battery is given an equalizing charge and water is added every 2 to 4 weeks, depending on the temperature, and therefore on the rate of evaporation. At least once in 4 months the battery should be charged at one-half its normal finishing rate until all the cells have gassed continuously for a period of 3 hours.

Dry storage requires that the battery be completely taken apart, after it has been given an equalizing charge, cleaned and all worn out parts replaced. It is best to make a sketch

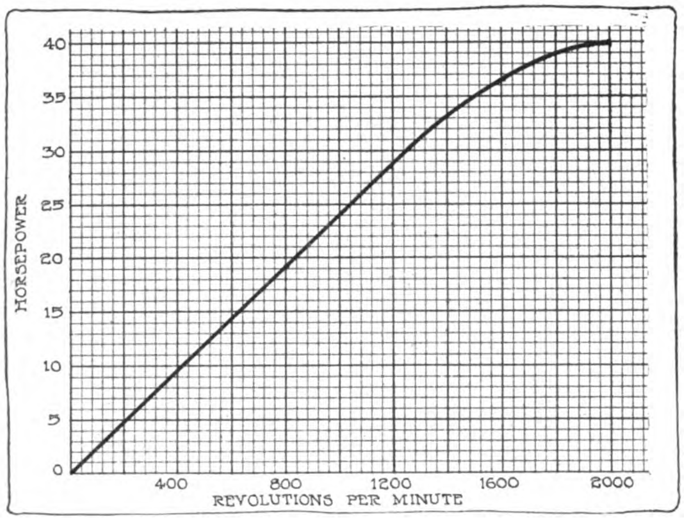


Fig. 4—Horsepower curve of Jeffery four motor measuring 3.75 by 5.25 inches

of the parts, so that no difficulty will be experienced in assembling it again.

The rubber separators should be washed and stored away. The positive plates are put into empty jars and the negative groups are placed in the remaining jars and the electrolyte which was saved for this purpose is poured over them and left there for 5 hours. It is then poured off, and the plates are stored in the empty jars.

Questions Concerning Jeffery Four

Editor THE AUTOMOBILE:—Will you please give me the following information regarding the 1914 Jeffery four:

1—Horsepower curve.

2—Gear ratio.

3—Explanation of steering gear and its adjustment.

4—What is the easiest way to change the lubricant?

5—Sketch the oil system.

6—Illustrate the gasoline pressure pump.

7—What is the metric size of tires that replace 34 by 4 tires?

8—Does a spark plug gather more carbon than usual if the porcelain is broken; if so, why?

9—How can I clean the radiator with soda?

10—Why does a Vesta 1913 type generator, model D2, properly set, only furnish 3 amperes of charge, running the car at a speed of 20 miles? The car is a 1913 Buick, model 30. The gear ratio is 1 to 1½, silent-chain drive, and wiring is all right. Can you advise me of some method to better the current output?

South Bethlehem, Pa. L. F. ORLANDINI.

—1—The horsepower curve of this motor is shown in Fig. 4.

2—The gear ratio is 13 to 51 on direct.

3—The steering gear is of the worm and gear type. The gear is mounted on the squared shaft of the bell crank.

If worn, the gear should be removed and revolved one-quarter turn, bringing into action a new section.

The bell crank connects with the knuckle steering arm by means of a fore and aft rod. The rear end of this rod is adjustable. To adjust, back off the lock nut, loosen the bolt in the hood and turn the ball and socket until the proper adjustment is obtained. Do not tighten it so that it will bind.

4—There is an oil drain in the form of a petcock on the left side of the motor at the bottom of the crankcase. Turn this on and allow all the oil to flow out. Then put a quart of kerosene in the oil filler opening and turn the motor over a few times to distribute the liquid. This will cut any gummed oil and will carry the sediment to the bottom of the crankcase, where it will flow out of the drain. Finally fill the system with a good quality of medium-grade oil.

The oil should be drained out every 2,000 miles, according to the Jeffery company. The oil reservoir should be filled every 200 miles. On the right side of the motor there is a gauge with high and low points marked on it.

5—The oiling system is illustrated by diagram in Fig. 5. It is a combination splash and pressure system. The bottom of the crankcase forms an oil reservoir or sump. Oil is drawn from the sump through a rectangular-shaped screen by a plunger pump worked by an eccentric on the camshaft. The oil is forced to a pipe extending the length of the crankcase in the upper right side. From this pipe oil is fed to the main bearings, camshaft bearings, timing gears and connecting rods. A metal trough retains a supply of oil for each connecting-rod. The splash of the rod dipping into the trough lubricates the pistons, wrist-pins and cylinders.

Surplus oil drains back to the sump, whence it is drawn again for circulation through the motor. A gauge on the dash indicates the oil pressure. If the hand is stationary and at zero, the pump is not working, and investigation should be made.

6—The gasoline pressure pump is illustrated in Fig. 6.

7—The corresponding metric size is 875 by 105 millimeters. This shoe will fit a little loose on a 34 by 4-inch rim. Therefore, if it is applied to a clincher rim do not fail to use lugs. If a quick detachable rim is used, care must be taken while the tire is inflated, because there is danger of the bead coming off, although after the tire is fully inflated it will stay put.

8—If there is a generous supply of oil it is possible that the plug will soot quickly, due to the fact that the crack allows the current to short circuit part of the time and the cylinder misses. Therefore the oil which accumulates on it during the three strokes preceding the power stroke is not burned off. When several explosions are missed in succession the amount of oil settling on the plug is considerable, and when an explosion does occur the intense heat burns and vaporizes some of the oil but leaves part of it in the form of a carbon deposit on the plug.

9—Use a boiling-hot solution containing 1 pound of soda to 2 gallons of water. Pour this through the system until all grease is removed. It must be understood that the soda only cuts the grease and oil, but in so doing it releases a large amount of dirt held by these lubricating materials. If the system is free from grease and oil possibly it will be sufficient to flush the system to remove the sand and grit. If very hard water has been used it may be that the water passages are covered with a deposit, in which case it will be necessary to apply a boiler compound.

10—The driving belt requires tightening. Loosen the three

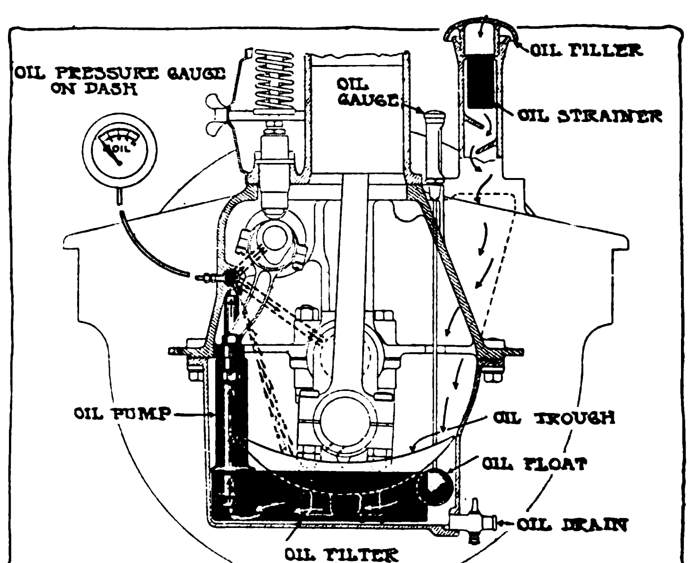


Fig. 5—Oiling system on Jeffery four motor

bolts holding the generator to its base and move it a little farther away to take up the slack.

How to Straighten Front Axle

Editor THE AUTOMOBILE:—1—I have a front axle of a standard design on a 1910 car. It is bent about 1 1-2 inches from the spring seat to the outer end of the axle, a distance of about 10 inches. I wrote to the makers and they said that it would have to be straightened and heat treated again to make it safe, but that the holes for the bushings were liable to be enlarged by the heat treatment and the axle thus spoiled.

2—What is the customary manner of straightening these, and are they considered safe afterwards?

3—What effect would it have on the steel to straighten it cold, and what, hot?

Harrisville, N. Y. HUDSON DE GRAFF.

—1—This axle should be heated to a cherry red heat and then straightened. The heat should be applied at the bend only, and as this is 10 inches from the king pin bushings there is no reason why the latter should be heated, and therefore no danger of them becoming enlarged. In fact it is doubtful whether they would be enlarged even if exposed directly to the heat. It is not necessary to give the axle any heat treatment after it is straightened.

2—This is the common method. The axle should be safe after being repaired in the manner outlined.

3—If it were straightened cold it might fracture.

Wants to Buy Racing Motor

Editor THE AUTOMOBILE:—I want a motor for a racing car, one that I can get high speed from, and come under the 300-displacement. What motor would you advise me to buy?

Los Angeles, Cal. W. F. GRIFFITH.

—There is no concern building motors of this type as stock. Probably any of the concerns making motors will be glad to build a motor to your specifications. Write the Wisconsin Motor Mfg. Co., Milwaukee, Wis., and F. S. Duesenberg, Des Moines, Ia.

Ford Planetary Gearset Not Invented

Editor THE AUTOMOBILE:—1—Who invented the planetary transmission used on Ford cars?

2—Who made the first four-cycle motor used on Ford cars?

3—How are the platinum points fastened to screws of a magneto?

4—What advantages are gained in disconnecting the countershaft gears when on direct drive?

5—What advantages are gained by fitting three piston rings to the groove instead of one?

6—Who makes the motor used on the Dodge car?

New York City, N. Y. W. R. C.

—1—This gearset was not invented but designed. It was produced in the Ford factory and differs only in detail from other planetary gearsets, which have been used on various cars from time to time. It is not an invention, since there were similar ones made before it.

2—This also was made by the Ford company. This concern has always used a four-cycle motor.

3—One method is to hard solder the points in place. The first step is to cut two small slots at right angles in the end of the two members carrying the points. Then by the aid of the brass solder the points are fastened in place.

4—Disconnecting the countershaft gears when on direct drive increases the silence of operation and reduces the wear and power consumed by the friction of rotation. Obviously the countershaft must make a small amount of noise even when it is rotated without doing any driving. Also this rotation causes a small amount of wear, and a slight quantity of power is used up which might otherwise be employed in propelling the car.

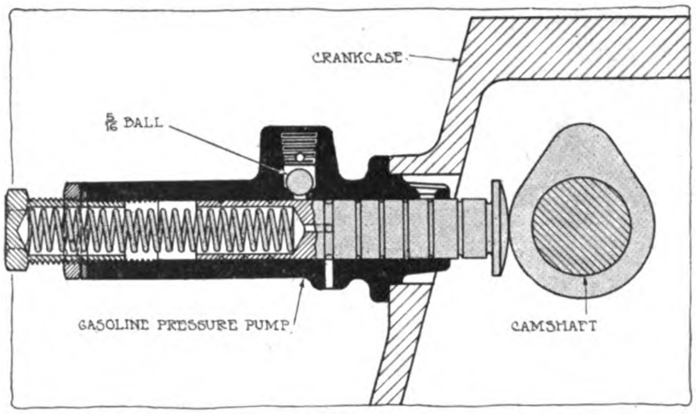


Fig. 6—Fuel pump construction found on Jeffery four

5—The advantages claimed for special piston rings such as this one are that it holds compression better, prevents oil from entering the compression chamber more effectively, and in some cases reduces the wear on the cylinder walls.

6—This motor is made by the Dodge company.

Kardo Patents Explained

Editor THE AUTOMOBILE:—Will you kindly inform me of what the Kardo patents consist?

Philadelphia, Pa. B. A. MEYER.

—The Kardo patents are eight in number and govern claims dealing with the gearset, driving mechanism and rear axle construction of the automobile. To quote from THE AUTOMOBILE for March 12, 1914:

The Kardo Co., recently incorporated in Ohio with headquarters at Cleveland and having a capitalization of $1,000,000, looms up as one of the most important of patent holding companies in the automobile industry, and has as its officers and directors very prominent figures in the motor car field. Alvan Macauley, vice-president and general manager of the Packard Motor Car Co., heads the new Cleveland organization, and T. W. Frech, of the Peerless, is vice-president, and F. C. Dorn, American Ball Bearing Co., is secretary and treasurer. Besides these men, the board of directors of the Kardo Co. includes Milton Tibbetts, patent counsel of the Packard company; F. S. Terry, of the Peerless company, and Walter C. Baker, of the American Ball Bearing Co.

Although the Kardo Co. is incorporated for the purpose of "acquiring, owning and dealing in vehicle patents," its chief concern at this time is with the axle patents of the Packard Motor Car Co., the Peerless Motor Car Co., and the American Ball Bearing Co. These patents have so overlapped and dovetailed one another that some sort of holding company for all of them was necessary to prevent litigation among the three concerns above named. By the transfer of all patents to the Kardo Co. protection is thus gained for all, since all can use the patents of all without conflict.

The formation of this holding concern for these axle patents makes a very strong combination, and since all other axles are said to be infringements of one or more of these patents, it is pointed out that other makers will either have to take out licenses or lay themselves open to litigation.

In a statement issued recently the Kardo Co. says of these patents:

"The patents are now owned by the Kardo Co. Some licenses under them have been granted and the company is negotiating others at the present time. Of course, the usual royalty reservations will be made, and manufacturers will receive licenses that will insure them the right to make and sell to their customers axles that are free from charges of infringement."

The Kardo Co. holds eight patents, as follows: 608,017, dated July 26, 1898, to W. C. Baker, on an anti-friction bearing for use in a front axle; 664,478, December 25, 1900, Hopewell patents, rear axle on removable pinion mounting; 705,304, July 22, 1902, Sangster patent of Packard company, which covers broadly adjustment of bevel gears; 783,168, February 21, 1905, Baker rear axle patent; 792,690, June 20, 1905, on bevel gear drive and compensating mechanism; 950,191, February 22, 1910, on adjustment bevel gearing—this is an improvement on the Sangster patent; 1,013,450, January 2, 1912, on rear axle transmission, and also the re-issue 12,966, June 1, 1909, on power transmission mechanism for automobiles which covers Peerless rear axle with universal joints and removable features.

The patents are described in detail in the issues for March 17 and 24.

In the October 22 issue on page 763 it was stated that the Berliet, a French machine, was no longer imported. Since then Lucien Babel, 371 East Twenty-ninth street, Chicago, Ill., has written us stating that he is representing this machine.

The Engineering Digest

An Untechnical Study of the Balancing of Motors—Leading to Fullagar System of Cross-connected Pistons

THOUGH the need of avoiding violent vibrations has compelled motor builders, since the very beginning of the motor boat and automobile industries, to pay considerable attention to the principles involved in the balancing of motors, it is only in recent years that practical construction has followed theory into the last refinements in this matter, the demand for complete silence of motors and the ever increasing motor speed leaving no choice of doing otherwise, while in the case of aviation motors, which are necessarily suspended in a very slender frame, the absence of even the minor vibrations is a condition for keeping intact the tension of the guy wires and the nicely adjusted strength of the whole aeroplane structure.

Probably on no other subject relating to motor engineering does the conception of the practical requirements get snarled up so stubbornly in the multitude of words needed for their adequate and exhaustive explanation. Provisions made for reducing vibrations of one sort are likely to introduce other ones of a different nature and origin, as when the number of cylinders is increased and the crankshaft at the same time is lengthened or when parts are lightened to reduce unbalanced momentums and the loss of rigidity caused by the change is not fully obviated.

The difficulties in presenting the subject so that all can understand it are met by H. F. Fullagar of Newcastle, England, in a paper to be read before the Institution of Mechanical Engineers, by showing simple outlines of constructions in each of which one or another or several of the five different causes of vibrations are eliminated, while—to save a maze of reasoning—leaving it to the reader to grasp from direct contemplation of the construction involved in each case how the end is attained. A rapid survey of the requirements is thereby reached, and this may be found of value, though it will be noticed that the means for neutralizing or avoiding vibration in the four-cylinder motor of standard automobile pattern are touched upon only very lightly, the author's preference running to more radical designs, apparently with aviation purposes mainly in view. His presentation, which invites discussion in many places, is substantially as follows, with reproduction of his illustrations:

Absolute freedom from vibration involves balance of two kinds, balance of mass and balance of impulse.

Balance of Mass Only

Balance of mass exists if the inertia forces due to the acceleration of rotating and reciprocating parts neutralize each other and have no external resultant when the engine is driven from an external source.

The balancing of the rotating members presents no theoretical difficulty, provided the crankcase is sufficiently rigid to resist the torque reactions set up.

[The exception may here be taken that the masses should be balanced not only equally on both sides of the axis of rotation, as is usually done, but also as nearly as possible in the same transverse planes, as now done in a number of high-speed motors.]

The inertia of reciprocating parts is compounded of forces which the understanding classifies as primary and secondary, the primary ones being due to the reciprocation in itself and the secondary forces to those irregularities in the speed of the reciprocation which are caused by using a connecting-rod of limited length. Reciprocation as such implies a harmonically repeated reversal of inertia, and the secondary irregularities are also almost simply harmonic in character but of double the frequency. ["Double frequency" is a term not generally used in this connection in treatises on the balancing of motors, but to discuss it would mean a long digression. The inserted sketch Fig. O, indicates the nature of the secondary irregularities. When the connecting-rod A is at B or C, at the largest possible angle with the axis of the cylinder, there is for this reason a relative retardation of the piston speed and this retardation does not occur quite at the moments, indicated by D and E, when the piston speed is maximum by reason of the direction of the crankpin movement. As BFC is shorter than CGB the retardations occur at two unequal intervals, so that the periodicity is not quite simple-harmonic. The portion to the right in the diagram indicates the modification of the irregularities occurring when the cylinders are offset with relation to the crankshaft. The horizontal component of the oblique thrusts between crankpin and cylinder walls, by way of the connecting-rod and piston, should also be mentioned among the secondary unbalanced mass effects which cause vibration, though stronger components of this kind occur as impulses.—Ed.]

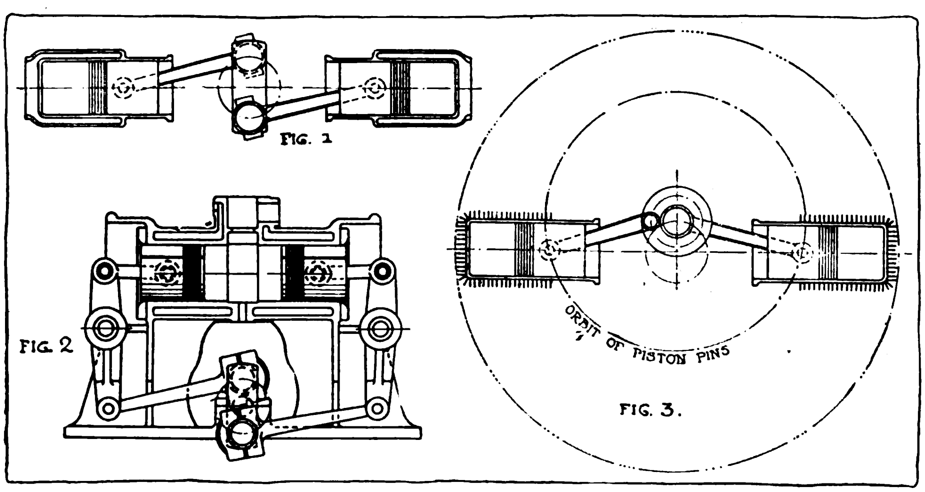


Fig. 1—Mass perfectly balanced. Fig. 2—Mass and impulse balanced; torque unbalanced. Fig. 3—Rotative motor; mass balanced

Perfect balance of both primary and secondary forces can together be secured only by placing connecting-rods on opposite sides of the crankshaft, Figs. 1 and 2. If as usual the crankshaft revolves, the connecting-rods must be attached to opposite cranks, but if the cylinders revolve, both connecting-rods can be attached to a single crank, Fig. 3. These constructions have however only limited application.

The four-cylinder four-cycle automobile engine necessarily has its cranks in one plane and 180 degrees apart, to give uniformity of impulse, but in this case the secondary forces are wholly unbalanced. When the plane of the cranks is horizontal the connecting-rod has moved the piston to below midstroke by the amount *a*, Fig. 4, and this amounts to one-sixteenth of the stroke if the length of the connecting-rod is four times the crank radius. As this displacement occurs twice per revolution and affects all four pistons, the secondary forces set free are equivalent to the inertia of a single piston moving the whole stroke but acting with double the frequency. When two such sets of four cylinders are placed

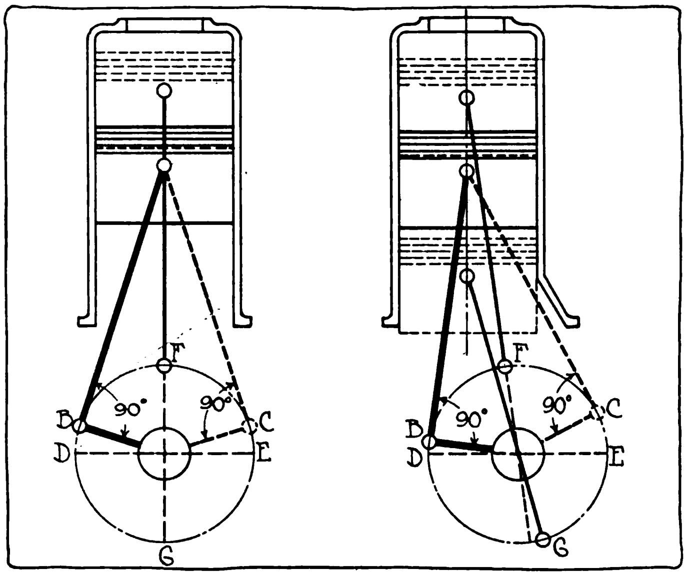


Fig. 0—Diagram indicating relations of primary and secondary forces causing unbalancing of mass. To the right: Same in the case of offset shaft

together in the V-type engine, the secondary forces of each set are unbalanced, and their resultant is 40 per cent. greater than either and acts in a horizontal plane, Fig. 5.

The secondary forces of the four-cylinder engine, Fig. 4, result from the fact that the common center of gravity of the four pistons, instead of being stationary, as would be the case if the connecting-rods were infinitely long, has a small harmonic motion of double frequency. It can therefore be balanced by reciprocating or rotating balance weights driven at twice the frequency of the main piston.

Lanchester's ingenious method of doing this consists in gearing a pair of wheels carrying balance weights to the main crankshaft, which drives them at double its speed and in opposite directions. The centrifugal forces of the weights balance themselves in the plane through the axes of the wheels, and they have a vertical component balancing against the secondary forces.

In four-cylinder motors of the two-cycle type the cranks can be placed at right angles, and it is then possible to secure complete balance of both primary and secondary forces, with the exception of a tendency to rock the motor lengthwise produced by the secondary forces. This can usually be absorbed in the chassis, where the question is of automobiles. Five- and six-cylinder motors of either four- or two-cycle type can be perfectly balanced with regard to the primary and almost perfectly with regard to the secondary mass effects.

To sum up, the motors in common use which may run without vibration when driven from an external source are only the following: The motor with rotating cylinders, ordinary five- and six-cylinder motors and four-cylinder two-cycle motors with the cranks at right angles. But, when the crankshaft is long, in any of these, it is difficult to make it so rigid that the motor will not tend to vibrate relatively to its flywheel, whose mass center remains almost stationary.

Balance of Impulse

Mere balance of mass is however insufficient to produce a vibrationless motor in practice, because, in considering it, no account is taken of the violently fluctuating pressures in the cylinders and the consequent strains in the crankshaft and the motor framing. These strains must be balanced so as to have no tendency to shift the center of gravity of the motor relatively to its crankshaft and points of support.

In Fig. 1, if the cylinders are in line and fire simultaneously with equal charges, there will be no tendency for the motor to move, except, by torque reaction, around the crankshaft, and the design of Fig. 2 secures this result more simply, the piston pressures being necessarily equal. The well-known valveless two-cycle Junker motor Fig. 6, has equality of impulse, but the secondary mass forces are unbalanced. The three cranks of each cylinder receive simultaneous impulses once only per revolution. The crankshaft receives therefore virtually one impulse for every half-revolution. In fact, in this, as in all single-acting motors, the pressures on the pistons during the compression and explosion strokes twist the crankshaft first backward and then forward, producing a severe condition of stress, while the reactions of the cross-heads also alternate in direction with each stroke.

If a second pair of cylinders, each with a pair of pistons, were arranged tandem on top of the first two, making each tandem line double-acting, the cranks of the two sets could be placed at right angles and the balancing of both impulse and mass would be almost perfected, but a motor of this description has great height and many parts, and the same results can be obtained by the author's arrangement shown in Fig. 7.

In this, two open-ended cylinders, each with a pair of opposed pistons, are placed closely together, side by side, and the upper piston of one cylinder is connected to the lower piston of the other by a pair of external oblique tie-rods, as shown. An explosion between A and B drives B down and A up, also drawing up D by the oblique rods, and gives two equal and opposite impulses to the two cranks. The explosion in one cylinder compresses the charge in the other, as the motor operates on the two-cycle plan, the pistons at the ends of their strokes uncovering inlet and exhaust ports, as in the Junker-Oechelhauser arrangement of Fig. 6.

The complete motor has two such pairs of cylinders and a

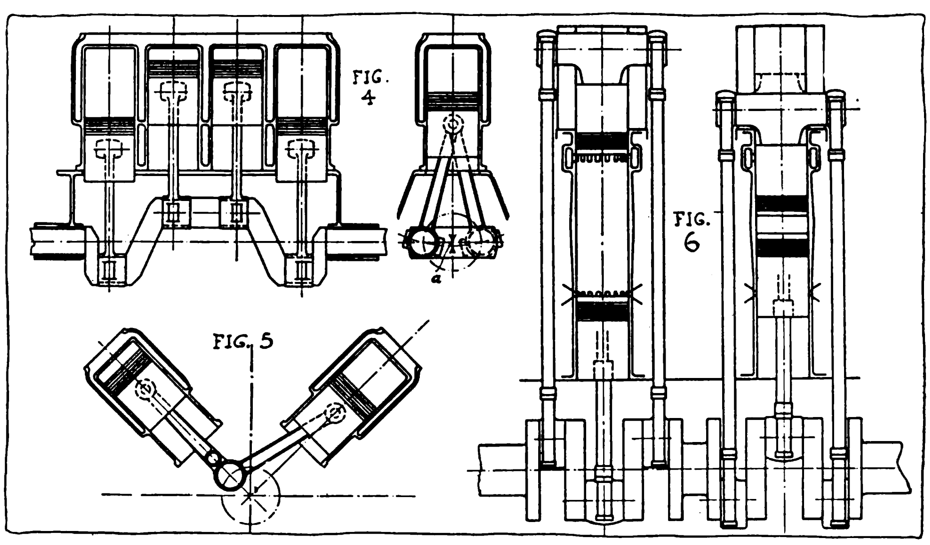
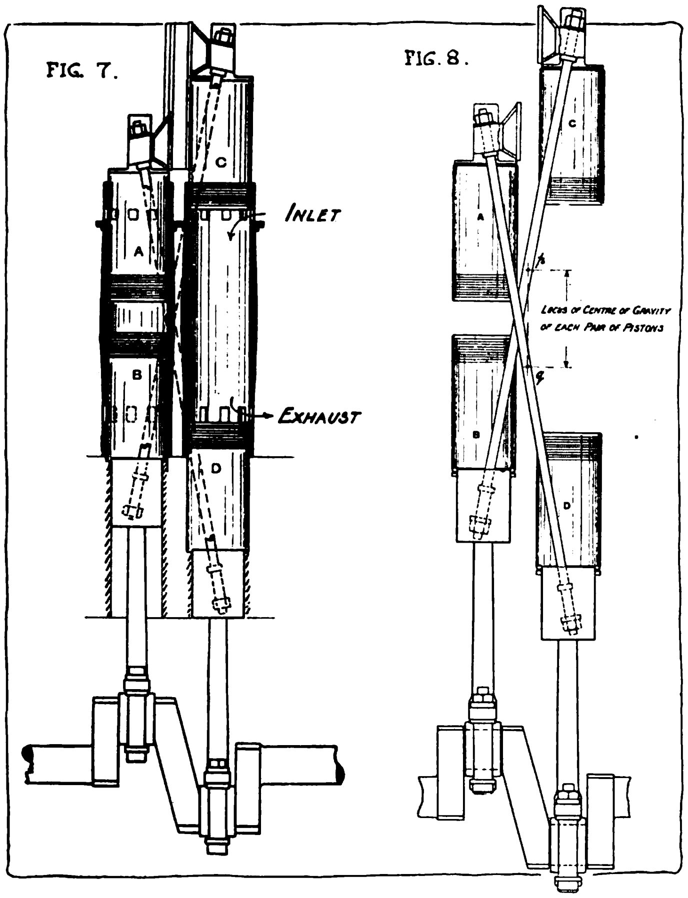


Fig. 4—Ordinary four-cylinder motor; secondary forces unbalanced. Fig. 5—Eight-cylinder V-motor; secondary forces unbalanced. Fig. 6—Junker-Oechelhauser motor; impulse and primary forces balanced; secondary unbalanced



Figs. 7 and 8—Fullagar motor. Mass balanced, both primary and secondary. Impulse balanced if motor is made with four cranks

second pair of cranks at right angles to the first, and the explosions in the four cylinders, acting upon the eight pistons, thus produce eight impulses per revolution. The vertical forces at all times balance each other and are not transmitted through the engine frame.

The pistons of each pair are rigidly joined and form one moving part, as shown in Fig. 8. The center of gravity of the pistons A and D is at the point q and travels up and down on the line pq, while the center of gravity of the other pair of connected pistons, C and B, is at the point p and travels up and down on the same line. The primary forces are thus perfectly balanced. Secondary forces result from the fact that the common center of gravity of all four pistons and their connecting-rods oscillates on the line pq with an amplitude which, with a connecting-rod of the length of five cranks, is equal to 1-20 of the stroke of each piston, but this force is balanced by the corresponding force in the other pair of cylinders, and as the two pairs of cylinders are brought closely together, the secondary couple which alone remains, is small. In a six-cylinder motor of the type it could be nil.

The only reactions on the frames of the Fullagar motor are the horizontal thrusts of the crossheads on their guides, and these are always in one direction. A 500-horsepower motor of this type, with 12-inch bores and 18-inch stroke, has been in operation for one year and at 250 revolutions per minute, which means an average piston speed of 750 feet per minute, develops scarcely any perceptible vibration. Even at 900 feet piston speed the vibration is still slight. The oblique rods cause little friction, as the angle of the rods is less than the maximum angle of the connecting-rods, and the total friction in the motor is less than it would be if each of the eight pistons had its own crank and connecting-rod. While the balance of mass and impulse is very good, there is, however, one unbalanced reaction of the motor, each successive impulse tending to rotate the motor backward around its crankshaft, and there is also the gyrostatic effect of the flywheel, which in the case of application to aeroplanes it might be desirable to eliminate.

The only extensively used motor in which the torque balance, just referred to, has been effected together with good balancing of mass is that which was fitted to Lanchester cars in 1896. As shown in Fig. 9, the primary forces were here balanced by weights on the crankshafts, the secondary forces of the pistons balance themselves, and the torque balance was secured by oppositely rotating flywheels. Balance of impulse was not obtained.

A motor which secures perfect balance of all forces is shown in Fig. 10. Two opposed pistons in a single cylinder are connected to two oppositely moving crankshafts at opposite ends of the motor. The shafts need of course to be kept in co-ordination by a layshaft and screwgears or by a pitch-chain and spurgears, though such a connection has to perform no appreciable work under normal operation. The arrangement has the advantage, for aviation purposes, that two propellers can be driven directly. If two such cylinders are placed side by side and their connecting-rods are coupled to opposite cranks, these rods will then balance each other, and perfect balance of all forces—mass, impulse, torque and gyrostatic effect—will be secured.

By applying the two-shaft principle to the Fullagar cross-connected cylinder construction, Fig. 7, a two-cycle and double-acting motor is produced in which each crank receives two impulses per revolution. An improved arrangement for this purpose is indicated in Fig. 11, where a pair of cylinders with cross-connected pistons is arranged in a plane at right angles to that of the shafts. Two such pairs can be side by side when the cranks are at right angles. Small balance wheels will then be needed to balance the connecting-rods,

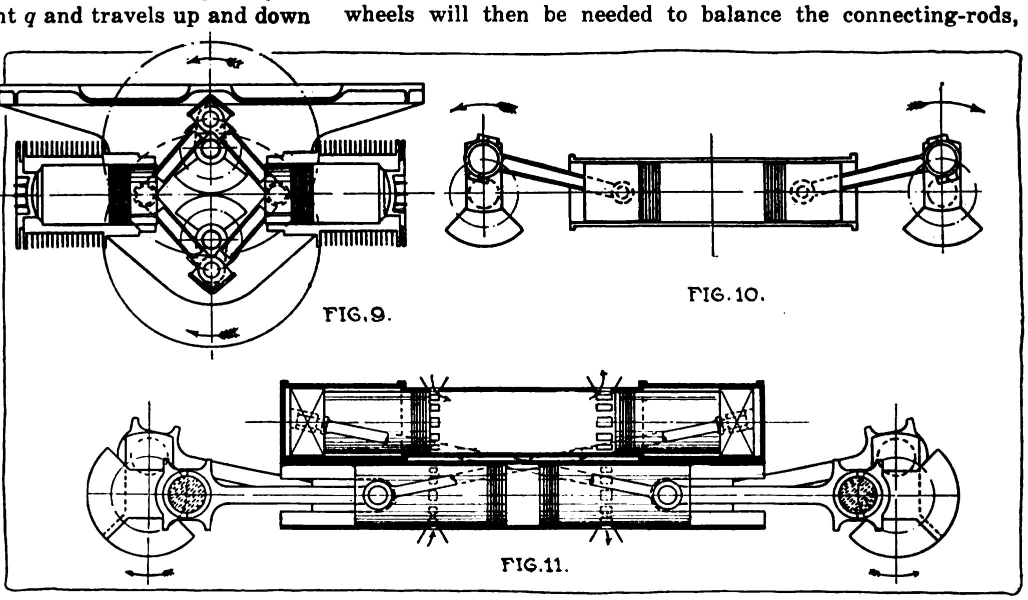


Fig. 9—Mass and torque balanced; impulse unbalanced. Fig. 10—General scheme of two-shaft motor with mass, impulse, torque and gyrostatic action balanced. Fig. 11—Double-acting valveless motor with two shafts and four impulses per shaft per revolution; perfect balance of all five kinds

and four impulses will be transmitted to each crankshaft per revolution. As the cylinders in either case work on two-cycle, an air pump of some kind is required, and in the illustration the two crossheads of each upper cylinder are arranged to act as blowers—a method found satisfactory.

The Improvement of Spring Suspension

An Examination of the Forces and Movements to which Motor Vehicles Are Subject on the Road and of the Cushioning Devices in Use or Required

By M. C. K.

COMMON unlearned ingenuity and plodding experimental metallurgy share the honors for most of the advancements which have been made in means for cushioning motor vehicles and their occupants against road shocks since the early days when ordinary vehicle springs were accepted as the only available basis for any new development that might be found necessary. Of systematic unfolding of scientific principles, like those which have governed the evolution of motors, there has been little question. No assistance has come from co-operation of investigators or the publication of indisputable data, excepting only the improvements which have been gradually made in the qualities of spring steels and their heat treatment, some of which have been duly tested and recorded. And the principal reason for the wild growth by which the present stage in the "springing" of motor vehicles has been reached, is easily discovered in the fact that it has always been the requirements which were in doubt rather than the means for meeting them.

The requirements are indeed most difficult to ascertain and express, covering an endless variety of conditions, due to the interactions among road, load and speed variations, further complicated by other interactions between springs and elastic tires. The problem of meeting requirements which cannot be specified naturally eludes a systematic and scientific solution, while it appeals to ingenuity and invites compromise, and it is therefore quite consistent with the intrinsic facts of the situation when the present status of the art seems to be characterized by a great multiplicity of loosely related auxiliary devices, all intended to obviate the shortcomings of the standard combination of vehicle leaf springs and elastic tires and representing a corresponding diversity of opinions as to what these shortcomings are.

While in recent years the vehicle springs proper have been modified in several ways—mainly by introducing a rocking motion around their thickest portion, as in cantilever springs, and by trussing two springs to combine strength with flexibility—these modifications have not yet been fully accepted as improvements or widely adopted; neither can it be said that auxiliary devices have been rendered superfluous by them, as, on the contrary, they continue to be used in connection with them.

Mechanical Requirements Never Defined

So long as nobody has yet been able to formulate sharply and precisely the mechanical actions required of a spring suspension for motor vehicles, no marked unity of efforts toward its improvement or standardization can evidently be expected. Furthermore, the mitigation of shocks, which in the widest term is the object of a spring suspension, is in itself a compromise action from which nothing absolute but only the alleviation of an undesirable effect is demanded. The whole foundation for a discussion of spring suspension principles and devices is therefore still largely one of personal opinion, with only here and there scientifically established facts and laws for guidance, and the most urgent need for making such a discussion fruitful is to get the requirements of a spring suspension formulated in terms of mechanical motion and as closely as possible to the essentials; and these, it may be said in advance, may differ for different classes of vehicles. The great difficulty is to narrow these requirements down to a working basis so well defined that the mechanical elements in any spring suspension stand in clear relations to them, and yet to have them wide enough to meet with general approval among those most competent to judge. Some general views on the whole subject and its relations to motor vehicle economy and motor vehicle manufacture seem here to be needed in order to make it clear that such a formulation of the essential requirements is desirable as well as possible, as the difficult nature of spring suspension mechanics and the resulting lack of a literature on the subject—excepting always the metallurgical end of it—have made it appear fairly satisfactory to many to go on stumbling toward final solutions rather than attempting a short cut through a systematic standardization of opinions and practical developments.

General Viewpoints—Relations to Economy

In the matter of economy to the user, the motor vehicle industry aims of course for nothing less in the end than to get back to first cost of transportation by animals, with maintenance expense much smaller, the life of vehicles at

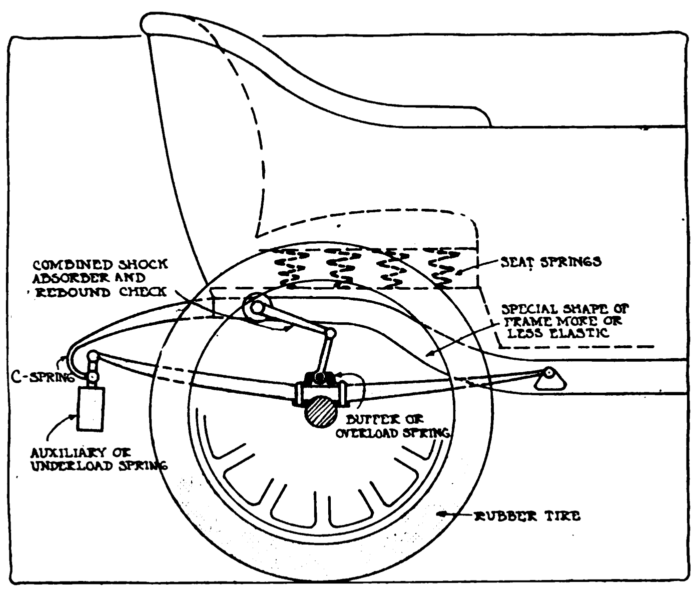


Fig. 1—Diagrams of main organs in modern spring suspension for rear end of a motor vehicle

least trebled by means of suitable repairs, as compared with the average life of draft animals, the speed at least doubled and the daily mileage quadrupled. This aim was taken for granted at the beginning of the industry, and belief in the possibility of realizing it, especially with regard to first cost and maintenance, was the principal motive for creating the industry. It was only later that speed was discovered to be the principal factor which actually operated in practice to make the use of motor vehicles broadly economical through the saving of time.

The great efforts made in the past few years for introducing economies by other means show, however, that an economical diet consisting of speed alone cannot be considered wholesome. Thousands of forms of transportation exist to which speed cannot be applied, and in these complete economy must come by more natural means. Also much doubt is caused by basing claims for economy on speed, as a high velocity over uneven ground is always more or less destructive and it is difficult to tell where the advantages of wage saving and of business efficiency begin to overbalance losses due to deterioration and repairs. Many hold that speed is already overdone and constitutes a public nuisance, which eventually must be checked. On the whole, the trend of opinion is perhaps toward the idea that speed must in the end become the free gift of motordom to the world rather than a commodity to be sold at the highest possible price. This implies that speed in moderation, yet far higher than any for which ordinary vehicle springs were intended, will always be practiced, and that speed in still higher degree must remain for nearly all vehicles a reserve property, to be utilized in emergencies without severe economical punishment.

Fundamental—and Needs Publicity

In the sharp economical development which has been inaugurated and which bids fair to become sharper yet, there will thus be no possibility for neglecting the improvement of spring suspensions, if it is admitted that speed cannot be much abated and that the present relatively high maintenance cost of motor vehicles is closely associated with their shortcomings in this respect. Among other subjects worth studying with a view to the increased economy so peremptorily demanded, that of spring suspensions, including tires, claims most public attention, because it is least recognized among engineering elements and is yet truly fundamental, deeply affecting durability, practicable speed, tires and tire wear, fuel consumption—in fact all the main factors in mechanical economy—besides being the principal one to be considered in the matter of producing driving comfort and security for frail loads.

The great variety of spring suspension schemes and devices which are in the market and, in the aggregate, very extensively used, speak of course loudly enough, if not very articulately, of the great economical importance of improved methods for cushioning against road shocks, but each of them is offered with the claim that it remedies the shortcomings as much as is needed, in one respect or another if not in all respects, and is therefore actually set up as an argument against the need of further discussion. And a similar pressure upon public opinion, making for silence where speech would be more profitable for the general advancement, comes from manufacturers of automobiles and of tires who never cease to warn against the economical dangers of overloads, holding themselves free from responsibility for tire and spring injuries if overloads are carried. By constant repetition of a warning which is in fact completely justified by the actually existing conditions, they have conveyed an impression to the effect that the user is at fault if he overloads—this being so far correct—but this impression is through the imperfections of average logic construed to imply that the manufacturers and the spring suspensions, including the tires, are all that could be expected and that consequently all discussion with regard to urgent improvement would be wasted, at least so long as one opinion is as good as another, in the absence of generally recognized requirements and means for meeting them.

A keener demand for economy must eventually result in recognition of the business fact that overloads are everywhere carried occasionally as a matter of necessity and that spring suspensions or tires which do not respond to this necessity are to that extent in need of improvement, a large margin being required for load variations as well as for speed variations. That the factor of safety should be permitted to be smaller—5 to 10 times smaller—in this respect than for any of the simple mechanical elements in the construction of an automobile or motor truck, is scarcely a proposition for which approval can be expected throughout the future of the automobile industry. The problem must therefore be faced as soon as possible in theory, in order that practice shall not find itself too far behind popular demands.

Before the mechanical requirements of a spring suspension can be formulated, it may be useful to pass in review the objects which it must serve, as some of these are otherwise easily overlooked. In widest generality it may be said that a spring suspension serves comfort under small shocks and security under sharp ones. More in detail the objects may perhaps be listed as follows:

(1) Protection; (a) for machinery and values, (b) for persons.

(2) Comfort; (a) in general, (b) to make driver's job less wearing, (c) to subserve safety by keeping the faculties unimpaired.

(3) Fuel economy; by reducing load lift and tire flexions.

(4) Speed; since protection, comfort and personal safety determine the speed limits under average American road conditions.

(5) Reserve speed; which, when permissible, enlarges the range of usefulness of each vehicle and reduces investment.

(6) Racing speed; an artificial requirement but important to demonstrate, among other things, the fitness of a spring suspension in its totality.

Present Complication

The equipment which has been developed gradually to serve all of these purposes already comprises a considerable number of additions to the simple springs which were found sufficient for the more slowly moving vehicles of the past. Fig. 1 presents a diagrammatic view of the organs now found necessary for a complete spring suspension at one end of a vehicle. Spring washers to prevent bolts from jarring loose throughout the vehicle structure come under the same head, and, if the front end of a vehicle is usually suspended a trifle more simply, this is mainly because the standard steering system is influenced unfavorably by large spring action. On the other hand, it is found necessary to give radiators at the front of motor trucks a special spring suspension, and in some cases it is deemed desirable also to hang the motor in a special spring frame. The whole equipment represents a considerable quota of the original cost of a vehicle, while the shortcomings still remaining in it, despite its elaborateness, stand for a much larger quota of upkeep expenses. Simplification would plainly be desirable if consistent with improvement. For convenience in reference a list of the organs or factors which enter into a complete modern spring suspension follows:

(1) Air tires; with solid rubber tires second choice and solid tires plus elastic wheels third choice.

(2) Alloy-steel vehicle leaf springs; either (a) long, strong and very flexible or (b) supplemented by auxiliary coil springs.

(3) Auxiliary coil springs; in all cases when the leaf springs, for economical or other reasons, are chosen stiffer than they are required to be for easy riding.

(4) Rebound checks; always required to remedy an intrinsic shortcoming in the strength of a leaf spring and to limit movements of the vehicle body under certain road shocks of a certain kind. They are often combined with

(5) Spring dampers, commonly termed shock absorbers, though this term is proprietary; always more or less useful if the leaf springs are flexible enough—alone or in combination with the auxiliary coil springs—to be efficient for comfort.

(6) Overload springs or buffers.

(7) C-springs; while apparently a fashion feature they maintain their necessity because they produce a longitudinal cushioning effect at stops and starts and also a lateral and

(Continued on page 993)

Chevrolet Continues Four and Six

Six Reduced to $1,425 and New Body Fitted—Four Has 106-Inch Wheelbase and Bigger Brakes

CHEVROLET for 1915 continues to make the two chassis which have been marketed for 1914. These are a four and a six, the latter coming out at last year's automobile shows. The price of this six, which comes only in touring form, has been cut from $1,475 to $1,425. On the four-cylinder chassis, Chevrolet puts a re-designed, streamline five-passenger body, calls the car the Baby Grand and sells it for $875. Or, it fits an attractive roadster body, designates the model the Royal Mail and continues to offer it at $750. With the Auto-Lite electrical system the four sells for $110 more.

The principal changes in the four-cylinder car are the wheelbase increase from 104 to 106 inches, and the making of more powerful brakes by enlarging their diameter 2 inches, making them 12 inches. Mechanically, the six is practically unchanged, but it has a new sloping body, which is roomier than that formerly used.

The six-cylinder motor is an L-head 3 5-16 by 5 1-4, with cylinders in blocks of three. Thermo-syphon cooling, constant level splash oiling, and Remy dual ignition are features of this power plant. The driveshaft is inclosed in a torsion tube, bolting at its rear end to the gearbox, the latter being in unit with the rear axle, which is three-quarter floating. Other specifications include cone clutch, platform rear spring suspension, left drive, center control and rear gasoline tank feeding by pressure.

The wheelbase of the six is 112 inches, tires are 34 by 4 and Auto-Lite cranking and lighting are furnished.

The fours have the distinctive Chevrolet motor with valves in the head, rockers and springs inclosed within an aluminum cover plate. Twenty-four horsepower is credited to the engine, whose dimensions are 3 11-16 by 4 inches. The cylinder head is a one-piece casting secured to the cylinder block by bolts, making a compact and readily removable assembly.

Rear Springs Take Drive

Drive is through a cone clutch to a three-speed gearset located amidships on two frame cross members. Final drive is by double universal uninclosed shaft, torque being taken by a rod and drive by the rear springs, which are three-quarter elliptic. Tires are 32 by 3 1-2 on both roadster and touring car.

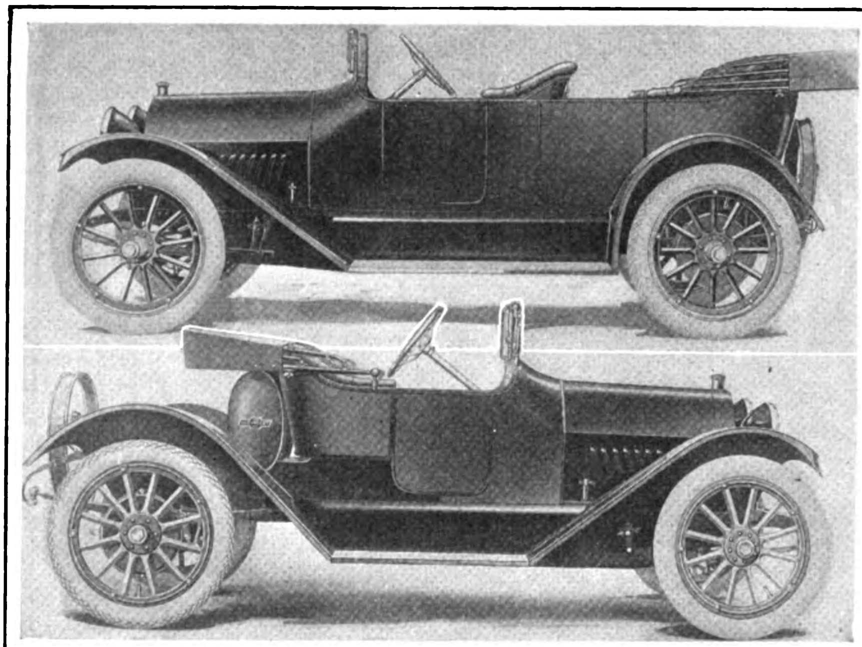
The Chevrolet Four

The valve-in-head type of engine which propels the four-cylinder roadster and touring car has a displacement of 170.9 cubic inches, and its stroke-bore ratio is 1.08 with an S. A. E. horsepower rating of 21.8.

The cylinders are cast in block form, with the upper half of the crankcase integral with them. The joint at the base of the cylinders is thus eliminated, resistance load being spanned to the crankcase walls and bearings through continuous webs placed so as to distribute the strain. This is reduced on each cylinder individually because of the support given by the adjoining cylinder.

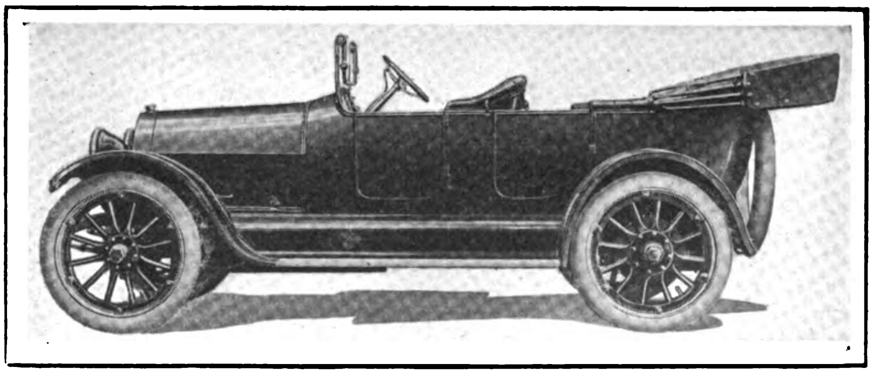
Detachable Cylinder Head

The head is a one-piece casting secured to the cylinder block by bolts, the joint being made with a copper and asbestos gasket. The special advantage of the separate head

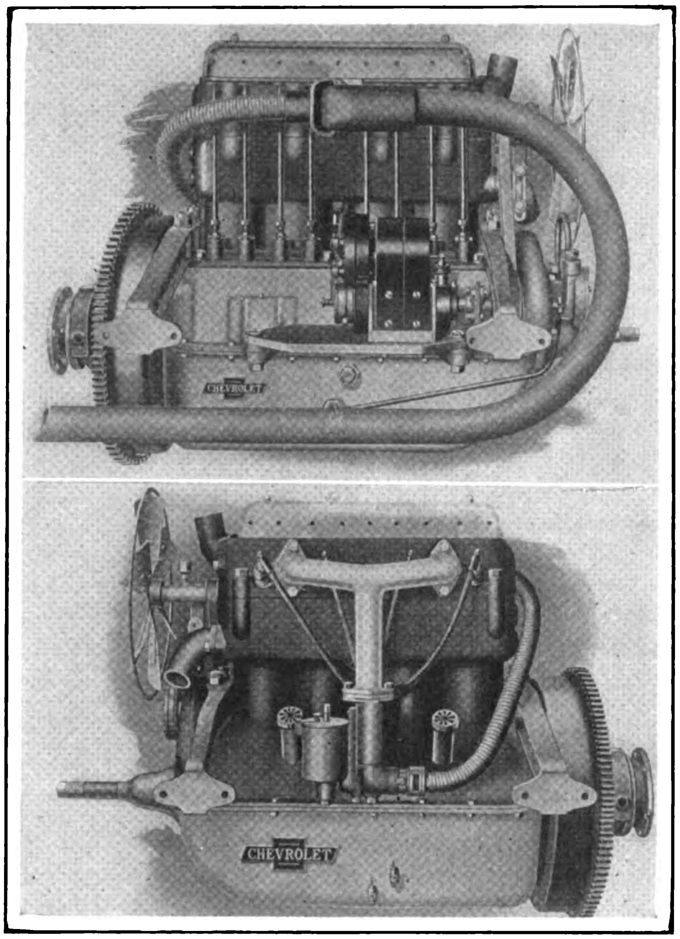


Upper—Four-cylinder Chevrolet Baby Grand touring car, which, with 106-inch wheelbase and full equipment, except electric starting and lighting, sells for $875. The Auto-Lite electrical system is furnished for $110 extra

Lower—Chevrolet Royal Mail roadster, which is mounted on the same four-cylinder chassis as the Baby Grand, and sells for $750 without electric starting and lighting, which is furnished at $110 extra



Six-cylinder Chevrolet, which has a 26.3-horsepower motor, 112-inch wheelbase and a new roomy body. The Auto-Lite electrical system is furnished at the stock price, $1,425



Upper—Exhaust side of Chevrolet four-cylinder motor, showing the mounting of high-tension magneto and hot air intake for carbureter. Note exhaust passing forward, down and back
Lower—Intake side of same motor showing carbureter mounting and connection of hot air intake. Note detachable cylinder head inclosing overhead valves. Flywheel is ready for gearing to Auto-Lite electrical system which is furnished at $110 extra on the four-cylinder cars

construction is that, being readily removable, access to valves and combustion chambers is an easy matter. The valves are carried in the head piece without cages, which allows efficient cooling of both valves and their stems, they being entirely surrounded by water. The plugs are also set at a convenient angle in the head casting on the right side.

A compact and neat appearance is given the engine assembly, due to the housing of the rockers and springs within an aluminum cover plate fitting to the cylinder head and held in place by a bolt at either end. Besides keeping out dirt, this also has the effect of silencing the valve actions. When the cover is in place, only the valve rods running down to the tappets on the right side are visible.

Gearbox Mounted Separately

The engine is not of the unit power plant type, but has exposed flywheel with gearbox separately mounted further back. The motor supports are at front and rear of the cylinder casting, and are in the form of arches from which the assembly is hung by bolts. These arched arms attach to the side frame rails.

The carbureter, which is a 1-inch Zenith, double-jet type, is placed on the left side and has a Y-shaped intake. The vaporization of the fuel is augmented by the utilization of heated air taken from a jacket on the exhaust manifold and conveyed through a flexible tube to the air intake. A shelf on the right carries the Simms high-tension magneto which is driven by a shaft connecting to the camshaft drive through helical gearing completely housed at the front of the motor.

On the touring model only, the gasoline tank is placed at the rear of the chassis, and instead of having pressure feed to the carbureter, the Stewart vacuum feed system is employed. The vacuum tank is mounted on the vertical portion of the intake manifold so that its feed to the carbureter is almost vertically downward. On the roadster model, this vacuum supply is not required, as a positive gravity feed is attained by placing the main supply tank on the rear deck, it being high enough above the carbureter to insure a good flow.

Internally, the Chevrolet four-cylinder motor presents no unusual features but adheres to approved design. The crankshaft is a three-bearing type running on die-cast babbitt bearings with the center one brass backed. The connecting-rod bearings are also brass backed, and are drop forgings with strap ends. The camshaft is also a three-bearing construction with integral cams, the bearings being of the plain type. This shaft is driven by a helical gear which bolts to its shaft.

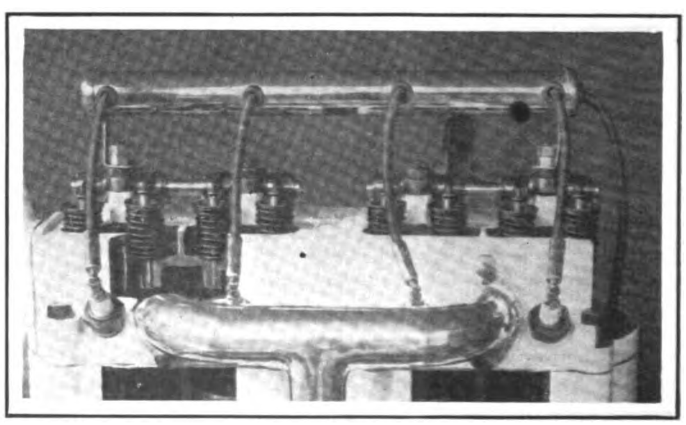
The cooling system is of the thermo-syphon type incorporating the usual belt-driven fan and radiator of large capacity.

The lubrication, ever an important part, is well worked out. The system is a self-contained, constant level splash type with the oil circulated by a gear pump which takes the supply from the lowest part of the crankcase and after forcing it through the dash sight feed, sends it back to a distributing pipe inclosed within the crankcase. This distributer delivers the oil to the individual oil troughs, into which the connecting-rod ends dip at each stroke. All bearings have oil grooves, while the crankshaft bearings are supplied from pockets in the crankcase casting above the bearings. These pockets receive their oil from the splash action. The camshaft bearings are oiled by wicking from the crankshaft bearing pockets.

Two-Unit Electrical System

The Auto-Lite cranking and lighting system, which is supplied at extra cost, is of the two-unit type, an electric motor connecting through the Bendix drive with teeth in the flywheel rim serving for turning the crankshaft, and a separate generator driven by helical gearing and carried on the right providing current for lighting and ignition. The latter has in unit with it a Connecticut coil and distributer to take care of the ignition, it replacing the magneto equipment when the electrical system is supplied. The storage battery used is a Willard, while the headlights are of the two-bulb form, eliminating side lamps. The cranking motor, when fitted, occupies a position to the right of the flywheel, being hung from a frame cross arm.

The drive features include a cone clutch of ample proportions. This acts in the flywheel and has leather facing with springs underneath. The cone is of pressed steel and there-



Upper part of Chevrolet four motor, showing overhead valves which are inclosed as illustrated at the upper left of the page fore light and strong. The gearset is carried amidships on two frame cross members. It gives three forward speeds and reverse. The main shaft is carried on annular ball bearings while the countershaft revolves on plain bronze bearings. The gearshifting lever is placed directly above, so that an efficient center control is provided.

Semi-Floating Rear Axle

The propeller shaft is of the open type fitted with two universals with the torque taken by a torque arm and drive by the leaves of the substantial rear springs. The rear axle is of semi-floating construction with its heat treated shafts running on Hyatt roller bearings. The housing is malleable, and is split crosswise. The gear ratio is 4 to 1. The outer ends of the axle tubes carry the brake shafts operating the internal expanding emergency and external contracting service brakes which act upon 12-inch drums 1 3-4 inches wide.

The rear springs are of three-quarter type and mounted outside of the frame rails. They are 48 inches in length and have scroll rear ends. The front pair are 36 inches long, while all leaves are 1 1-2 in width.

A 17-inch wheel controls the steering gear, which is on the left. This gear is of the worm and worm gear type, adjustable. It incorporates ball thrust bearings to take the thrust load.

The equipment of both roadster and touring car includes everything now looked upon as a standard part of the modern automobile, and is ready for the road.

The Six-Cylinder Model

There is very little in common between the chassis design of the six and the fours already described. The motor with its dimensions of 3 5-16 by 5 1-4 delivers 26.3 horsepower by S.A.E. formula, has a displacement of 271.5 cubic inches, and its stroke-bore ratio is 1.58. The cylinders are cast in blocks of three of L-head type, valves being on the right. The crankcase is a two-part, horizontally split design with the cylinder blocks bolting to the upper half of the case.

This engine has the same method of support in the frame as the four, there being arched cross arms from which front and rear of the crankcase are hung by bolts. Arranged on the right side are the exhaust manifold and the three electrical units for ignition, cranking and current generating, crankcase brackets carrying them. The Zenith double jet, horizontal carbureter is placed on the opposite side, there being little or no external intake manifold, connections to the adjacent corners of the cylinder blocks providing entrance to the passages within the castings.

Thermo-Syphon Cooling

The cooling is by thermo-syphon in connection with a five-blade, belt-driven fan. Oiling is a constant level splash arrangement with circulation maintained by a plunger pump, operated by a camshaft eccentric. The oil reservoir is an integral part of the lower half of the crankcase, on the right rear side.

Like the four, the main bearings of the crankshaft, which are three in number, and the connecting-rod bearings, are of die cast babbitt brass backed. The camshaft, a drop forging with integral cams, has three plain bearings and is operated by helical gear connection with the crankshaft.

The shaft on the right, which is also driven by helical gears, drives the Auto-Lite generator, and back of it the Remy dual magneto, through universal joint connection. The cranking motor, also an Auto-Lite, is mounted so that its gears will shift into mesh with the flywheel face teeth when the pedal is pressed. This pedal not only makes the gear connection but sends the current to the motor. The storage battery is a 6-volt Willard.

The final drive after it leaves the cone clutch is through a propeller shaft inclosed within a torsion tube. In this construction, only one universal is used, that being ahead of the point where the shaft enters the tube. This tube takes both drive and torque, and is braced by radius rods running from its front end diagonally out to the ends of the axle tubes.

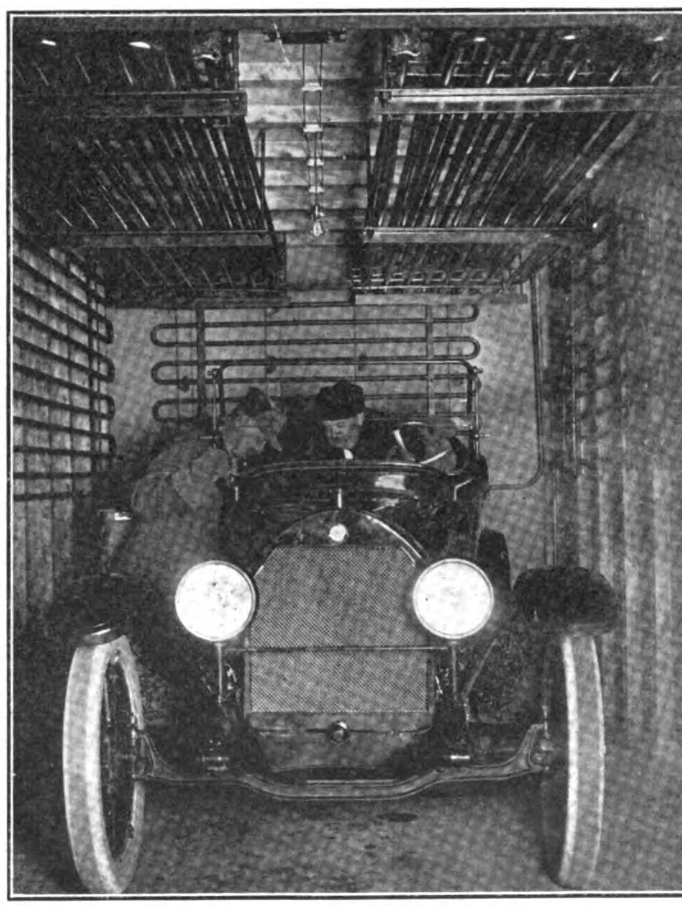
The gearbox is a part of the final drive unit, being interposed between the end of the tube and the axle housing, flanges connecting all three to make a unit. This gearset has three selective speeds and reverse, while the axle is three-quarter floating.

The rear spring suspension departs radically also from that of the four, as it is of the platform type, in which a transverse half-elliptic crass spring shackles at its ends to the rear ends of two other half-elliptics. These parallel the side frame rails, attach to the axle at their centers and shackle to frame brackets at the front ends. The center of the rear cross spring attaches to the frame rear cross member.

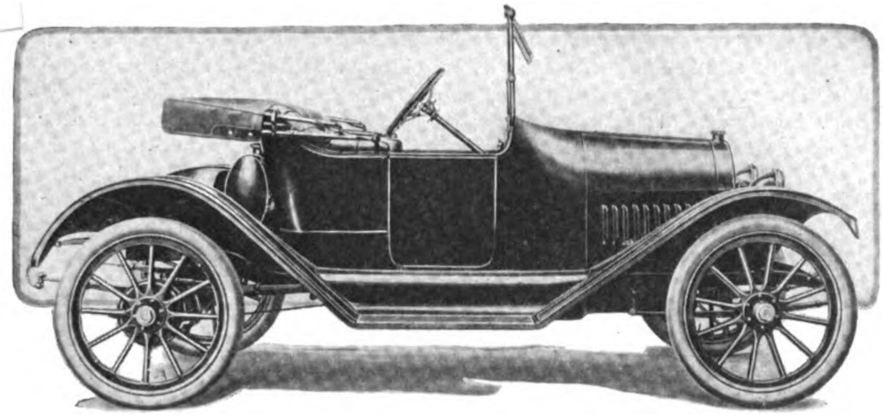
This construction serves as a protection for the 15 1-2-gallon fuel tank hung from the rear of the chassis. Gasoline is fed to the engine under pressure.

Drive is on the left, control in the center and the equipment is complete. Some motor dimensions follow:

Part	Four	Six
Crankshaft:		
Front bearing..........	2 3-4 by 1 1-2	3 by 2 3-16
Center bearing.........	2 by 1 31-32	2 5-8 by 2 7-32
Rear bearing...........	3 1-8 by 2	3 3-4 by 2 7-32
Camshaft:		
Front bearing..........	2 9-16 by 1 5-16	2 9-16 by 1 3-4
Center bearing.........	2 by 1 11-16	2 3-8 by 1 11-16
Rear bearing...........	1 7-8 by 1 1-4	2 by 1 1-4
Valve diameter...........	1 1-2	1 1-8
Connecting-rod bearing..	2 1-8 by 1 1-2	2 3-8 by 1 11-16



The Thomas B. Jeffery Co. has recently installed at Kenosha, Wisconsin, a refrigerating plant for the purpose of making cold weather tests on carbureters, batteries and motors. In an hour after starting the refrigerating machinery, it is possible to get a temperature of from 8 to 10 degrees below zero. The room in which this outfit is installed will accommodate the largest models and leaves plenty of room for men to work on the car



New Monroe roadster, which sells for $460 with equipment

Monroe Two-Passenger Car $460, Equipped

Top and Windshield—Electric Lights—Unit Power Plant Standard Parts Throughout

A TWO-PASSENGER 20-horsepower roadster selling for $460 with complete equipment has been announced by the Monroe Motor Car Co., Flint, Mich. The car is of standard design throughout, has pleasing lines and the equipment includes all the ordinary accessories except a starting motor of Auto-Lite make which is $35 extra. Two electric headlights and a tail light are fitted, the current being supplied by an Auto-Lite generator and an L.B.A. storage battery. The top is mohair and has a full set of side curtains and a dust cover. A two-piece, double-ventilating rain-vision windshield has been adopted and there is an electric horn, tire pump and tool kit to complete the equipment.

Thirty Miles per Gallon

Thirty by 3-inch Goodyear clincher tires are used and the wheelbase is 96 inches with standard tread. A speed of from 3 to 50 miles per hour is claimed for this car and the gasoline consumption is stated to be 30 miles per gallon.

The motor is a unit power plant construction suspended at three points. The four cylinders are cast in a block. The valves are in the head which is removable. The bore of the motor is 3 inches and the stroke 3.75, giving an S. A. E. rating of 14.4. Power is transmitted through a 10.5-inch cone clutch to a three-speed selective gearset. The flywheel is exposed and the gearset is connected to the motor by means of two arms which pass around each side of the flywheel.

The electric generator is situated on the right hand side of the motor at the forward end and is driven from the timing gear case by a helical gear. Ignition is supplied by a Connecticut automatic system, the electrical energy being taken from the storage battery. This unit is located directly in front of the lighting generator and is driven by helical gears.

When a starting motor is fitted it is also placed on this side of the motor and drives through teeth which are cut in the rim of the flywheel. The release of the pinion is accomplished by the Bendix helical drive. In this drive the pinion is mounted on a helically cut shaft so that when the starting motor is driving the engine, the pinion tends to slide forward as far as possible and thus holds itself in mesh with the flywheel gear, but when the drive is in the opposite direction the gear slides back out of mesh.

The camshaft is situated on the right side of the motor and operates the valves through a conventional rocker arm construction. The head is held down by seven nuts.

On the right side of the motor is found the Zenith carbureter to which there is a flexible tube connected with a hot air stove on the exhaust pipe. An unusual arrangement is noted in the method of carrying away the exhaust gases. The exhaust pipe is attached to the rear of the casting.

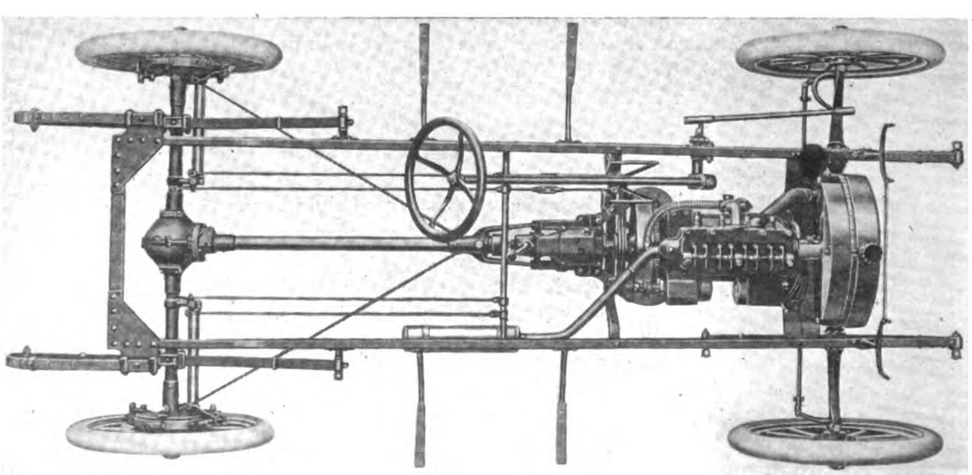
Cooling is by means of the thermo-syphon system. A honeycomb radiator with an auxiliary tank at the top is used, the circulation of air through it being aided by a belt-driven fan. The lower connection to the motor is a large diameter hose which enters on the left side near the front, while the return connection to the radiator is at the front end of the motor at the top and in the center.

Two Main Bearings

The spark plugs are S. A. E. Standard and are situated on the left side and are horizontally placed. The valves are 1.375 inches in diameter. Two main bearings are employed, the front one being 1.5 by 2.5 inches and the rear 1.625, by 2.5 inches. The camshaft bearings are both 1.4375 by 2.75 inches. Helical timing gears are used.

Lubrication is by a pump and splash system, the pump delivering oil to all the rods, bearings and timing gears. The crankcase is provided with a reservoir and there are individual troughs into which the connecting rods dip. The oil level is shown by a float in the breather tube.

Double heat-treated nickel steel gears, carried on ball bearings throughout are found in the gearset. The shifting lever is mounted conveniently at the rear of this unit.



Plan of chassis, showing unit power plant and location of accessories

The rear construction consists of a semi-floating rear axle with a torque tube which is attached to the rear of the gearset by means of a yoke. This complete unit is reinforced by rods running from the yoke to the axle ends.

A bevel gear reduction of four to one is standard. New departure bearings carry the differential gears and Hyatt roller bearings are used on the axle shaft and main drive shaft. Adjustment of the differential and pinion gear can be made outside of the axle thus obviating the necessity of disassembling the axle.

Internal expanding and external contracting, toggle-operated brakes operating on 10 by 1.25-inch hubs are used. Brakes are lined with Thermoid hydraulic compressed brake lining. The service set is actuated by the clutch pedal and the emergency by another pedal which has a ratchet for locking it.

Half elliptic springs, 36 inches long, are fitted in the front and 3-4 elliptics, measuring 46 inches, are used in the rear. These springs are made from heat-treated steel.

The front axle is an I-beam drop forging with removable bronze bushings in the steering knuckles and ball bearings in the wheels.

A worm and worm gear adjustable steering gear with 16-inch walnut wheel is used with the spark and throttle levers mounted under the wheel. There is also an accelerator pedal.

Instruments on Cowl Board

The dimming switch for the headlights, the ignition switch and ammeter are mounted on the cowl board. The upholstery is tufted and it is stated that liberal leg room is afforded. There is a large deck at the rear for carrying baggage. The body is finished in royal blue and metal parts are standard black with nickel trimming.

While this new company is an independent concern it is closely allied with the Chevrolet Motor Co., inasmuch as all stock holders of the Monroe company are also stockholders of the Chevrolet company.

The Monroe company was organized at Flint, Mich., Aug. 1, 1914, with a capital stock of $250,000, half of which is preferred and half common. The officers of the company are: President, R. S. Monroe; vice-president, W. C. Durant; secretary, Curtis Hathaway; treasurer, Arthur G. Bishop; chief engineer, C. J. Whittacre; consulting engr., John T. Trumbell; purchasing agent, W. C. Rose.

The Improvement of Spring Suspension

(*Continued from page* 988)

torsional effect which is of value when only one of two wheels on the same axle is bumped.

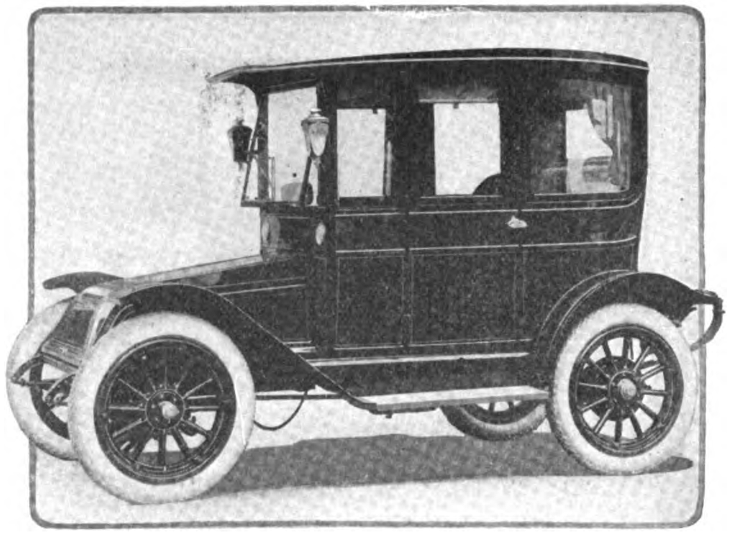
(8) Flexible and elastic vehicle frames; which are often considered undesirable, as they expose bodies and loads to twists and irregular strains and movements.

(9) Seat springs plus upholstering; these are seldom coordinated with the rest of the suspension system.

(10) Spring washers and other anti-vibration devices.

In trying to determine how an equipment composed of some or all of these organs does or does not perform the functions required of it, and how a number of special spring suspensions, to which it will also be necessary to refer in detail, perform similar service, the first thing to be done must of course be to undertake an analysis of the movements to which a vehicle is subject on the road under a number of different representative conditions. In this analysis not only one kind of vehicle must be considered but as many as show essentially different effects, and it is evident that the movement of the body, the load, the running gear must be determined separately and in relation to each other, in so far as possible, and also in relation to the road level and to inequalities in this level, both humps and hollows.

(*To be continued*)



Ward coupé with five-passenger body which sells for $2,100

Ward Has New Coupé and Delivery

Coupé Has Five Passenger Body—Delivery Wagon Sells for $875—750-Pound Body

THE Ward Motor Vehicle Co., New York City, manufacturer of electric trucks, has entered the pleasure-car field by making a five-passenger electric coupé for 1915. This car is complete in every detail and sells for $2,100. In addition a 750-pound delivery wagon is announced for $875. Standard parts are used throughout this car, and it will travel 35 to 45 miles per charge. The other commercial vehicles will be continued practically without change.

The most striking feature of the new coupé is the grouping of all the battery cells in a single compartment at the front of the car. This is covered by a hood, hinged at the rear, which is artistically shaped, its curves blending with those of the body.

Comfort has been aimed at in the design of this machine by adopting a 96-inch wheelbase, large pneumatic tires and coach springs 64 inches long. The upholstery is deep and roomy.

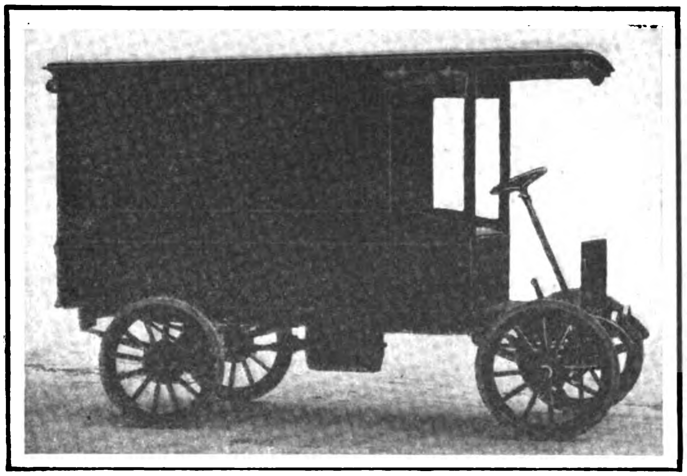
Three passengers are accommodated on the broad rear seat while two more are provided for on individual swivel seats in front. This allows the passenger sitting next to the driver to face forward, or to the rear, as desired.

The interior is upholstered in blue broadcloth to match the body finish. The curtains are of blue silk. The interior equipment includes a silver-mounted flower vase, toilet case watch, memorandum book, and perfume bottles.

Drive on Left

The car is driven from the left side, the horizontal controller being operated with the left hand. There is an electric bell or horn button conveniently placed in the end of the handle. The steering handle, just above the controller lever, is worked with the right hand. There are two sets of expanding foot brakes, either set can be applied and either is sufficiently powerful for perfect control although both can be used if desired.

The master switch is in front of the operator and immediately below the windshield. Three sets of electric light but-



Ward Special light delivery wagon which retails for $875

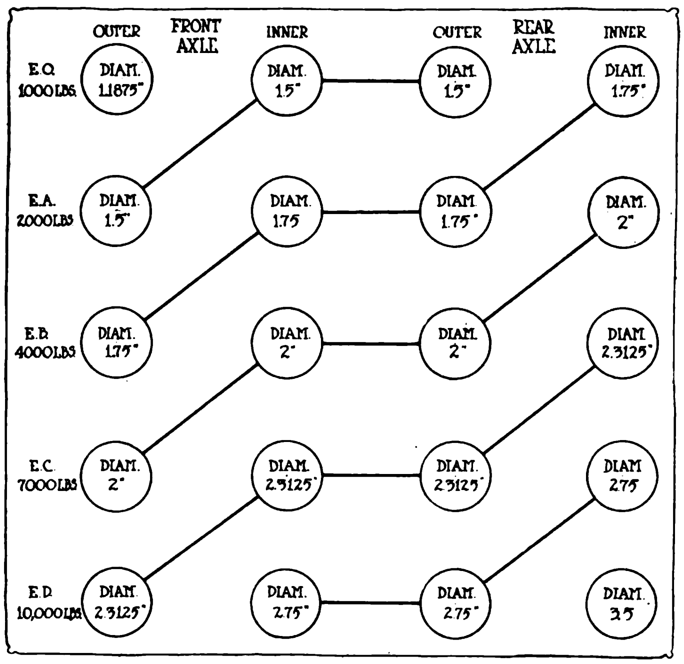


Diagram showing relation between bearings sizes used on five different Ward models. The lines connecting the different circles show the bearings of one size. There are only seven sizes in all

tons arranged on the left just beyond the steering handle, control the lights including a rear lamp and reading lamps.

The battery is a lead cell type made by the company. It has 40 cells of 15 plates each. This gives a mileage radius of from 60 to 100 miles depending on road conditions. The speed varies from 17 to 20 miles per hour. Five forward speeds are provided and there are two reverse.

Power is produced by a 3.5-horsepower General Electric series-parallel motor located amidships. The drive is transmitted through a single pair of bevel gears to a floating axle of Timken make. The front axle is also made by Timken. The springs are alloy steel, heat-treated and 64 inches in length. Wood wheels of the artillery type are fitted and the tires are 34 by 4.5 inches all around. Demountable rims and Brown puncture-proof inner tubes are used.

The regular equipment includes seven lamps, two side lamps, two reading lamps, two standing lamps and one rear lamp, an electric bell or horn; speedometer; locks for doors and control box, hydrometer, thermometer, pump, complete kit of tools and jack.

Ward Special Costs $20 a Month

The Ward Special, which is the name of the delivery car, has been brought out especially to compete with horse-drawn wagons of this type. The Ward company claims that this machine may be stored, washed and charged for $20 per month while a horse and wagon will cost $30.

The driver sits on the left side and steers through a wheel. The control levers are all within easy reach and controller switches are accessibly located under the driver's feet.

A Westinghouse motor is used. It is suspended from the center of the chassis and connects with the rear axle through two universals. Timken axles are fitted both front and rear. From 35 to 45 miles can be obtained from a single charge and the speed varies from 10 to 12 miles per hour.

Wooden wheels and 32 by 2.5-inch solid tires are equipped all around. A single set of expanding brakes act on the rear wheel drums.

The standard finish is a Brewster green body, light green belt panel, and running gear of the same color. The equipment includes storm curtain, lamps, bell, thermometer, plug, cable, hydrometer, and complete kit of tools.

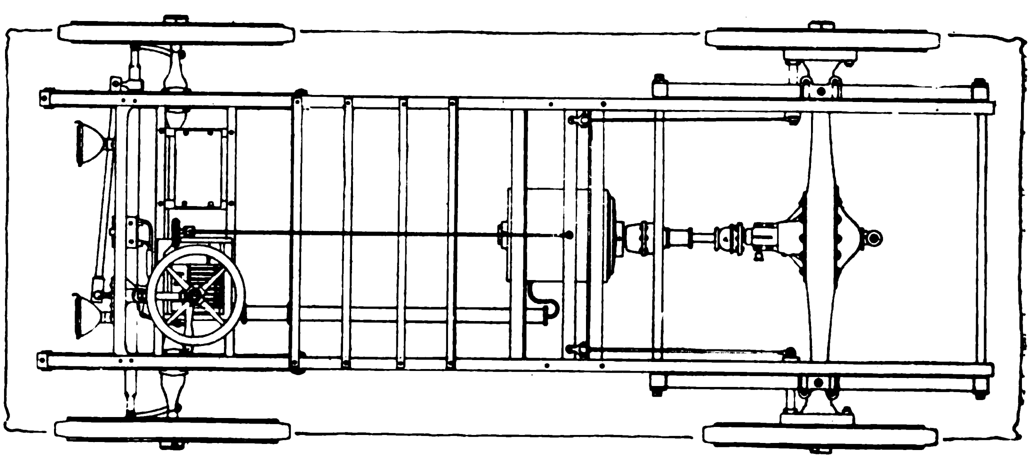
On the five other models there have been no changes of note except in the capacity ratings which are now as follows, the respective prices also being given: 1,000 pounds, $1,250; 2,000 pounds $1,500; 4,000 pounds, $1,900; 7,000 pounds, $2,-450; 10,000 pounds, $2,950.

Wheel Parts Standardized

An interesting feature which is a step towards standardization is noted in the dimensions of wheels, tires, and wheel bearings on these five models. The sizes of wheels and tires progress from the smallest to the largest model so that the total number of sizes is reduced to six instead of having ten as would otherwise be necessary. The rear wheel of one truck is used as the front wheel of the next one and the rear wheel of this truck is used as the front wheel of the following larger size, etc.

This principle is further illustrated in the accompanying figure which shows the bearing sizes for the different models. First looking at the inner bearing on the front wheel spindle of the 1,000-pound truck it will be noted that this becomes the outer bearing on the front axle of the 2,000-pound truck. Likewise, the same diameter of bearing is used for the outer bearing on the rear axle of the 1,000-pound truck. This results in seven bearing sizes instead of twenty.

This scheme of construction not only saves in first cost but where a man has a fleet of trucks of different sizes the stock of repair parts that it is necessary for him to carry is greatly reduced.



Chassis plan of Ward Special, showing motor mounted in the center

Detroit S. A. E. Compares Eight with Six

Attendance of Many Chief Engineers Indicates Intense Interest in Subject—Weight and Balance Much Discussed

DETROIT, MICH., Nov. 23—A discussion of the eight versus the six-cylinder motor held the attention of the Detroit Section of the Society of Automobile Engineers at its meeting on Nov. 20. The attendance and the number of chief engineers present indicates that there is no question but that this is at present the leading topic of design in the automobile industry at the moment.

Opening the discussion was a review by T. P. Chase, chief engineer of the King Motor Car Co., of the considerations which led his company to adopt the eight-cylinder motor instead of the six-cylinder type for coming year. Beside the increase in torque over the four-cylinder design, and the high-speed possibilities of the eight, the King company has been able to place the new motor in the present chassis and under the present sized hood.

Comparison of Weights

A change to a six-cylinder design of the same power as its present motor would have necessitated either a cramping of the body room or the lengthening of the wheelbase. A 90-degree V-type motor is to be used and it is to have practically the same piston displacement as the present model.

Mr. Chase made some interesting comparisons as to the approximate weights of the various parts in the two motors. In the new motor, the cylinders are cast in two blocks, of four cylinders each, and from the rough castings it is estimated that these two blocks, together, weigh about 28 pounds more than the single block of the present four-cylinder motor. Other comparisons indicate that the eight connecting-rods weigh but little more than the four old rods; crankshaft bearings are of practically the same size, and therefore, of the same weight; and the flywheel, of course, does not have to be as heavy as on the four, due to the increased number of explosions per revolution. In these two motors, of practically the same piston displacement, it is estimated by Mr. Chase that the eight-cylinder job, complete, will not weigh over 35 pounds more than the present four-cylinder motor.

It is possible to make the connecting-rods each considerably lighter than those of the four-cylinder motor, due to the fact that they have to withstand a smaller total pressure, since the areas of the pistons are less. The same applies to the bearings.

In relation to sizes and weights, Wm. B. Stout, chief engineer of the Scripps-Booth Co., stated the law governing areas and volumes. By this law areas increase or decrease by two dimensions, while volumes may vary in three dimensions. If a mass is made on-half the size of another mass, the surface will be one-fourth as great as the latter, and the weight one-eighth as great. Mr. Stout cited the aeroplane as an example of this. With a machine half the size of another the wing area per unit of weight will be twice as great.

Considering the weight and area relations of high-speed motor-car engines, the above law also holds within the limitations of construction. These limitations mean that in foundry practice a piston wall can be cast only just so thin and, therefore, it is often impossible to make the parts as light as would be theoretically possible. If a piston for one motor was of the correct weight, the theory would show that another piston of half the dimensions would have one-fourth the working area, and one-eighth the volume.

Light Reciprocating Parts

Even with the practical limitations of construction, a motor with the same stroke as another but with half the bore will give better high-speed results than the other, due to the greatly reduced weight of the reciprocating parts, and the resulting decrease in vibration, together with the greater possibilities in revolutions per minute. The newer 3 by 6-inch high-speed motors certainly show a decided improvement over the older 6 by 6-inch square motors. Mr. Stout stated that passenger comfort depended not so much upon the impulses per revolution as upon the number of revolutions per mile. Since the eight-cylinder motor will be primarily a high-speed motor, and also give more explosions per revolution than the four or six, the increase in the impulses per mile will be very marked.

In Favor of Six

For the six-cylinder side, the case was presented by J. G. Vincent, chief engineer of the Packard, Allen Loomis, also of the Packard, and S. I. Fekete of the Hudson. Mr. Loomis drew numerous diagrams upon the blackboard in explanation of the balance of the inertia forces. He showed that due to the angularity of the connecting-rod the inertia curve is not a true harmonic motion, and for this reason the inertia forces do not exactly balance in the four-cylinder motor when the cranks are in the horizontal and vertical planes. With the cranks in the vertical plane the unbalanced portions tend to lift the four-cylinder motor, and when in the horizontal plane there is a downward thrust. These unbalanced forces tend to cause the four-cylinder motor to vibrate up and down.

Questions of Balance

The new eight-cylinder motors have the cylinders inclined to each other at 90 degrees, or in other words, their center lines are inclined 45 degrees from the vertical plane through the crankshaft. The unbalanced inertia forces in each block of four cylinders are, of course, the same as in the case of a four-cylinder motor, and act along the center lines of the cylinder. Since these center lines lie in planes inclined 45 degrees from the vertical, the inertia forces may be resolved into vertical and horizontal components. Because of the relations between the piston movements in the two sides of the motor, the vertical components of these forces cancel each other, and there is no tendency for the motor to vibrate up and down. The horizontal forces, however, add to each other, and during part of a revolution their direction is to one side of the motor, while later it is to the other side. These horizontal forces, therefore, mean that there is a tendency for the motor to vibrate sideways.

Vibration Tendencies

In the six-cylinder motor a plotting of the inertia forces shows that the resulting reaction on the engine base is equal to zero. There is, therefore, no tendency to vibrate in the six-cylinder motor, due to unbalanced inertia forces.

Another solution, showing the tendency of four and eight-cylinder motors to vibrate, was presented by Mr. Fekete. This speaker considered the center of gravity of the total system of pistons and connecting-rods. He stated, that due to the angularity of the connecting-rods the center of gravity in a four-cylinder motor would vary up and down as much as 5-8 of an inch. Plotting this movement for the eight-cylinder motor the variations for the two sets of cylinders would, in some cases, add to each other so that the total variation might easily be as great, in some cases, as 3-4 inch. In a properly designed six-cylinder motor, Mr. Fekete said that the center of gravity of the piston and connecting-rod systems did not move.

Preventing Crankshaft Whipping

Although the theoretical discussion showed the inertia forces in the six-cylinder motor to be in perfect balance, the point was brought up as to the difficulties in six-cylinder design in preventing the whipping of the long crankshaft. In the eight-cylinder V-motor the crankshaft need be no longer than in a four-cylinder motor, and therefore, the vibration and other difficulties arising from the springing and whipping of the crankshaft may be more easily overcome than in the case of the six.

Speaking of the relation of the ignition problems to the eight-cylinder engine, A. de Maringh, of the Mea company, thought that battery ignition would not be suitable for these new type engines, due to the great speed which would be required of the coil. He believed that a magneto would be required for the best service.

The Automobile

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The New Fuel

ALTHOUGH the new fuel may be manufactured in quantities at 2 cents per gallon as reported and sold in quantities at 6 cents per gallon; and although it has demonstrated its practical value in a 1000-mile speedway test, it must not be assumed that it has taken a place side by side with gasoline, with the possibility of ousting the older fuel from the field in a few years. The promoters of the fuel may have no such thought in mind, rather they apparently have a new fuel which offers particularly attractive manufacturing and merchandising qualities, and its entry into the field cannot be looked upon with anything else but a spirit of welcome, as any new fuel that will tend towards lower existing prices will be gladly received.

The fuel will face greatest competition when it comes to the question of manufacture for general distribution and then will follow the greater problem of national distribution. The distribution of any motor fuel must be as general as that of the sale of sugar or any other household staple. Gasoline is really becoming more so by the wide extension of the curb-side station, which during the past year was so extended as to make it unprofitable for many garages to sell it. The new fuel has to meet these conditions.

Merchandising motor fuels is one of the expensive factors in connection with them. For several years we have seen our big refineries buy the crude, pump it a thousand miles or more to the refinery, refine it, load it into railroad tank wagons and ship it to substations, and there load it into tank motors and deliver to garages and private users for 10 cents per gallon or under. While this was being done many garages were selling it for 20 cents and some for 25 cents per gallon, yet these garages had nothing to do but install a storage tank with pump and pump it into the tank of the automobile. Look on the one hand what the manufacturers did for 10 cents and then what the middle man did for the same amount.

Viewed in the light of merchandising conditions the new fuel has its battles to win. It is sincerely hoped that it may develop into a fuel forming a worthy rival of gasoline, and further that if it attains such prominence, that, then, may come some economies in merchandising which will make it possible for the car owner to profit by reduced cost of manufacture rather than losing all of such advantages due to the merchandising of it through a middle man at an unreasonable profit.

Rational Fire Regulations

THE recent activity of the fire-marshal department in New York State, in which a new code of regulations governing the construction of new garages and modifications to be made in old ones was promulgated, suggests how essential it is for automobile manufacturers and dealers to take due recognition of the abuses that are certain to invade any industry and to take measures to correct these before too great activity is launched from other sources.

Every new industry has its abuses, and it cannot be denied that there are many garages in New York State and in nearly every other state in the Union that violate all rational regulations. On the other hand the majority of the new garages are exemplary structures, practically on a par with the moving picture theatre in obedience to fire regulations. With the revamped livery stable as an example of the fire trap in the garage field, it at once becomes imperative on those with modern buildings to take up the burden of getting a higher standard in the dangerous buildings.

It cannot be gainsaid that there are dangers connected with the general use and storage of gasoline in a garage or repairshop, but if we hedge the storing and handling of the gasoline around with good safety precautions there is not any reason why we should go to the opposite extreme and introduce unnecessary legislation, once we have really eliminated the danger factor of the garage.

It is absurd to draft any laws prohibiting the use of an open torch in a repair shop, and requiring that the torch can only be used in a separate room with a door opening only to the outer air. It is generally equally absurd to require the same regulations governing heating boilers, etc. What is needed is sane legislation.

To Revise Fire Regulations for Garages

New York Trade Association Shows Injustice of Enforcing Present Rules—Another Hearing Before State Marshal December 9 —Saxon Brings Out Five-Passenger Six

ALBANY, N. Y., Nov. 18—The regulations governing changes in structure of garages and repair-shops recently promulgated through the state of New York by Thomas J. Ahearn, state fire marshal, and which regulations were to take effect December 1, have been temporarily held up, due to a conference in the state capitol today at which the Automobile Trade Assn. of New York showed why the present regulations are unjust, inconsistent and in many cases would work very serious injury to existing garages in the state. As a result of today's conference the existing regulations will not go into effect December 1 and it is probable that they will not be enforced at all in their present manner.

Another Hearing December 9

On December 9 there will be another hearing before the state marshal at the capitol here when the officers of the State Dealers' Assn. will meet with the state fire marshal to revise the present code. It is expected that in this revision a great many of the articles will be changed and that the enforcement will not follow until requisite time. In the meantime the state marshal is notifying all of his deputies throughout the state that the code as promulgated will not be enforced December 9 and matters will remain as they are until a revision is accomplished.

At today's hearing president R. H. Johnston, of New York City, and head of the State Dealers' Assn., read letters from Rochester dealers showing how the Rochester fire marshal had notified them that their garages were violating the new code and that alterations must be made before December 1. Practically every garage in Rochester had received notification covering improvements on the ceilings of the garages, requiring metal lath and three-quarters inch of plaster; also notifying them that the repair-shop must be separated by a fireproof wall with automatic fire doors from the garage proper; also that staircases and elevators must be enclosed in fireproof partitions with automatic fire doors; also that metal window frames and sashes with wire glass must be changed, etc., etc.

It was shown that one dealer would have to make an expenditure of $6,000 on his garage in order to conform with the new requirements, and that these changes could not be made inside of 8 weeks, although only 2 weeks were given in which the work was to be done and if not completed at the end of that time action would be taken towards closing the garage according to the regulations.

This danger has now been overcome and the probabilities are that the final draft of garage regulations will be entirely rational and not work a foolish hardship on any garageman with the exception, perhaps, of those who have located in one-time livery stables which have not been brought up to rational fireproofing standards.

Many Unfeasible Rules

Today's hearing demonstrated conclusively that there are many unfeasible rules in the existing regulations. One is that a torch cannot be used in a repair-shop, the idea of the regulations being that there would have to be a separate fireproof room in one corner of the repair-shop. The torch, forge, etc. would have to be used in this fireproof room and this room would not have a door into the repair-shop but only one leading into the outer air. It was shown that this was impossible in many existing modern garages built in entire accordance with the existing fire laws previous to the recent code which the state fire marshal had circulated. If there is to be a fire door between the repair-shop and the garage, and if gasoline is not permitted in the repair-shop, then there is no reason why the open torch or the forge should not be permitted without restrictions in the repair-shop.

Then if the revision takes place it is certain that there will be a new classification of garages instead of the promulgated one.

Charles Thaddeus Terry in arguing the case for the New York dealers, drew attention to the general lack of feasibility existing throughout the new draft. He attacked the basis of garage classification on the ground that it was unfair and irrational. He cited one case where an existing garage has a cement floor 2 3-4 inches thick but according to the promulgated regulations this should be 3 inches thick and that it would be impossible to lay an additional 1-4 inch and have a satisfactory floor.

The regulation requiring that heating boilers be located in a room with an entrance only leading to the outside air was shown to be impracticable in many existing fireproof garages.

The New York State Dealers' Assn. is going to get from all of its dealers an expression of opinion on the various garage questions and will go to the next hearing on December 9 in possession of all this information so that the outcome should be a code of garage and repair-shop regulations that are sane and enforceable.

Saxon Brings Out 5-Passenger Streamline Six

DETROIT, MICH., Nov. 20—The Saxon Motor Co. has had a new car on the road in the vicinity of the city for the past 6 months which will be shown at the New York show. It is a six-cylinder type of five-passenger body design, with stream lines and sloping hood.

In bringing out this new model, the production of the small four-cylinder roadster at $395 will not in any way be curtailed. In fact, the success which this car has attained since the concern was started about a year ago has prompted the arranging for greatly increased output of the four for the coming year.

Present factory facilities have become inadequate and plans have been completed for utilizing parts of factories near the present plants on Bellevue avenue. The overflow quarters are on Beaufait avenue, and they give to the Saxon company triple the factory space it formerly occupied.

General Electric To Make Starters

NEW YORK CITY, Nov. 21—A new electric starter is about to be placed on the market by the General Electric Co. of Schenectady, N. Y., Lynn, Mass., Windsor, Conn., and Fort Wayne, Ind. The first effort of this giant concern will be the production of a starter for Ford cars to market at $87.50. It will be a single-unit design made under the trade name G. E.

The selling end of the business will be handled through the A. J. Picard company of this city which has signed a 3-year contract. This concern has been taking care of the Gray and Davis interests in New York and has been closely in touch with the industry, through its president A. J. Picard, for several years.

Welfare Men Want Truck Drivers Examined

YORK, PA., Nov. 21—At the second annual conference of the Industrial Welfare and Efficiency Conference held in this city for 3 days last week and at which the welfare of workmen and workwomen in factories was the subject of much discussion, the adoption of an act requiring all drivers of motor vehicles to take an examination before an examining board was favored by several of the delegates. The examining board would issue a certificate and it was hoped by this means that accidents would be reduced.

SYRACUSE, N. Y., Nov. 23—The Brown Co., of Syracuse, N. Y., announces that it has purchased the rights, plans and good will of the Lewis-Sanford Pump Works, Boston, Mass. This concern has manufactured several types of pumps, the latest of the line being the one-cylinder pump of original ideas and adaptable to Ford and several other makes of cars.

France Buys 900 More Trucks

600 of 2-Ton and 300 of 5-Ton Type Bring Total U. S. Sales to France to 2,640

NEW YORK CITY, Nov. 23—The French government which some 6 weeks ago purchased 1,740 motor trucks from four American companies, namely, White, Packard, Pierce-Arrow, and Kelly-Springfield, made another purchase last week from White and Pierce-Arrow. Both orders were practically a duplicate of the previous ones, the White order being for 600 of their 2-ton models. The Pierce order is for 300 of the 5-ton trucks. This last order makes a grand total of 2,640 American trucks sold to date to the French government as the result of the present war.

Word comes from Detroit that the Standard Motor Truck Co., that city, has received an order for 100 trucks, some 3-tons and other 5-tons. These have been sold to the British government.

Special Work for Big English Firms

LONDON, Nov. 10—There is little if any change in regard to the condition of touring car manufacturers in England, many of them being out of action indefinitely, to use a military phrase. Fortunately some of the larger concerns that were well equipped with automatic machinery have been able to undertake the production of special work for the war department, which will continue until the end of the war.

Government Buys Chassis

The completed chassis which the majority of the English companies had on hand when the war broke out have been disposed of to the government, many being fitted with armored bodies for scouting work. The Red Cross has absorbed a great many of these. As an indication of government orders there is the case of the Vulcan Motor Co., which has obtained an order for vehicles and parts to the amount of $1,000,000 during the past month, which will keep the factories busy for some time. The war business in the commercial vehicle end has greatly helped conditions and the leading factories now operating for the government are producing approximately seventy chassis per week. Firms not engaged on orders for the British government are working on others for the Belgians and Russians. Only last week the Austin Motor Co., secured a Russian order amounting to $1,250,000, with an additional order for parts valued at $250,000.

This order called for forty-eight armored cars, each carrying two machine guns and five men and with a maximum speed of 40 miles per hour; eighteen automobile work shops equipped with lathes, drills, etc., sixteen tank wagons for transporting gasoline; eight spare-parts wagons equipped as traveling stores; 128 ambulances for twelve stretchers each; and 100 transport wagons of the 3-ton type. In addition there was a large equipment of accessories such as jacks, lighting sets, extra tires, spare parts, etc.

There is much enterprise being shown here by several American makers of trucks. The Peerless company, which had some trucks accompanying the Canadian contingent is here demonstrating. The Jeffery quad or four-wheel-drive, is making an impression on the war authorities, the Standard of Detroit is being demonstrated, as is the Fremont-Mais, as well as several others. It was reported here that the Woolesley company, one of the largest makers of gasoline trucks in England, has secured the agency for the full line of Baker electrics in this country.

Shortage of Horses

The shortage of horses is becoming a critical factor in England, and already the government has special buying agents through all the South American countries. This condition is bound to have an effect on the motor vehicle industry in the near future.

Conjecture has it in and around the war office in London that should the war be prolonged over another year or longer, there will not be much slackening in the demand for commercial vehicles for field service. Britain's army will be much larger next spring, and at present the Russian army is being handicapped by lack of trucks. Lord Kitchener is at present training an army of 1,000,000 men in different parts of the British Isles. These are to take the field in the spring and their presence in the war zone will call for a great increase in motor equipment. It has just been reported that the Australian government has voted $1,000,000 for motor equipment to accompany its expeditionary force which is now being prepared.

Many other reports are current in London regarding truck sales, one being that Whitings, Ltd., has secured an order from the Russian government for fifty American Federal trucks.

The present winter has already greatly hampered the use of trucks in Russia, Eastern Prussia and Austria. Non-skid tires are receiving much attention, and now many of the armored cars are being fitted with a tire known as the K.T., which, instead of being a continuous band of rubber, is made up of rubber studs placed very closely together. Another device extensively used is the Parsons non-skid chain as well as the Never-Skid device. It has recently been learned that the German government in June had placed a very large order with the English company for Parsons chains, the order to be delivered on telegraph demands. These demands came at the time the war broke out and deliveries were not made.

Many Steam Wagons

An interesting aspect of motor transportation in the war is the great number of steam wagons collected from users throughout England. These wagons were largely used in the milling industry and are giving a good account of themselves in the hauling of heavy guns in the war zone. They have been fitted with specially wide tires, making it possible for them to be used in soft fields.

Metzger Sues United States Motor Directors

NEW YORK CITY, Nov. 20—Emanuel Metzger, a minority stockholder in the old United States Motor Co., which was succeeded by the present Maxwell Motor Co., has filed a suit in the Supreme Court for New York county, asking that the directors of the old company account for assets which he alleges were wasted during the months prior to the receivership. Metzger attempted to intervene in the receivership

Automobile Securities Quotations

NEW YORK CITY, Nov. 24—During the past week there was a market for automobile securities on the curb, but not a very active one. The following quotations are those which a prominent brokerage house finds to obtain in private sales and are not to be taken as official. However, they will serve as a guide until the re-opening of the Stock Exchange.

	1913		1914	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com	200	215	150	..
Ajax-Grieb Rubber Co., pfd	96	102	100	..
Aluminum Castings, pfd	98	101	..	..
Chalmers Motor Co., com	95	98	..	93½
Chalmers Motor Co., pfd	..	97	..	97
Firestone Tire & Rubber Co., com	250	255	..	..
Firestone Tire & Rubber Co., pfd	103	104	..	..
Garford Co., pfd	80	90	..	..
General Motors Co., com	36	35	66	68
General Motors Co., pfd	74	76	82½	84
B. F. Goodrich Co., com	18	19½	20	21
B. F. Goodrich Co., pfd	80	83	87	..
Goodyear Tire & Rubber Co., com	225	230	175	185
Goodyear Tire & Rubber Co., pfd	96	97½	..	..
Gray & Davis, Inc., pfd	96	102	..	..
International Motor Co., com	..	5	..	..
International Motor Co., pfd	..	15	..	..
Kelly-Springfield Tire Co., com	..	..	60	63
Kelly-Springfield Tire Co., 1st pfd	..	..	75	80
Kelly-Springfield Tire Co., 2nd pfd	..	..	92	96
Lozier Motor Co., com	10	16	..	..
Lozier Motor Co., pfd	..	92	..	..
Maxwell Motor Co., com	2¼	2¾	14½	15
Maxwell Motor Co., 1st pfd	18	20	43	45
Maxwell Motor Co., 2nd pfd	5½	6½	17½	18½
Miller Rubber Co	120	130	..	..
Packard Motor Car Co., com	..	..	..	100
Packard Motor Car Co., pfd	90	94	89	..
Peerless Motor Car Co., com	15	25	..	..
Peerless Motor Car Co., pfd	75	85	..	..
Pope Mfg. Co., com	1	3	..	..
Pope Mfg. Co., pfd	10	20	..	..
Portage Rubber Co., com	..	35	..	..
Portage Rubber Co., pfd	..	90	..	..
Reo Motor Truck Co	6	7½	10½	11½
Reo Motor Car Co	15	16½	21½	22½
Stewart-Warner Spd. Corp., com	55	60	46½	47½
Stewart-Warner Spd. Corp., pfd	94	97	92	98
Studebaker Corp., com	16	17½	27	..
Studebaker Corp., pfd	66½	69	..	81
Swinehart Tire & Rubber Co	78	80	..	..
U. S. Rubber Co., com	53½	54½	43	44½
U. S. Rubber Co., pfd	99¾	100	95	97
White Co., pfd	104	110	..	..
Willys-Overland Co., com	64	66	70	72
Willys-Overland Co., pfd	84	90	85	90

proceedings in the federal court in New York a year or so ago but was ruled out by the court.

As individual defendants he names James C. Brady, Benjamin Briscoe, Frank Briscoe, Richard Irvin, Herbert Lloyd, Johnathan D. Maxwell, Eugene Meyer, Jr., Edgar J. Meyer, Ora J. Mulford, Henry W. Nuckols, Richard A. Robertson, Kenneth B. Schley, Charles G. Stoddard, James W. Stoddard, Carl Tucker and the company itself.

Another echo of the receivership was heard in the United States district court in New York last week when Harold A. and John C. Howard, trustees of the estate of Sarah J. Howard, secured permission to sue the old Maxwell-Briscoe Motor Co. They demand the balance on a lease on the company's Chicago branch, the lease running until 1929 and payments having ceased in the summer of 1913.

The assets of the United States Motor Co. were sold by the receivers with the permission of the court and were in turn sold to the present Maxwell corporation. The receivers have not yet been discharged and the United States Motor Corp. and its subsidiaries still exist in form at least. Under a ruling of the court, claimants were required to appear before a certain date or be stopped from collecting, and it was this ruling which had to be modified before the Howards could sue on their lease. Should they recover they may collect under an arrangement made by the court when the Maxwell Motor Co. bought the assets.

Haynes Asks Retrial of Agent Suit

KOKOMO, IND., Nov. 21—The Haynes Automobile Co. has asked for a retrial of the suit brought against it by Benjamin H. Goodman, Omaha, Neb., whose dealership contract, signed at the factory in the afternoon, was rescinded in favor of one given in the forenoon in Omaha to C. F. Louk. The Goodman contract was given by sales manager Richard Bacon and the Louk contract by S. H. How, a field representative of the Haynes company. After long litigation and an appeal from the United States district court to the Court of Appeals, Goodman recently secured a verdict of $3,250.

Manufacturers state that such a condition could not now arise because of a contract clause which requires the approval of some high factory official before any contract becomes binding. But in 1909 this apparently was not the case with the Haynes company.

Goodman's story is that during the afternoon of September 1, 1909, he contracted at the factory in Kokomo for twenty-five Haynes cars and gave two checks totaling $1,250 as deposit. At 11 o'clock that morning the traveling representative in Omaha had signed up Louk; both contracts were for an exclusive agency. As soon as the Haynes company discovered the duplication it returned Goodman's deposit September 8, with an explanation that the Louk contract, made several hours earlier, must stand.

His deposit checks had been cashed by the company, however, and the return was by a Haynes check, which Goodman also cashed. When he went to the factory again to insist that the contract be carried out he tendered $1,250 in cash as a deposit. The offer was declined.

He sued for $25,000, in the United States district court for Indiana and Haynes won. On appeal Goodman secured a new trial; on the new trial a jury gave him $3,250, November 12, 1914. The reasons given by Haynes in its motion for a new trial are that the verdict is not substained by sufficient evidence, is contrary to law, is contrary to evidence and is too large.

Piel Charges Infringement of Long Patent

NEW YORK CITY, Nov. 23—Gottfried Piel and the G. Piel Co. filed suit yesterday in the United States district court against the Stewart Warner Speedometer Corp., charging infringement of the Long hand horn patent, No. 1,090,080. It is charged that the Stewart Warning Signal, recently brought out, infringes the Long patent in its diaphragm and adjustable wear piece. The suit is directed against the manufacturing company, a Virginia corporation, and the New York branch, a New York corporation.

C. of C. Special Meeting December 3

NEW YORK CITY, Nov. 23—A special meeting of all the members of the National Automobile Chamber of Commerce has been called by President Clifton for Thursday, December 3, at 11 a. m., at which time the attention of the entire chamber will be drawn to the present litigation of the Kardo company on floating axle construction and other patents. It is expected that the national chamber may consider the advisability of defending suits brought against its members by the Kardo company.

Prompt Shipment of Crude Rubber

NEW YORK CITY, Nov. 20—Arrangements are being made for operation of steamers, carrying the Holland flag, from Sumatra and Java direct to the United States, in order to enable consumers of crude rubber in this country to get their supplies of plantation grades more promptly. According to plans now under consideration the first vessel will sail from the Far East on December 20.

The cruiser Emden, which was recently sunk after a career in which she destroyed many merchant vessels, was the cause of some worry to the rubber trade of the United States, and there was general relief at the news of the Emden's destruction. That vessel, it is said, probably cost the rubber industry in America $1,000,000, and had she been allowed to continue to roam the Indian Ocean indefinitely she would have cost the American industry still more.

Before she was sunk, the vessel destroyed two dozen merchant ships, carrying 3,900 tons of crude rubber.

Overland Car Shipments Increase 4,194

NEW YORK CITY, Nov. 23—The Willys-Overland Co., Toledo, O., shipped 15,207 cars up to November 6, as against 11,013 for the same period in 1913. The shipment for the first 6 days of November was 1,135, as against 803 last year. The total shipment of 1914 cars was 45,003. The output for 1915 will be 75,000.

Chicago Stock Exchange Resumes Trading

CHICAGO, ILL., Nov. 23—The Chicago Stock Exchange opened its doors today and trading resumed where it stopped July 30, when with other trading centers the Exchange closed because of the European war.

That the stock exchange in New York City is quite certain to reopen for limited business before the end of the month, was the substance of the assurances received from responsible banking and brokerage authorities. On Nov. 24, the Governors of the Stock Exchange will meet for the purpose of deciding the question of resuming business in bonds.

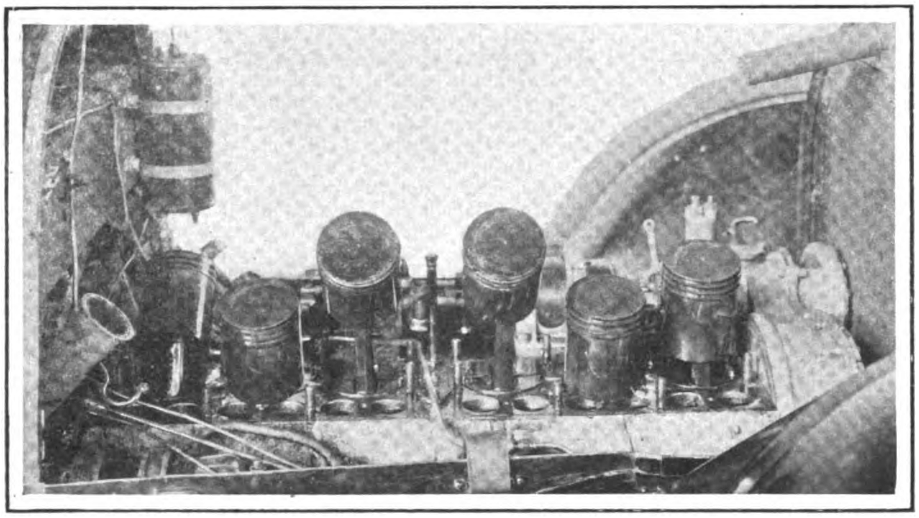
Market Reports for the Week

Changes in the market reports this week were few. These few were increases, occurring in the copper, tin and cottonseed oil markets. Electrolytic and Lake coppers saw a slight gain for the week with business quiet, although a firmer tone prevailed in sympathy with the further rise at London. Tin went up $1.63 per 100 pounds, in sympathy with the further sharp rise at London due partially to the unfavorable reports in the Far East affecting the safe transportation of tin from the Straits to Europe. Cottonseed oil rose $0.18 per barrel. However, the tone is unsettled and the consuming demand not what it was a week ago, being then very strong. The local market for crude rubber lacked new features of importance last week. Inquiries continue light, consumers being disposed to go slowly in the matter of replenishing supplies pending new developments in the situation.

Lead rose $0.20 per 100 pounds, closing at $3.90. This product was quiet but firm at the closing. The rest of the markets remained at the same prices quoted last week. In the metals markets, antimony was quiet at $0.13 1-2, the other markets remaining steady. All of the oils and lubricants continued steady. A moderate demand was reported for petroleum. Linseed oil was firm with trading more active.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Antimony	.13¼	.13½	.13½	.13½	.13½	......
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	......
Bessemer Steel, ton	18.50	18.50	18.50	18.50	18.50	......
Copper, Elec., lb	.11 9/10	.12 1/14	.12⅛	.12 3/20	.12¼	+.00 7/20
Copper, Lake, lb	.12 1/10	.12⅛	.12⅛	.12¼	.12⅜	+.00 11/40
Cottonseed Oil, bbl	5.40	5.41	5.40	5.51	5.58	+.18
Cyanide Potash, lb	.25	.25	.25	.25	.25	......
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	......
Gasoline, Auto, bbl	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	.90	......
Lead, 100 lbs	3.70	3.90	3.90	3.90	3.90	+.20
Linseed Oil	.47	.47	.47	.47	.47	......
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.71	.71	.71	.71	.71	......
Rubber, Fine Up-River, Para	.67	.67	.67	.67	.67	......
Silk, raw, Ital	..	4.00	..	..	4.00	......
Silk, raw, Japan	..	3.13	..	..	3.13	......
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	......
Tin, 100 lb	32.00	32.10	32.75	32.75	33.63	+1.63
Tire Scrap	.05	.05	.05	.05	.05	......

Marmon Goes 1,000 Miles on New Fuel



Marmon 41 motor taken down after running 1,000 miles on the new fuel

Actual Running Time

MILES	TIME HRS.	MIN.	SEC.	AVERAGE M.P.H.
100........	1	54	50.8	52.3
200........	3	57	37.0	50.6
300........	6	01	26.3	49.95
400........	7	49	27.4	49.45
500........	9	34	30.8	52.45
600........	11	19	47.5	53.00
700........	12	53	53.4	54.40
800........	14	45	44.9	54.25
900........	16	27	27.3	54.80
1000........	18	06	49.3	55.25
Total time lost.....	1	56	07.0	

INDIANAPOLIS, IND., Nov. 20—To demonstrate that a new motor fuel which it is claimed can be manufactured for 2 cents per gallon, and marketed at 6 cents per gallon in large quantities, is a practical fuel for motor car use, an official 1,000-mile test was made on the speedway here yesterday and today with the Marmon 41 touring car, covering 500 miles each day.

The new fuel was employed throughout the test in which the 1,000 miles were covered at an average of 50.2 miles per hour. Throughout the test only one apparently serious trouble was encountered at the end of the first 100 miles when it was discovered that the fuel was apparently frozen in the vacuum tank where it enters the carbureter. It was necessary to clean the pipe out, a 40-minute stop being required. This trouble was explained as being due to failure to strain the fuel before putting it in the car. With this single exception the fuel gave apparently satisfactory results although the consumption was rather high, averaging 7.42 miles per gallon. The weather was not satisfactory to a test of this nature, being very cold, the temperature during the first day ranging from 10 to 20 degrees Fahr. and on the second day being as low as 6 degrees at the start but rising to 25 when the trials were finished late in the afternoon.

The new fuel used showed a hydrometer reading of 55 Baumé as compared with 58 Baumé for gasoline. This 55 reading was at 40 degrees Fahr. and at 28 degrees Fahr. the reading was 53 Baumé. This fuel, as described in THE AUTOMOBILE, July 9, is made from a number of secret chemicals with water and naphthalene also used. Naphthalene is a substance from which moth balls are made and it is because of this that this fuel has been so closely associated with moth balls in the minds of many people. The fuel is said to have a moth ball odor.

The test showed that speeds, that compared favorably with those made by using gasoline, were obtained. The Marmon 41 used in the trials was the same car that a week ago averaged 62.89 miles in 1 hour with top and windshield up and carrying five passengers. In the new fuel test the car carried but the driver and mechanic and had the windshield up but the top down. With this equipment it averaged 55.25 miles per hour during the last 100 miles of the test. Its other average for 100 mile periods ranged between 49.45 and 54.80, the average for the entire distance being 50.2.

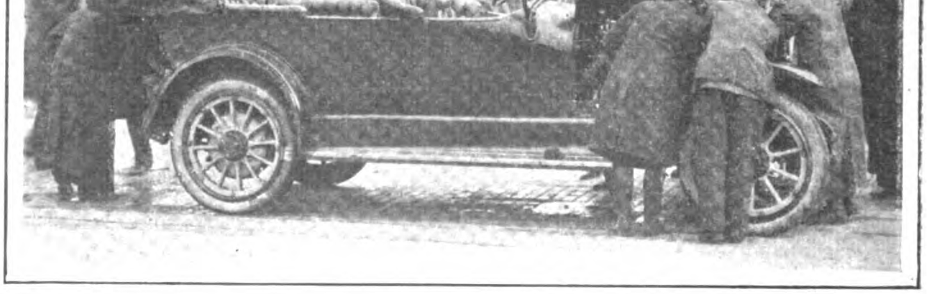
After the test was over the motor was dismantled in order to note the carbon deposits that had collected. In this examination the cylinders were taken off and the valves removed. The official report made by F. E. Edwards, technical representative of the contest board of A. A. A., states that "the metal parts of the engine are remarkably clean, showing very little more deposits than were found in this same engine at the completion of its 1-hour trial on November 12. No deterioration of metal parts due to chemical action was to be observed with the eye."

The fastest lap in the 2-day trial was second to the last, which averaged 62.85 miles per hour, a speed practically equivalent to that which the car averaged with gasoline in its hour test on November 12.

When the total lost time of 1 hour and 56 minutes is taken out, the average speed is brought up to 55.95 miles per hour.

The trials were timed by a new electric timer, the invention of Chester Ricker, the speedway engineer.

INDIANAPOLIS, IND., Nov. 23—Plans for a trip to the Panama-Pacific exposition to be held in California next year have been outlined to the Hoosier Motor Club. Division No. 1 would leave Indianapolis June 1 and require about 60 days for the trip. Division No. 2 would leave about July 1 and would require 30 days. The third division which would be a special train, would leave July 26.



Technical committee examining the car before the runs made in the 1,000-mile test of new fuel in a Marmon 41

Scene at Indianapolis Motor Speedway during 1,000-mile trial of new fuel in Marmon 41. Note supplies, tires, etc., at side of track

Twenty-One Entries for Corona Road Race

Practice Starts for 301-Mile Contest

CORONA, CAL., Nov. 19—Twenty-one entries have been received for the Corona road race to take place on the Grand boulevard, Thanksgiving Day.

The purse is $12,000 and the $5,000 Flagler trophy.

The length of the course is 2.76895 miles. The race is 109 laps or a total of 301.81 miles.

Practice started on the course November 17.

CAR	DRIVER	ENTRANT
Peugeot	Burman	Peugeot Import Co.
Peugeot	Rickenbacher	Peugeot Import Co.
Sunbeam	Grant	Harry Grant.
Sunbeam	Babcock	Harry Grant.
Duesenberg	Alley	E. L. Duesenberg.
Duesenberg	O'Donnell	E. L. Duesenberg.
Duesenberg	Callaghan	E. L. Duesenberg.
Stutz	Cooper	Not named.
Stutz	Klein	Walter M. Brown.
Stutz	Not named	Walter M. Brown.
Mercer	Pullen	Simplex-Mercer Co.
Mercer	Nikrent	Simplex-Mercer Co.
Mercer	Ruckstall	Simplex-Mercer Co.
Marmon	D'Alene	Wilbur D'Alene.
Marmon	Cadwell	A. A. Cadwell.
Maxwell	Carlson	Maxwell Motor Co.
Maxwell	Not named	Maxwell Motor Co.
Mercedes	De Palma	Ralph De Palma.
King	Ball	Eagle Motor Co.
Gordon Special	Gordon	Tom Gordon.
Bergdoll Special	Bergdoll	Louis Bergdoll.

Nineteen More Exhibitors for Big Shows

NEW YORK CITY, Nov. 23—Seven makers of electric passenger cars, two makers of gasoline passenger pleasure cars, and ten accessory exhibitors have been added to the already long list for the national automobile shows in New York and Chicago. Following are the electrics: American Electric Car Co., Saginaw, Mich.; Anderson Electric Car Co., Detroit, Mich.; Baker Motor Vehicle Co., Cleveland, O.; Ohio Electric Car Co., Toledo, O.; Rauch & Lang Carriage Co., Cleveland, O.; Waverley Co., Indianapolis, Ind., and Woods Motor Vehicle Co., Chicago, Ill. All of these makers will exhibit at both shows, except the American Electric Car Co., and the Woods Motor Vehicle Co., which will be only at the Chicago exhibition.

The added gasoline car makers are: Chevrolet Motor Co., New York City, and Trumbull Motor Car Co., Bridgeport, Conn.

The ten new accessory exhibitors are as follows: Chicago and New York Charter Single Sleeve Motor Co., Chicago, Ill.; Gray Bros. & Co., Chicago, Ill.; Lipman Air Appliance Co., Beloit, Wis.; Mathisen Spring Cushion Wheel Co., Chicago, Ill.; A. J. Picard & Co., New York City; Positive Supply Co., Davenport, Ia.; Wm. Shakespeare, Jr., Co., Kalamazoo, Mich. At New York only will be: Eclipse Machine Co., Elmira, N. Y.; W. S. Sheppard, Newark, N. J.; K. G. Welding & Cutting Co., New York City.

Cut Down Space at Quaker Show

PHILADELPHIA, PA., Nov. 21—Owing to inability to secure adequate quarters to accommodate all the would-be exhibitors at the forthcoming automobile show of the Philadelphia Automobile Trade Assn., that organization has been compelled to adopt a plan restricting the amount of space to be allotted. In order to secure a representation of the greatest number, any member handling but one make of car will be limited to 400 square feet of exhibition space. An additional 200 square feet will be optional to those handling two or more makes.

Drawings for space will take place at a meeting of the Trade Assn. to be held next Tuesday.

Vanderbilt and Grand Prize Course Practically Completed

¶ SAN FRANCISCO, CAL., Nov. 20.—*W. L. Hughson, chairman of the Vanderbilt and Grand Prize racing committee, states that the course on which the big races are to be run in February is practically completed and some fast laps have been made to show the possibilities of the 4-mile lap. The entire course has been changed from a gravel road to an asphalt surface.*

The course is 4 miles around and ranges in width from 40 to 70 feet. There are two right-angle turns and at each of these the road is 70 feet wide. There are two half turns, two gradual curves and one hairpin. The race will be spectacular from almost any point on the course. The grandstand will accommodate 25,000 people.

Dissension in N. Y. State Association

Rochester and Buffalo Clubs May Join Syracuse—Drop Forge Association Formed

POUGHKEEPSIE, N. Y., Nov. 19—There may be formed in New York State an independent organization as an aftermath of the proceedings at the annual convention of the New York State Automobile Assn. which closed here tonight. The convention, which began yesterday, was the scene of a faction fight between the present association organization, headed by President A. J. Deer, Hornell, and the Rochester and Buffalo clubs, which endeavored to prevent Deer being chosen for a fourth term and also attempted to have the by-laws amended. They were steam-rollered in all their moves, and the larger part of the two big club delegations left before the convention ended.

The fight was for and against Deer. The Rochester and Buffalo clubs charge that he is operating *Motordom*, the official organ, as a profit-paying enterprise. Deer replied that, while he owns 398 shares in the publication, he is willing to turn it over to the association as soon as it is free and clear from an indebtedness of $15,000. Deer had secured and voted twenty-three proxies from the smaller clubs of the State, and this proxy question was another source of difference. One of the amendments proposed by Rochester and Buffalo was that a proxy must be held bv a resident member of the club represented. It failed to pass.

So strong has been the opposition of the two big clubs to the conduct of Deer and his organization that they had not paid dues up to the hour the convention opened: at that time Buffalo paid dues for 3,002 members and Rochester for 2,861, thus giving their delegates standing. After having been steam-rollered, however, they stated that there was a strong possibility that Rochester, Buffalo and Syracuse would form an independent organization—Deer termed it a "progressive party"—and ask recognition from the A. A. A. If formed, it would have about 10,000 members and would be about equal in strength to the regular organization. The matter is to be taken up at the next meeting of the respective clubs. Syracuse pulled out about 2 years ago.

Highway Commissioner John N. Carlisle injected an element of surprise when he suggested that there be a reciprocal arrangement between New York, New Jersey, Massachusetts and Connecticut whereby foreign tourists pay a tax of 4 cents a gallon on gasoline for good roads maintenance. Sanitary Supervisor Paul V. Winslow, of Wappingers Falls, suggested that the association co-operate with the State in sanitary work about hotels and other public places.

General Counsel Melvin Bender reported on bills which had been throttled during the year and urged the passage of a wheel tax. The convention named a committee to take up long detours because of closed roads. Leaving half the road passable was urged.

The association now has seventy-five clubs, a gain of thirteen, and 17,516 members, a gain of 2,995.

American Drop Forge Assn. Formed

DETROIT, MICH., Nov. 20—Factory superintendents and shop men from American and Canadian drop forge manufacturing concerns met here yesterday and formally organized the American Drop Forge Assn.

A preliminary meeting was held several weeks ago with this organization in view and the officers then suggested were elected at yesterday's meeting. These officers are: R. R. Ellis, superintendent Detroit Forging Co., Detroit, Mich., president; George Des Autels, manager Anderson Forge & Machine Co., Detroit, Mich., vice-president; A. E. Dibble, manager Frost Gear & Forge Co., Jackson, Mich., secretary; E. B. Horne, superintendent Packard Motor Car Co., Detroit, Mich., treasurer.

An executive committee was then named consisting of the following men: E. Ingalls, Ingalls-Shepard Forging Co., Harvey, Ill.; M. Henry, Henry & Allen, Auburn, N. Y.; C. A. Prochler, Canton, O.; R. Herdegen, Dominion Stamping Co., Walkerville, Ont., and E. B. Horne, of the Packard Motor Car Co., Detroit.

"The object of this organization," said Vice-president Des Autels, "is to bring the factory and shop men in the drop forge industry together. It must not be misconstrued that the manufacturers have organized. As a matter of fact we managers and superintendents have not asked the manufacturers what they thought about the idea and we took steps among ourselves because we found it advisable that we should get better acquainted as to matters concerning the shops. We want to better conditions for the shop men, we desire to discuss our mutual methods and improve them, to get together from time to time at meetings similar to those of the society of automobile engineers, and especially, to promote better efficiency among the men."

History and Progress at E. V. A. A. Session

NEW YORK CITY, Nov. 23—Things which were serious in the early days but which cause smiles now were described by Robert McAllister Lloyd last week at a meeting of the New York section of the Electric Vehicle Assn. of America; he talked on The Influence of the Pioneer Spirit on Electric Vehicle Progress. Lloyd is a consulting engineer and one of the old-timers in the electric vehicle field.

He said the first impulse given the industry was by the battery makers who sought a new market for their products; the second motive was the public craze for the electric when $70,000,000 of capital was put into the industry, only to suffer loss by collapse; then came the "dark ages"; the next impulse was given by the electric light companies which, too, sought an extended market for their current. Pioneering, he said, was over by 1908.

Lozier Company Fights Insolvency Charge

DETROIT, MICH., Nov. 24—*Special Telegram*—U. S. District Judge Tuttle yesterday granted permission to three creditors of the Lozier Motor Co., to amend their petition to the Court to include the charge of bankruptcy because the company is unable to pay its debts.

At a meeting of directors of the company a special committee consisting of J. M. Gilbert and E. D. Stair, of Detroit, and E. P. Earl, New York City, was appointed to confer with Eastern creditors holding claims for about $1,000,000 to further discuss plans for reorganization and legally avoid, if possible, having the company being declared bankrupt on the grounds that the company is unable to pay its debts. The hearing of the creditors has been set by the court for December 1.

Overland's Connecticut Dealers Hold Convention

HARTFORD, CONN., Nov. 23—Thirty sub-agents of the Overland-Connecticut Co., which has all of the state of Connecticut with the exception of Fairfield county, met at the Hartford headquarters Friday for a business convention. Addresses were made by general manager C. W. Hine and sales manager Carney of the Hartford office and by H. B. Harper, factory sales manager, R. L. Lockwood, special factory representative, I. F. Maxson, district factory representative and J. R. Wallace, factory mechanical representative. All the new Overlands were on display in the local salesrooms. Several of the sub-agents drove away with new cars to be used as demonstrators in their respective districts.

A Many-Named New Spark Plug

NEW YORK CITY, Nov. 23—Over 3,800 names for a new spark plug were received by the Emil Grossman Mfg. Co. in its contest for a name for its new plug. R. F. Darby, 30 Church street, New York, and in the employ of the American Steel Foundries, suggested the winning name, Onepiece, which the judges today selected as the most appropriate one, in that the plug is really a one piece construction, as the insulation is cemented by baking process into the shell, giving a plug without gaskets, etc. In all over 2,200 letters were received in reply to the advertisements of the contest placed exclusively in the Class Journal publications, THE AUTOMOBILE, *Motor Age* and *Motor World*.

Raise Ferry Rates on Automobiles

PHILADELPHIA, PA., Nov. 20—Automobilists are now compelled to pay an increase in ferriage rates on the Pennsylvania Railroad ferries between Philadelphia and Camden. This went into effect on November 17. The new rate for automobiles is 25 cents, which entitles four persons to ride in the car, and for each additional passenger riding in the machine ferry ticket sellers will collect an additional 3 cents. Under the old rate a flat charge of 25 cents was collected for each automobile carried between the two cities.

Factory Miscellany

MILLER Rubber Adds—The Miller Rubber Co., Akron, O., has let contracts for the erection of a two-story, 120 by 128-foot brick fireproof building, which will increase the present capacity to over 1,000 tires a day. Recently the company bought the plant adjoining its property, which was owned by the Franz Body Works. This will be partly rebuilt and used as a shipping department, while temporarily it serves as a garage, until the 60 by 100-foot garage is completed. At the rear of the plant a three-story, 40 by 110-foot warehouse is being built, while an extension to the rubber drying-room, 50 by 110 feet, is in course of construction. To take care of the additional factory space, which will total 272,905 square feet, or about 6 1-2 acres, a 2,000-horsepower plant is being installed. Complete extensions are expected to be finished by January 1.

Standard Tire's $25,000 Addition—Standard Tire & Rubber Mfg. Co., Willoughby, O., will build a steel factory addition at a cost of $25,000.

DeLion Tire Building in Trenton—The DeLion Tire & Rubber Co. Trenton, N. J., has started the construction of a large plant for the manufacture of its specialties.

Portable Garage Factory Planned—The Mower Portable Automobile Garage Co., Seattle, Wash., is planning to erect a factory for the manufacture of portable garages.

Hercules Tire's Plant—The Hercules Tire Co., Oakland, Cal., plans to construct a plant at Long Beach, Cal., for the manufacture of automobile tires. The plant will turn out about 190,000 tires annually.

Kelsey Wheel to Add—The Kelsey Wheel Co., Memphis, Tenn., will enlarge its plant to permit the manufacture of entire wheel frames for automobiles instead of spokes only, as heretofore; estimated reported cost $100,000.

Fifty Men Added to Gramm Plant—Fifty men will be added to the Gramm motor plant at Lima, O., which follows the announcement that the company has decided to increase the capacity of the plant and only turn out 1,350-pound trucks.

Apple Plant at Waverley—The Apple Electric Co., whose plant was formerly in Dayton, O., has completed the shipment of its machinery from that plant to its new factory in Waverley, N. J. The Dayton plant hereafter will be used only as a service and distributing station.

Bartlett to Establish Factory—Reginald Bartlett of Toronto, Ont., president of the Bartlett Automobile Co., has signed an agreement with Stratford, Ont., to establish an automobile factory there. The company is capitalized at $1,000,000. It will manufacture a medium-priced automobile.

Singer Co. Settled in Factory — The Singer Motor Co. is settled in the new factory in Long Island City. At the present time the company is turning out five cars a week, and by the first of the year will be increased to fifteen. There is also a complete service station where overhauling and painting are done.

Fisher Body Enlarging—A further enlargement of the Fisher Body Co., Detroit, Mich., is taking place. A six-story steel and concrete addition 80 by 112 feet is in course of construction and will cost $40,000, while to the present five-story building another story will be added, the enlarged plant to be 280 by 112 feet.

Motokart Plant in Scranton — Scranton is to have another industry. The plant of the Motokart Co., Peekskill, N. Y., is to be moved from that city to Green Ridge street, Scranton. The board of trade in the latter city will erect the building, which will cost about $60,000. The machinery of the company is valued at over $100,000. At present the company employs 200 hands, but within a year it may employ 1,000 hands.

Vaughan Plant to Be Marketed—J. P. Day has been appointed exclusive sales agent of the Vaughan Motor Car Co. one-story brick plant at Kingston, N. Y., which recently was remodeled by the Vaughan company. The property is located on the main line of the West Shore Railroad, sidings from which run into the plant. It is also equipped with a modern power plant having a 250-horsepower Corliss engine driving dynamos of 75 and 90 kilowatt.

Crawford's Spring Co. About Ready—The new automobile spring company in Lansing, Mich., will probably be formally announced in the near future, the $100,000 necessary for its organization having been very nearly subscribed for by local business interests. The inventor of the spring is W. H. Crawford, who has secured basic patent rights. The name of the company will probably be Crawford No-Shock Spring Suspension Co.

Milwaukee Westinghouse Plant Working—The Westinghouse Lamp Co., of New York, a subsidiary of the Westinghouse Electric Co., has commenced operations in its new western plant at Milwaukee, Wis., purchased some months ago from the Kissel Motor Car Co. of Hartford, Wis., upon the abandonment of the Kissell company's Milwaukee factory. The new Westinghouse plant will have an output of 600,000 Mazda lamps monthly, and it is said a considerable share of these will be low-voltage lamps for motor car purposes. The plant consists of five large buildings and is located on the main line of the C., M. & St. P. Ry. Co. at Thirty-first and Center streets, Milwaukee.

The Automobile Calendar

Nov. 26..........Corona, Cal., Road Race, Corona Auto Assn.
Nov. 26..........Harrisburg, Pa., Economy Run, Harrisburg Motor Club.
Dec. 1-4..........New York City, Annual Meeting of the American Society of Mechanical Engineers.
Dec. 12-19........Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.
Dec. 14-18........Chicago, Ill., American Good Roads Congress.
Jan. 2-9..........New York City, Annual Automobile Show, Grand Central Palace.
Jan. 2-9..........New York City, Automobile Salon, Grand Ball Room of Astor Hotel, Automobile Importers' Alliance, E. Lascaris, Pres.
Jan. 3-10.........Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 9-16.........Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.
Jan. 16..........Detroit, Mich., Show.
Jan. 16-23........Cleveland, O., Show, Cleveland Automobile Show Co., F. H. Caley, Mgr.
Jan. 23-30........Chicago, Ill., Automobile Show, First Regiment Armory.
Jan. 23-30........Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb..............Portland, Ore., Show, Portland Auto. Trade Assn.
Feb..............Toledo, O., Show, Toledo Auto Show Co.
Feb. 15..........Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids *Herald*, C. S. Merriman.
Feb. 15-20........Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 22..........San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27........Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.
Feb. 23-27........Syracuse, N. Y., Show, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.
Feb. 27..........San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama - Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13.........Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 9-15.........Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14..........San Francisco, Cal., Panama - Pacific Cup Race, Panama - Pacific Exposition Grounds; Promoter, Panama - Pacific Exposition Co.
April............Calumet, Mich., Show, Coliseum.
May 29...........Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
Sept. 20-25.......San Francisco, Cal., International Engineering Congress.

The Week in  the Industry

Motor Men in New Roles

COZZENS Joins Four Wheel Drive—Fred. H. Cozzens, formerly of the International Motors Co., New York, and the Peerless Motor Car Co., Cleveland, O., has been made Eastern and foreign sales manager of the Four Wheel Drive Co., Clintonville, Wis. He will have charge of truck sales in the territory east of Pittsburgh and north of Wilmington, N. C., and in addition will look after the foreign business of the company.

House Manager—G. A. House has been appointed manager of sales of the Auto Wheel Co., Lansing, Mich.

Greenwald Firestone Branch Manager—Lemon Greenwald of Ashland, O., has been made manager of a branch of the Firestone Tire and Rubber Co. to be opened at Santiago, Porto Rico.

Smith Blair Truck Manager—Charles Smith, formerly manager of the Newark Lumber Co., Newark, O., has resigned his position to become general manager of the Blair Auto Truck Co., Newark.

Knowles Milburn Assistant Manager—R. W. Knowles has been appointed assistant engineer of the electric vehicle department of the Milburn Wagon Co., Toledo, O.

Weaver Resigns—H. G. Weaver has resigned his position as publicity manager of the Haynes Automobile Co., Kokomo, Ind., to become sales manager of the Newell Motor Car Co., St. Louis, Mo.

Moore Saxon Sales Manager—Lawrence Moore, formerly in charge of the foreign sales department of the Saxon Motor Co., Detroit, Mich., has been made manager of sales both foreign and domestic.

Paxson Joins Regal—C. K. Paxson has been appointed a special representative of the Regal Motor Car Co., Detroit, Mich. Formerly he was general sales manager of the Ohio Motor Car Co., Cincinnati, O.

Shettler Resigns—Leon T. Shettler has discontinued his connection with the Grant company at Los Angeles, Cal., distributor and has joined the Earl C. Anthony organization, which has the agency for the Packard in southern California.

Blethen Heads Seattle Club—At the annual meeting of the Automobile Club of Seattle the following officers were elected: Joseph Blethen, president; W. A. Avery, treasurer; R. L. Sparger, vice-president, and F. M. Fretwell, secretary.

Jack Russell Chief Engineer—R. F. Jack has been appointed chief engineer of the Russell Motor Car Co., Ltd., Toronto, Ont. Mr. Jack comes from the Cadillac Motor Car Co., Detroit, where he was assistant chief engineer of that company.

McCune Kissel Manager—The Kissel-Kar Co. is the name of a new concern which has been organized with C. G. McCune as general manager to handle the KisselKar in central Ohio. The sales agency is located at 241 North Fourth street, Columbus, O.

Dalton Studebaker Assistant Branch Manager—F. N. Dalton has been appointed assistant branch manager for the Studebaker Corp. in Los Angeles, Cal. Mr. Dalton was called to Los Angeles from Salt Lake City.

Hinkle Heads Tire Co.—A reorganization of the Livingston-Hinkle Rubber Co., 186 East Gay street, Columbus, O., has been made by the retirement of G. E. Livingston. The entire concern will be operated by H. L. Hinkle under the name of the Hinkle Tire & Rubber Co.

Lansdale Krit Sales Manager—H. L. Lansdale, who was sales manager of the Krit Motor Car Co., Detroit, Mich., has been appointed general manager, replacing H. H. Crawford, who has resigned and who had the position since the Krit company was reorganized the latter part of 1913.

Jamison Resigns—C. F. Jamison has resigned his position as sales manager for the Saxon Motor Co., Detroit, Mich., to enter business for himself. Mr. Jamison long has been a member of the firm of Jamison Bros., Lafayette, Ind., implement and hardware dealers. It is understood that the firm will continue to handle automobiles.

Marshall Inter-State Representative—W. L. Marshall, formerly the Xenia agent for the Studebaker has become factory representative for the Inter-State factory, Muncie, Ind., and will cover ten counties in southwestern Ohio. The new distributing firm will be located at Dayton and will be known as the Twyman Motor Car Co., Dayton.

J. M. Studebaker Injured—J. M. Studebaker, Sr., of the Studebaker Corp., South Bend, Ind., was painfully injured November 19 in an automobile accident. The car in which he was riding and another car crashed together in a blinding snowstorm. Mr. Studebaker is 81 years old, but his injuries are not regarded as serious.

McDuffie Joins Los Angeles Firm—Joseph H. McDuffie, one of the pioneers of the automobile business in the United States, has become associated with the W. R. Ruess Co., Los Angeles, Cal., in the capacity of general manager. Mr. McDuffie is well known, as at one time he was connected with the McDuffie Automobile Co., Chicago, and until recently he was Western representative of the F. B. Stearns Co.

Myers Heads Baltimore Dealers—E. R. Myers, of the Motor Car Co., Baltimore, Md., was elected president of the Baltimore Automobile Dealers' Assn. at the annual meeting which was held November 11. He succeeds F. S. Bliven of the Standard Motor Co. The other officers elected were: G. B. Hall, of the Auto Outing Co., vice-president in the place of A. S. Zell, of the Zell Motor Car Co.; R. J. W. Hamill, of the Mar-Del Mobile Co., secretary-treasurer in the place of E. R. Myers. On the board of directors G. B. Hall was elected to take the place of Walter Scott.

Garage and Dealers' Field

Foreign Agent to Add American Cars—Watson & Co., 164 Broadway, Madras, India, at present importers and general distributors of motor cars and accessories, shortly will take the agency for an American car.

Electric Mfg. Opens St. Louis Branch—The American Electric Car Co. opened a branch house in St. Louis, Mo., recently, at 5029 Delmar boulevard, with Louis Goodhart as manager. The branch will be incorporated as the American Electric Car Sales Co.

Hartford May Be Motorized—If the recommendations made this week to the Mayor in the annual report of the Board of Public Safety are carried out, all horse-drawn vehicles in the police and fire departments of Hartford, Conn., will be displaced by motor cars as soon as the city's finances permit.

Large Garage in Centralia—St. John & Titus, Centralia, Wash., automobile and accessory dealers, are adding a concrete addition to their garage, 26 by 130 feet. This will be used for a tire and supply department and also for a showroom. A floor space of 12,000 square feet will be had with the enlargement.

Maxwell to Have Women Demonstrators—As a measure to increase the number of Maxwell sales to women customers the Maxwell Motor Co., Detroit, Mich., is to make a nation-wide canvass of all women's organizations for the purpose of engaging women demonstrators. It is stated that they will be paid at the same rate as the men already employed.

Recent Incorporations in the Automobile Field

New York

ROCHESTER—United Taxi & Delivery Co.; capital, $4,000. Incorporators: Julian B. Lewis, 23 Herman street; William Mayerson, 27 Gilmore street; Morris M. Dollts, 16 Herman street.

YONKERS—Morris Place Garage Co.; capital, $500; to operate a garage. Incorporators: Harry J. Haeussler, William H. Haeussler and William Haeussler, all of 45 Post street.

Ohio

AKRON—Superior Tire & Rubber Co.; capital, $25,000; to manufacture tires, etc. Incorporators: George S. Andrus, H. E. Andress, C. G. Wise, W. E. Young and R. I. Moore.

WILLOUGHBY—Standard Tire & Rubber Mfg. Co.; capital, $100,000; to manufacture tires and mechanical goods. Incorporators: Charles E. Shaw, C. F. Groth, E. A. Williams, J. W. Smith and J. A. Smith.

Tennessee

MEMPHIS—Bender's Garage; capital, $2,500. Incorporators: D. A. Fisher, C. N. Bender, L. G Bender, L. T. Kavanaugh and I. W. Crabtree.

MEMPHIS—Tennessee Garage Co.; capital, $10,000 Incorporators: Leroy H. Friedlander, Richard W. Burk, Dan L. Killain, A. D. Bearman and Joseph Friedlander.

Automobile Agencies Recently Established

PASSENGER CARS

Kansas

Chapman	Oldsmobile	Perry Frazier
Ellsworth	Overland	C. B. Flora & Charles Hackenberger

Massachusetts

Boston	Empire	Empire Motor Sales Co
Boston	Regal	W. L. Russell Co.
Boston	Saxon	Saxon Motor Car Co.
Pittsfield	Chandler	City Garage & Sales Co.
Springfield	Dodge	P. A. Williams, Jr.
Worcester	Trumbull	Edward E. Allen

Michigan

Detroit	Franklin	Wm. Doughty
Detroit	Gadabout	Gadabout Sales Co.
Saginaw	Franklin	Fred H. Witters
St. Johns	Briscoe	W. M. Luecht
Three Rivers	Saxon	Three Rivers Garage

Minnesota

Arlington	Oldsmobile	H. J. Moskop
Brainerd	Haynes	Sherlund Co.
Chatfield	Oldsmobile	Co. A. Murphy
Duluth	Oldsmobile	E. W. Bradley
Eagle Lake	Haynes	John Casper
Kasson	Oldsmobile	Otterness & Son
Lake Elmo	Oldsmobile	A. Fazendin
Minneapolis	Durant-Dort (Smith)	La Grosse Auto Co.
Minneapolis	King	Martin Motor Sales Co.
Minneapolis	R-C-H	Northwest Haynes Auto Co.
New Germany	Oldsmobile	New Germany Auto Co.
Newport	Oldsmobile	Metzger Bros.
Olivia	Haynes	Knech & Jamsen
Winona	Cole	Nevius Livery & Transfer Co.
Wykoff	Haynes	Olson & Leutink

Mississippi

Columbus	Regal	S. L. Wright
Duck Hills	King	E. E. Wilkins
Meridian	Haynes	Bostick Lumber & Mfg Co.
Meridian	KisselKar	A. J. Lyons & Co.
Perthshire	Chandler	S. D. Knowlton
Vicksburg	Haynes	B. J. Robinson Mach. Works.

Missouri

Columbia	Moon	W. C. Bowling
Hannibal	Moon	Long Mfg. Co.
Joplin	Moon	Joplin Supply Co.
Kansas City	King	King Motor Co. of Miss.
Kansas City	Moon	MacDowell Motor Car Co.
Kansas City	R-C-H	J. A. Garnier & Son
Mexico	Saxon	Fred A. Morris
Moberly	King	King Motor Sales Co.
Mound City	Franklin	C. N. & J. Scott
Ravenwood	Haynes	E. F. Bishop
Ridgeway	King	Curtis & Francis
St. Charles	Oldsmobile	Dr. F. J. Tainter & Dr. B. K. Strumberg
St. Louis	Dodge	Frank R. Tate
St. Louis	Haynes	Newell Motor Car Co.
St. Louis	Haynes	St. Louis Kisselkar Co.
St. Louis	King	Heinrich Auto Co.
St. Louis	Chandler	Lewis Auto Co.
St. Louis	Regal	Anselm-Ganahl Motor Car Co.

Montana

Sheridan	Haynes	H. R. Marsh

Nebraska

Coleridge	Haynes	Howard Morrison
Cozad	King	Wm. Robertson
Omaha	Regal	T. G. Northwall Co.

New Hampshire

Manchester	Maxwell	Maxwell Motor Sales Co

New Jersey

Atlantic City	Oldsmobile	Irwin's Garage
Delaware	Franklin	Quig Brothers
Elizabeth	Oldsmobile	Franklin Garage
Hackensack	Oldsmobile	Hackensack Auto Co.
Trenton	King	J. R. McCardell & Co.

New Mexico

Albuquerque	Oldsmobile	J. L. LaDriere
Taos	Oldsmobile	Dr. T. P. Martin

New York

Auburn	Moon	Moon Garage
Avon	Oldsmobile	H. W. Spencer, care of Central Garage Co.
Baldwin	KisselKar	Baldwin Garage
Bloomingburg	KisselKar	Clapham & Hagan
Brooklyn	Moon	Putnam Motor Car Co.
Buffalo	King	Mutual Motor Car Co.
Elmont	King	Hoeffner Bros.
Ellenville	KisselKar	R. D. Cookingham
Groton	Regal	J. H. Waterman
Lestershire	King	Chas. H. Wakeman
Lodi	Oldsmobile	John C. Townsend
Marathon	Regal	W. E. Seamans & Son
Mt. Vernon	Cole	Central Garage Co.
New York	KisselKar	Benz Auto Corp.
New York	Lewis-Six	Stewart Auto. Co.
Plattsburg	King	L. G. Barton
Port Jefferson	KisselKar	D & H Garage
Quogue	King	Louis Muley
Saranac Lake	King	Shelley Tool Co.
Shelter Island	King	Geo. B. Wells
Skaneateles	Oldsmobile	G. A. Chamberlain & Co.
Suffern	KisselKar	Suffern Garage
Syracuse	King	Ferdinand Crosby
Syracuse	Oldsmobile	W. R. Shaw
Utica	King	Fred Klopfanstein
Wellsville	Franklin	Messrs. Brown & Duke

North Carolina

Charlotte	Haynes	Ham Ross Motor Co.

North Dakota

Fargo	Cole	C. H. Reineke & Son
Dickinson	Oldsmobile	E. G. Holst
New Salem	King	Schultze & Toppins

Ohio

Akron	Regal	Main Auto & S. Co.
Akron	Saxon	Prospect-Buick Co.
Bucyrus	Haynes	H. A. Paxton
Bucyrus	Oldsmobile	McFarland, Miller & White
Cambridge	Overland	V. W. Fordyce
Canton	Chalmers	Al Shem
Cincinnati	Chalmers	Fischer Auto & Service Co.
Cincinnati	Herff-Brooks	Herff-Brooks Motor Sales Co.
Cincinnati	King	Avon Garage & Sales Co.
Cincinnati	Hupmobile	Charles Schiear Motor Car Co.
Cleveland	King	Dunham Motor Co.
Cleveland	Moon	Dunham Motor Car Co.
Clyde	Oldsmobile	W. A. Roush & Son
Columbus	Ford	Ohio Auto Sales Co.
Columbus	Imperial	Warren-Southwick Co.
Columbus	King	Auto Inn & Exchange Co.
Columbus	Oldsmobile	Muzzy's Garage
Columbus	Oldsmobile	W. W. Muzzy
Columbus	Velie	Winders Motor Car Co.
Coshocton	Haynes	Fifth Street Garage
Cumberland	Overland	Young & Mann
Dayton	Detroiter	F. C. Moody
Grand Rapids	Oldsmobile	E. H. Mercer
Greenville	Westcott	John W. Ludy
Hebron	Westcott	C. A. Pence
Lewisburg	Westcott	F. J. Wilson
Lima	Buick	W. F. Bryan
Lima	Moon	H. L. Sherrick
Lima	Overland	Lima Overland Co.
Lorain	Oldsmobile	F. F. Burrer
Marietta	Lozier	Walter W. Wood
Mt. Gilead	Oldsmobile	Wm. D. Mathews
Mt. Vernon	Oldsmobile	B. E. Salisbury
Mt. Vernon	Oldsmobile	B. E. Salisbury
Nelsonville	Oldsmobile	Frank Minner
New Philadelphia	Buick	F. S. Hertzig
Portsmouth	Haynes	Hill Top Auto Co.
Powhatan Pt	Oldsmobile	F. E. Berry
Springfield	Oldsmobile	Eaton Motor Service Co.
Springfield	Oldsmobile	Eaton Motor Service Co.
Springfield	Wescott	F. L. Ensign
Steubenville	Franklin	Messrs. Hill & Lydick
Steubenville	Haynes	Steubenville Motor Car Co.
Toledo	Detroiter	Guy R. Ford
Toledo	Oakland	Guy R. Ford
Toledo	Regal	Auto Distributing Co.
Toledo	King	Maumee Motor Car Co.
Toledo	Oakland	Guy R. Ford
Wauseon	Oldsmobile	Miller & Hoy
Youngstown	King	J. Ralph Seidner
Youngstown	Moon	Regal Sales Co.
Youngstown	Regal	Regal Sales Co.

Oklahoma

Tulsa	Chandler	J. T. Forster
Tulsa	Oldsmobile	New State Auto & S. Co.

Pennsylvania

Allentown	Moon	W. F. Rabenold
Altoona	King	R. E. Bell
Barnesboro	Oldsmobile	J. H. Vogel
Bloomsburg	Oldsmobile	J. W. Wright
Carlisle	KisselKar	Gillmor & Kaufman
Cannonsburg	Cole	Globe Garage & Mach. Co.
Doylestown	Oldsmobile	Geo. B. McLaughlin
Erie	Saxon	Motor Service Co.
Johnstown	Westcott	S. N. Hayes
Lehighton	Oldsmobile	Jones Garage Co.
McKean	King	F X. Bowman
Mt. Union	Haynes	City Garage
Monongahela	Haynes	Monongahela, Pa.
New Castle	Cadillac	Elton Auto & Repair Co.
Norristown	Haynes	F. Kenneth Moore
Philadelphia	Dodge	Thornton-Fuller Auto Co.
Philadelphia	Moon	Stearns Motor Co.
Philadelphia	Regal	Regal Sales Organization
Pittsburgh	King	W. W. Bennett Motor Car Co.
Pittsburg	Chandler	Vestal M. C. Co.
Pittsburg	Regal	Buhl Regal Car Co.
Rummel	Moon	Rummel Auto Co.
Scranton	Oldsmobile	The Oldsmobile Sales Co.
Scranton	Oldsmobile	Oldsmobile Sales Co.
Tyrone	Haynes	W. H. & J. R. Davis
Tyrone	KisselKar	J. Ray Davis
Uniontown	Saxon-Studebaker	J. T. Binns
Washington	Haynes	H. L. Robinson
Waynesboro	King	Owen D. Shank
Wilkes-Barre	Haynes	Frank F. Matheson

Rhode Island

Providence	Dodge	Arthur J. Feltham

South Carolina

Greenville	Oldsmobile	W. M. Thompson
Williamston	Oldsmobile	Jas. P. Gossett

South Dakota

Mitchell	Oldsmobile	Mitchell Auto & Supply Co.
Tabor	Oldsmobile	Jos. Skorpik & Co.

Tennessee

Nashville	King	Alexander Bennie & Co

Texas

Balmorhea	Oldsmobile	Will J. Rhea
Fort Worth	Oldsmobile	Oldsmobile Sales Co.
Galveston	Haynes	Texas Garage
San Angelo	Oldsmobile	Cain Bros.
San Antonio	King	Guarantee Motor Co.
Wichita Falls	King	Shamburger

Utah

Salt Lake City	Chandler	Frank Roueche

Virginia

Norfolk	Moon	Norfolk Garage & Mach Shop
Pulaski	Haynes	City Auto Corporation

Vermont

Beebee Plains	KisselKar	J. E. Turner

Washington

Everett	Dodge	F. C. Sheridan & C. E. Dow
Seattle	King	F. H. Bardshar

West Virginia

Bluefield	Chandler	Jno. L. Crocket
Davis	Oldsmobile	L. E. Crain
Logan	Chandler	J. A. Washington
Wheeling	Haynes	Everybody's Garage

Wisconsin

Eau Claire	Cole	Tamberg Auto Co.
Johnson Creek	Buick	J. C. Shekey Co.
Lancaster	KisselKar	John Day
Lone Rock	KisselKar	B. M. Dewey
Manitowoc	Briscoe	Olson-Pauly Motor Co.
Manitowoc	Ford	Dicks Motor Car Co.
Manitowoc	Oldsmobile	Chas. A. Streich
Marshfield	KisselKar	Hugo Wegener
Milwaukee	Apperson	Creek Motor Sales Co.
Milwaukee	Briscoe	Milwaukee Auto Sales Co.
Milwaukee	Chandler	Schreiber-Boorse Motor Car Co.
Milwaukee	Dodge	Edwards Motor Car Co.
Milwaukee	King	Schreiber-Boorse Motor Car Co.
Milwaukee	Locomobile	Harry F. Krueger
Milwaukee	Maxwell	Johnson Auto Co.
Milwaukee	Oldsmobile	Emil Estberg
Milwaukee	R-C-H	Creek Motor Sales Co
Waukesha	KisselKar	R. W. Crary

Wyoming

Cody	Haynes	Adam Hogg
Douglas	Moon	Rice Hdwe. & Motor Co

COMMERCIAL CARS

Maryland

Hagerstown	Koehler	Central Garage & Elec. Co.
Maryland Line	Koehler	H. Curtis Krout

North Carolina

Durham	Koehler	Carpenter Bros.
Raleigh	Koehler	Ford Sales Co.
Winston-Salem	Koehler	The Motor Co.

New York

Brockport	Koehler	Frank E. Wilson

Ohio

Cook	Koehler	H. M. Campbell

Pennsylvania

Easton	Koehler	James S. Lerch

Tennessee

Dyersburg	Koehler	Dyersburg Auto Co.

Texas

Houston	Koehler	Young & Dwire

ELECTRIC VEHICLES

Washington	Waverley Electric	Pollock Car Corp.
Minneapolis	Flanders Electric	Henry C. Burleigh

Automobile Agencies Recently Established

PASSENGER CARS

Alabama

Birmingham	King	Coxe Motor Sales Co.
Birmingham	Moon	Chafin Auto Co.

Arkansas

Little Rock	King	Shoemaker Bale Auto Co

California

Eureka	Haynes	Mercer & Way Garage
Hanford	Oldsmobile	Marak & Haynes
Long Beach	KisselKar	Mission Garage
Los Angeles	Glide	Battey Bros.
Los Angeles	Herff-Brooks	De-Vaux Motor Sales Co.
Los Angeles	Moon	L. C. Baxton
Los Angeles	Saxon	Hawley, King & Co.
Los Angeles	Saxon	Holley King Co.
Maysville	Haynes	Merles Garage
Oakland	Oakland	F. H. Dailey Motor Car Co.
Porterville	Oldsmobile	The Mission Garage
Sacramento	Chalmers	J. S. Vasey
Sacramento	Oldsmobile	Bend & Duren
San Bernardino	Oldsmobile	Central Garage
San Francisco	Glide	The Continental Auto Co.
San Francisco	King	Reliance Auto Co.
San Francisco	Oakland	F. H. Dailey Motor Car Co.
Santa Maria	Oldsmobile	W. H. Crakes
Santa Monica	Oldsmobile	R. C. Silvernale
Ukiah	Haynes	Gowan Bros.
Weed	Oldsmobile	Weed Mercantile Co.

Canada

Calgary	Haynes	H. T. Sheffield
Calgary, Alta	King	Diamond Motor Car Co., Ltd.
Calgary, Alta	Maxwell	Thos. E. Jackson
Lethbridge, Alta	King	H. B. Henderson Garage
Victoria, B. C.	Lozier	J. Cameron
Hamilton	Oldsmobile	Hamilton Garage Co.
Winnipeg, Man.	Malcolm	I. H. Weeks
Winnipeg, Man.	Van Auken	Manitoba Elec. Motor Car Co.
Halifax, N. S.	King	L. M. Trask Co.
Berlin, Ont.	Regal	E. L. C. Brown
Hamilton, Ont.	Cole	Patterson Auto Sales Co.
Hamilton, Ont.	Haynes	Jack V. Elliott
London, Ont.	Chandler	Central Garage
Niagara Falls, Ont.	Marathon	Crane Bros.
Ottawa, Ont.	Brockville Atlas	Hull & Ottawa
Paris, Ont.	Saxon	A. C. Lee
Sault Ste. Marie, Ont.	Regal	G. P. Black
Toronto, Ont.	Kissell	H. E. Rickettson
Swift Current, Sask.	King	Wright & Mitchel (McDougall)
Lepage, Que.	Moon	Lepage Garage & Exchange Co.
Montreal, Que.	Moon	Sovigny & Lalonde
Moose Jaw, Sask.	Maxwell	Henry B. Annabel
Toronto, Ont.	Regal	Regal Motor Sales Co.
Canon City	Moon	J. J. Armstrong & Son

Colorado

Colorado Springs	Moon	C. S. Wolfe
Denver	Briscoe	Cadillac Motor Co.
Denver	Crescent	George E. Hannan
Denver	Henderson	Mid-West Auto Sales Co.
Denver	Hupmobile	George A. Estabrook
Denver	Moon	Vreeland Bros. Auto Co.
Denver	Regal	Mid-West Auto Sales Co.
Denver	Saxon	Colorado Motor Car Co.
Trinidad	Franklin	W. G. Hall

Connecticut

Bridgeport	Cole	West End Auto & Carriage Co.
New Haven	Moon	Reichert Auto. Co.
New Haven	Stearns	Holcomb Co.
Waterbury	Moon	Wm. F. McGinniss
Wethersfield	Moon	Kingsbury & Wetherell
Winsted	Haynes	John & Nelson Secor

Cuba

Havana	Cole	A. L. Fernanders Morre

Washington, D. C.

Washington	King	Wm. P. Barnhart
Washington	Mitchell	Crescent Motor Co.
Washington	Stutz	Tighlman & Owen

Georgia

Atlanta	King	W. F. Plane, Jr.
Atlanta	Regal	Harry Holland & Henry Collier
Valdosta	Haynes	Jno. T. Roberts & Son

Idaho

Burley	Haynes	Dr. Carl Snodgrass

Illinois

Adrian	Glide	J. L. Atwater
Aurelia	King	Julius Jordan
Barry	Haynes	McVay & Lake
Chatsworth	Haynes	T. E. Baldwin
Chicago	Haynes	Julius Debits
Chicago	King	W. E. Stalnaker
Chicago	Oldsmobile	De Luxe Auto Service Co.
Chicago	Oldsmobile	John Hemwall Auto Co.
Chicago	R-C-H	Gus B. Owens & J. H. Quinlan
Columbia	Moon	L. P. Weinel
Du Quoin	Moon	Our Garage
East St. Louis	Haynes	East Side Overland Auto Co.
Granville	Haynes	Excelsior Garage Co.
Henning	Haynes	T. T. Cornell
Jerseyville	Moon	O. S. Nelson
Kewanee	Maxwell	E. J. Mosier
LaSalle	Oldsmobile	Leonard Travis, Cadillac Garage
Lincoln	Oldsmobile	Frank R. Woland
Manhattan	Oldsmobile	Manhattan Motor Car Co.
Marion	Oldsmobile	Hosea W. Cagle
Olney	King	A. E. Hill
Ottawa	Oldsmobile	F. S. Knowles, care of W. H. Knowles Foundry & Machine Co.
Piper City	Glide	W. L. Quick
Ridgefarm	Haynes	D. A. Jones
Rushville	Haynes	A. C. Tomlinson
Springfield	Moon	Engle & Otto
Springfield	Oldsmobile	L. Lee Savage
Spring Valley	Cole	Miller & Co.
St. Augustin	Moon	Sherman Babbitt
Tuscola	Haynes	Douglas County Auto Co.

Indiana

Butler	Haynes	J. C. Brown & Son
Converse	Haynes	Wm. A. McDaniel
Frankfort	Cole	Model Machine Works
Frankfort	Haynes	W. F. Kernedle
Fowler	Haynes	The Sleeper Co.
Gary	Haynes	Doeman & Sykes
Highland	Oldsmobile	Highland Garage
Indianapolis	Haynes	Indianapolis Haynes M. C. Co.
Indianapolis	King	W. J. Fitton
LaFayette	Haynes	J. L. Sheetz
Lawrenceburg	Haynes	Lawrenceburg Garage & Repair Co.
Logansport	Haynes	B. F. Conwell
Milford	Haynes	F. M. Neff
Muncie	Haynes	A. E. Needham
South Bend	Haynes	J. W. Nikart
Tipton	Haynes	K-C Motor Co.
Warsaw	Haynes	Earl W. Cenrad

Iowa

Alta Vista	Oldsmobile	Alta Vista Auto Co.
Cedar Rapids	Moon	Moon Auto Sales Co.
Center Point	Haynes	Heverly & Knight

Recent Incorporations in the Automobile Field

Arkansas

LITTLE ROCK—Butler Auto Co.; capital, $12,000; motor cars. Incorporators: F. L. Butler, Fremont Stokes and Mary A. Stokes.

Canada

LONDON, ONT.—Warwick Wheel Co. of Canada; capital, $100,000; to manufacture and deal in vehicle wheels, springs, tires, rims, etc.

TORONTO, ONT.—Noble Air Pump Co.; capital, $25,000; to manufacture motor car pumps and accessories.

Colorado

PUEBLO—Silver State Auto Co.; capital, $50,000.

Delaware

NEW CASTLE—New Castle Garage; capital, $25,000. Incorporators: S. C. Mulrooney, E. Krause and J. W. Brady, all of Wilmington.

WILMINGTON—Sharp & Rush Bros. Co.; capital, $75,000; to manufacture motor cars, wagons, etc. Incorporators: F. R. Hansell, Philadelphia, Pa.; G. H. B. Martin and S. C. Seymour, both of Camden, N. J.

Georgia

SAVANNAH—Dupon Auto Livery Co.; capital, $1,000; motor cars. Incorporators: R. A. Hicks and F. T. Dupon. (Central Press Bu.)

Illinois

CHICAGO—Automobile Clearing House; capital, $1,000; to manufacture, repair and deal in motor car repairs and accessories. Incorporators: R. E. Gray, C. E. Hall and J. C. Morrow.

CHICAGO—Century Auto Top & Supply Co.; capital, $10,000; to manufacture and deal in motor car supplies. Incorporators: B. M. Goff, C. A. Wever and B. M. Govy.

CHICAGO—Flanders Electric Co.; capital, $25,000; to manufacture electrical appliances. Incorporators: J. P. O'Shaughnessy, J. P. Rosen and J. L. Toohey, all of Chicago.

CHICAGO—Gas-O-Co.; capital, $20,000; to buy, sell and deal in gasoline, kerosene, electricity and all other commodities for motive power. Incorporators: Herbert K. Greenman, Arthur W. Brintell and Jacob A. Prassel.

CHICAGO—Lyon Tire & Rubber Co.; capital, $10,000; to manufacture and deal in tires. Incorporators: Leroy Harris, A. W. Lemke and W. B. Lathrop.

OAK PARK—Harrigan Auto Co.; capital, $5,000; to manufacture, lease, repair and deal in motor cars and other conveyances. Incorporators: George Von Moos, Agnes Von Moos and Thomas J. Harringer.

Indiana

INDIANAPOLIS—Hartman Top Co.; capital, $5,000; motor car and vehicle tops. Incorporators: Lawrence C., R. H. and L. M. Hartman.

SOUTH BEND—Teschner Tire & Equipment Co.; capital, $1,000; to deal in motor car accessories. Incorporators: Frank A. Teschner, Z. P. Teschner and Charles F. Roth.

Kentucky

HENDERSON—White-King Motor Co.; capital, $2,500; to deal in motor cars. Incorporators: Larkin White, Herbert L. King and Ben T. White.

LOUISVILLE—Orolo Mfg. Co.; capital, $10,000; general motor vehicle business. Incorporators: William H. Roose and others.

LOUISVILLE—Overland-Louisville Co.; capital, $10,000; to deal in motor cars. Incorporators: James H. Limbird, Robert H. Green and Charles S. Lattin.

SOMERSET—G. & O. Taxi-Service Co.; capital, $1,200. Incorporators: F. E. Gregory, W. H. Girdler and others.

Massachusetts

BOSTON—Apex Carbureter Co.; capital, $75,000; others. to manufacture carbureters. Incorporators: G. E. Parker and K. F. Parker, both of Boston, and others.

BOSTON—Johnson Pneu-Metal Tire Co.; capital, $1,000,000. Incorporators William P. Meehan and others.

Michigan

DETROIT—Automobile Owners Protective Association; capital, $10,000. Incorporators: Isaac Applebaum, Mark Mitchkum and Louis Applebaum.

DETROIT—Berry Automobile Pump Co.; capital, $10,000. Incorporators: Charles Retter, William W. Gunn and Henry J. Berry.

DETROIT—Cincinnati Precision Lathe Co.; capital, $12,500; to manufacture lathes and special machinery and tools. Incorporators: Albert M. Farlner, G. McHenry and others.

DETROIT—Disco Electric Starter Co.; capital, $60,000. Incorporators: Jacob and Henry J. Dornbus, Charles J. Carpenter.

DETROIT—National Electric Starter Co.; capital, $10,000. Incorporators: Trevor S. Murton, Harold K. Murton and Frederick M. Guy.

DETROIT—Wagner Resilient Wheel & Tire Co.; capital, $500,000. Incorporators: William F. Wagner, William F. Fergison, G. H. Karlcofe, W. E. Russell and A. C. Baird.

JACKSON—Jackson Cover & Bag Co.; capital, $12,000; to manufacture motor car covers of paper and cloth.

SAGINAW—Letts Auto & Taxicab Co.; capital, $12,000; motor cars and supplies. Incorporators: F. L. Butler and others.

TRAVERS CITY—West Michigan Garage; capital, $6,000. Incorporators: James B. Martin, William S. Titus and Alvin E. Hill... William P. Crotser, R. E. Wynkoop and James Purvis.

Missouri

LAWRENCEVILLE—Automatic Eagon Brake Co.; capital, $10,000. Incorporators: Olin E. Gillett, William S. Titus and Alvin E. Hill.

ST. LOUIS—Gerdelman Auto Supply Co.; capital, $10,000; general motor vehicle business. Incorporators: Benjamin Gerdelman, Rudolph L. Gerdelman and Lotta Gerdelman.

ST. LOUIS—Koehler-Woodruff Auto Repair Co.; capital, $2,000; general motor car and repair business. Incorporators: Frank J. Koehler, Leslie Woodruff and Henry J. Kroeger.

North Carolina

SALISBURY—Piedmont Automobile & Truck Co.; capital, $25,000; to deal in motor cars, etc. Incorporators: W. A. Brown and others.

New Jersey

TRENTON—B. & K. Specialty Mfg. Co.; capital $50,000; to manufacture rubber goods, hardware, electrical appliances, etc. Incorporators: L. W. King, S. Berman and U. G. King, all of Trenton.

WESTWOOD—Bergen Machine & Auto Repair Co.; capital, $30,000; general motor car and machine shop business. Incorporators: J. B. Haskin, New York, N. Y.; P. S. Schultz, West wood, N. J.

New York

BROOKLYN—Sterling Auto Exchange; capital, $10,000. Incorporators: Charles Erickson and William C. Lohse, both of 622 Pacific street; Henry Meier, Farmingdale, L. I.

BROOKLYN—Universal Tractor Co.; capital, $15,000. Incorporators: Florence O'Sullivan, 120 A Rockaway avenue; Charles Roessle, 907 New York avenue; Joseph Woodcock, 181 West street.

HEMPSTEAD—Topford Detachable Limousine Co.; capital, $50,000; to manufacture motor car bodies, etc. Incorporators: John A. McAvoy and William Hutchinson, both of Hempstead; Frank C. Cadden, 200 Fifth avenue, New York, N. Y.

NEW YORK—Boska Mfg. Co.; capital, $100,000; to manufacture rubber tires and tire fillers. Incorporators: Charles F. Saunders, 164 Sherman avenue; R. W. Wason, 607 W. 139th street; Simon F. Peavey, Jr., 151 Columbia Heights, Brooklyn.

Accessories for the Automobilist

NEW Champion Priming Plug—The Champion Spark Plug Co., Toledo, O., has brought out a new type of priming plug, Fig. 1, especially adapted for winter use.

It is similar to the former priming plug of Champion make so far as the combination of a priming cup with a plug is concerned, but it has the new features of a handle for turning the needle valve so as to admit the gasoline to the cylinder, and also a new steel needle valve, hardened and ground to a compression-tight seat in the priming portion of the shell.

There is an opening in the top of the needle valve for insertion of the oil-can nozzle. Having filled the priming cup, which is the inner part of the needle valve itself, the valve is raised from its seat by turning the handle. This allows the gasoline to flow through the side of the valve and down through its own channel to the plug base. Thus vaporization occurs directly past the ignition points, insuring ignition at once. The price is $1.25.

Advance Ford Pump — A power tire pump driven through the fan has been brought out by the Advance Machinery Co., Toledo, O., for Ford cars exclusively. It lists at $6.50. It is a double-acting type, Fig. 2, with a compression space at either end of the piston, which is driven by a yoked connecting-rod.

The fan shaft or journal stud is replaced by a shaft that rotates in the pump frame. The fan is rigidly secured to this shaft, on the opposite end of which is secured a driving pinion. This driving pinion engages with a steel gear supported by an eccentric bearing, thereby providing a means whereby the pump may be engaged or disengaged with the driving pinion.

The piston is packed with three piston rings at each end. These rings preclude any possibility of oil reaching the tire tubes.

The cylinder heads are removable. They are machined so that the clearance space between the cylinder head and the piston does not exceed the thirty-second of an inch.

The discharge valves are located at the end of the piston stroke. They are quarter-inch steel balls retained by light springs.

The cylinder is lubricated by means of wicks located in the middle of the body. The wicks are saturated with oil. All other bearings are oiled direct.

Easyon Tire Chains—The device shown in Fig. 3 has just been put on the market by the Leather Tire Goods Co., Niagara Falls, N. Y., to prevent skidding and give traction when the wheels tend to slip. Eight of these go to make up a set and they are attached to the spokes of the wheels. The part of the chain coming into contact with the wood of the wheel is made of leather, while the portion touching the tire tread is rounded so that it will not cut the tire. Four chains are used on each rear wheel. These chains are made in two sizes, the small size fitting 2, 3.5 and 4-inch tires, and the larger size fitting 4, 4.5 and 5-inch tires.

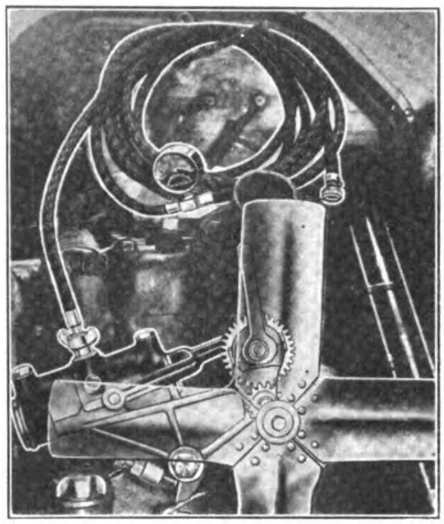


Fig. 2—Advance Ford pump driven by fan

Fig. 3—Easyon tire chains

Dudly Folding Shovel—An all-steel shovel, Fig. 4, of the folding type, with a blade 6.5 by 9 inches and a 3-foot handle, has been brought out by the Dudly Tool Co., Menominee, Mich.

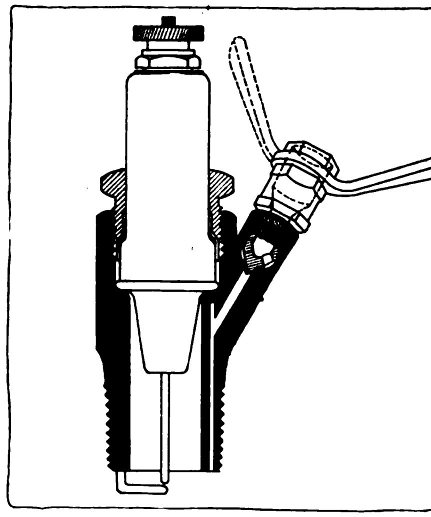


Fig. 1—New Champion priming plug

It makes it possible for the tourist to dig himself out quickly when stalled in the mud. In addition the blade of the shovel may be used to place the jack on when the ground is soft.

The weight of the shovel is 4 pounds, and it occupies a space 12 by 6.5 by 2 inches when folded up. It is nickel-plated and sells for $3.

J-M Tirenew and Narco Filler—J-M Tirenew is a compound of Para rubber in liquid form for use as a coating for tires. While adding to the appearance of the tires by making them clean and fresh-looking the makers insist that this is by no means its chief value. It is claimed that this compound penetrates into the cuts and crevices and thoroughly waterproofs the exposed fabric beneath, thus preventing decay from moisture and oil, and greatly prolonging the life of the tire.

For use in connection with the above, the makers recommend J-M Narco Tire Cut Filler, a combination cement cut filler and mastic, heavy in rubber. This substance fills the cuts and holes in a tire, welds the loosened tread to the casing and, it is claimed, forms a union so perfect as to be immune to the effects of road abuse. It sets over night and is said to be absolutely non-shrinking.

To restore and preserve automobile tops there is a special Narco product called J-M Narco Rubber Reviver and Refinisher. It is not a varnish, but a liquid rubber compound with an absolutely invisible protecting coat that waterproofs pantasote, mohair, fabric or rubber, with equally good results. One coat, it is asserted, lasts a long time.

In addition to the foregoing, the J-M Narco line also includes patching and vulcanizing cements of the highest

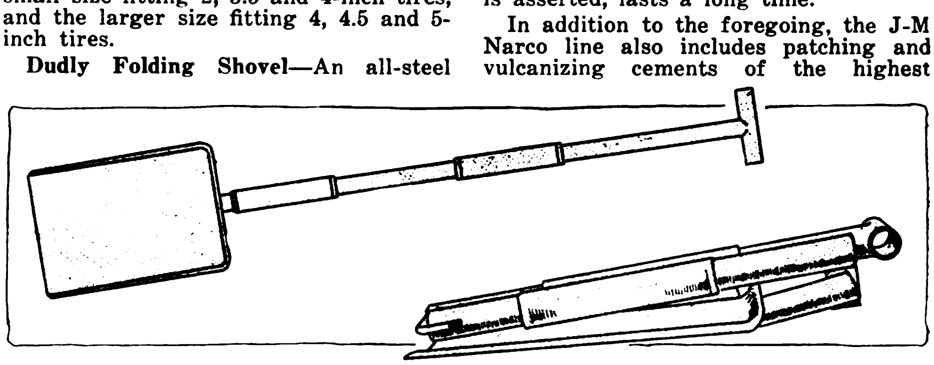


Fig. 4—Dudly folding shovel

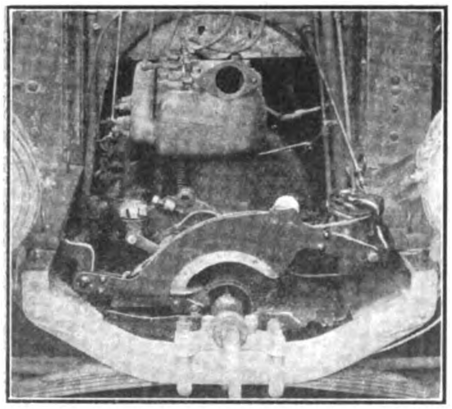


Fig. 5—Denver Ford starter

grade and special' cementless patches that may be used successfully without cement or acid. For the convenience of car owners who operate a small vulcanizer, four vulcanizing outfits are regularly supplied each containing enough for several jobs. Another very handy outfit for making inexpensive and satisfactory home and roadside repairs is the J-M Narco Ford Tire Repair Outfit, which contains a repair for every tire trouble that might possibly be met on the road, also several preventatives. This compact outfit can be carried in the tool kit and in time of need is a friend indeed.

The products are marketed by the H. W. Johns-Manville Co., 41st street and Madison avenue, New York City.

Denver Ford Starter—A mechanical starter, Fig. 5, of the pull type, weighing only 10 pounds, and fitting readily between the fan belt and the fan, is made by the Denver Ford Starter Co. A pull on the hand lever always connects immediately with the crank shaft, no matter where the engine happens to rest, and a 12-inch pull turns the engine over completely and quickly.

The device is entirely concealed and is bolted to the frame with two forward fender bolts. One distinctive feature is that it is not necessary to remove the crank or any part of the car to install the starter. A new fan belt pulley with a wider rim than the regular pulley, however, is furnished. The power is applied directly to the crank shaft without ratchets or cogs, two jaws gripping the rim of the fly-wheel the moment the lever is pulled. The method of connection is on the principle of slipping the jaws of a monkey-wrench over the rim of a fly-wheel and making the open wrench grip the rim by a pull downward. This method, made secure by a short, sharp jaw on the outer side of the rim, does away with slipping and allows scarcely any friction.

In case of back fire, the hand lever is automatically released by a rest on which it is seated.

This starter is adapted to both Ford and Metz cars. It sells for $15.

Garford Ford Speedometer—At $12.50 the Garford Mfg. Co., Elyria, O., is offering a speedometer for Ford cars which has a 100-mile trip odometer and a season mileage register of 100,000. The principle involves the centrifugal movement of steel balls which raise a cup in direct proportion to the speed of the flexible shaft. The construction employs a revolving drum or ball race mounted directly on the main driving shaft. This ball race has radial openings or channels

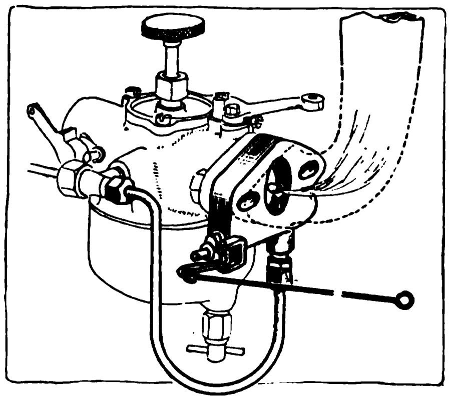


Fig. 6—Injex applied to Holley carbureter

containing four ½-inch steel balls. Fitting over this ball race and arranged to move vertically in line with the main shaft is an inverted cup-shaped member of steel with the inner surface so de-

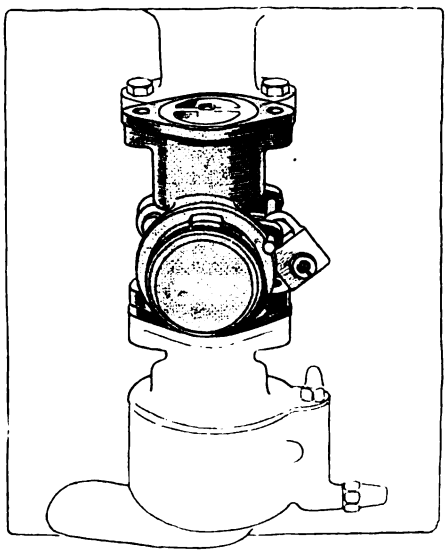


Fig. 8—Kramer self-contained engine governor, which is placed between the carbureter and the intake pipe

signed that the centrifugal movement of the steel balls in these radial grooves will raise the cup in direct proportion to the speed of the shaft. This vertical motion of the cup is transmitted to the indicating hand through a very simple lever arm. There is one spring used in the entire system and it is used to bring the indicating parts back to zero.

Injex Primer—To allow easy starting of the motor in cold weather the Reflex Ignition Co., 211 High avenue, Cleveland, O., has brought out the primer shown in Fig. 6 for $2.50.

By pulling a ring on the steering post or dash a spray of gasoline is injected from the feed pipe into the manifold.

The fuel is brought to the primer from the main gas line through a T pipe connection. Then by pulling the lever shown, a charge of gasoline is carried into the cylinder of the primer. On releasing the lever a strong spring forces the piston back and the gasoline is injected into the manifold.

Two types are made—one with a flange which is attached between the manifold opening and the carbureter, and the manifold type, which may be attached to any point of the manifold.

Kramer Governor—Controlling the speed of the motor by utilizing the velocity of the inrushing gases is the feature of a new governor made by the Kramer Governor Co., Detroit, Mich. As is shown in Fig. 9, as the speed of the motor grows higher, the increasing velocity of the gases past the floating disk in the intake passage raises this disk and closes the damper, placed below it. Thus when the speed of the gases reaches a pre-determined amount the butterfly begins to close and the speed drops. These two members are contained in a suitable casing which is inserted between the carbureter and intake manifold. Since it is compact and self-contained, it may be easily attached to any motor. There are no revolving parts and little to get out of order or wear.

It is stated that all governors are thoroughly tested and set for a maximum speed of about 1,000 revolutions per minute. The governor may be simply adjusted to any speed desired. This gives a direct control of the piston speed of the motor as the speed of the intake gases is a direct function of the piston speed. This is of course within the limits of ordinary running where the volumetric efficiency of the motor does not vary sufficiently to alter the proportions to an appreciable extent.

Imported ball bearings are used on the shaft of the butterfly valve and a clock spring regulates its action. The throttle shaft is ground true to 1-1000 inch. Hardened steel bushings are used in the links.

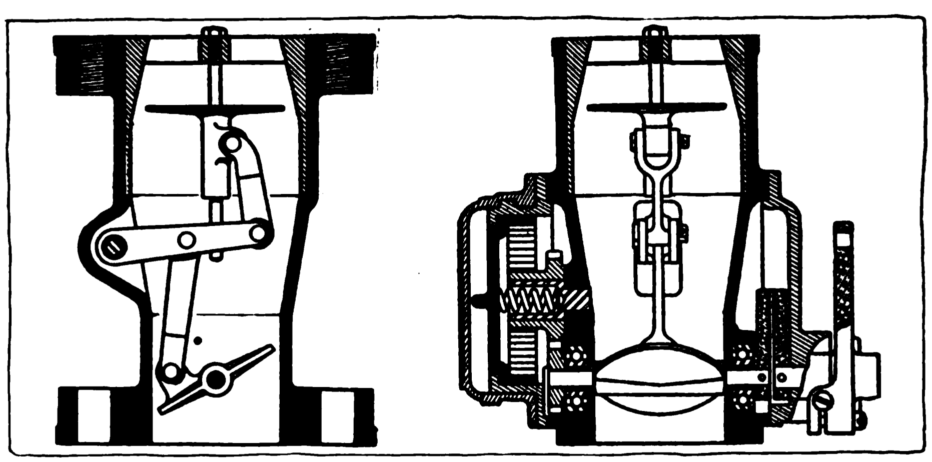


Fig. 9—Sections through Kramer engine governor showing operating disk which is raised or lowered according to the speed of the incoming gases, thus opening or closing the butterfly valve below

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The AUTOMOBILE

Germany's Export Trade

An Analysis Revealing Opportunities—How the 1912 Foreign Business of $30,000,000 Was Distributed

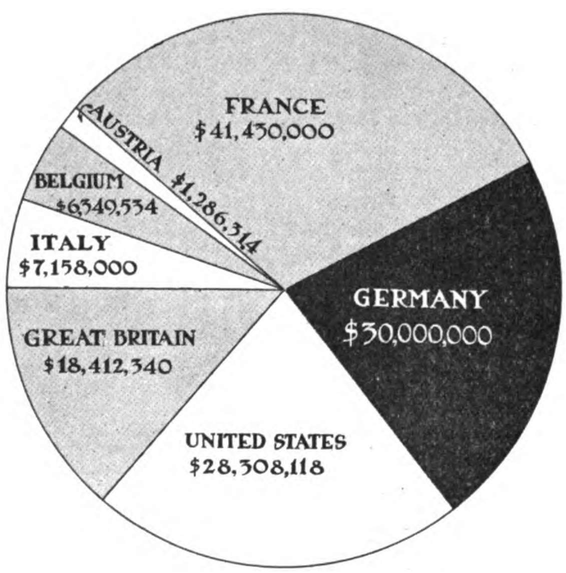
By Marc Braun

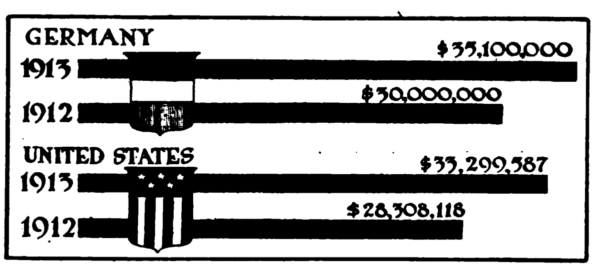
THAT Germany's exports of automobiles, motor trucks, parts, etc., for 1913 totaled $35,000,000 in value, or more than those of the United States for that year, will be news to a good part of the American automobile and allied industries. Exports of the United States covering these lines amounted to $33,299,587 in 1913, while for 1912 the statistics gave Germany's shipments a value of $30,000,000, as compared with $28,308,118 for those of the United States. Detailed information is not as yet available for 1913, but the 1912 statistics in themselves tell a story of the greatest interest to the automobile, commercial vehicle and accessory manufacturers of the United States, disclosing as they do the tremendous extent of their German competitors' influence throughout the world. In other words, owing to the war in Europe, the great markets which Germany has heretofore supplied would seem to be open to our enterprise. But let us see what an analysis of the 1912 exports of German makers reveals.

An Analysis

According to reports in the annual year book of German statistics, monthly bulletins and other official documents, information is available on German automobile exports to practically all the countries of the world except Austria, Italy, Turkey, Greece, Servia, Bulgaria and Roumania. Of these, however, the only ones of any importance are Austria and Italy.

Germany's shipments to the other nations of the globe totaled $25,078,118 for the year 1912. This figure includes automobiles, motor trucks, parts for both classes of vehicles and motorcycles. The countries to which the $25,078,118 worth of automobiles, trucks and allied products were shipped are: All of Europe except the seven countries named, all of Asia, Africa, Australasia, Mexico, Central and South America, the United States and Canada.



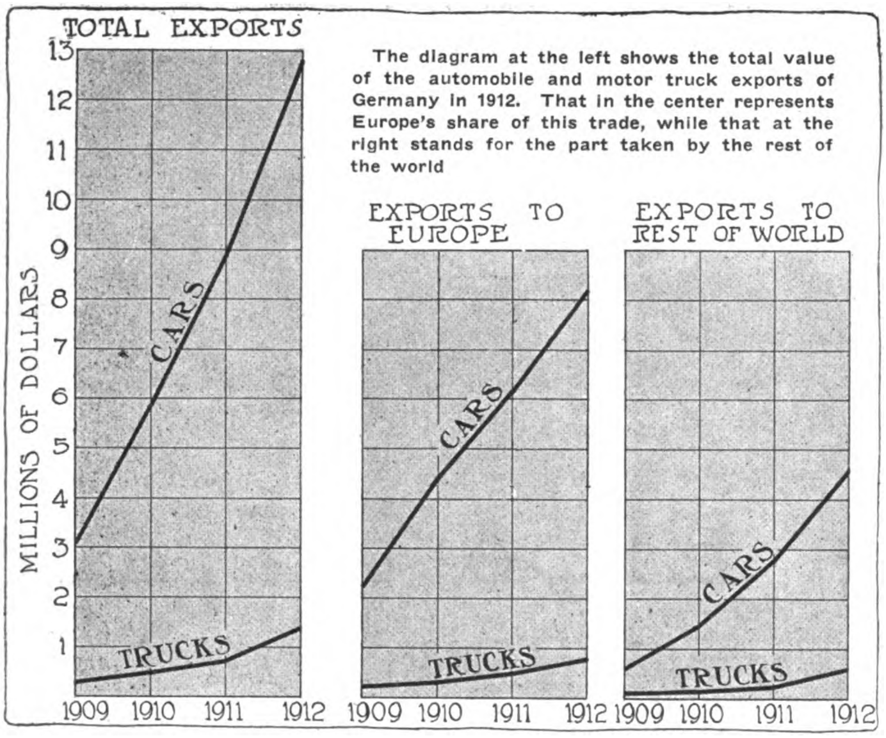


Above—Diagram showing relative value of automobile exports of the various nations. France leads with Germany second and United States third.
Below—A comparison of the export trade of Germany and the United States for 1912 and 1913

Europe's Share Largest

Naturally, the bulk of Germany's exports went to European countries, the total value of Europe's share being $15,945,834 in 1912, as compared with $8,470,-950 for the rest of the world, except the seven countries named and the United States and Canada, the total exports of Germany to the two last mentioned for 1912 being $258,250.

An idea of the importance attained by the German automobile and motor truck export industry may be gained from a comparison of the total values of cars, trucks, etc., shipped by other countries in 1912. An inspection of the chart on this page brings out clearly the fact that the world's export business in 1912 might be considered as divided into four parts, France, Germany and the United



The diagram at the left shows the total value of the automobile and motor truck exports of Germany in 1912. That in the center represents Europe's share of this trade, while that at the right stands for the part taken by the rest of the world

States each taking one and the rest of the countries, Great Britain, Italy, Belgium and Austria all together constituting the fourth.

France the Leader

France in 1912 was the great leader in motor car exports, her total figures for the year being $41,430,000. A further analysis of these figures show that of this total of French exports England took 27 per cent., Belgium 22 per cent., Algiers 7.8 per cent., Germany 7 per cent., Argentina 6.26 per cent., Brazil 5 per cent., Spain 2.4 per cent., United States 2.4 per cent., Switzerland 2.2 per cent., Italy 1.3 per cent. and Russia 1.2 per cent.

Britain Supplies Colonies

During the same year Great Britain exported motor cars and parts to the value of $18,412,340. Great Britain's exports are largely to her own colonies or possessions. Thus, in 1912, of her total automobile exports of $18,412,340 more than one-half went to her possessions, the exact figure being $10,765,500, as compared with a total export business on cars and parts to foreign countries of $8,397,970.

Belgium exported $6,349,534 worth of automobile products, her greatest consumers being Great Britain, Germany, France and Argentina, in the order named.

Italy's 1912 exports amounted to $7,158,000. Austria exported passenger cars and trucks to a total value of $1,286,314.

Returning again to the German industry: The information concerning automobile parts not being available for 1911, 1910 and 1909, we will deal principally with the motor car and motorcycle business only.

The Yearly Increase

Figures tell the story better than explanations. While in 1909 the German export trades in passenger vehicles represented a total value of $3,095,375, this increased to $5,859,350 in 1910, to $8,848,500 in 1911, and reached a total of $12,789,-550 in 1912.

Just as rapid was the increase in the commercial vehicle export business which totaled $301,500 in 1909, grew to $463,666 in 1910, rached $720,500 in 1911, and was almost one and one-half millions in 1912, the total being $1,405,734.

Motorcycles to a total value of $292,-250 were exported in 1909, while the following year the exports dropped to $254,-250. In 1911 the exports again increased, totaling $320,750, and in 1912 this total amounted to $471,250.

6,331 Vehicles in 1912

All told, the German manufacturers exported 6,331 passenger vehicles and chassis in 1912—not including the countries referred to above. The total value of these cars was $12,789,550 and the average price per car or chassis was $2,020.

The total number of commercial vehicles exported was 502, valued at $1,395,734 or an average of $2,780 each.

There were exported 2,352 motorcycles valued at $471,250, or $200 each.

Average Car Values

The average value of the passenger cars exported into European countries was $1,-924 and of those exported outside of Europe $2,025.

The total value of the automobile parts exported by Germany in 1912 was $10,-411,584 and it will be seen from the detailed statistics that fully 65 per cent. of the total represents automobile tires and inner tubes. Next in importance are motors and engines for automobiles and other vehicles.

Russia, the Big Buyer

Germany's best customer in Europe in recent years has been Russia, which purchased 1,120 passenger vehicles and 143 commercial vehicles in 1912, representing a total value of $3,152,500. The average price of the passenger car was $2,382 and of the commercial vehicle $3,386. The total increase of business over 1911 was a trifle over $1,000,000 and only a little less than $2,000,000 as compared with 1910, while in comparison with 1909 the increase was nearly $2,500,000.

Great Britain Second Buyer

The next best customer was Great Britain, which bought 1,072 passenger cars and twenty-four commercial vehicles or all told 1,096 of a total value of $1,886,750, which was an increase of less than $400,000 over the business of 1911. Including parts and motorcycles the total business of Germany with Great Britain in 1912 amounted to over $4,500,000.

France Slow on German Cars

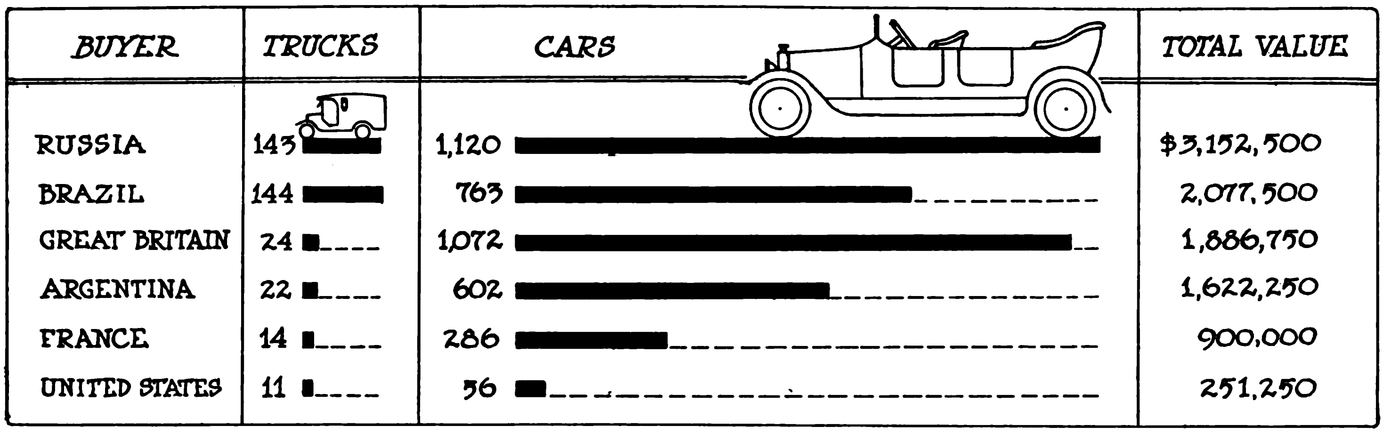
France imported only 300 German cars of which fourteen were commercial vehicles. The total value was about $900,-000, but with parts and motorcycles the total was more than $3,000,000.

France was Germany's second best customer for automobile tires, its purchases totaling $2,123,750, which was about $450,000 less than the British purchased of German tires in 1912.

Our German Imports

According to the government statements only fifty-six motor cars worth $220,750 were shipped to the United States in 1912 and their average value was $3,718, while the average value of the eleven commercial vehicles, worth $30,500 in all, exported to the United States was $2,772. Only thirteen motorcycles came to this country from Germany and their price was $211 each.

According to the German records the total value of the German cars, motorcycles and parts exported to the United



Chief buyers from Germany—A graphic representation of the number of cars and trucks and the total value in each case bought by the different leading countries from Germany in 1912. Russia, strange to relate, was the best customer, with Brazil second, Great Britain third, followed in order by Argentina, France and the United States

States was: $331,500 in 1909; $321,500 in 1910; $549,750 in 1911; and only $263,000 in 1912. This tremendous decrease of German imports into the United States in 1912 as compared with the amount purchased from the Empire in 1911, is a significant indication of the increasing influence of the American manufacturers.

In 1911 the German pleasure vehicles imported into this country represented a total value of $497,250. In 1910 the imported pleasure vehicles were valued at $265,250, and in 1909 their value was $271,000. In that year the imported commercial vehicles represented a value of $2,750, which increased to $17,500 in 1910, and to $23,500 in 1911.

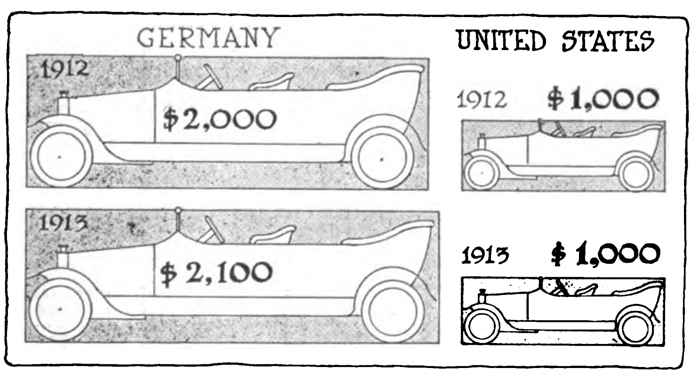
Small Canadian Business

The German business with Canada amounted to very little, totaling $18,250 in 1912, of which $14,000 represents automobile tires, $4,000 the value of two passenger vehicles and $250 the value of one motorcycle.

Quadruples in 4 Years

A table showing the grand total of German export trade of automobiles, parts, accessories and motorcycles with the most important countries in the world:

	1912	1911	1910	1909
PASSENGER CARS	$12,789,550	$8,848,500	$5,859,350	$3,095,375
COMMERCIAL VEHICLES	1,405,734	720,500	463,666	301,500
MOTORCYCLES	471,250	320,750	254,250	292,250
	$14,666,534	$9,889,750	$6,577,266	$3,689,125
PARTS	10,411,584	....	....	....
	$25,078,118	....	....	....



The diagram at the left represents the average value per vehicle exported by Germany in 1912 and 1913, while at the right is a similar illustration of the average value per vehicle for United States exports. The figures include both passenger cars and trucks

An analysis of this tabulation shows that this export trade has almost quadrupled in 4 years, growing from $3,000,000 in 1909 to $12,500,000 in 1912 in passenger vehicles alone. In commercial cars her exports have increased five fold in these 4 years.

Trade with Europe

The total value of the German export trade of automobiles, parts, accessories and motorcycles from 1909 to 1912 to countries in Europe only is shown in the following tabulation:

	1912	1911	1910	1909
PASSENGER CARS	$8,175,850	$6,045,500	$4,392,700	$2,476,475
COMMERCIAL VEHICLES	804,984	482,000	310,750	234,000
MOTORCYCLES	390,250	262,000	196,000	204,250
	$9,371,084	$6,789,500	$4,899,450	$2,914,725
PARTS	6,574,750	....	....	....
	$15,945,834	....	....	....

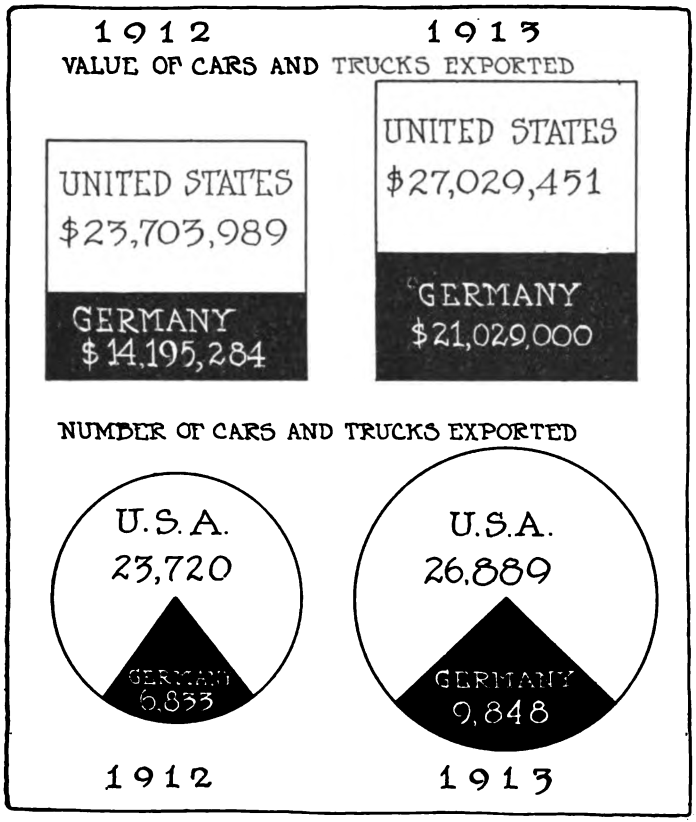
An inspection of the figures will reveal a story of greatly increased business, as the passenger car exports have more than tripled in the 4 years referred to; the truck business has similarly grown; and the motorcycle business has shown material gains. This condition of growth of exports is not local to Germany but applies to practically all European countries building cars except Austria and is largely due to the rapid development of the industry.

Business Outside Europe

To supplement the foregoing tabulation, the following statistics give the total value of German export trade in passenger cars, commercial vehicles and motorcycles to countries not in Europe, except the United States and Canada:

	1912	1911	1910	1909
PASSENGER CARS	$4,389,950	$2,305,750	$1,201,400	$347,900
COMMERCIAL VEHICLES	560,250	215,000	135,416	64,750
MOTORCYCLES	78,000	48,500	37,000	55,250
	$5,028,200	$2,569,250	$1,373,816	$467,900
PARTS	3,412,750	....	....	....
	$8,470,950	....	....	....

These figures aid those already quoted in bringing out the fact that the bulk of Germany's export trade is taken by



The upper diagrams represent a comparison of the total value of cars and trucks exported by Germany and the United States in 1912 and 1913 and the two lower charts contrast the number of vehicles exported by each of the two countries in these years. Note the greater number and lower average price of the American cars and trucks

European countries, but it must not be overlooked that German makers have extended their business into every quarter of the globe and have developed in a few years an export business of over $8,000,000 in countries outside Europe, the United States and Canada.

Exports, to South America, Africa, Asia, Australasia,

During 1912 Germany exported all told 2,241 automobiles valued at $5,028,200 to countries outside of Europe. The export trade in motor cars of the United States during that same year and to those same countries totaled 8,400 cars valued at $8,416,095 or an increase over the German business of nearly $3,500,000.

Americans Gain

Compared with 1911 the increase in business on the American side had been a little over $3,400,000 while on the German side the total showed an increase of only $2,500,000. The proportion of the increase of business is even greater for the American manufacturers for 1911 as compared with 1910, the total difference being $2,600,000 in favor of the United States and only $1,200,000 for the German manufacturers.

Comparing the German to the French export trade in 1912 to all countries outside of Europe, except the United States and Canada, and including parts, accessories and motorcycles, the official government records show that the value of the German exports totaled $8,470,950 while the total to the credit of the French manufacturers was $13,374,659 or nearly $5,000,000 more.

All the figures given in the charts or tables were taken from official German consular reports or from other official source. While the details for each country are available only for the year 1912 the totals are given for the years 1909 to 1911, and the data will give a fairly good idea of the rapid growth of the German automobile business with foreign countries which are now looking principally to the United States to supply them with these goods and others.

$2,000,000 Increase in 1 Year

Briefly stated, Germany exported $4,389,950 worth of passenger cars to South America, Asia, Australasia, Africa and Mexico during 1912, while the trade with those same countries in 1911 amounted to only $2,305,750, or a difference of over $2,000,000. In 1910 the total value of Germany's export business to all countries, excepting Europe, amounted to $1,201,400 for its passenger cars, which represented an increase of over $850,000 over 1909.

Truck Exports Double

The exports of commercial motor vehicles has followed about the same increase, its value in 1909 being only $64,750 while the following year it more than doubled, totaling $135,416. In 1911 the total was $215,000 and in 1912 it had increased to $560,250.

The motorcycle business has not followed the same ascending trend, for while in 1909 $55,250 worth of the little two-wheelers were exported, there was a sharp decline in 1910 when the exports showed a total value of only $37,000. The following year a gain of $11,500 was made, the total value being $48,500. In 1912 the German manufacturers had their banner year as they exported $78,000 worth of motorcycles outside of Europe.

$3,442,750 in Parts

For 1909, 1910 and 1911 the information for parts exported is not at hand, but for 1912 it totals $3,442,750 of which fully three-quarters represent tires and inner tubes.

$2,150 Per Car

All told, it appears from the records of the German government that only 2,241 passenger cars were exported outside of Europe in 1912 and their average value was $2,150. According to the detailed statistics per country the average value of the cars often varied, taking each country separately. Thus, for instance, the average value of the 763 passenger cars imported into Brazil was $2,183 while the average price of the 602 imported into Argentina was $2,582 or $399 more per car than those which went to Brazil. On the other hand, the average price of the thirty-six cars which were shipped to Japan was $1,660 or $523 less than those which went to

Analysis of German Passenger Car Exports in 1912

Passenger Cars and Chassis	No.	Value	Average Value per Unit
Exported	6,331	$12,789,550	$2 020
Sold in Europe	4,248	8,175,850	1,924
Sold outside Europe	2,025	4,389,950	2,167
Sold in U. S.	56	220,750	2,718

Analysis of German Commercial Vehicle Exports in 1912

Commercial Vehicles	No.	Value	Average Value per Unit
Exported	502	$1,395,734	$2,780
Sold in Europe	291	804,944	2,766
Sold outside Europe	200	560,250	2,901
Sold in U. S.	11	30,500	2,772

Brazil and over $900 less than those which were imported into Argentina. This is an interesting point as showing the trend of business in the different countries.

Trucks Average $2,801

The average price of the 200 commercial cars exported in 1912 was $2,801. The variance in average price per country was as marked as for the passenger vehicles. For instance those which went to Brazil averaged $2,858, those which were shipped to British Malaysia averaged $3,833 and those which went to Australasia averaged $2,125.

The average value of the 384 motorcycles exported was $203. The ninety-seven which went to Brazil averaged $219; the nine shipped to Mexico averaged only $166, while the twenty-seven purchased by Siam averaged $120.

A Steady Increase

The South American countries were Germany's best customers. The business in pleasure and commercial motor cars with Brazil totaled only $83,750 in 1909. One year later its total was $424,250. In 1910 it had come near the million dollar mark, totaling $826,750 and in 1912 it had passed the two million mark, the total being $2,077,500. The German trade with Argentina was about just as steadily on the increase, being only $82,500 in 1909 while in 1912 the total was $1,622,250.

2,801 Cars for Argentina in 4 Years

The German consular reports for the 4 years from 1904 to 1908 show that during that period a total of 2,801 automobiles were imported into Argentina and that 1,772 came from France, 348 from Germany, 236 from the United States, 216 from Great Britain, 180 from Italy, thirty-one from Belgium and nineteen from Spain.

During 1910 there were imported 1,610 cars, during 1911 the total was 2,473 and this reached 4,013 in 1912. About 39 per cent. of the cars came from France, about 25 per cent. from Germany, about 16 per cent. from the United States and about 13 per cent. from Italy.

The average value of the passenger cars imported by Argentina in 1912 was $2,582, while the trucks averaged $3,070. Motorcycles averaged $219.

Argentina's Growing Demand

The statistics representing automobile exports from all countries into Argentina in 1909, 1910, 1911 and 1912 are:

	1912	1911	1910	1909
	PASSENGER CARS			
602	$1,554,750	$619,000	$259,000	$80,000
	COMMERCIAL VEHICLES			
22	67,500	19,000	10,000	2,500
624	$1,622,250	$638,000	$269,000	$82,500
	PARTS			
...	*$853,000	......	......	....
	MOTORCYCLES			
41	$9,000	$14,750	$6,000	$6,500

*Includes automobile tire covers and tubes for $601,500.

One-Third of Brazil's Imports Are German

The imports of motor cars into Brazil increased from 735, valued at $1,123,400 in 1910, to 1,574, valued at $2,293,-700, in 1911, and to 3,785 of a total value of $5,368,000, in 1912. The average value per car for those 3 years was respectively $1,528, $1,457 and $1,418. One-third of the imported cars in 1912 came from Germany and one-fifth from the United States, while in 1911 the proportion was one-fifth for both countries. In 1910 the proportion was one-fourth from Ger-

(*Continued on page* 1047)

Automobiles, Motor Trucks, Frames, Motors, Parts, Tires and Motorcycles Exported by Germany for the Year 1912.

Country	Number of Cars	Total Value	Number of Trucks	Total Value	Parts, Value	Frames, Value	Motors, Value	Tires and Tubes, Value	Motor Cycles, No.	Value
Algeria	2	$3,750	1	$750	....	....	....	....	....	....
Argentina	602	1,554,750	22	67,500	$256,500	....	....	$601,500	41	$9,000
Australasia	117	186,000	4	8,500	149,250	....	....	663,250	54	11,250
Belgium	316	424,350	19	42,484	....	....	....	....	....	....
Brazil	763	1,666,000	144	411,500	132,500	....	....	216,750	97	21,250
British India	48	83,250	....	....	136,250	....	....	176,250	22	4,000
British Malaysia	10	13,750	3	11,500	17,250	....	....	110,250	2	500
British East Africa	1	2,000	....	....	....	....	....	....	2	500
British West Africa	....	....	....	....	5,500	....	....	....	....	....
British South Africa	33	47,250	2	3,250	....	....	....	137,500	58	9,500
Canada	2	4,000	....	....	....	....	....	14,000	1	250
Ceylon	12	33,500	....	....	2,000	....	....	17,000	....	....
Chili	44	71,250	1	4,000	5,250	....	....	13,500	14	5,500
China	15	22,750	....	....	16,000	....	....	38,250	1	250
Colombia	1	1,250	....	....	....	....	....	....	....	....
Cuba	5	15,500	....	....	41,500	....	....	....	3	250
Denmark	298	381,250	10	22,250	....	....	....	252,500	503	106,750
Dutch India	191	307,500	2	3,750	60,750	....	....	174,750	15	2,750
Egypt	4	10,750	1	2,250	40,000	....	....	32,000	....	....
Finland	121	268,500	35	73,500	....	....	$5,000	19,500	66	13,750
France	286	878,000	14	15,500	....	$500	11,500	2,123,750	76	14,000
French Indo-China	....	....	....	....	500	....	....	13,750	....	....
German African Posses.	8	14,750	1	2,750	....	....	....	....	22	4,000
Holland	511	729,000	11	22,500	....	1,250	18,000	405,500	134	24,750
Jamaica	3	6,000	....	....	....	....	....	....	....	....
Japan	36	59,750	3	7,000	144,250	....	....	4,500	16	2,750
Kiao-Chow	5	10,250	....	....	3,000	....	....	....	3	500
Mexico	24	61,000	....	....	16,250	....	....	25,000	9	1,500
New Zealand	8	15,250	2	5,250	650	....	....	108,850	1	250
Norway	59	108,500	13	28,250	....	....	1,500	25,000	....	....
Paraguay	1	4,000	....	....	....	....	....	....	....	....
Peru	1	1,500	....	....	....	....	....	....	....	....
Persia	1	2,500	....	....	....	....	....	....	....	....
Portugal	59	138,000	4	13,000	14,250	....	....	54,500	138	24,250
Portuguese E. Africa	2	3,000	....	....	500	....	....	....	....	....
Portuguese W. Africa	2	3,500	....	....	1,250	....	....	....	....	....
Russia	1,120	2,668,250	143	484,250	....	3,750	48,500	549,000	577	114,250
Siam	31	45,750	9	19,000	6,500	....	....	....	27	3,250
Spain	84	183,500	2	5,250	....	....	4,750	189,250	7	2,000
Sweden	201	354,000	....	....	....	2,000	4,250	191,000	135	31,250
Switzerland	121	218,000	16	35,750	....	1,250	41,750	....	104	19,000
Tunis	....	....	....	....	19,500	....	....	....	....	....
United Kingdom	1,072	1,824,500	24	62,250	....	....	40,500	2,566,000	214	40,250
United States	56	220,750	11	30,500	....	....	7,000	2,000	13	2,750
Uruguay	71	190,000	3	6,000	54,500	....	....	....	14	4,000
Venezuela	1	3,250	....	....	....	....	....	....	....	....
Total	6,348	$12,786,350	500	$1,388,484	$1,123,900	$8,750	$182,750	$8,725,100	2,369	$474,250

NOTE.—No statistics were available on German exports of automobiles, trucks, etc., to Austria-Hungary, Italy, Greece, Turkey, Roumania, Servia and Bulgaria.

Fashion Hints for Winter Wear

Part II

NOWADAYS very few ladies who drive their own cars, or are used to the pleasure and convenience of riding about in them, let the weather conditions interfere with their frequent excursions into the realm of the open air. In a recent issue THE AUTOMOBILE reviewed and described the most up-to-date and most comfortable garments offered for the winter season for the masculine automobilist; herewith are similarly treated the latest dictates of Dame Fashion for the motoring lady who loves the snappy, zestful air of winter and the feel of the frozen road as the silent tires sweep the purring car briskly along.

A glance at the varied styles illustrated gives an idea of how carefully the supply companies have prepared for the winter trade. Almost every imaginable type of garment and accessory has been designed and manufactured for winter wear and great attention is given to include in the make-up of each article the qualities of comfort and stylish appearance. But look at the illustrations and you will recognize all these little features without further comment being necessary.

Ladies' raccoon coat finished with silk or blanket linings and designed to be at the same time comfortable, warm and becoming in appearance. While this is a midwinter type of garment, it will not be found too warm for the late fall and early spring. Auto Supply Co., $125 to $300. The silk-lined short gloves illustrated sell at $6.

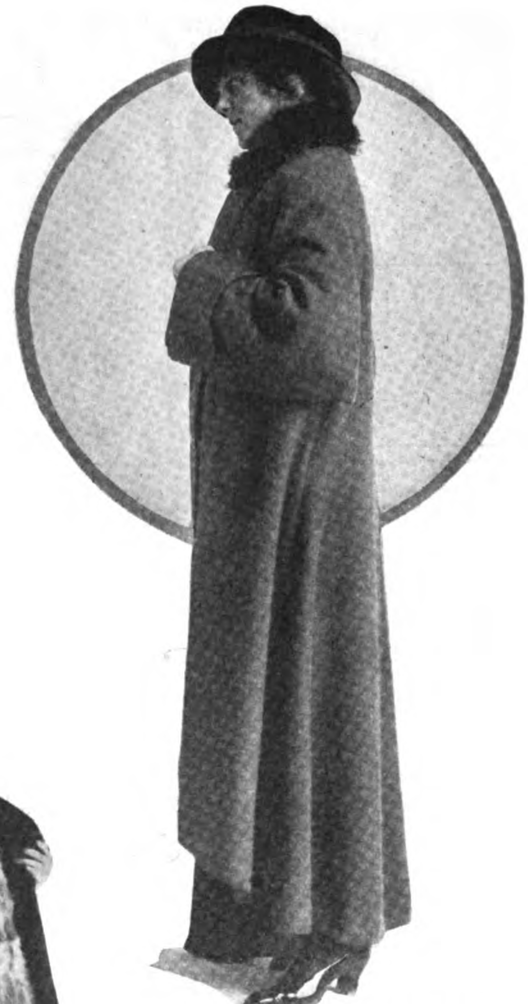
Cloth hat with velvet band. This shape presents a number of possibilities in the way of trimming and is sold either with or without plume. The hat will always be attractive and stylish. Smith-Haines, with plume, $7.50. Without plume, $5.

Above—An Angora wool muffler which is furnished in all colors and combinations. These mufflers are soft and warm, and are made long enough to prevent slipping loose, as may be seen. Auto Supply Co., $2.50 to $6.50. The velour hat illustrated is $10.

At the left—Retaino bonnet for ladies. The close-fitting shape prevents it from blowing off and its simplicity insures attractive appearance. The use of the bonnet with a veil is illustrated. Lowe Motor Supplies Co., $4.

Above—Automobile coat which comes in soft worsteds in all colors and combinations. The collar is convertible and the belt is an added feature of completeness in design. Auto Supply Co., $35 to $52.50. The velvet cap in all colors is $2.50 to $5.

Above — Another adaptation of the Retaino bonnet and a veil. This bonnet is slightly different in shape, material and construction from that illustrated on the opposite page and is a little lower in price. Lowe Motor Supplies Co., $4.

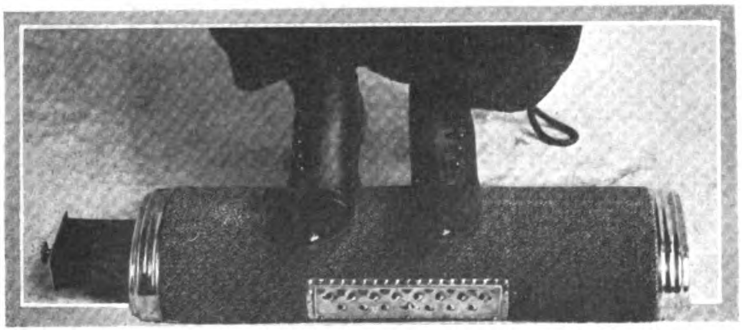


Above — Bedford cord robe for keeping the driver or passengers warm and cosy on a wintry day. The robe is made in all sizes and colors and is surprisingly light to carry, especially in view of its warmth-giving qualities. Auto Supply Co., $15 to $47.50. The cushion shown open is described at the bottom of the page.

A silk-lined coat with Australian opossum collar and well-designed set-in sleeves. The illustration gives an excellent idea of the becoming appearance of the garment, which is warm and cosy. Auto Supply Co., $40 to $55. The hat is the same as that shown at the left of the page.

Combination coat for wear in either street or car with large set-in sleeves and convertible collar. The material is worsted. Auto Supply Co., $30 to $50. The velour hat sells for $5 to $7.50.

Squirrel-lined coat with black fox collar. The coat material is black broadcloth. This is a very elegant, comfortable and becoming coat. It may be had in other material and different furs if desired. Auto Supply Co.. $75 to $1.50. The green plush hat is $5 to $7.50.



At the left is illustrated a charcoal foot warmer which comes in blue, maroon, black and gray, and in sizes from 12 to 24 inches length. The fuel drawer is pulled out at the left. Trimmings are nickel. Auto Supply Co., $2 to $10. The one illustrated is $10.

Leather cushion with pockets, shown open at the top of the page, for carrying veils, gloves, toilet articles, etc. This is a very useful article, especially for touring. The Retaino bonnet is illustrated on the opposite page. The cushion has handles for carrying it. Auto Supply Co., $6.50.

Left—Goggles with ball and socket joint over nose, allowing folding. The lenses are removable and interchangeable. There is provision for ventilation. A. J. Picard & Co., $1.50 with plain lenses. With amber lenses $2.

Right—Imitation tortoise-shell glasses for ladies' wear. They are made in one piece and do not fold or bend. A wide cheek-piece serves to keep out dust, dirt, etc. A. J. Picard & Co., $2.

At the left—Goggles of imitation tortoise-shell with gold-filled mountings and folding bows. The folding eye-cups serve to protect the eyes. These glasses are furnished with either amber or plain lenses and are light and comfortable. Lowe Motor Supplies Co., $1 to $5.

Above—Ladies' velour hat with buckskin band. This neat and serviceable sample of motor millinery comes in all colors and is both durable and comfortable, while at the same time being attractive in appearance. Auto Supply Co., $6.50.

One of the pretty silk mufflers which are furnished in all colors and combinations. They are of the best material and are soft, warm and of ample length to prevent slipping out of position. Auto Supply Co., $2 to $10. The hat is described on page 1014.

Photographs by Lazarnick.

New York Car Registrations Total 166,961

ALBANY, N. Y., Nov. 30—The records of the State Automobile Bureau show that registrations and receipts from fees for the first 9 months of 1914 are in advance of those for the entire year of 1913. According to the statistics from February 1 to November 17, there were 166,961 car owners registered as compared with 131,095 last year. Receipts from owners' fees this year total $1,283,895, a substantial increase over the $1,050,215, taken in during 1913.

An additional source of income is the chauffeurs' registration fee. To date there are 65,080 chauffeurs registered, 15,910 paying $5 fees, and 49,170 paying $2 fees. The fees total $177,890. In 1913 there were 55,185 chauffeurs registered who paid $157,866.

To November 17 this year there were 1,741 dealers registered in New York State, the amount of fees totaling $37,007. These figures compare favorably with the 1,735 dealers registered in 1913 and paying $37,080.

2,348 Foreign Cars

There were 2,348 foreign cars registered during 1914 to November 17 as compared with 2,134 in the preceding year.

Miscellaneous receipts totaled $16,871.86 as compared with $14,841.77. These miscellaneous receipts are made up of affidavit fees, lost plates, certificates, badges, etc. Vendee affidavits brought in $10,151 as compared with $7,116 for 1913.

In 1914 there are 1,355 numbers reserved, as compared with 1,017 in 1913. There are 418 registrations without fee, an increase of 108 over 1913. The commercial registrations without fee totaled 130 as compared with 75 last year. Owners' $5 fees number 68,059 and amount to $340,295. For 1913 these statistics were respectively 49,419 and $247,095. Owners' $10 fees number 50,764 and amount to $507,640 as compared with 42,176 fees amounting to $421,760 last year. The $15 fees totaled 18,894, bringing in $283,410. In 1913 16,762 fees brought in $251,430. This year $25 fees number 1,272, a significant decrease from the 1,358 of 1913.

Commercial fees of $5 were paid by 15,973 owners as compared with 12,263.

There are 60,628 original full rate numbers and 94,882 renewals. Last year the figures were 50,238 original numbers and 72,125 renewals.

There are 6,575 owners paying half rate or $2.50 in the $6 class as compared with $3,802 last year. When a car has been registered 4 years in succession it is entitled to half rate. In the $10 class 2,957 registered this year for $5. In the $15 class the half rate registrations totaled 925 and in the $25 class they amounted to 24.

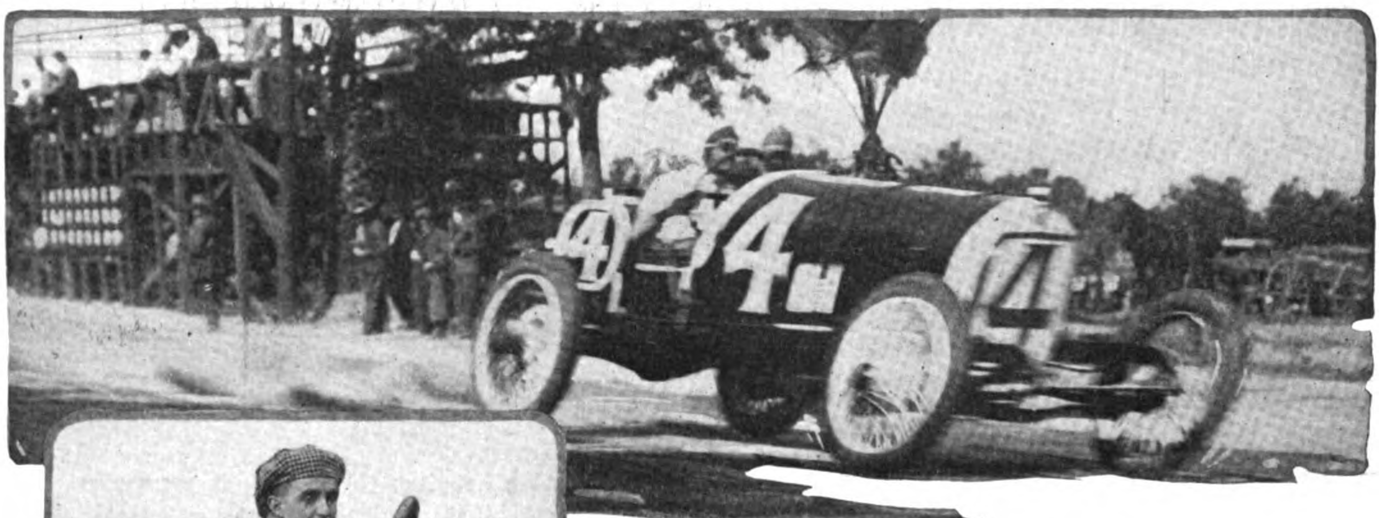
Owners, Chauffeurs and Dealers Registered in New York State

REGISTERED	NO.	FEES	NO.	FEES
Owners	166,961	$1,283,895	131,095	$1,050,215
Chauffeurs	65,080	177,890	55,185	157,866
Dealers	1,741	37,007	1,735	37,080
Foreign cars	2,348	....	2,134	....

New York Registration from 1901 to Date

YEAR	OWNERS	CHAUFFEURS	RECEIPTS
1901	954	......	$954.00
1902	1,082	......	1,082.00
1903	6,412	2,382	9,181.00
1904	6,739	2,265	14,249.14
1905	8,625	4,387	25,953.50
1906	11,753	7,067	35,463.27
1907	13,985	9,388	44,580.10
1908	15,480	10,335	53,736.36
1909	24,059	12,533	81,772.67
1910 to July 31	19,252	9,595	57,694.00
1910, Aug. 1 to Feb. 11	62,655	27,416	339,845.90
1911	83,969	35,890	905,179.37
1912	107,262	45,347	1,056,620.80
1913	134,405	56,702	1,275,727.27
1914 to Nov. 17	166,961	65,080	1,461,785.90
Totals	664,663	288,487	$5,363,825.28

Pullen Wins Corona Race at 87.7 M. P. H.



Ed. Pullen swinging into the home stretch in his victorious Mercer which won the 301.89-mile road race at Corona, Cal., on Thanksgiving Day at an average speed of 87.7 miles per hour

Ed. Pullen, winner of the Thanksgiving Day road race at Corona, Cal., in his Mercer racer

Mercer Covers 302-Mile Course at a Record - Breaking Speed —Oldfield's Maxwell Second— O'Donnell, Duesenberg, Third

CORONA, CAL., Nov. 26—The greatest automobile race ever held on the Pacific Coast, the second annual Corona road race of 301.89 miles, was won by Eddie Pullen in a Mercer. He averagea 87.7 miles an hour, covering the 109 laps of the 2.76 miles in 3 hours 26 minutes 2 seconds.

It was a close, nerve-racking contest throughout. Pullen got the green flag at the finish, then Oldfield in the Maxwell shot across the line with O'Donnell's Duesenberg just 40 seconds behind. Less than 2 minutes after O'Donnell finished, DePalma crossed the tape in his Mercedes.

By capturing first place Pullen gets first money, the purse being $6,000; Oldfield in second place takes $2,500; O'Donnell wins $1,500 for third honors; DePalma $1,000 for fourth position; Gordon $750, or fifth money and Carlson takes the remaining $300 for sixth place.

Finishing Times in Corona Race

Car	Driver	Time	M.P.H.
Mercer	Pullen	3:26:02	87.7
Maxwell	Oldfield	3:29:58	86.3
Duesenberg	O'Donnell	3:31:12	86.0
Mercedes	De Palma	3:31:51	85.0
Gordon-Special	Gordon	3:48:29	84.0
Maxwell	Carlson	3:51:10	78.5
Mercer	Nikrent	3:55:10	77.2

How the Cars Went Out

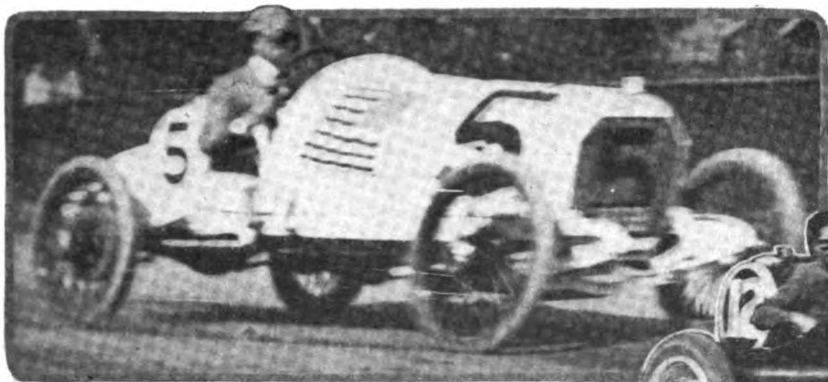
Car	Driver	Lap	How Eliminated
Marmon	D'Alene	1	Wrecked in smoke
Duesenberg	Alley	5	Broken clutch spring
Klein-King	Ball	30	Broken connecting rod
Peugeot	Rickenbacher	36	Transmission trouble
Stutz	Klein	34	Cracked cylinder
Stutz	Lewis	43	Broken bearing
Sunbeam	Grant	43	Burned up
Duesenberg	Callahan	58	Engine trouble
Marmon	Cadwell	63	Ignition trouble
Sunbeam	Babcock	88	Broken steering arm
Stutz	Cooper	107	Stripped timing gear
Mercer	Ruckstell	108	Out of gasoline

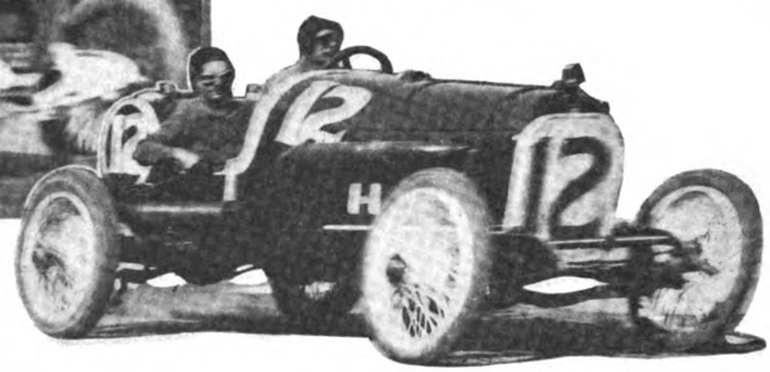
Pullen Takes the Lead

At the start Pullen took the lead and set a fast pace. For twenty laps he held the lead by a fair margin, averaging better than 96 miles per hour, with his right front tire giving way. When tire trouble set in he was thrown back several places losing practically a lap. Babcock in the Sunbeam, took the lead at the thirtieth lap and held the lead until the fifty-third lap when he struck a small dog and broke a steering arm. This was repaired and Babcock went back in the race but many laps behind, and when the eighty-seventh lap was reached, the repaired damage showed up again and the Sunbeam retired.

Earl Cooper in a Stutz held the lead from the sixtieth to eightieth lap when he was overhauled by Pullen and forced back into second position. Cooper held a close second from then to lap 108, when he went out with broken timing gears.

The only accident of the race was the wreck of the Sun-





Left—Huntley Gordon sending his Gordon Special along the last stretch of the Corona race. He finished in fifth place

Below—Louis Nikrent in Mercer No. 12 as the car appeared in the Thanksgiving Day road race over a 301.89-mile course at Corona

beam, driven by Harry Grant. The driver had built two 25-gallon gasoline tanks under the car. This was supposed to remedy the top-heavy trouble which has been claimed for the car. Grant was driving fast in fifth place on the forty-seventh lap, when a rear wheel collapsed. As the car had but about 6 inches clearance, the tanks dragged and sprung a leak. The scraping axle raising sparks on the course, set fire to the trail of gasoline. Before Grant could stop, the flames had caught up to the car and the fast racer was soon enveloped in flames. Unable to get out of the car, Grant and his mechanic, Harold Smith, were severely burned before they could get clear.

Early Eliminations

Almost from the start, the cars began to go out. The Marmon, driven by D'Alene, did not complete the first lap. Tom Alley, in the Duesenberg No. 20, was forced to retire at the end of the fifth lap with a broken clutch spring. The Klein-King, driven by Guy Ball, broke a connecting-rod and retired in the thirtieth lap.

The Peugeot, driven by Rickenbacher, held second position to Pullen's Mercer during the first twelve laps. A tire change was the first setback and in the thirty-sixth, Rickenbacher went out with transmission trouble.

Fast Stutz Speed

Arthur Klein, in the Stutz No. 2, averaged 98 miles an hour to the thirtieth lap when he stopped at his pit for a complete change of spark plugs. Going out again and traveling at a high rate of speed, Klein cracked a cylinder and was out. The cylinder had been welded the day before the race.

Dave Lewis, in the Stutz No. 3, was running in eighth position in the forty-third lap when a bearing burned out in the transmission.

A. A. Cadwell in the Marmon No. 11 changed a set of spark plugs in the sixty-third and after losing about twenty laps, returned to the race and was still running when he was flagged off the course after the last car in the money had finished.

Flying Speedway Start

At the start the leaders set a fast pace. This was largely due to the rolling start. The cars were lined up in sets of fours. It was a perfect start. The course was so fast that the drivers wore face masks, with one or two exceptions, to protect them from the small rocks thrown by other cars.

In the front rank were Oldfield, O'Donnell, Rickenbacher and Klein. The motors were started and the cars rolled around the course in a cloud of smoke. Oldfield tried for the jump at the start, but the starter held him back and when they got the flag, every car was in perfect position.

Nearly 100 M. P. H.

Averaging 98.6 miles an hour up to the thirtieth lap, the drivers circled the course like crazed demons, even Oldfield, said after the race that he never saw such a race and admitted that he was carried on by the speed of the others, realizing all the time that it was risky to do it, and expecting an accident at every turn.

When the cars began to thin out and the leaders came to the pits more often, the pace was cut down. From the third lap, Carlson, in Maxwell No. 17, had ignition troubles and was unable to get enough speed to catch the leaders. Louis Nikrent, in the small Mercer No. 12, did not have the speed of the other two Mercers nor the Gordon Special, which is a rebuilt Mercer. Nikrent drove a conservative and heady race, and finished just one behind the last money place.

DePalma, in the Mercedes, forged up to the front but when

Times of Contesting Cars and Purses in Corona 301.89-Mile Road Race

CAR	DRIVER	M.P.H. 96.9	96.2	98.6	90.4	90.4	88	88	86.5	88	87	86.5	M.P.H.	Pos.	Purse
		Lap 10	20	30	40	50	60	70	80	90	100	109			
Mercer	Pullen	18:10	37:38	59:15	1:16:20	1:33:41	1:55:36	2:13:28	2:31:38	2:51:53	3:08:55	3:26:02	87.7	1	$6,000
Maxwell	Oldfield	19:53	37:55	57:09	1:16:10	1:35:35	1:54:49	2:14:25	2:34:20	2:55:52	3:13:06	3:29:58	86.3	2	2,500
Duesenberg	O'Donnell	18:48	39:29	59:09	1:18:39	1:37:21	1:58:27	2:18:37	2:35:37	2:54:14	3:12:49	3:31:12	86	3	1,500
Mercedes	De Palma	18:35	38:14	57:51	1:16:12	1:38:52	1:56:59	2:15:14	2:34:12	2:54:44	3:14:48	3:31:51	85	4	1,000
Gordon-Spec.	Gordon	22:05	41:45	1: 1:35	1:21:29	1:42:03	2: 2:15	2:22:19	2:45:12	3: 8:46	3:29:24	3:48:29	84	5	750
Maxwell	Carlson	19:08	39:05	1: 8:15	1:28:30	1:52:35	2:13:30	2:34:10	2:54:30	3:14:50	3:36:10	3:51:10	78.5	6	300
Mercer	Nikrent	21:13	42:17	1: 3:39	1:24:24	1:47:19	2:11:15	2:35:11	2:55:24	3:16:14	3:35:18	3:55:10	77.2	7	....
Mercer	Ruckstell	18:10	39:06	57:45	1:16:30	1:34:40	1:55:31	2:13:50	2:36:15	2:55:55	3:14:25	Ruckstell on Mercer when in 4th place, ran out of gas on last lap.			
Stutz	Cooper	18:44	38:57	55:32	1:15:48	1:34:04	1:54:31	2:12:34	2:32:22	2:52:10	3:10:19	Cooper in 2d place when he broke timing gears in next to last lap.			

Equipment Used on Contesting Cars in Corona Road Race

CAR	DRIVER	MAGNETO	PLUGS	CARBURETER	OIL	TIRES	WHEELS
Marmon	D'Alene	Bosch	Bosch	Rayfield	Motoreze	Silvertown Cords	Wood
Stutz	Klein	Bosch	Bosch	Schebler	Motoreze	Firestone	Houk
Stutz	Lewis	Bosch	Bosch	Schebler	Motoreze	Firestone & Braender	Houk
Mercer	Pullen	Bosch	Bosch and Rajah*	Rayfield	Castor	Silvertown	Rudge-Whitworth
Gordon-Spec	Gordon	Bosch	Penn Yan	Master	Oilrite	Goodyear	Houk
Peugeot	Burman	Bosch	Rajah	Master	Castor	Nassau	Rudge-Whitworth
Peugeot	Rickenbacher	Bosch	Rajah	Zenith	Oilzum	Nassau	Rudge-Whitworth
Stutz	Cooper	Bosch	Bosch	Schebler	Motoreze	Firestone	Rudge-Whitworth
Sunbeam	Grant	Bosch	K.L.G.	Master	Castor	Palmer Cord	Steel and Wood
Duesenberg	Callaghan	Splitdorf	Bosch	Master	Oilzum	Riverside	Steel
Marmon	Cadwell	Bosch	Bosch	Rayfield	Motoreze	Silvertown Cords	Houk
Mercer	L. Nikrent	Bosch	Bosch	Rayfield	Castor	Silvertown Cords	Rudge-Whitworth
Maxwell	Oldfield	Bosch	Rajah	Harroun	Monogram	Firestone	Houk
Klein-King	Ball	Bosch	Bosch	Master	National	Firestone	Houk
Mercer	Ruckstell	Bosch	Bosch	Rayfield	Castor	Silvertown	Rudge-Whitworth
Maxwell	Carlson	Bosch	Rajah	Harroun	Monogram	Silvertown	Houk
Sunbeam	Babcock	Bosch	K.L.G	Master	Castor	Palmer Cord	Steel
Duesenberg	O'Donnell	Splitdorf	K.L.G	Master	Oilzum	Riverside	Rudge-Whitworth
Duesenberg	Alley	Splitdorf	Rajah	Schebler	Oilzum	Riverside	Wood
Bergdoll-Spec	Bergdoll						
Mercedes	R. DePalma	Bosch	Bosch	Rayfield	Monogram	Nassau	Rudge-Whitworth

*Rajah on one side.

the cars began to fall out, he dropped back and drove his usual heady race, but the course held the speed of the leaders and DePalma took only fourth place.

Oldfield was a feature of the race. He had only driven the Maxwell twice in practice for the race, and was not in physical condition. He said after the contest that he could have got more speed out of the car early in the race but as he did not know the machine, played safe. His non-stop record was one of the features of the race, however.

For 109 laps or 301.87 miles, Oldfield drove without a stop. Several times he was signaled from the pits to stop for oil and gas, but he shook his head and went on. Twice he had his mechanic open the tanks and look in to see how much fuel was left. This was done on the backstretch, where the course climbs about 100 feet, in the seventy-third and again in lap 103.

A Close Contest

At the end of the sixty-seventh lap with an average of 88 miles an hour, Cooper was in the lead, 48 seconds ahead of Pullen, and there were but ten cars left. Cooper was third and DePalma fourth, Ruckstell was in fifth place and O'Donnell sixth. Gordon and Carlson were together for seventh. At the seventieth lap Cooper still had the lead with Pullen a few seconds in his rear, but Ruckstell had taken third over Oldfield.

With a lead of 4 seconds, Pullen led the race at the end of the eightieth lap. Cooper was in second place; Oldfield third; DePalma fourth; Ruckstell having fallen back to fifth on account of a tire change, and taking on water, oil and gas. O'Donnell was in fifth.

When 100 laps had been covered, Pullen had the lead with 1 minute 36 seconds over Cooper. Ruckstell was third and O'Donnell had climbed into fourth over Oldfield.

This order continued until lap 108 when Cooper broke his timing gears. It was almost certain that Ruckstell would take second, giving the Mercer first and second, but on the last lap Ruckstell ran out of gasoline on the back stretch.

Close Finishes

Pullen finished amid the cheers of the 100,000 spectators who lined the course. Then came the Maxwell, driven by Oldfield, 40 seconds ahead of O'Donnell in the Duesenberg. Less than 2 minutes after O'Donnell finished, DePalma crossed the line. Fifth and sixth places were still in doubt and Gordon, Carlson and Nikrent were all the drivers left to fight for place. Although the Marmon was still on the track it was far in the rear.

Gordon had too much speed for Carlson, and took fifth. The last place went to Carlson, with Nikrent coming in eighth, four minutes out of the money.

It was truly a great race. There were 15,000 automobiles parked around the course and many thousands parked in the city back from the course. The attendance was estimated at 100,000. The first four cars to finish broke the world's speedway record and the road race record as well.

A new non-stop record was established and the Corona course which is now admitted to be the fastest in America with the possible exception of the Indianapolis speedway, is credited with the fastest time ever made.

Harry Babcock on Sunbeam No. 18 shortly after the start

Barney Oldfield tuning up his Maxwell before the start

Magneto Spark Vs. Battery-Coil Spark

Oscillograms Used to Show Characters of Both Sparks Wherein They Differ —Discharge Across Spark Plug Varies with Different Systems— Fuel Economy Directly Affected

By Dr. D. H. Cunningham

Chief Engineer, Splitdorf Electrical Co.

EDITOR'S NOTE.—*The oscillograms reproduced in this article were made by Dr. H. B. Williams and Dr. R. H. Cunningham, chief engineer of the Splitdorf Electrical Co., Newark, N. J. The experiments were made with an Einthoven string galvonometer in the Department of Physiology, Columbia University.*

NEWARK, N. J., Editor THE AUTOMOBILE:—The character of the spark bridging the gap in a spark plug with current from a magneto is different in many respects from the spark furnished by a battery-coil system and it is the purpose of this communication to show wherein these two sparks differ and how this difference affects the ignition of the explosive charge.

Why the Magneto?

Magneto ignition superseded old-time battery ignition by reason of its greater reliability. For, in addition to ignition troubles arising in connection with electro-magnetic vibrators, mechanical timers, and timer-distributers, the batteries proved to be non-durable and subject to rapid deterioration on standing.

Although the modern storage battery is a great improvement upon those in use 8 or 10 years ago, nevertheless experience teaches that even the present-day battery is far from being the dependable and durable reservoir for the storage of electricity which the exigencies of automobile ignition require.

The magneto, being a permanently excited electric generator, is always ready for its duties, requiring very little attention except an occasional drop of oil to its bearings and an infrequent adjustment of its platinum contacts. Unlike the storage battery, it may stand idle for months or years without attention and undergo no deterioration, being ever ready to deliver the required spark at a pull of the starting crank.

Battery Deterioration

All battery makers emphasize the necessity of care of the battery. The fluid electrolyte must be kept at the proper level. The battery must not be seriously overcharged, nor must its charge be allowed to fall too low, nor must too great an intensity of current be withdrawn from it at any time, for damage to the battery will result. In other words, the most important backstay of the automobile, the ignition, has for its anchorage, in the battery, a rather uncertain and variable foundation requiring constant care.

Promoters of the retrogressive innovation of return to ancint battery ignition glibly inform th uninitiated trusting intending purchasers that since the introduction of the lighting dynamo and its usually accompanyng electric starter, a reliable source of electric energy for the ignition will always be at hand; theoretically an alluring talking point for battery ignition, but in practice, seldom maintained for any great length of time. Mere observation at night of the lamps of the average automobile fitted with electric starting and lighting outfits, when standing with resting engine, usually demonstrates that few of their batteries are suffering from a plethora of overcharge. In fact, the lamps of most of the cars indicate that in but few of them are the batteries even normally charged, while in the majority the batteries appear to be undercharged.

Present-Day Gasoline

In former years when one bought gasoline, we received a fluid with a gravity of about 72 degrees Baumé. Nowadays we are lucky if we get gasoline of 65 degrees Baumé, and often we are handed lower grade gasoline of even 58 degrees Baumé.

This clearly indicates that what is now sold for gasoline is not the same kind of fluid as that of former years. Since the 72 degrees Baumé gasoline of former years was not a fluid of definite chemical composition, but was a fractional petroleum distillate composed chiefly of a mixture of hydrocarbons of the marsh gas or paraffin group, *it is evident that the lower grade gasoline of* 58 *degrees Baumé contains a smaller proportion of the more volatile components of the mixture and a greater proportion of the less volatile or heavier hydrocarbon members of the paraffin series.*

Gasoline Diagram

Without any great effort of the imagination one may readily form a crude mental picture of the probable microscopic structure of the charges of explosive gas obtained by carburetion of the above mentioned high-grade and low-grade gasolines. Thus, in diagram A, Fig. 1, the light space or white within the square may be considered to represent that part of the charge of gas that has been fully volatilized and thoroughly mixed with a requisite volume of air. The scattered globules of various sizes represent the various heavier hydrocarbon constituents that have been nebulized by the inflow of air through the carbureter during the suction cycle of the engine.

In diagram B, Fig. 1, representing a carbureted charge of a lower-grade gasoline, for instance, from gasoline of 58 degrees Baumé, as generally sold today, the space within the square is slightly shaded to indicate the more or less incompleteness of the volatilization, and many more nebulized globules appear in the explosive mixture. In other words, such a mixture consists practically of gasoline and kerosene and experience teaches us that the greater the proportion of kerosene present the greater is the difficulty of initiating the ignition of such mixtures by means of a thin *ionizing* spark of very brief duration.

While it is probable that ionization is intimately concerned in initiating ignition when a suitable explosive volume of a pure gas, such as methane* is used, my personal experience has been that where the mixture has been of a composition resembling more or less that depicted in diagram B, Fig. 1, namely, from 58 degrees Baumé gasoline, the use of a flame

*W. M. Thornton, Proceedings of the Royal Society May 28, 1914, page 272.

or arc spark of appreciable duration always proved to be the best form of ignition.

That the spark delivered by a properly proportioned and constructed high-tension magneto contains the so-called arc-flame is readily capable of demonstration, Fig. 2, by means of a sufficiently sensitive oscillograph; and furthermore, the intensity of current forming the arc and the time of its duration can be measured with considerable exactness, so that an accurate comparison can be made with the spark obtained from an induction coil actuated by a mechanical circuit breaker and current from a battery.

At each interruption of the primary current passing through an induction coil, the resultant spark or sparks have been demonstrated by scientists years ago to consist of but one single discharge of an extremely brief duration, or of several successive sparks or discharges, usually oscillatory in character and strongly damped.

Since the orthodox spark coil consists of two closely coupled mutually inductive electric circuits both containing inductance, capacity, and resistance, and since the terminals of one of these circuits, the high-tension or secondary circuit, are connected to the capacities of the high-tension cables of the plugs and of the frame of the automobile, with one or often more spark gaps included in the external circuit, it is probable that the secondary discharge over the spark gap or gaps is oscillatory in character, and it is evident that the frequency and damping of these oscillations will depend upon the magnitudes of the inductance, mutual inductance, resistance, and capacity of the circuits.

With the small induction coils usually employed with battery ignition, the magnitudes of the preceding factors are relatively speaking minute, while the frequency of the oscillations is correspondingly high and the damping strong. In fact, often the frequency of such oscillations is so high that it is hardly possible to obtain a photographic record of them, although their presence can generally be detected with a Gehrke oscilloscope or with a cathode ray or Braun tube.

Spark Character

In Fig. 3 is shown the current curve of a secondary spark delivered across a gap of .025-inch by a so-called single-spark timer-distributor. The capacities of the short high-tension lead and spark gap were very minute, and although a slight irregularity in the descending part of the curve can be detected on close inspection, the frequency of any oscillations present was entirely beyond the range of the instrument employed for their registration.

In Fig. 4, we have the curve of a spark from a larger two-section coil actuated by a type of interrupter that permits a preliminary closure of the primary circuit for 33 degrees. Inspection of the shape of this curve shows that oscillations were undoubtedly present in its descending portion, but their frequency was too quick for the instrument. In order therefore to more closely approximate to the conditions that are in an automobile when the spark plug gap is within a cylinder containing compressed gas, the gap was made .1875-inch, and a capacity equivalent to,—or in this particular instance, probably slightly greater,—that of the high-tension cable and of the frame, engine, etc., of a large six-cylinder motor. By this procedure, the frequency of the oscillations was considerably lowered, and a graph of the series of sparks composing the damped wave train is reproduced in Fig. 5. In other words, Fig. 5 is an analysis of the curve in Fig. 4, and shows that in reality the curve in Fig. 4 is nothing but a series of sparks of very brief duration and not so dynamic in exploding a charge as an arc such as shown in Fig. 2.

The spark plug gap is filled with electrons or ions which in an alternating field vibrate back and forth between the electrodes of the spark plug, Fig. 6. This is the alternation discharge we get with the induction coils such as illustrated in Fig. 5. In the magneto with a discharge similar to Fig. 2 the ions are projected out more into the surrounding gas, Fig. 7, and so tend to a quicker explosion. These ions radiate along the electrostatic lines in the field surrounding the electrodes of the plug. The ion is real parts of the electric charge of the atom and these inconceivable particles fly off

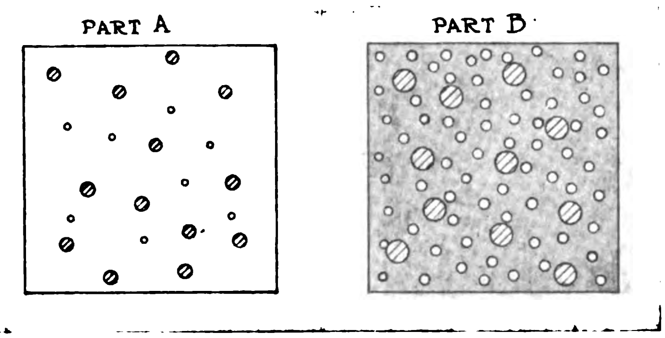


Fig. 1—Part A—Light portions represent fully volatilized part of a charge of gas while the scattered globules are the heavier hydrocarbon constituents nebulized by the inrushing air on the suction stroke

Part B represents a mixture of a lower-grade gasoline such as 58 degrees Baumé. Shaded sections show the more or less complete volatilization of the fuel. Note presence of numerous nebulized globules

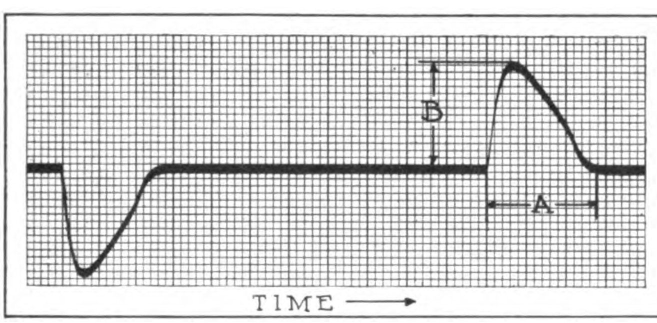


Fig. 2—Oscillogram of magneto high-tension spark bridging a gap in the spark plug .025 inch in length. The speed is 500 breaks per minute and the breaker box is in the retarded position. In this illustration the abscissae each section represents .001 second of time. The ordinates are 1 CM = .040 ampere. The maximum deflection indicated by the vertical line B = .058 ampere. The duration of the arc as indicated by the line A is approximately .0125 second. The maximum deflection B means maximum current which is synonymous with large volume and which characteristic is essential to the modern gasoline engine. The line A representing duration of the spark is interpreted as meaning that the current continues to flow across the gap in the spark plug for this interval

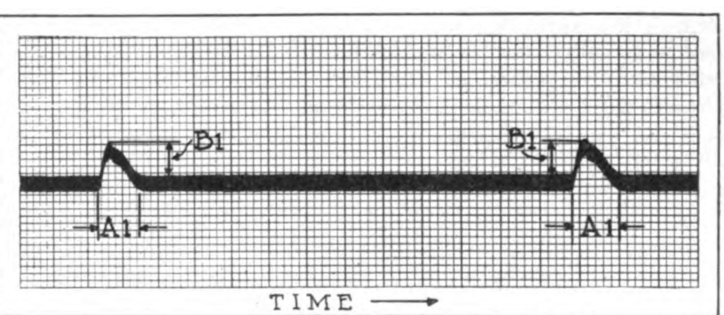
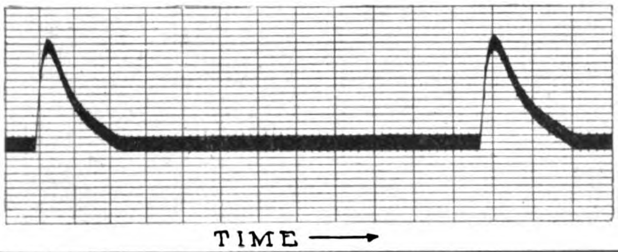


Fig. 3—This oscillogram of a high-tension current was made from a small induction coil actuated by a single-spark interrupter and a 6-volt battery. The gap over the spark plug was .025 inch, the speed 500 breaks per minute. In this illustration the abscissae, each section, represents .001 second time. The ordinates are 1 CM = .040 ampere. All conditions are the same as in Fig. 2. The line B1, which indicates the maximum current, is scarcely one-third in height of the line B in Fig. 2 indicating the same factor. The duration of the spark indicated by A1 shows it to be not one-half that indicated by A, Fig. 2. The frequency of any oscillations present was beyond the range of the instruments used for their registration, owing to their minuteness



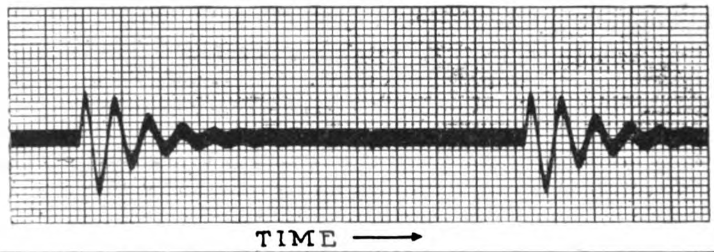


Fig. 4—Oscillogram of high tension current from large two-section coil actuated by a breaker allowing a preliminary 33 degree closure of the primary circuit. A 6-volt battery was used, the spark gap measured .025 inch, and there were 500 breaks per minute. Abscissae, one section, = .001 second. Ordinates, 1 CM equals .040 ampere. As is brought out in Fig. 5, which is in reality an analysis of the above curve, Fig. 4 is nothing but a series of sparks of very brief duration and not so dynamic in exploding a charge as an arc such as is illustrated in Fig. 2, which is that produced by a magneto high-tension spark

Fig. 5—A damped oscillatory discharge over a spark gap 3/16 inch in length. The coil, used in making this oscillogram was the same as in Fig. 4, namely, a large two-section one actuated by a breaker allowing a preliminary 30 degrees closure of the primary circuit. A 6-volt battery was used. In making this oscillogram the conditions were practically the same as in regular car use, namely, with compression as encountered in a cylinder. It will be noted that each discharge instead of being as in Fig. 4 is a series of very rapid sparks or discharges above and below the line. Abscissae, one section .001 second

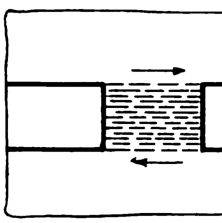
into the surrounding gas. Their action is somewhat similar to the mist that hangs in the air around the Niagara Falls. This mist is not a part of the cataract but an effect. The only difference with the ions is that they are radiated into the surrounding gas before the spark begins arcing over the plug, whereas in the comparison of the mist at the falls it follows after the water has been precipitated over the cataract.

Less Current Needed

WORKING WITH BREAK SPARKS OF DIRECT AND OF ALTERNATING CURRENTS, PROF. THORNTON FOUND THAT WHEN CONTINUOUS CURRENT WAS EMPLOYED, FIGS. 2 AND 3, LESS CURRENT WAS REQUIRED TO START IGNITION OF EXPLOSIVE MIXTURES OF GAS. HE ATTRIBUTES THE DIFFERENCE TO THE FACT THAT WHEN ALTERNATING CURRENT IS USED, THE RAPIDLY REVERSING ELECTRIC FIELD ACROSS THE SPARK GAP, FIG. 6, DRAGS THE IONS OR ELECTRONS FROM POLE TO POLE AND PREVENTS THEIR ESCAPE INTO THE GAS. WITH THE DIRECT CURRENT ARC THE IONS ARE PROJECTED OUT INTO THE GAS AND IGNITION IS MORE READILY INDUCED, FIG. 7.

High-Frequency Results

Apropos of the preceding results of Prof. Thornton is an experience that occurred to the writer some years ago during an investigation of the ignition qualities of a certain novel high-frequency magneto-ignition outfit. The spark delivered by this apparatus covered a gap of .5-inch in air, and appeared to be a veritable ball of flame. The effective high-tension oscillatory current from the small oscillator coil measured with a suitable hot-wire milammeter reached the high value of 350 milamperes, with the magneto-generator running at 1800 revolutions per minute. This ignition outfit was tested upon several different makes of four-cylinder motors with the uniform result that the engines were very sluggish, possessed little power on hills, overheated readily, and the speed of the cars lessened at least 50 per cent. From subsequent measurements and calculation the frequency of the oscillations across the gap was probably in the neighborhood of 300,000 per second.



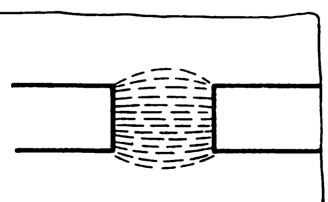


Fig. 6—Left—Diagram of the vibration of electrons or ions between the spark plug electrodes with an alternating discharge such as obtained with induction coils as illustrated in Fig. 5

Fig. 7—Right—Illustrating how the ions are projected out more into the surrounding gas by a magneto discharge such as that obtained in Fig. 2, tending to quicker explosion

Thin, Brief Spark

In other words, when a small induction coil is energized by a feeble primary current during a very brief period, as occurs in many of the present timer-distributor models, the resultant spark appears extremely thin, and is of such brief duration that often imperfect combustion of the explosive mixture with diminution of power results.

At high engine speeds, owing to the shortening of the time of closure of the primary circuit, the magnetic field of the coil does not have time to build up properly and hence the resultant sparks become progressively weaker and weaker and even fail altogether, unless a precaution similar to that used in the days of early battery ignition is taken; that is, the use of a type of timer in which the time of closure of the battery current through the primary of the coil is automatically increased as the speed of the engine increases.

Former experience with such appliances has demonstrated that, although these more or less complicated mechanisms frequently work well for a short time after their installation upon the car, ultimately they become loose, wabbly, out of time, and succumb to the effects of the action of grit, oil and vibration.

The Magneto Spark

Quite different, however, is the behavior of the spark from a high-tension magneto as the speed of the engine increases. Instead of growing progressively thinner it becomes hotter and hotter, until at about 1800 revolutions per minute of the armature, the maximum strength of the alternating current forming the arc-flame discharge between the spark plug points becomes approximately constant, and since each arc or spark lasts for an appreciable time and contains ample heat, it is evident that, as an ignition device for the highest engine speeds, so far nothing has been found that will fulfill the requirements as simply and effectively.

Spark at Slow Speeds

In former years, it must be admitted, that magnetos had not reached the perfection to which they have attained at present, nor was the present slow-speed, powerful gasoline automobile engine so much in evidence, hence to facilitate starting, or to be able to run on high gear at the very slow speed of 3 or 4 miles per hour, recourse had to be had to battery ignition. But high-tension magnetos capable of giving good sparks at 50 revolutions per minute are now made that will permit of this, provided the engine at such slow speeds is capable of propelling the car.

Advocates of battery-coil ignition extol the great advantage of the extensive range of spark advance necessarily provided with such outfits in order to compensate for the electrical lag inherent in such a system, but none draw attention to the fact, that in order to spark the engine with proper reference to its various speeds, almost constant manipulation of the spark advance lever becomes necessary. The closest attention of the driver is required at all times to maintain a smooth running of the engine. With modern types of magnetos, extensive range of advance is provided.

Simple Wiring

In the present combination of battery, ignition-lighting-starting outfits, one glance at the innumerable rat's nest of ignition cables, lighting cables, starter cables, cut-outs, and cut-ins, fuse boxes, etc., is enough to give one cold chills when he thinks of how he would be off for ignition were one or more short circuits to occur in that tangle of wires, when he is miles from anywhere on a stormy night. Generally, it means walking to the nearest garage and a tow, unless some good Samaritan in another car happens along.

On the other hand, consider the extreme simplicity of the wiring required by the usual high-tension magneto. Besides the requisite high-tension leads to the spark plugs only one wire leading to a simple grounding switch is necessary.

During the past season, numerous chauffeurs of cars fitted with battery ignition were interrogated for information regarding fuel consumption and car speed. Some of them having driven no car with magneto ignition could give no definite information, but none were enthusiastic concerning the speed of their car; all, in fact, admitted that their cars were not speedy. Many of them, however, were used to magneto ignition; in fact, a number of them had driven cars similar to what they had, but fitted with magneto ignition instead of battery ignition. Without exception, those with that experience regretted the fact that their bosses had bought the new model car fitted with battery ignition and expressed a very decided longing for their former cars with magnetos.

Where they had formerly with magneto ignition been able to get about 14 or 15 miles to the gallon of gasoline and had been able to attain a speed of 50 miles per hour, after the same type of car had been fitted with the battery ignition, they could get only about 11 or 12 miles to the gallon of gasoline, and could with difficulty get up to a speed of 40 miles per hour.—DR. R. H. CUNNINGHAM, Chief Engineer Splitdorf Electrical Co.

Baltimore Municipal White Truck Has Wireless Equipment

THE Electrical Commission of the City of Baltimore has placed in service a motor truck which performs an astonishing number of duties in the maintenance of the municipal conduit system. The truck was built by the White Co., Cleveland, O., and combines a vehicle for transporting repair crews and supplies and embodies a pumping station, lighting plant, repair shop and a wireless equipment, enabling the workers to keep in constant touch with headquarters.

The wireless equipment, unlike any other portable set, enables the crew to receive messages while the truck is being driven along the streets. When ready for action it is capable of pumping 12,000 gallons of water per hour from a flooded conduit and it will furnish a flood of light for inspection and repairs, to say nothing of carrying all the necessary paraphernalia.

Truck Is Receiving Station Only

The most unusual and interesting feature of the outfit is the wireless equipment, through the agency of which the department keeps in constant communication with its trouble crew, so that all emergency calls can be handled with the greatest dispatch before serious damage can ensue. The truck serves as a receiving station only.

The antennæ are suspended immediately under the roof of the car and are made of approximately 425 feet of No. 14 stranded, rubber insulated, copper wire, which was laced back and forth until forty wires were obtained with a separation of 1 inch.

A series of rigid tests proved conclusively that the equipment is entirely practical and that excellent results can be obtained, through the aid of a simple code of signals without resorting to the employment of trained wireless operators. It was also demonstrated that direct earth connection was unnecessary, inasmuch as the iron framework of the chassis serves admirably as a counter-poise ground, thereby enabling the truck to receive while in motion.

During all the preliminary tests the truck never failed to intercept any message sent to it within a radius of 10 miles of the sending station, and even under the most unfavorable conditions, with the truck running at full speed and blanketed by tall buildings of steel construction, no difficulty was experienced in reading the messages.

The body is specially constructed. Hinged entrance doors, one on each side, greatly facilitate the operation of the equipment, while hinged double doors in the rear provide a ready access to various inclosed compartments used as repositories for suction hose and other paraphernalia. The overhanging hood also forms a locker compartment which is used for the storage of boots and water-proofing clothing.

12,000 Gallons-per-Hour Pump

Just in the rear of the driver's seat is mounted a gasoline-driven centrifugal pump which is capable of exhausting water from manholes at the rate of 12,000 gallons per hour. For the sake of economy the pump is not driven by the 30 horse-power truck engine, but is directly connected to an independent four horse-power gasoline marine engine.

The pumping engine, however, is cooled from the same source as the larger engine, that is, water is pumped from the bottom of the truck radiator through flexible metal hose to the marine engine and returned to the top of the radiator after circulating around the cylinders of the truck engine.

The pumping engine also operates a small dynamo, which, in addition to furnishing ignition for the marine engine, supplies sufficient current for illuminating manholes. By the aid of the portable lamps, which can be plugged in on the dynamo current, duct chambers may be examined for a distance of 50 feet to determine the nature and cause of obstructions in the conduits.

White truck in the service of the Electrical Commission of the City of Baltimore, which, in addition to performing manifold duties, is fitted with a wireless receiving station by means of which it keeps in constant communication with the office

Top and Upholstery Often Neglected

Many Car Owners Do Not Realize Value of Their Part in Appearance—Artificial Leather Improving in Quality and Gaining in Use—Carpets Important

By M. C. Hillick

THE last word in top and upholstering goods is probably Morocco, water grain, French finish, hand-buffed leather. This leather is to be had in either pebble or straight grain, and in all the popular colors, black, green, etc. The Morocco leather, finished as above, represents the most elegant and expensive class of trimming leathers used in automobile work.

Next to the Morocco is the hand-buffed Spanish leather likewise furnished in practically all colors. This Spanish material yields beautiful effects. These leathers may also be obtained in machine-buffed form, and while they may not suit the buyer of exacting inclinations they nevertheless are capable of wearing durably and show a finish concerning which even the expert has small reason to complain.

Buffed Leather, etc., Good

Specially buffed leather, split grades, and so on, are extensively employed in automobile top and upholstery work, and such leathers show an attractive form and finish, and stand up nicely under severe service at a moderate cost.

Black enamel top leather, either in pebble or straight grain, and in various grades is, in addition to the above, being put into automobile trimming.

In the making of leather substitutes there is no end. The popularity of these goods, in all conceivable colors and styles of finish, is a matter of comparatively recent history.

With the great middle class of car buyers these artificial leather fabrics are favorites because they furnish such a variety of style, color and design, at a reasonable expense, that all may enjoy them.

Artificial Leather Gains

The increasing demand for artificial leather is, moreover, due to the steadily decreasing supply of cattle hides the world over. The present year, it is stated by those having access to the statistics, imported hides have constituted fully 45 per cent. of the total amount of raw leather used in this country. Should the prevailing conditions in the hide market fail to mend in the near future we may reasonably expect to find the consumption of artificial leather enormously increasing.

When the production of artificial leather first became a noteworthy business the process consisted, in the main, of covering cloth with a flexible composition and then embossing the resultant product in imitation of leather.

Processes Are Improved

Improvement in manufacturing process has developed a fabric which today is suitable for tops, curtains, cushions—in fact, suitable for anything about the automobile that leather is suitable for.

The most essential feature, among many, of the artificial leather, is the coating, and for the splendid resources of this medium we have to thank the chemist. The requirements of the coating are manifold. In the first place it must retain its chemical composition without change throughout all its life. During the cold of winter and the heat of summer, it must retain a uniform suppleness and flexibility. It must have toughness of texture to allow for the mechanical manipulation and stretching necessary to shape it into the fashions designed by the trimmer. This coating composition must have adhesive properties of such power that, regardless of time or nature of service, it will not peel. Originally it was applied to coarse-woven fabrics, but heavy sateen is at the present time chiefly, or at least very largely, used as the backing up cloth, although, of course, it can be, and, in fact, is applied to many fine cloths.

Close Imitation Required

No great demand for the embossing of this artificial leather for top and curtain uses exists. However, for cushions and upholstery goods applied to the interior of the car there is a large market, and the call is for the closest possible imitation. That public requirements in this respect are being successfully met is attested by the fact that expert judges of leather sometimes mistake the artificial material for genuine leather. The remarkably real feel and appearance of the artificial leather is due in large part, it is said, to the exceedingly fine embossing plates produced through the medium of electrotyping processes from the genuine leather.

Carpets a Factor

Carpets constitute an important feature of automobile upholstery work. Not only should they harmonize in color and design with the other interior appointments of the car, but they should, moreover, accentuate and add to the general charm and luxury of the whole upholstering scheme.

The loosely woven, flimsy carpet that persists in creeping under one's feet is a poor investment. So, too, may we describe the carpet carrying an inferior dye that discolors and bleaches out. Insist on the carpet with a guaranteed fast dye.

Quality Most Important

Carpets are furnished in many colors, kinds, and qualities, among which you will find horse hair in mixtures fancy and plain, wools, worsteds, jutes, and so on; but whatever the sort or color, make quality, first of all, the basis of your choice. Then see that the fitting is correct, that the carpet is well made, and that in all respects it is a distinct addition to the artistic appearance of the car interior.

The closed type of car is showing many beautiful novelties in upholstering fabrics. Among the recently introduced novelties are such leaders as bedfords, Parisian and Vienna cloths, etc. In broadcloth the so-called Four-in-Hand fabric is probably one of the best known. It has quality, richness of effect, fineness of finish, and great durability, the latter a very telling factor in the case of a material that is expected to do service for more than a season or two.

Plain Cloths Popular

The popularity of plain cloths, broadcloth finish, is notably on the increase among exclusive users of the closed car. These cloths reflect a modest, but unmistakable elegance quite unsurpassed by other textile fabrics, and they continue to have this refinement of finish until well worn beyond the point of renovation or repair.

Foreign fabrics for use in the above class of cars are said to be superior in practically all points to those of domestic manufacture, and recent tariff reductions have brought these foreign made goods to the consumer in this country at no advance in cost over the domestic article. However, should the present European war long continue the "Made in America" goods must suffice. The domestic manufacturer, it would seem, has only to create novelties in design, increase their suitability to automobile requirements, improve their finish, and impart to them the required measure of durability, in order to occupy a preeminent position in this field of work.

Bad Garage Practices

In the care of the car top, trimming and upholstery furnishings, etc., the car owner may very well regard it as a matter to be vitally concerned with. Garage practices are too often ruinous to the reasonable wear and the original appearance of the fabrics employed. Leather, and good artificial leather materials will naturally stand much abuse without, for a time, showing evidences of brutal treatment. On the other hand, the upholstery and interior furnishings of the car reveal at once the lack of care, or the wrong kind of care, which the garage attendant or the chauffeur may be guilty of. Many of the fine upholstery fabrics, in cleaning, should be worked over with a brush; never with an ordinary whisk room.

Special Upholstery Brooms

There are soft point brooms now specially furnished for this work which readily remove light dust without injury to the cloth. The vacuum cleaner properly handled will extract all manner of dry dust and dirt from the upholstery and the car interior. Grease spots, oil smears, and stains of many kinds may be removed from the cloth upholstering by saturating a piece of the same goods as that contained in the upholstering with ether, and rubbing the cloth sharply over the smear or stain. If, for any reason, the strength of the ether needs to be reduced this may be accomplished by mixing it with pure grain alcohol. Ether mixes in all proportions with alcohol, either grain or denatured. It should be used with great care, however, being very inflammable and its heavy vapor is a source of much danger from fire. Nevertheless, as a simple, effective medium for extracting stains, grease spots, etc., from cloth goods, without injury to the finest fabrics, it is unexcelled, if applied as above directed.

In looking after the automobile top fabrics, the leathers, hand or machine buffed, so long as the enamel remains in good condition will need when mud splashed or stained with the accumulations of travel, scarcely more than wiping off with a soft wool sponge wet in a weak solution of castile soap and soft water. It is a good plan to defer the application of dressings, renovators, etc., until the wear of the goods makes these renewal mediums necessary. The same advice applies to the artificial leather products. For mohair, as has already been stated in these columns, the whisk broom deftly used furnishes the most dependable results. The use of benzine, gasoline, naphtha, alcohol, or any other solvent, for cleaning the mohair top should be strictly prohibited.

Apply Dressing Sparingly

In coating up the leather, rubber or artificial leather top, the never to be violated rule should read: "Apply sparingly." A little of such mediums may with profit to the car owner go a long way. At the same time, some good reliable dressing material becomes a necessity in due course.

Things Worth Saving

What the car owner and user needs to appreciate is the fact that the useful life of the car depends to an important extent upon the character and quality of the top, trimming and upholstery fabrics, and the manner of promoting their wear and appearance.

Haynes Cabriolet Is An All-Weather Car

BUILT to be equally useful in all sorts of weather, the Haynes six cabriolet may be used as a coupé completely inclosed, or, at a moment's notice, changed into an open roadster. The cabriolet mounted on the model 30 chassis sells for $1,750. The body comes in light royal green finish.

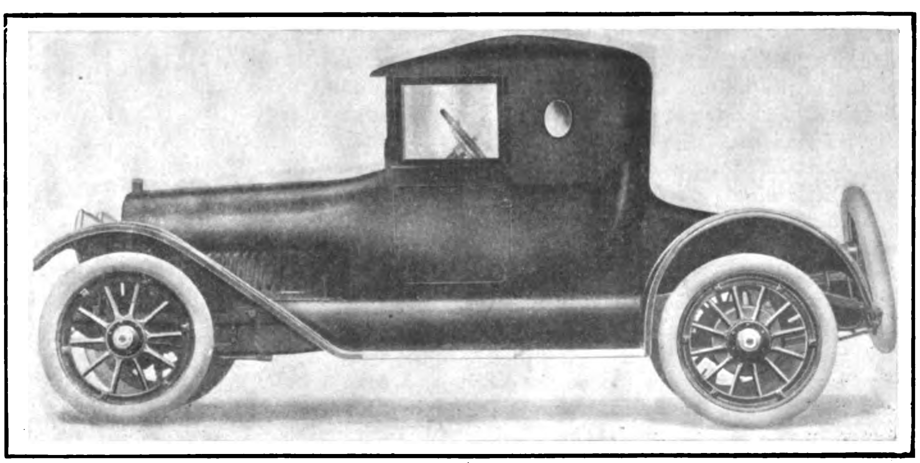
When used as a roadster the plate glass windows are dropped into recesses in the doors and the curtains are kept in a carrying space built into the back of the seat. The collapsible top is made of high grade black leather and is braced in such a manner as to stretch out all wrinkles when in the coupé position, giving a smooth, even appearance.

The transformation from roadster to coupé or vice versa may be effected in less than a minute's time by a person within the car.

The cushion is 46 inches wide and is unusually deep, and the car, although much lighter than any coupé, is remarkable for its Pullman-like riding qualities. A compartment is provided in the back of the driver's seat, out of the way and yet easily accessible, for carrying gloves, parcels and other small articles; and ample space is provided at the rear for carrying suitcases, grips, etc.

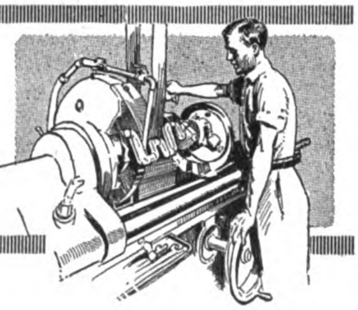
The upholstery is of the same grade black leather as the top and is deep and resilient.

A motor-driven tire pump, clear and rain vision ventilating windshield, Stewart-Warner speedometer, Firestone demountable rims, including extra spare rim, tire carrier at rear of chassis, electric horn located under the hood and operated from button at center of steering wheel, Leece-Neville electric starting and lighting separate unit system, large electric headlights with No-Glare bulbs and special dimming attachment, electric tail light, cowl light and dome lamp, 100-ampere hour storage battery, robe and foot rails, carpet on floor, and full set of tools are included in the regular equipment. A set of five Houk wire wheels is furnished for $100 extra.



New Haynes six cabriolet which, mounted on model 30 chassis, sells for $1,750

The Rostrum



This department is for the instruction of the readers and all are at liberty to ask questions. Be sure to give full name and address that we may send you a reply by letter if there is no space in the Rostrum. If you wish to sign a fictitious name, also sign your own.

Additional Treads Increase Gasoline Consumption

EDITOR THE AUTOMOBILE:—I have noted with interest the opinions expressed recently as regards the practicability of applying additional treads, or carcasses, of old shoes over casings in serviceable shape. I have not seen advanced any argument which is authoritative as to the economic principle involved and having had over 5 years' experience with tire damage and misuse and its origin, I have gained more than a fair knowledge of what is conducive and detrimental to tire longevity.

Tire resiliency is a most important factor, for the car mechanism, as well as the tires. Loss in this connection means increased gasoline consumption as the engine and its parts must function under more trying conditions. By applying an additional tread, it is most surely diminishing tire resiliency and I offer in substantiation the following examples:

Take five thin pieces of sheet metal, bend in the middle, continue a hinge-like action for several minutes. Now try a second experiment to obtain a comparison. Take ten pieces of metal similar to the above and repeat the action above mentioned. What do we find? Double the amount of energy required to produce the same degree of flexibility. A tire with an added tread is working under these latter conditions and as it must retain its normal speed, gasoline consumption is increased as well as wear and tear on the car mechanism. There is absolutely nothing illogical or theoretical in this comparison.

Second in importance is the heat occasioned by the additional opportunity for friction to develop. Under ordinary conditions there are several places for friction to occur. By adding a tread you will double this number and, therefore, increase the opportunity for development of this disastrous action. Canvas will give way from the inside first unless, provoked by an injury, and its durability under abnormal conditions will unquestionably be curtailed. Instead of increasing the number of plies of canvas in a shoe, such as one would be doing by the application of an additional tread, the tendency should be towards decreasing, as the ideal tire from an all-round standpoint would be one constructed of two plies, allowing only one place for friction to develop. The cord tire as manufactured in this country today is the achievement of this tendency and is found to be highly successful for the manufacturer and economical for the car owner. There are only two plies in the carcass of this tire regardless of its size and it is the strongest and most resilient tire in use today.

New York City. JOHN C. PEPPER.

Recommends Fabric Clutch Facing

Editor THE AUTOMOBILE:—I wish to say a word with reference to clutch facings, being prompted by reading your answer to J. F. Angstad in the issue of November 12. I have replaced a leather facing with one made of fabric such as is used for brake linings and have had no clutch trouble since. The fabric was bought endless and hence was applied very easily. I find that the fabric is better than leather for the reason that oil does not injure it—in fact it works better after a little oil is squirted upon the face. With the leather clutch both water and oil of a certain kind cause poor operation.

Another thing I have found, and that is that the fabric lining wears better and holds much better although at first I had trouble with grabbing due to poor adjustment of the clutch spring. I used the fabric lining because I heard that many racing cars had abandoned the leather. I read a letter in one of the trade magazines about a Duesenberg car, which I believe was equipped with Thermoid clutch facing. Then I tried the same and got very good results. One very important feature of the fabric, I think, which you do not mention is that it does not require the care that leather needs, and I believe the fabric is the most advanced form of clutch facing.

I would like to hear what other readers have done in the matter of clutch facing.

Chicago, Ill. J. McGOVERN.

Friction Drive Suitable for All Cars

Editor THE AUTOMOBILE:—I note that Mr. Frank A. Rice, Ithaca, N. Y., made inquiry as to whether there had been published in THE AUTOMOBILE an article on the advantages and disadvantages of the friction drive as compared with other types of transmission now more commonly used.

You state the disadvantages are that, "the friction disk must be renewed every few thousand miles. This is a small matter but worth noting." Permit us to state that since we have been using the copper alloy disk which we have now for over 4 years, that we have yet to renew a single one and we could show you many of them which have been run as high as 100,000 miles, and show practically no wear. The average life of the friction filler is all the way from 5,000 to 20,000 miles and costs but $5.00 to replace, at retail.

You further state that the amount of horsepower that it will transmit under the conditions found in automobile design is limited, therefore, has never been used to any extent on large cars but has found favor on some cars of medium size and on more small ones. The friction transmission is just as successful in a large high-power car as on a small one. It is simply a case of building the transmission to take care of the power. One of the most successful models we ever built was a seven-passenger car having a four-cylinder motor, 4.5 by 5.25 car weighing 4,000 pounds.

Pontiac, Mich. H. R. RADFORD, Gen. Mgr. Cartercar Co.

—The statement referring to the life of the disk was slightly in error. The fiber filler in the rim of the friction wheel was the part referred to but inadvertently the word disk was used instead of the word wheel.

Three Types of Radiator Construction

Editor THE AUTOMOBILE:—What are the different types of radiator construction? Illustrate them.

2—Where could I obtain the best book for the care and repair of storage batteries, principally those used for cranking and ignition systems?

Rices Landing, Pa. A. J. SHARPNACK.

—1—There are three principal types of radiator construction, the cellular, vertical tubular and horizontal tubular. These are illustrated in Fig. 1. There are many variations under the first head. The second and third types are generally provided with fins to increase the effectiveness of the cooling.

The best example of the cellular radiator is the true honeycomb which was introduced by the Mercedes company. This is shown in Fig. 2. There are both horizontal and vertical passages in this design. There are many types that resemble this closely in principle, the only difference being in the section of the individual tube through which the air flows. One of these is illustrated in Fig. 3.

There are many radiators that look like the honeycomb, yet are not, being more like vertical tube radiators. Two of these are shown in Fig. 4. Still another type of cellular radiator is shown in Fig. 5. This is a combination of the vertical and horizontal flow designs.

2—The Electric Vehicle Hand-Book, by H. C. Cushing, Jr., and Frank W. Smith, published by H. C. Cushing, Jr., 53 Park Row, and Manual of Exide Batteries in Electric Vehicles, published by the Electric Storage Battery Co., Philadelphia, Pa., are two good books.

Operation of Electric Furnace

Editor THE AUTOMOBILE:—Can electricity be used in any way to heat a furnace, or furnish heat? If so, how? Give instances.

2—What machinery is necessary for charging storage batteries?

3—What are the objections and advantages of the friction transmission?

4—What is the price of the 1914 Cartercar?

5—What company makes the frictions used in the transmissions of this car?

6—How many Cartercar cars are in use?

7—How long has the Cartercar been manufactured?

Cooper, N. C. S. B. TEW.

—1—Whenever an electric current flows it gives off heat. The amount produced when the current flows through an ordinary wire is small because the conductor, which is generally copper, has a low resistance and therefore does not heat to any extent under the transmission of normal current but if an excessive current flows, the wire may melt. In other words the amount of heating depends on the resistance the wire offers to the flow of current, and the amount of current flowing. The resistance varies with different materials, copper and silver offering the least resistance, and also with the size of the wire. A wire with a cross-sectional area of .1 square inch will offer twice the resistance of a wire of the same material but with half the area.

Electric furnaces may be divided into two classes. Those in which the heating effect is produced by the electric arc between the electrodes which are generally made of carbon—in the spark plug, which is an electric furnace on a small scale, the electrodes are metal, and those in which the heat is produced by the passage of the current through a resistance which either forms part of the furnace proper or else is the material which is to be treated.

In the Moissan arc furnace two chalk blocks are bored out to receive a carbon crucible which incloses the center or hearth of the furnace proper. In this cavity pass two massive carbon electrodes, through openings in the walls which are held together by clamps. The arc established between the ends of the carbons when the current is turned on, plays over the center of the crucible, heating the contents.

The other type of furnace which is known as a resistance furnace may be illustrated by the Acheson furnace which is used for the manufacture of carborundum.

It is a rough firebrick structure, through the end walls of which project the electrodes consisting of composite bundles of carbon rods set in metal clamps. The space between the two electrodes is bridged by a conducting path of

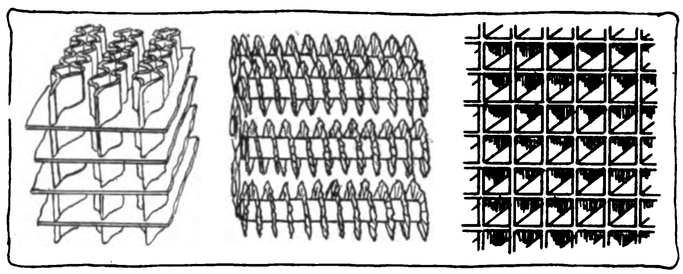


Fig. 1—Three principal types of radiator construction. At the left is the vertical tubular, in the center the horizontal tubular and at the right is the cellular

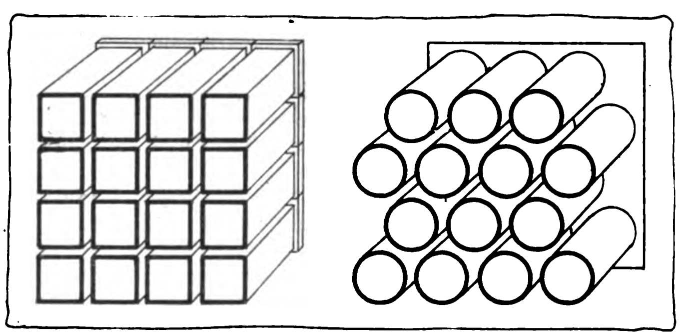


Fig. 2—Left—True honeycomb radiator. Fig. 3—Right—Radiator resembling Mercedes somewhat in principle

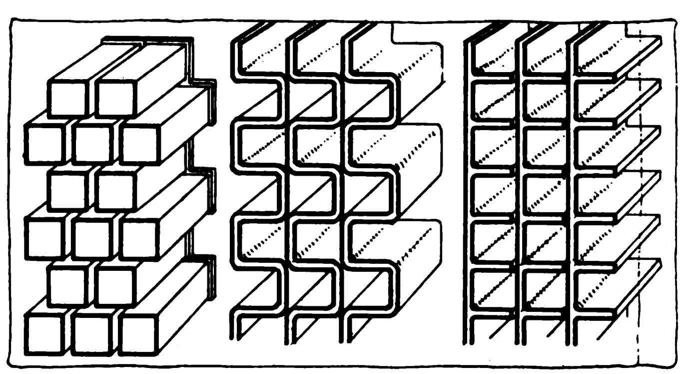


Fig. 4—Right and Center—Cellular radiators which appear to be honeycomb. Fig. 5—Left—Another cellular type

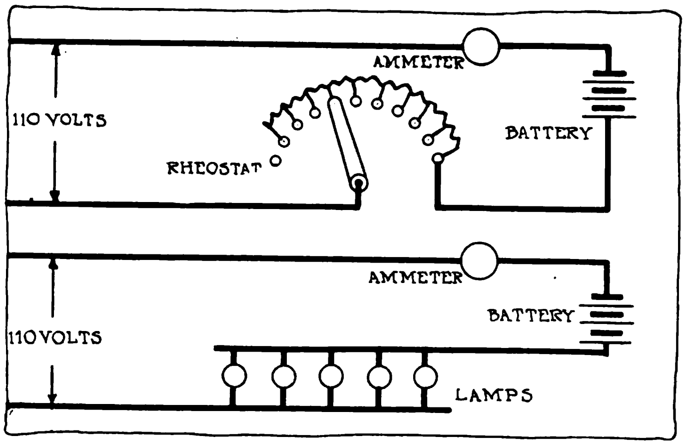


Fig. 6—Upper shows wiring diagram for charging a storage battery from direct current by the use of a rheostat. Fig. 7—The lower illustrates the use of a lamp board resistance in place of the rheostat. The resistance is varied by screwing lamps in or out

coke, which constitutes the core of the furnace. This coke is packed around with the raw material, consisting of coke, sand, sawdust and common salt.

2—The apparatus required for charging a storage battery depends on whether the current available is alternating or direct. If the latter, all that is required is an ammeter, some form of variable resistance to vary the rate of current flow, the necessary switches and wiring, and a hydrometer. If the former, a rectifier will be required to turn the current into direct, as it is obviously impossible to charge a battery with alternating current.

Fig. 6 shows the method of connecting a battery for charging on direct current. The positive of the charging line should be connected to the positive side of the battery. The rheostat is for the purpose of controlling the flow of current through the battery.

A lamp board, Fig. 7, may be used instead of the rheostat. Every lamp in circuit means decreased resistance, and increased current flow. If 110-volt lamps of 16 candlepower and carbon filaments are used, each lamp in circuit allows the passage of about .5 ampere, therefore if the charging rate were 5 amperes, ten lamps would be needed.

3—See The Rostrum for November 5 and this issue, page 1026.

4—The price of the 1914 model is $1,250.

5—Rockwood Mfg. Co., Indianapolis, Ind.

6—There are about 10,000 according to the Cartercar company.

7—The Cartercar has been actively produced since 1906, although a few cars were turned out before this time.

Gasoline Consumption High

Editor THE AUTOMOBILE:—1—I have a 1912 model 40-horsepower Michigan automobile and would like to know if it would be advisable to put radius rods and an additional torque tube on same.

2—What company made the above car, and why was it discontinued?

3—What would you suggest to lower my gas consumption? The car is equipped with a Stromberg with hot-air pipe. I have tried every possible adjustment on the carbureter with no satisfactory results.

4—About how many miles per gallon of gasoline should I get? The compression is very good and the engine runs nicely on high and low speeds.

5—What did the above car cost new? It is a five-passenger 40-horsepower, and was the car made entirely in the Michigan shops?

Brigham City, Utah. A READER.

—1—Unless you are certain that fitting a torque rod and radius rods will improve the running of the car do not do it. You do not state why you desire to make this change. If you are having trouble with spring leaves breaking, it would be better to install new leaves or complete springs, as required. This car was designed to operate properly without the use of torque or radius rods, and therefore it is likely that it will give satisfaction without the addition of these members, providing defects are corrected.

It would be difficult, if not impossible, to fit radius and torque rods so that they will work properly.

2—The Michigan Buggy Co. made this car. The company failed.

3—How do you know the carbureter is at fault? Possibly you are driving with too late a spark. Keep the spark lever advanced as far as possible at all times without allowing the motor to knock. Jack up the front wheels and note whether they turn freely. Do the same with the rear wheels with the gear lever in neutral. If any great resistance is encountered in turning the wheels, look at the bearings and also note whether the brakes are dragging. Then repeat this part of the test with the lever in gear and the clutch out. If the system turns hard there must be excessive friction in the gearset.

Make certain that you are receiving full measure when you buy your fuel and that there are no leaks in the system.

4 and 5—This information is unobtainable.

Starting on Cold Mornings

Editor THE AUTOMOBILE:—I am the owner of an Overland roadster, 1914 model, and since the cold weather has come I have experienced a little difficulty in starting in the mornings. Would it be any benefit to double the number of dry batteries so that the additional number could be switched on and off at the moments of starting? In other words, would increasing the number of dry batteries approximate a high-tension magneto and again, would increasing the number of batteries injure the coil?

Lansford, Pa. L. DOUNELLY.

—No. This would injure the coil by allowing an excessive current to flow through it. If your present cells are in good condition, they should furnish a satisfactory spark for easy starting.

The spark is probably all right but the real difficulty is due to the gasoline not vaporizing. To overcome this trouble you might use a lighter grade of gasoline, such as you can probably obtain at your drug store. Ether might also be used. Either of these fuels may be injected through the priming cups or introduced through a special priming device.

There are several devices on the market which facilitate starting on cold mornings by warming the fuel; one of these might be a good remedy for your trouble. You might also use a radiator heater to keep the motor warm at night.

Mitchell Six Motor Information

Editor THE AUTOMOBILE:—1—Who manufactures the motor that is used in the 1914 Mitchell Big-Six 4 1-4 by 7?

2—At what speed does it give its best results?

3—What is the highest speed obtained by these motors?

4—What timing should be used for speed?

5—Would the intake valves stand more than one tooth advance from its present timing? Would exhaust?

6—What is the maximum speed of the Wisconsin model K motor?

7—What ratio of weight is used in determining the weight of the crankshaft to the connecting-rods and pistons? Also the flywheel to the other masses?

8—Are the steel cylinders, like those used in De Palma's Mercedes, a difficult engineering problem, and are they very expensive castings to make?

9—What percentage of steel is used in the pistons in the racing Delages?

10—What gear ratio would be best on a 1914 Trumbull?
Manchester, N. H. R. & L.

—1—This is built completely in the Mitchell plant.

2—It gives a maximum of 72.7 horsepower at 1,300 revolutions per minute.

3—The maximum speed is 2,000 revolutions per minute.

4—Use the regular timing. If maximum speed is desired the ratio of the bevel gears should be changed from 3.357 to 2.936 to 1.

5—The timing of the intake and exhaust can be very easily advanced if so desired, although it is doubtful whether an increase of power will be noted.

6—The type K motor which is a six-cylinder, T-head design, 5.25 by 7 inches, with the cylinders cast in pairs develops about 112 horsepower at 1,400 revolutions per minute. This motor is also built as a racing design known as the KR. This model will give 175 horsepower at 2,000 revolutions per minute, it is stated.

7—There is no definite relation between the weight of the connecting-rods and the crankshaft. The crankshaft must be stiff enough to stand the stresses imposed upon it not only without breaking but without deflecting sufficiently to cause uneven wear on the bearings. Likewise the connecting-rods must be strong enough to take the piston loads without giving out.

The size of flywheel depends on the speed of the motor. A very high-speed motor that is not expected to throttle down can have a very small flywheel. Some such motors have been built with none at all.

The function of the flywheel is merely to store energy. Part of the explosive force of each power stroke is stored in it by accelerating it slightly. This energy is drawn from the flywheel later, the flywheel slowing down a small amount. On a high-speed, racing motor the impulses come so close together that there is little need to store energy for use between the power impulses.

8—The cylinders used on De Palma's latest Mercedes were very costly to make, since they were machined from individual blocks of steel.

9—The composition of these pistons is not known.

10—The stock gear ratio is probably best. In a very hilly country a somewhat lower gear might be found better, and on the other hand in a very level country, a higher gear might be more satisfactory. You must use your own judgment in this matter.

Wood Alcohol—a Good Carbon Remover

Editor THE AUTOMOBILE:—Please advise me whether you recommend the use of wood alcohol as anti-carbon treatment.

I used it twice, when the motor was very hot, using about 4 ounces per cylinder. When the car was started the next day, it smoked, had an alcohol smell but seems to run better. In my opinion it is superior to kerosene.

2—Are 4 ounces too much?

3—Does it injure any part of the motor or does it affect the oil in the base?

4—What temperature will half wood alcohol and half water stand safely in a radiator during the winter?

Fall River, Mass. E. J. D.

—1—Wood alcohol should be satisfactory. Four ounces should be enough for each cylinder. After injection of the liquid to all cylinders the motor should be cranked a few times to distribute the alcohol to all parts of the combustion chambers.

2—No.

3—No. Alcohol has no action on metals nor on lubricating oil. The only effect it would have would be to dilute the oil in the crankcase, but the alcohol in this oil would soon evaporate.

4—Thirty degrees below zero Fahrenheit. This subject was fully discussed in the Rostrum for October 15.

To Go from Los Angeles to Chicago

Editor THE AUTOMOBILE:—Can you refer me to any pamphlet or article describing a trip from Santa Fé or Los Angeles across to Chicago? Am principally interested in finding out the best summer route and condition of roads from the coast through to Omaha.

Three Rivers, Mich. CHAS. P. WHEELER.

—According to the *Automobile Blue Book* there are two main routes, Fig. 8, both of which are good in summer. One is by way of Salt Lake City and the other through Santa Fé.

The former is not practicable before April 15, but the latter is open all year.

Starting from Los Angeles over the Northern route go through San Francisco, Sacramento, Reno, Winemucca, to Ogden, thence through Cheyenne, to Omaha. The Southern route lies through Needles, Flagstaff, Springerville, Santa Fé, La Juanita, Hutchinson, Kansas City, St. Joseph, Omaha. An alternative route through from Los Angeles is by way of San Diego, Yuma, Phoenix, Springerville. The parts of the road which are indicated by the full black line are good. The Northern route follows the Lincoln Highway from Salt Lake City to Omaha. From Omaha, go to Chicago by way of Des Moines and Clinton.

Fan Flywheel Requires Small Clutch

Editor THE AUTOMOBILE:—Would you kindly explain why the fan for cooling is not made integral with the flywheel on cars having the transmission combined with the rear axles?

During the last 3 years I have driven a car having the fan integral with the flywheel and have not found anything wrong with the cooling system.

2—Was this system of cooling used on Mercedes cars? If so, to what extent?

Cleveland, O. T. J. MILLER.

—1—First of all the flywheel type of fan does not produce as rapid a circulation of air as the ordinary type just behind the radiator. Second, even with the gearset on the rear axle it might not be possible to use a fan flywheel. This type of flywheel, when at the rear, requires that the clutch be very small, in other words a multiple-disk clutch of small diameter or a clutch of the original Mercedes type must be used. A cone clutch, expanding band or large-diameter, dry-plate can not be used.

In other words less is required of the radiator. It may be smaller, the water circulation and pump speed slower or a less effective radiator may be used.

2—This method of air circulation has always been used on Mercedes cars.

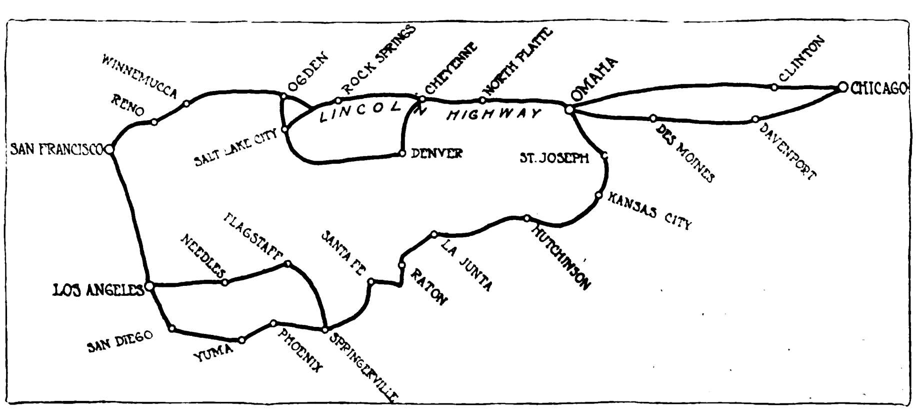


Fig. 8—Map showing best routes between Los Angeles and Chicago

Trucks and the Traffic Engineer

Motor Truck Is a Hauling Machine Built to Compete with the Horse-Drawn Vehicle and to Be Sold to Business Men as an Investment

THE traffic engineer is the efficiency doctor of motor truck selling, and motor truck operating. A motor truck is a machine designed and built in a variety of sizes for hauling materials, its chief competitor being the horse-drawn vehicle. The motor truck has a high first cost and is bought by business men as an investment.

The Sales Problem

Now here you have the entire sales problem boiled down into one statement. A motor truck is a hauling machine which is to compete with the horse-drawn vehicle, and which is to be sold to business men as an investment.

Handling the Customer

We know the sales problem—how are we going to solve it?

The first step in selling any machine to a business man is to reach him and interest him. How is this to be done? It can be done in two ways:

First.—By proper advertising.

Second.—By supplying dealers and their salesmen with reliable, accurate, and undisputable data, carefully collected from all the various lines of business which the truck is designed to fit.

Real Advertising

By proper advertising is not meant advertising the chemical properties of your springs and axles for the horsepower, bore and stroke of the motor, but it means advertising the service value of the truck and the economies to be affected by its installation.

Here is where the traffic department must start. It must collect the data which should form a basis for all advertising and furnish the dealer and his salesmen with the ammunition which should not only interest the prospective buyer but make him ask for an investigation of his own delivery equipment.

Trucks Are Profitable

After we have reached and interested a customer what is the next step in selling a machine? The next step naturally is to show him that it will be a profitable investment for him to buy. This can only be accomplished after the salesman knows such facts as:

What is the present equipment doing?

What does it cost to operate and maintain it?

Editor's Note—At the recent convention of motor truck makers and dealers held in Detroit, Mich., by the Motor Truck Club of America, the question of traffic engineering was one of the most pertinent topics. One of the best suggestions on traffic engineering was that of having each truck company open a school on traffic engineering for the benefit of its dealers and their salesmen. The school would partake of a series of correspondence courses between the factory and the dealer, and the dealer in turn could use whatever means he desired for getting the information to his sales force. This plan was suggested by E. L. Shumacher, traffic engineer of the Denby Motor Truck Co., Detroit, Mich.

Can it be improved in any way?

What can the motor truck do operating under these conditions?

What will it cost to operate and maintain trucks working under these conditions?

The Salesman Expert

Such facts can only be learned after a thorough investigation has been made. A very large percentage of firms think they know what their delivery equipment is doing and what it costs, but actually a very small percentage knows, hence a motor truck salesman must be a transportation man, capable of analyzing conditions, comparing costs, accurately figuring savings and correctly advising the proper installations. In other words he must fit trucks to the business and not permit the business to be fitted to the truck.

Business Methods Needed

Merely going into a prospective customer and telling him he can replace three teams with one truck and save money because one of his competitors did so, is ridiculous and won't serve much longer. Why I have recently investigated two similar lines of business and found the cost per mile of operating the same kind of wagons doing the same class of work to vary over 100 per cent.

It is suicidal to the truck industry to sell trucks predicting savings on this information. The conditions under which deliveries are made, the efficiency of operating the equipment all vary so widely that it is impossible to accurately compare costs, calculate savings, or advise installation without a thorough investigation. And eventually the truck salesmen must be able to make these investigations for it is only after such investigations that business men can be shown that a motor truck is a profitable investment.

Know Your Truck

After the average business man has been interested in a machine and convinced that it will be a good investment there is still one point he must be convinced of. He must be convinced there is no better machine on the market from the standpoint of price, adaptability and economy.

Here again it is up to the salesman and he must know his product. This does not mean he must talk transmission, magneto or wheels, but it does mean that the buyer must be convinced that the cost per mile of operating and maintaining the proposed truck will be a minimum and that it will be the proper capacity and design for his particular requirements.

Competent Salesmen

This is nothing new in selling machines. I don't believe there is one type of machine excepting the motor truck which is not sold as just described. Take for example the gas producer, steam engine, locomotive machine tool, before any one of them can be sold the purchaser must be shown:

1—That he needs one.

2—That it will be a profitable investment.

3—There is no more profitable machine on the market.

Can you imagine a salesman selling steam engines without being so schooled in his product that he could not figure the cost per b.h.p. or the saving to be effected by replacing an older or less efficient equipment?

Can you imagine a gas producer salesman unable to accurately predict the quantity and B.t.u. value of the gas produced together with the savings it should effect over the installations?

Can you imagine tool salesmen unable to predict the advantages and exact performances of his milling machines or lathes? And the savings to be effected by this installation?

And likewise in the near future you will be unable to imagine a motor truck salesman unschooled in transportation analysis, costs and economies. Furthermore there is not one of the above named machines which is not sold along the same lines as trucks are being sold.

Now you will say, "What is it going to cost to sell trucks, under this plan?" and in answer, I will say, "the selling expense per car will be less, and the number of sales should very quickly double and treble."

You will then most probably ask, "Where are we to get salesmen capable of making these investigations, etc.?" and in answer I will say here is where the traffic engineering department comes in again. It does not take any more intelligent or higher grade salesman.

With a little schooling and coaching your present salesmen can all be supplied with the proper data and training and shown how easily they can make these investigations, and it should be one of the most important duties of the traffic department to help in this development.

Fooling Yourself

There is one other point in connection with motor truck selling which I wish to touch upon and that is "fooling the customer." Motor truck salesmen must realize that it is the truck buyer and not the manufacturer who pays their bills. Just as soon as they realize this they will have the backbone to advise him not to buy if it will be unprofitable, and the foresight to see that a sale made which will not be satisfactory to the customer will most probably spoil the chances for making a dozen or more similar sales, for one dissatisfied owner will do more harm to future business than a dozen satisfied owners can do good.

With the exception of motor truck selling I believe that motor truck operating offers the greatest field for advancing the motor truck industry quickly. This advancement will be made along three distinct lines:

1—By waging an educational campaign for truck owners and operators. This is being done at the present time by getting the truck owners and operators together once a month. At these meetings there is generally a couple of educational papers presented and the operators exchange their experiences and get light on their troubles.

2—By injecting efficiency into delivery equipments and methods. Deliveries have been considered necessary evils and have been run in a haphazard way. Very few are run economically. In some cases little things such as changing routings, or lengthening loading platforms will save considerable time and money. The salesman when making his investigation should be quick to detect such defects. There is no quicker or better way of convincing a firm that you know hauling problems.

3—By the development of time saving appliances such as quick loading and unloading devices, specially designed bodies, etc. It is in this direction and not in motor truck design that the opportunity for effecting large savings is offered. There undoubtedly will be many thousands of dollars saved in this direction.

This work naturally is one of the chief duties of the traffic engineering department and should do much in advancing the economies to be effected in motor truck operation.

Three Ideas

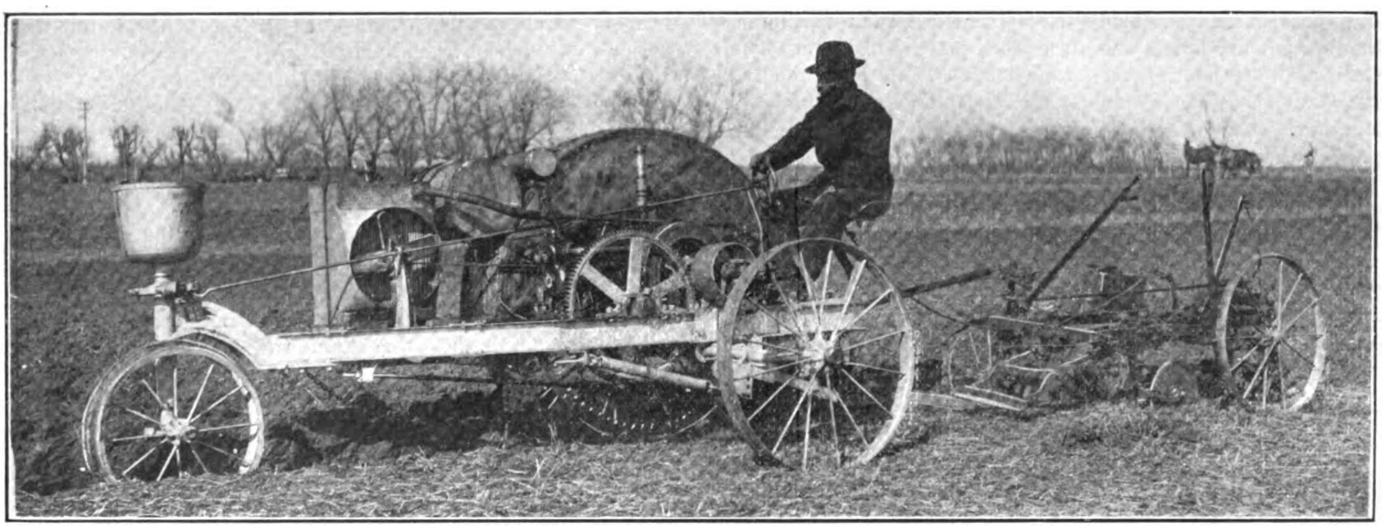
In conclusion I would simply like to add that any traffic engineering department if it ever expects to be a success or accomplish results, must bear in mind three things:

1—That every truck owner must be a satisfied owner.

2—That every dealer must make money.

3—That to accomplish 1 and 2 the traffic department and the dealer must work hand in hand to not only sell more trucks but to also sell them better.

Bull $335 Farm Tractor Does Work of Five Horses

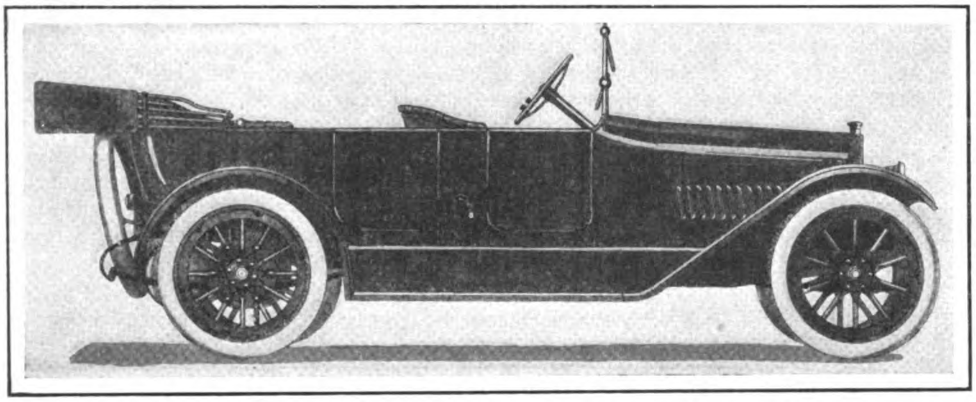


THE Bull Tractor Co., of Minneapolis, Minn., is manufacturing a farm tractor for $335 that is capable of pulling two 14-inch stubble plows or their equivalent in any other work on the farm. The tractor, which is shown in the accompanying illustration at work with a plow, employs a two-cylinder, four-cycle opposed motor having a bore of 4.75 and a stroke of 6.5 inches. It operates at from 750 to 800 revolutions per minute and delivers 5 horsepower to the draw-bar and 12 horsepower at the belt. It is 12 feet overall, 5 feet 4 inches high and 6 feet 6 inches wide. It operates on gasoline or Motor Spirit and the makers claim for it an average fuel consumption of 1.75 gallons per acre.

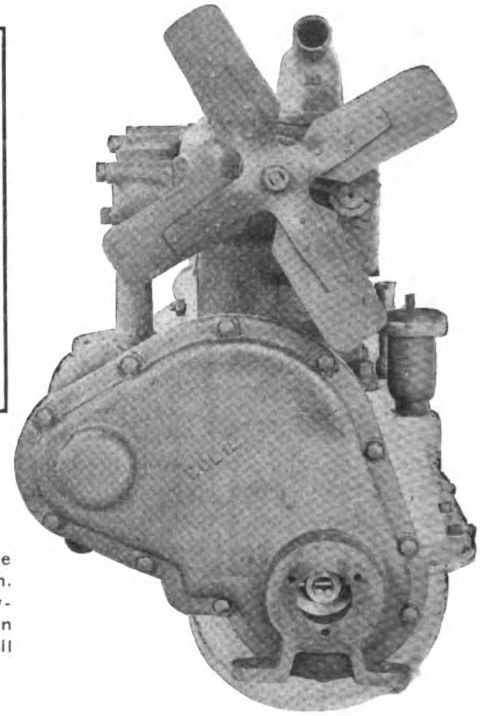
The Bull Tractor Co., estimates that the tractor is able to do the work of five good horses and for that reason represents a considerable saving of money to the farmer employing it. It is operated by one man who is seated on it and who guides it by means of the 28 inch front wheel which serves the double purpose of supporting the frame and at the same time automatically following the furrow for guidance in plowing. In other work it steers the same as an automobile.

CHICAGO, ILL., Nov. 27—The Illinois Public Utilities Commission has granted a license to the Chicago Automobile Transportation Co. which will launch Chicago's first boulevard motor bus line. The company expects to operate 150 cars. Four other motor bus companies have applied to the commission for licenses.

Kline Adopts Unit Power Plant



Touring body fitted to the six-cylinder Kline car for the 1915 season



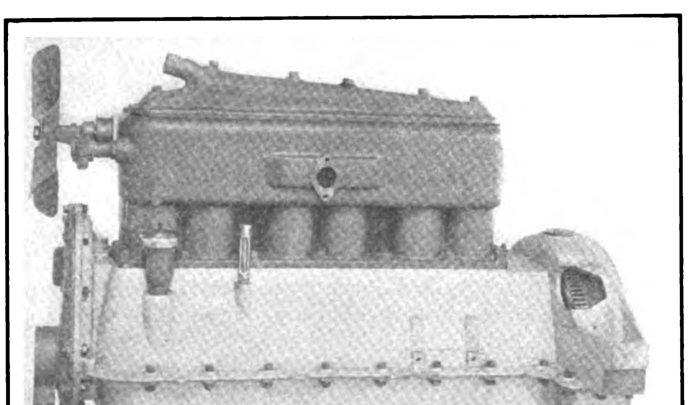
Front end of the new 3.5 by 5.125-in. power plant, showing mounting of fan and crankcase oil filler

Five Bodies on Two Chassis Similar Except Wheelbase—Change to Three Speeds

TWO chassis which are practically the same in every detail with the exception of the wheelbase will compose the line of the Kline Motor Car Corp., Richmond, Va., for the coming season. These chassis which are known respectively as 6-42 and 6-42A embody a six-cylinder motor which differs from previous Kline practice in that it is a unit power plant instead of the separate engine and amidship gearset as previously used. The cylinder castings on the new car are now a one-piece block instead of the separable block as in former practice. Last year Kline cars had their cylinders cast in pairs with the ends machined and bolted together.

New L-Head Motor

The new motor is an L-head which is not altogether new for the company as in a four previously manufactured it was employed, although the T-head has been used on the previous larger models. The three-point suspension heretofore employed has been changed. The pivot point was formerly at the flywheel but has now been changed to the front on account of the change to the unit power plant. The radiator suspension has been changed from the main side members to studs placed in the bottom of the radiator and bolted to a cross-member. This change was made on account of relieving the strain on the radiator, due to the twisting of the side members. In practice the company has found that the new suspension works out better as regards the elimination of strains on the radiator structure.



Left side of the six-cylinder L-head Kline motor

The four-speed gearset formerly used, which was direct on third and geared up on fourth, has been replaced by a three-speed type. The reasons advanced for this change is that the new motor is more flexible and more powerful than the old and the direct drive on high is quieter than the overgeared drive. It has been found, according to the company's engineer, that a speed of from 3 to 58 miles per hour can be obtained with the regular gear ratio of 3.75 to 1.

The electric starting motor has been changed to the left side of the engine above the frame line and bolted directly to the crankcase. This change has enabled the designers to completely inclose the Bendix gear by means of which engagement with the flywheel is effected, providing a more dirt-proof construction and at the same time silencing the engagement. The former mounting was on the right side of the motor below the line of connection to the frame and in muddy weather it was found difficult to keep the dirt from entering between the pinion and the teeth on the flywheel.

The lighting generator is now located on the right, next to the water pump, and is driven by the pump-shaft at 1.5 crankshaft speed. The former mounting was on the frame next to the gearbox and a silent chain drive was taken from a gear from the rear end of the gearset shaft. The generator has been decreased in speed by the difference in ratio of the former 3 to 1 and the new 1.5 to 1.

Vacuum Fuel Feed

A change in the gasoline system has been effected by placing the 20-gallon tank at the rear of the chassis and feeding by means of the Stewart-Vacuum system which carries the gasoline from the rear tank to a small tank on the side of the dash next to the motor and from there to the carbureter by gravity. Formerly there was a gasoline tank under the seat and a gravity system was used. By the new system it has been possible to shorten the intake manifold, which has resulted in more advantageous carburetion and a more accessible carbureter. There is a gain by this of 3 gallons in the capacity of the gasoline tank.

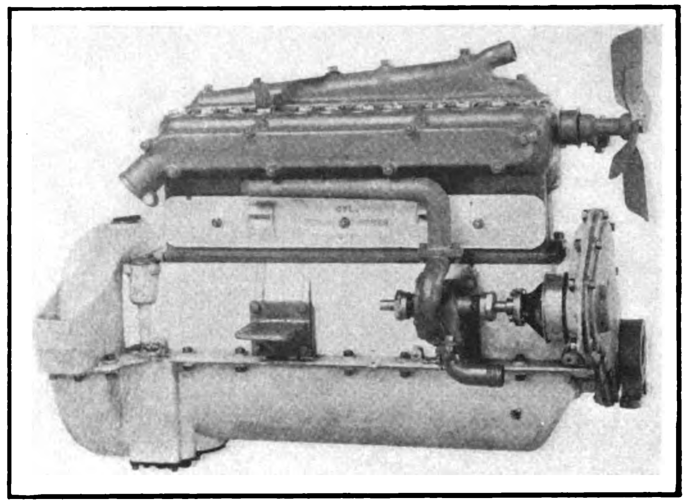
12 Per Cent. Lighter

A streamline body completes the list of innovations for the Kline car of 1915. It has a rounded radiator and hood, oval mud guards, built-in windshield, low, long body lines, deep upholstery and an up-to-date appearance throughout. The weight has been decreased more than 12 per cent. according to the Kline company, by using the unit power plant construction eliminating the sodpan, lighter body, top, rims, tire irons, etc., and by the fitting of narrower drip-pans between the motor base and frame.

The cylinders are 3.5 by 5.125 inches and have the valves on the right. The manifolds are formed with the intake integral with the cylinder casting and the exhaust separate. Cooling is accomplished by a centrifugal pump which circulates the water through ample water jackets and a cellular radiator.

Lubrication is taken care of by a combination pressure and splash system. The oil is forced by pump to the main bearings and thence flows to the splash trough, whence it is splashed to the cylinders and other bearings within the motor.

The entire electric equipment with the exception of the storage battery is taken care of by the Westinghouse company. The battery is a Willard. The system works at 6 volts and provides a dual-ignition system together with lighting and starting. The battery capacity is 130 ampere-hours at 6 volts.



Right side of Kline six-cylinder power plant

The clutch is a dry disk located in the flywheel with the driving surfaces engaging against asbestos and copper lining. The power is delivered to a three-speed gearbox which on direct provides a reduction of 3.75 to 1. Final drive is by spiral bevel and propulsion is through the springs. The rear axle is three-quarter floating. Thirty-four by 4 tires and a 123-inch wheelbase are found on the 6-42 chassis upon which are mounted a touring, toy tonneau or roadster body, while on the 6-42A chassis the wheelbase is 127 inches, the tires are 35 by 4 1-2 and the bodies are a seven-passenger touring and a seven-passenger limousine. The prices of the bodies on the 6-42 are $1,750. On the 6-42A, the touring is $1,850 and the limousine $2,850.

Completeness Features Moline-Knight Closed Cars

COMPLETENESS and luxury are the keynotes of the two closed cars recently brought out by the Moline Automobile Co., Inc., East Moline, Ill. They are a seven-passenger limousine and a five-passenger sedan mounted on the 50-horsepower Moline-Knight chassis. Three speed gearbox is standard, though a four-speed type may be furnished. Wheelbase is 128 inches for both cars and 36 by 4 1-2-inch tires are used. The limousine sells for $3,800 fully equipped and the sedan for $3,250 with wood wheels and for $3,340 with wire wheels.

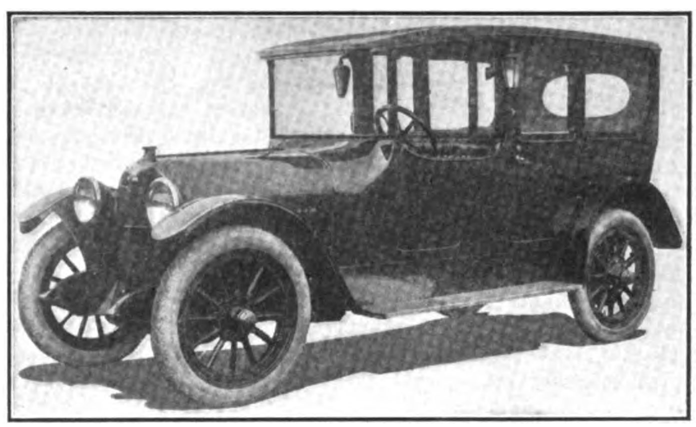
The tonneau of the limousine is trimmed with medium gray whipcord while the front seats are finished with hand buffed, long grain, black enamel leather. The body is painted blue above the panels and black beneath.

The window ledges are finished with aluminum drip molding and there are aluminum door moldings and nickel fence rails. The roof is three-ply veneered wood and the top over the driver's seat is painted black. The rear doors are hung with concealed upper hinges and the lower hinges are exposed covered joint types. The front door hinges are concealed. Equipment is complete.

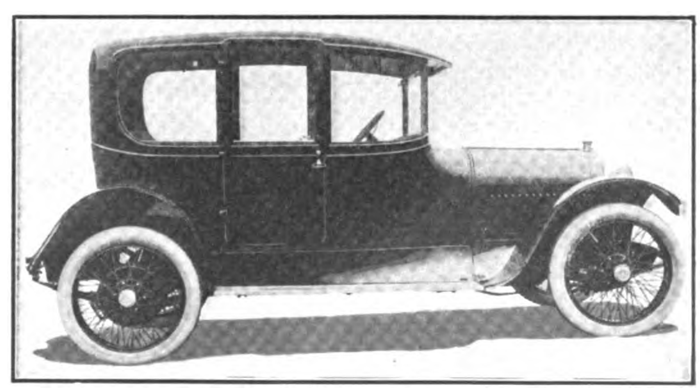
Removable auxiliary seats face forward and are arranged so that they may be folded against the side of the body or placed in sockets on the division when not in use.

Doors and windows are prevented from rattling by bumpers or antirattlers, and a pair of pillar lamps are so arranged that the light will be thrown on the running board.

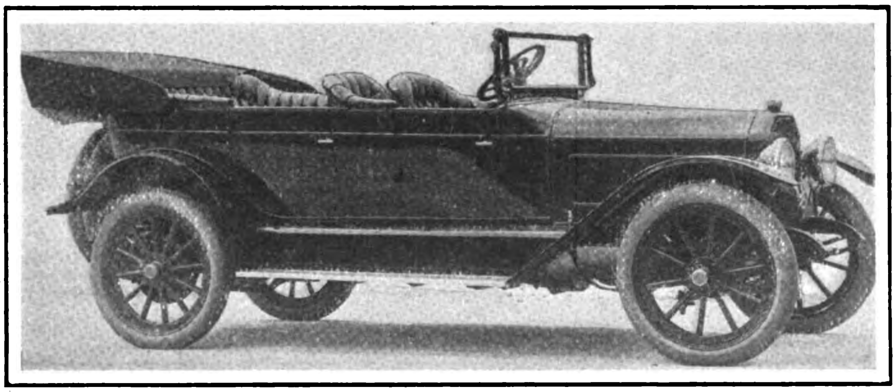
The general make-up of the sedan is similar to that of the limousine. A dark gray whipcord upholstering is used in place of the lighter gray in the limousine. All panels are of 22 gauge cold rolled automobile body steel with joints either welded or covered with aluminum molding. Equipment is similar to that of the limousine.



Moline-Knight limousine, which sells, completely equipped, for $3,800



Sedan at $3 250, with wood wheels, and at $3,340, with wire wheels



Five-passenger, six-cylinder Peerless touring car with individual front seats and selling for $2,250

New Peerless Four, $2,000—Six at $2,250

Block-Cast Unit Power Plants of Similar Design and Largely Similar Dimensions Used in Both Models

IN bringing out its two lighter and lower-priced cars, which have been styled all-purpose models, the Peerless Motor Car Co., Cleveland, O., has produced a type of machine new to its factory. Heretofore only big cars of the $5,000 and $6,000 class have borne the Peerless name, and the striking part of the move is that the new models 54 and 55, the latter a six, are none the less distinctive in appearance and finish or carefully designed than are the larger cars on the 48-six chassis. In the open models, the new four sells for $2,000, and the six for $2,250.

Block Cast Unit Power Plants

The motors, with the same dimensions wherever possible, are consistently alike in construction. They are block-cast unit power plants with L-head cylinders. Other chassis specifications include left drive and center control, open driveshafts with two universals, disk clutch, semifloating rear axle, 34 by 4 tires on all models, Gray & Davis cranking and lighting, Atwater Kent ignition, Stromberg carbureter, Stewart vacuum gasoline feed from tank at the rear of the chassis, and drive through platform rear springs.

A special point is made of the short wheelbase—113 inches for the four and 121 for the six. By saving space at points which would not affect the comfort or convenience of the passengers, this has been accomplished. Credit is due the engineers for this wheelbase shortness, when the roominess of the bodies is considered. The open bodies are interchangeable on the two chassis, and have a distance from the dash to the front edge of the rear seat of 74 inches, and from the dash to front seat of 23 1-2 inches.

Individual Front Seats

Both the bodies and the chassis are practically identical, such differences in dimensions as are to be found being incident to the longer motor of the six. A feature of the touring body is the use of individual front seats, these providing a passage way from front compartment to tonneau. The arrangement aids in the ventilation of the front compartment and makes it easy to manipulate the one-man top.

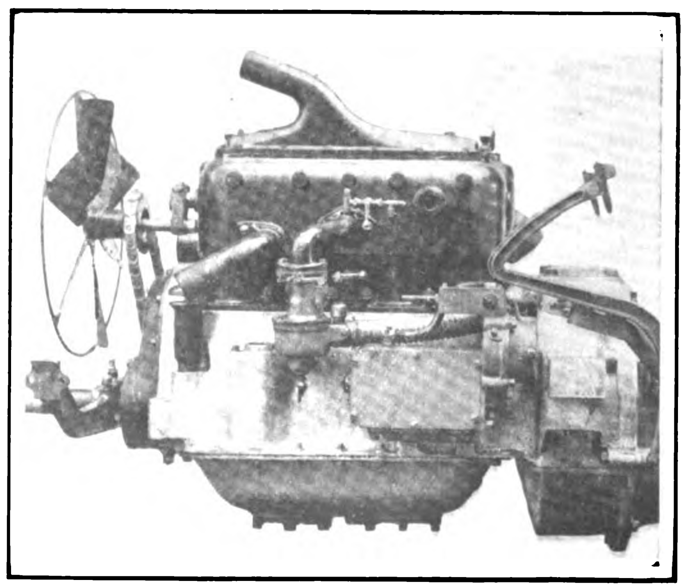
Other than the differences due to the two additional cylinders, there are only two dimensional items not alike in four and six engines. These are the bore and the valve diameter. The four is a 3 3-4 by 5 motor, and the six a 3 1-2 by 5. The former has 1 7-8 valve diameter and the latter 1 11-16. Despite the fact that the S. A. E. formula, which is based upon 1,000 feet per minute piston speed, accords the four 22.5 horsepower and the six 29.4 horsepower, the former develops 38 and the latter 50, they reaching their highest efficiency at 2,000 revolutions per minute, which is a piston speed of about 1,666 feet per minute with this stroke of 5 inches. The piston displacement of the six is 288.6 cubic inches and of the four, 220.92 cubic inches.

The general arrangement of the motors places most of the external fittings on the right side. Valves are all on this side, as well as the exhaust manifold with individual opening to each cylinder. The generator shaft is here also. It drives a centrifugal water pump on the six, the four having thermo-syphon cooling. On this shaft there is also a gear for driving the single-cylinder Kellogg tire pump.

On the left are only two parts, the Stromberg carbureter and the cranking motor which gears to the flywheel. There is no external intake manifolding, the distribution of the gases to the several intake ports being through cored passages within the cylinder casting. Only a single opening in the center of the block communicates with the carbureter through the intermediary of a short L tube. The fan has adjustable belt drive at the front end.

On these motors, crankcase and oil pan are separate; the former is an aluminum casting. The latter is made of pressed steel, thus saving several pounds in weight over cast aluminum. All bearings are carried in the crankcase and are accessible after the oil pan is removed.

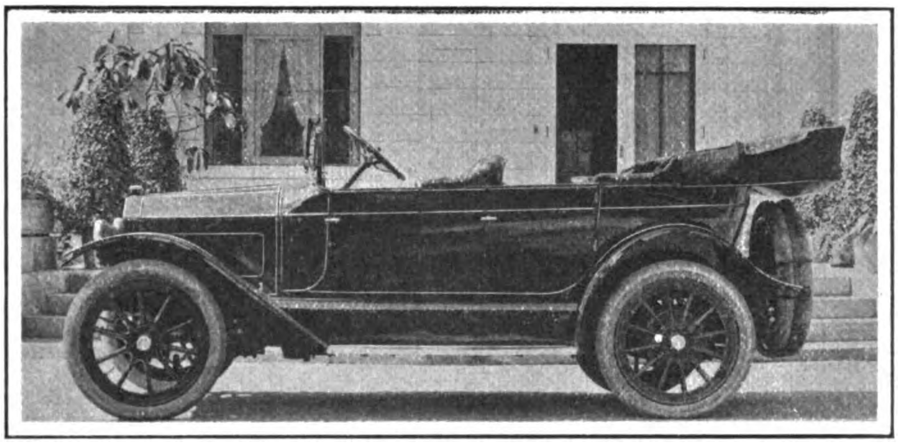
The pistons cast from the same grade of metal as used in the cylinders carry three, diagonally-split, eccentric, expansion rings which, having gone through a special machining process which relieves all strains, are ground. Oil grooves



Left side new Peerless four motor, showing mounting of carbureter are turned on the outside of the piston for distributing the oil splash over the cylinder walls, yet special provision is made to prevent excessive amount of oil reaching the combustion chamber.

The piston pin is of special steel tubing, hardened and ground to size, is held stationary in the piston bosses by a locking device and has its bearing in a large bronze bushing which is pressed into the connecting-rod. Ample lubrication is obtained through an opening in the upper end of the connecting-rod in which oil from the splash is trapped.

Connecting-rods are I-beam .35 carbon steel, drop-forged and heat-treated. The crankshafts of both motors are three-bearing types with well proportioned and liberal sized bearings. It is made of a special crankshaft steel, drop-forged and heat-treated, giving a tensile strength of 90,000 pounds per square inch. Flanges are provided on both ends of the center bearing to take any end thrust which may be imparted from the clutch or other source.


Peerless all-purpose four-cylinder touring car listed at $2,000

The camshaft is drop-forged from a single piece of low carbon steel, the cams being integral with the shaft, which runs on three large, white bronze bearings, lubricated from oil pockets cast in the crankcase for this purpose. The camshaft may be readily withdrawn after removing the gearcase cover.

The crankshaft bearings and connecting-rod bearings are made of nickel babbitt, backed with bronze and held in place by brass retaining screws. Bearing adjustment is secured by means of a number of punched sheet steel shims varying in thickness from .002 inch to 1-16 inch.

Valves Are Interchangeable

Inlet and exhaust valves are interchangeable and have nickel steel heads electrically welded to carbon steel stems. The clearance around the valve heads is so proportioned as to attain the best efficiency, and the ends of all the valve stems are hardened to insure against wear from the tappet action. The removable metal plates which cover the valves not only keep them free from dirt, but also tend to quiet the motor.

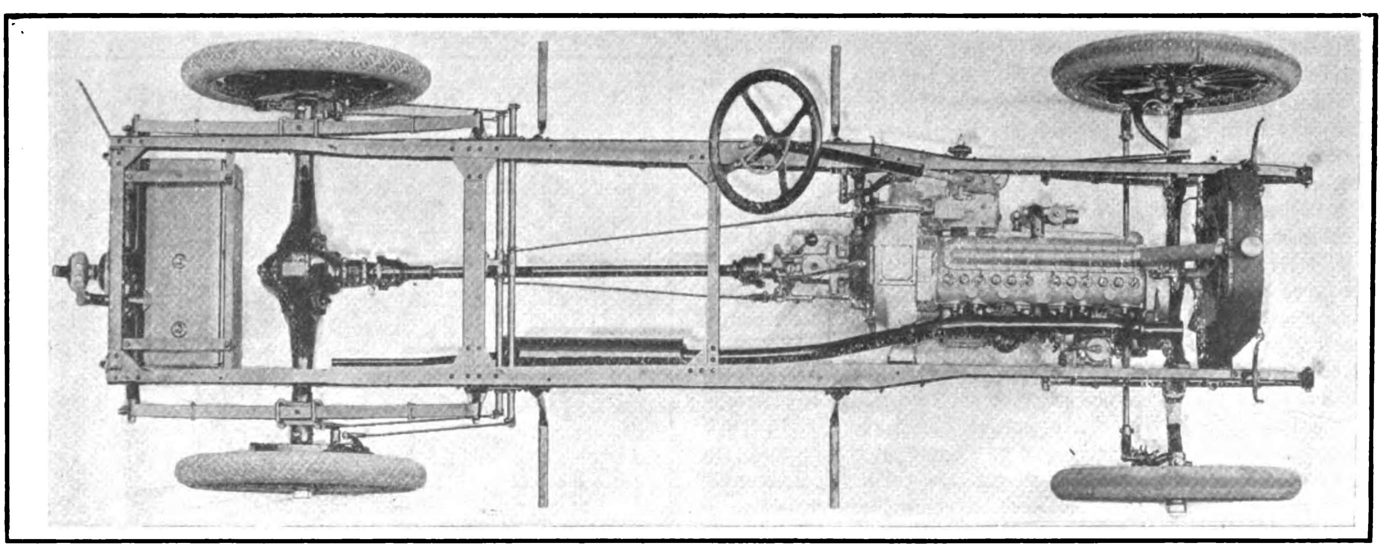
Both the four and six-cylinder motors have a combination force feed and splash system of lubrication. A horizontal plunger pump driven by an eccentric on the camshaft forces oil through copper tubes direct to the timing gears and main bearings. It then drains back into the oil troughs, thus maintaining a level for the splash lubrication of pistons, connecting-rods and other bearings. From the oil troughs it overflows into the oil pan, passes through a filter which removes any foreign particles and is again picked up by the pump.

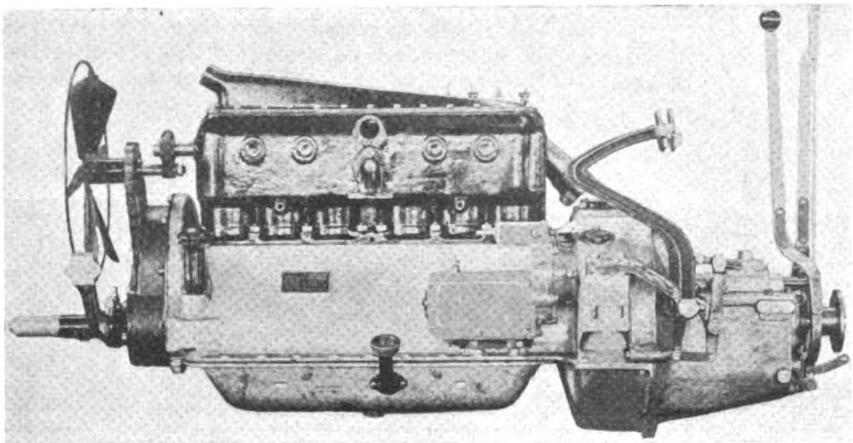
Timing gears are helically cut and in order to secure best results, particular attention has been paid to the maintenance of accurate gear centers. Each set is housed in the usual gear case on the front of the motor.

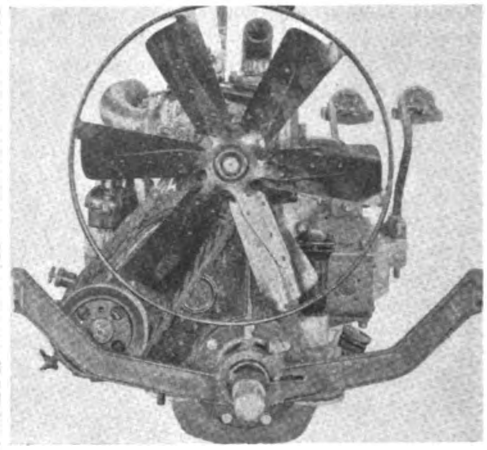
Vacuum Fuel Feed

Gasoline is supplied from a 20-gallon tank at rear of car to the carbureter through Stewart vacuum feed system. The upper chamber of the gravity tank on the dash receives fuel drawn up from the main tank due to action of vacuum in the inlet manifold. When the upper chamber becomes filled, the contents are automatically discharged into the lower reservoir, whence gasoline flows by gravity directly to the carbureter. This system does away with the pumps, gauges and filters necessary on the older pressure feed systems and makes an especially neat installation on small and medium sized motors.

Ignition is provided by the Atwater Kent Unisparker which receives current at 7.5 volts from dry cells for cold weather starting, and 6 volts from storage battery for regular running. The dash switch is of unique design which automatically provides for frequent reversal in direction of primary current through the interrupter, thus lengthening the life of the contacts. Interrupter, distributer and governor providing automatic advance, are combined in a com-


Peerless six chassis, showing block motor, left drive, center control, main fuel tank at rear and platform spring





Left—Intake side of new six-cylinder Peerless power plant. Right—Front view of motor, showing pivot support for front end

pact unit positively driven from the shaft of the lighting generator. Open wiring is employed, the high tension leads to spark plugs being carried on fiber block insulators to insure protection against leakage or grounds.

Single Wire Lighting

The lighting system is a single wire type using Gray & Davis 6-volt generator. The generator is mounted on a bracket at the right side of the motor and is driven through a leather disk coupling on the gear-driven shaft. The generator also is arranged to carry and drive the igniter unit.

The generator is a variable-speed, shunt-wound type T machine with cut-out coil and two-point voltage regulator mounted thereon. The shunt winding of the coil causes the generator to cut into the lamp and battery circuit at 600 revolutions per minute. Voltage is then regulated against effects of fluctuations in engine speed by means of the two-point regulator which automatically inserts or cuts out resistance from the two generator shunt field windings. A main cut-out acts also as protection for the generator against possible reverse currents from the storage battery.

No Side Lamps Needed

Head and service lamps are combined and provided with two bulbs, one of 15 candlepower for country driving and the other of 4 candlepower, and out of focus, for city driving. The storage battery is a 6-volt 80-ampere-hour Willard, common to both lighting and starting systems and interchangeable on models 54 and 55. Dry cells are provided for emergency ignition.

The cranking unit is a Gray & Davis type Y, series wound, motor, mounted on a bracket at the left side of the engine and driven through a self-contained countershaft and pinion, meshing with a ring gear on the flywheel only when starting. The operation of starting consists in pulling a knob on the instrument board which transmits force through leverage and a helical spring to the sliding pinion on the countershaft. The helical spring causes meshing the instant the pinion begins to turn over.

The electric motor gives a breakway torque at the crankshaft of approximately 285 foot pounds. It will spin the engine at 125 revolutions per minute with a current consumption of 70 amperes, which speed is so high as to insure easy starting of the engine in all weather, it is said.

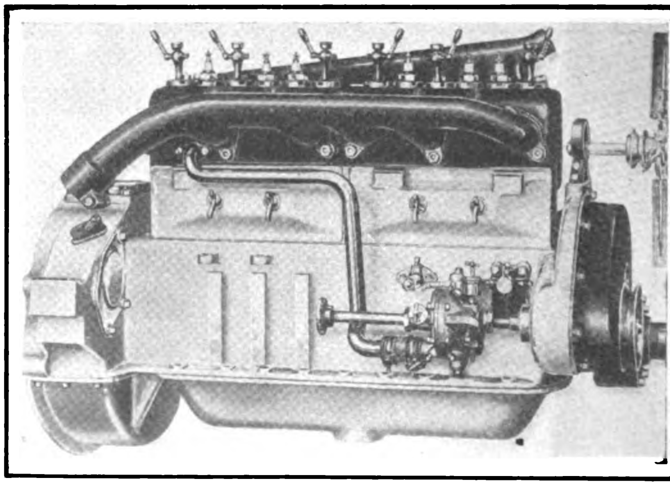
Clutch and change-speed gearset are assembled in a single transmission unit with case bolted directly to motor bell housing. All moving parts are protected by the aluminum case and are accessible for inspection through removable plate and cover. The units are interchangeable on models 54 and 55.

The clutch is of the multiple-disk type and controlled by pedal through ball bearing thrust, a special lever design providing easy clutch action and pedal adjustment. Inside clutch plates are 3-32-inch stock hardened and ground. Outside plates are cold rolled steel covered with asbestos friction surface and driven by twelve case-hardened keys, riveted to the pressed-steel clutch driving-drum.

The gearset is a sliding, selective, with three speeds forward and one reverse. Gears are 6—8 pitch with wide face, and are of 3 1-2 per cent. nickel .20 carbon steel, heat-treated and carbonized. Other features are a square driveshaft of .80 carbon, crucible tool-steel, tempered; Timken roller bearings on mainshaft; S. R. B. ball bearings on countershaft; die-cast, babbitt pilot bearing and special ball thrust bearing between front and rear members of the mainshaft.

Universal joints are provided at both ends of the open propeller shaft. These joints are packed in grease and oil, and are protected from leakage and dust by sheet metal boots. The propeller shaft is integral with the universal joint member at the rear axle end, while at the gearcase end it has a fluted sliding joint, thus providing for movement of the rear axle on rough roads. The propeller shaft center is of steel tubing.

The rear axle is semi-floating, with the main housing of reinforced pressed steel with pressed steel rear cover. The differential and pinion shaft form a unit with the front cover, thus insuring alignment, yet giving commendable accessibility. The pinion shaft and differential are each carried on two taper roller bearings which care for both the radial and thrust loads. The pinion is of 3 1-2 per cent. nickel steel and the gear is of nickel-chrome steel. They are of the helical bevel type which insures quiet running. Live axles are of



Exhaust side of six, showing cover plates inclosing valves, etc.

1 1-2-inch nickel-chrome steel provided with single taper roller bearings near the outer ends to take the wheel load.

Easy Brake Adjustment

There are the usual two sets of hub brakes. The foot or service brakes are of the contracting-band type while hand brakes are of the expanding-shoe type. Both are provided with asbestos friction lining. Adjustment of service brakes is made simple through the use of wing nuts.

The new cars have a pressed steel frame of 4-inch channel section, dropped at the rear and inswept at the front. Frames of both models are of the same general design, but the dimension from dash to front end is 8 inches longer on Model 55. The frame is trussed to give maximum stiffness with minimum weight.

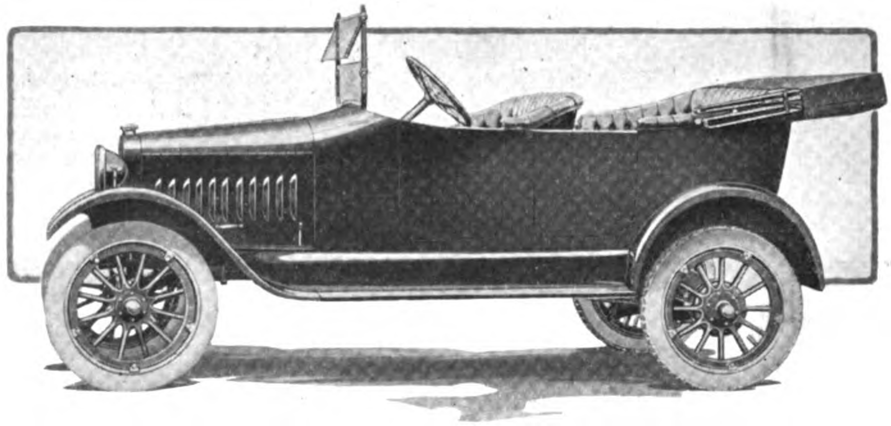
Platform type of rear spring suspension, which has been featured on former Peerless cars, is continued on Models 54 and 55. Lightness and simplicity of chassis are furthered in these smaller models by eliminating radius rods and using the rear side springs to take the drive from rear axle to frame. They also take the torque reaction, thus permitting the omission of a separate torque member.

Data on New Peerless Motors

	FOUR	SIX
Firing order	1-3-4-2	1-5-3-6-2-4
Valve diameter (inlet and exhaust)	1 7-8 inches	1 11-16 inches
Valve lift (inlet and exhaust)	3-8 inch	3-8 inch
Diameter of flywheel	15 inches	15 inches
Crankshaft front bearing	2 3-16 by 2 7-8	2 3-16 by 2 7-8
Crankshaft center bearing	2 7-32 by 2 1-2	2 7-32 by 2 1-2
Crankshaft rear bearing	2 1-4 by 3	2 1-4 by 3
Camshaft front bearing	2 19-32 by 1 1-2	2 19-32 by 1 1-2
Camshaft center bearing	2 5-8 by 1 1-8	2 5-8 by 1 1-8
Camshaft rear bearing	1 1-2 by 1 3-4	1 1-2 by 1 3-4
Connecting-rod bearing	1 7-8 by 2 3-16	1 7-8 by 2 3-16
Connecting-rod length	10 1-4	10 1-4

Saxon Six To Sell for $785

FOLLOWING up its success in the field of low-priced fours the Saxon Motor Co., Detroit, Mich., has joined the move for really low-priced sixes. Bringing out a car with a power plant of this type for $785 is the newest development offered by this Detroit concern.



Five-passenger, six-cylinder Saxon touring car, which sells for $785, completely equipped

To take care of the added production facilities necessary in marketing the low-priced four and six-cylinder cars, as reported elsewhere in this issue, the company will take over the building formerly occupied by the Abbott Motor Car Co., in Detroit. The output of the four will be increased and the Saxon company states that the price of the six is based upon an output of 25,000 cars.

The new model is fully equipped and mounted on a 112-inch wheelbase and uses 32 by 3 1-2 tires. It has a five-passenger capacity. The tread is standard 56 or optional 60-inch width. The motor has its six L-head 2 7-8 by 4 1-2-inch cylinders cast in a block. The valve action is inclosed by cover plates and the valves are of nickel steel with carbon-steel stems.

A drop-forged steel crankshaft of 1.875 inches in diameter carried on three main bearings is used. The camshaft is also a drop forging of 1-inch diameter and is carried on four bearings. The cams are integral with the shaft which is driven by helical gears.

Thermo-Syphon Cooling

Oiling is by splash to the cylinders but by pressure to the main bearings, the circulating pump taking the oil from the crankcase to these bearings and from this point a gravity flow carries the oil into the splash trough. The oil is carried through a strainer before again reaching the pump to be re-circulated. Cooling is by thermo-syphon with a cellular radiator and fan.

Ignition is by the Atwater Kent system which provides either automatic or hand control. Gasoline is fed by gravity from the 10-gallon tank located in the cowl.

Power is taken from the motor by a multiple disk dry-plate clutch with steel against Raybestos bearing surfaces. The gearset provides three speeds forward and is mounted on the rear axle being carried on Hyatt roller bearings with ball thrust. The driven pinion gear is adjustable and the shafts are all of nickel-steel. The shaft connecting the clutch and gearbox is of solid alloy steel 1-inch in diameter with two universal joints and with a concentric torque tube.

Two sets of brakes are used on the car, both of which are on the rear wheels. The service brake is external contracting, 10 inches in diameter with a 2-inch space. The emergency is internal expanding having a diameter of 9.75 inches and a face width of 2 inches. Both these brakes are lined with Thermoid. The steering gear is a worm and full gear with a 17-inch wheel. The steering connections throughout are all drop-forged and heat treated.

The front axle is a single-piece I-beam drop forging, heat treated, with ball bearing in the hub. The rear axle is three-quarter floating and is contained in a pressed steel housing. The main driveshafts are alloy steel 1 1-16 inches in diameter. The differential is a two-pinion design carried on Hyatt rollers. The frame is a channel section of .25 carbon steel.

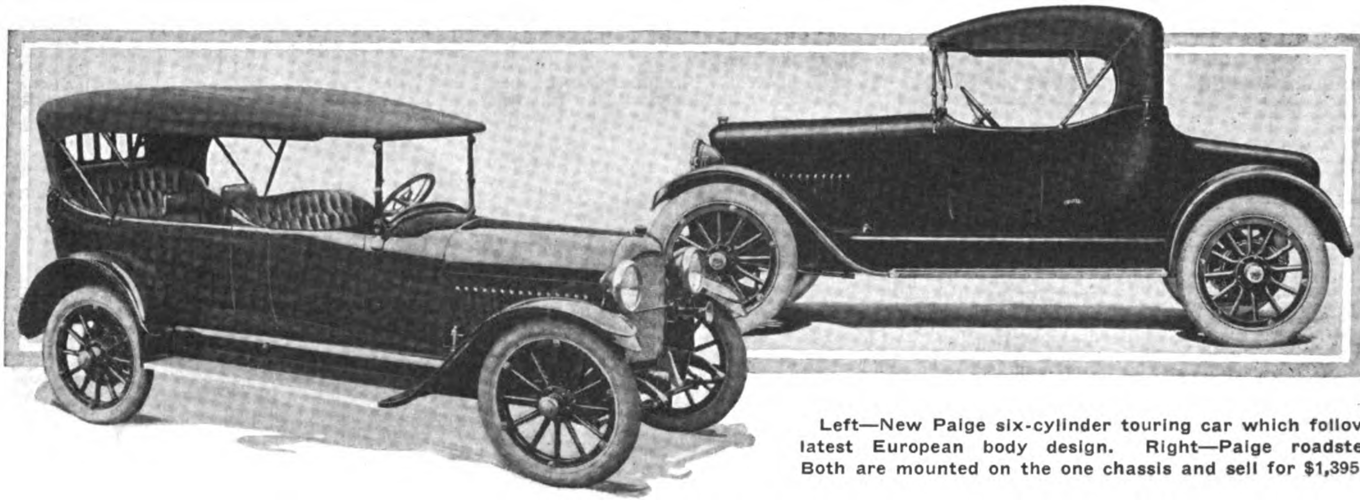
Cantilever Springs Used

The springs are cantilevers, 30 inches long and 2 inches wide. They are of vanadium steel. The bodies are designed to have the maximum room. The streamline touring design seats five passengers. The distance from the heel board to the dash is 28 inches. The front seat inside the upholstery is 41 inches wide and 16 inches deep. The rear seat inside the upholstery is 47 inches wide and 18 inches deep. The front cushions are 7 inches in depth and the rear cushions 8 inches. The doors are 19 inches wide for the front and 21 inches for the rear. All doors have concealed hinges. The standard color is Richelieu blue with black running gear.

The equipment includes electric starting and lighting without side lamps, but with dimming bulbs in the headlights. Top, windshield, speedometer, extra rims, etc., are also included in the equipment.

Paige Has New Block Six at $1,395

Made in Both Touring and Roadster Form—Streamline Bodies and Crowned Fenders



Left—New Paige six-cylinder touring car which follows latest European body design. Right—Paige roadster. Both are mounted on the one chassis and sell for $1,395

THE Paige-Detroit Motor Car Co., Detroit, Mich., is bringing out a new six under the model number of 6-46. Mounted on a 124-inch wheelbase, either a touring car or roadster may be had at $1,395, with streamline body and full equipment.

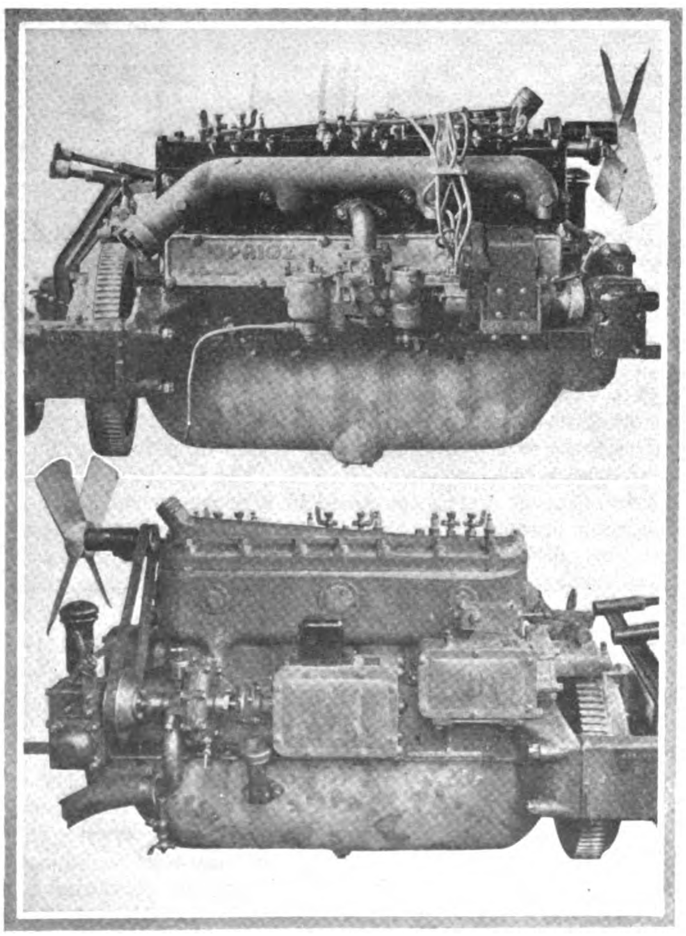
The power plant used in connection with this new car is a Continental product having its six L-head 3 1-2 by 5 1-4-inch cylinders cast in a single block. The material used in the cylinders is reverberatory air-furnace iron. The cylinders and the upper half of the crankcase are cast together, a feature which is claimed to add both accessibility and strength. The cylinders are bored and ground to a finish fit. A three-speed gearbox is provided.

Detachable Heads

The waterjacket heads are cast separately and are fastened to the cylinders by twenty-two bolts. Water leakage is prevented at the point of connection by a copper asbestos gasket. When these heads are removed the interiors of the cylinders are accessible for inspecting the valves, pistons and cylinders. The oil pan is of stamped sheet steel and the false bottom containing the oil troughs is separate, being riveted to the pan.

Valves on the Right

The valves are all on the right side and are completely housed with aluminum plates giving an oiltight chamber in which the valve action operates. The valves are all driven from a single camshaft. The camshaft taking its drive from a cross shaft at the front of the motor. The latter shaft also serves for the magneto, generator, water pump and the fan pulley. A bronze spiral gear on the end of the crankshaft drives a cross shaft which in turn drives all the auxiliary parts to steel spiral gears which operate in oil. This form of drive is claimed to be as quiet as it is possible to secure and at the same time to be accurate in keeping the timing of the valves correct under all conditions. Because the parts having frictional contact run in oil, the wear is reduced to a minimum.



Upper—Right side of motor showing piping and mounting of carbureter and magneto

Lower—Left side of motor showing water pump, oil gauge and starting and lighting units

The electrical equipment is provided by Gray & Davis for lighting and starting and by Bosch for ignition. This is a two-unit installation, 1 unit, the Gray & Davis motor generator takes care of lighting and starting and the Bosch magneto takes care of ignition. The mounting of the starting motor and generator is such as to provide accessibility with an aim of maintaining freedom from dirt, grease and oil.

Two arms extending from the back of the motor form a housing to which is fastened the gearset housing providing a unit transmission. The clutch is in the flywheel and is a multiple disk with cork inserts. The continuous housing is oil-proof, allowing the clutch to operate continuously in a bath of lubricant. The drive is transmitted through a three-speed gearbox to a driveshaft having two universal joints. The rear axle is a three-quarter floating design with a housing of malleable iron. A .625-inch crossbar takes the strain of the road shocks from the axle housing.

Cantilever Spring Suspension

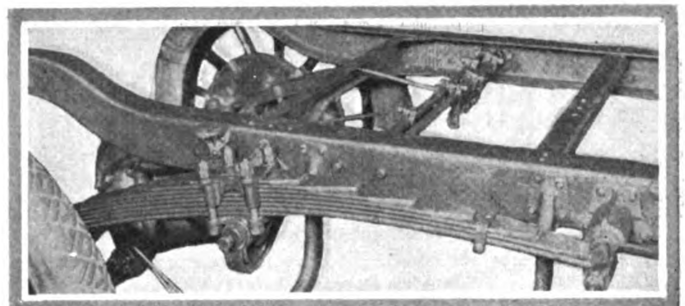
The brakeshafts are mounted on stiff brackets. There are two sets of brakes on the rear wheels. The drums are 14 inches in diameter and the face width is 2 inches. Cantilever spring suspension has been adopted. The length of the springs is 48 inches and the width 2.5 inches. The drive is taken through the cantilever springs and through the torque arm. The front axle is an I-beam section drop forging. Spring pads are forged integrally with the axle and have a curved shape so as to conform with the spring seat. The spring leaves are made of high carbon steel, heat-treated, for resiliency and strength. The spring eyes are provided with means of lubrication.

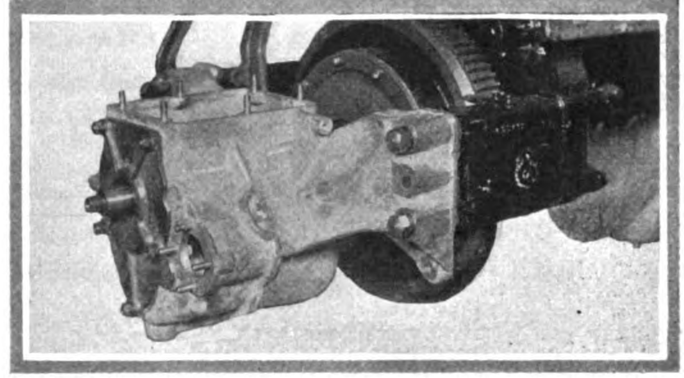
Easy Steering Control

Irreversible steering is used. The trunnion arm is in a straight line so that the road shocks transmitted to the wheel do not give a turning moment on the steering wheel thus removing the strain from the driver's hands. This gear is a nut-and-sleeve type made by the Jacox company.

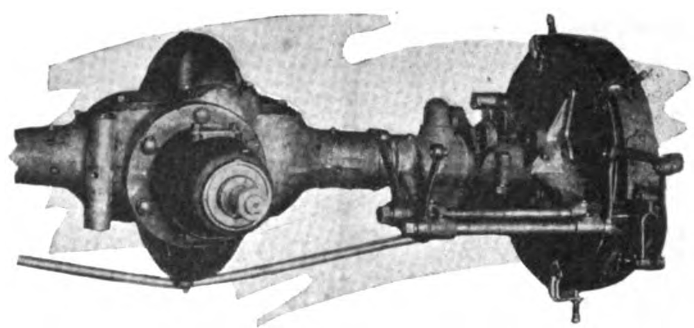
Streamline Body and Crowned Fenders

The body is a streamline design capable of carrying seven passengers. The doors are U-shaped with flush tops. The upholstery is of leather and the tonneau is supplied with a foot and robe rail. Two auxiliary disappearing seats fold against the back of the front seats. The fenders are of the latest design, being crowned. Running boards are steel stampings covered with linoleum. Equipment is complete.

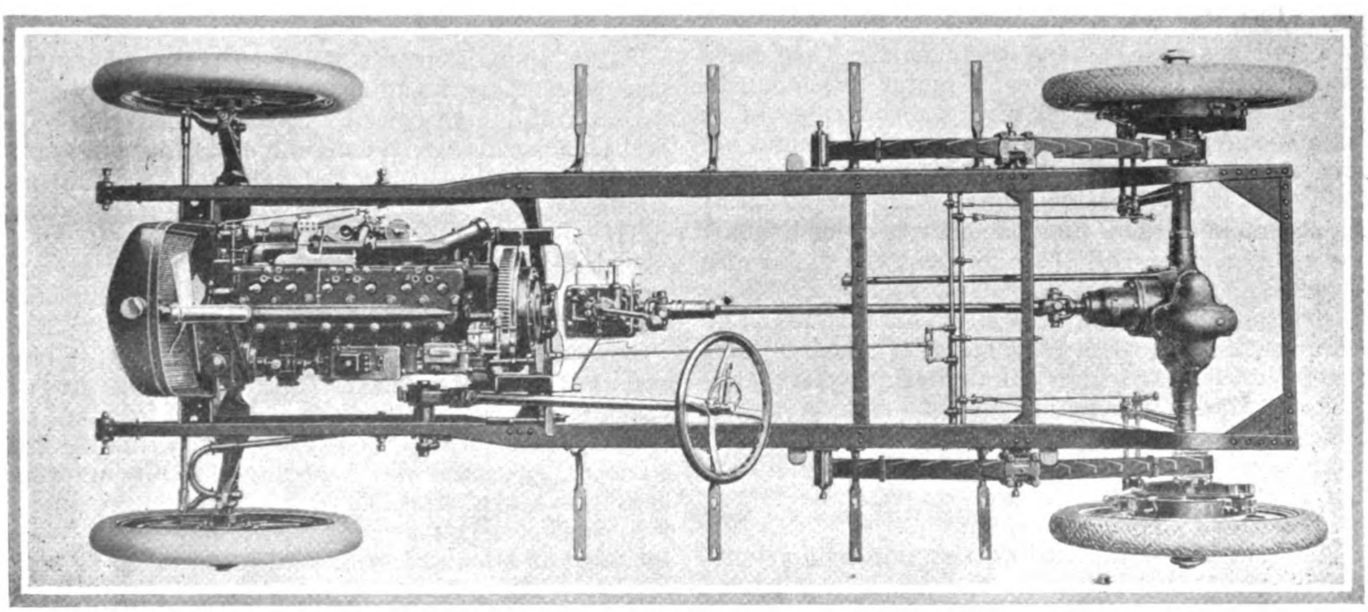




Upper—Paige cantilever spring construction. The drive is taken through the springs but the torque reaction is taken care of by a torque arm. Lower—Gearset showing attachment to crankcase. Note teeth on flywheel for starting the motor by Gray & Davis system



Rear axle illustrating details of differential housing and brake members. A cover plate makes the differential easily accessible and the driving pinion may also be removed without much difficulty



Plan of Paige chassis showing block motor in unit with gearset, contilever rear springs and three-quarter floating axle. The frame is strongly braced

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Speedway Opportunities

WITH practically double the number of automobile speedways for next year, it is anticipated that the use of these special speed creations will be broadened and that something more than speed and endurance will result. Races have done much for the advancement of the motor science and are still playing their part. They have been pioneers in many lines of motor development.

But a greater variety of tests can be conducted on these speedways, tests which, while they cannot vie with the speed spectacle in public approval, nevertheless do much to solve many of the problems of the automobile. The fuel efficiency tests of the last few months have had their lessons; the endurance tests have brought out not a few factors in motor lubrication and cooling, as well as carburetion; and there yet remains room for a series of research tests that would be particularly illuminating. The question of wind-resistance at various speeds is not appreciated as it should be and some research tests along this line would be very valuable to manufacturers and interesting as well as valuable to car owners.

The question of lubricating the motor of a touring car when traveling with its load and equipment at maximum speeds is a problem yet far from being settled with all makers. True this condition is not frequently met with in regular use, but it is for the extreme cases that the factor of safety must be provided. Oil temperatures at different sustained speeds could be measured; tire temperatures and pressures might be noted; the question of wheel slip at different speeds is a vital factor in tire wear and could be looked into to advantage; in fact, there are several forms of research tests that could be carried out, tests equally essential to the maker, the dealer and the user.

Body Comforts

IT is rarely that any one season witnesses so many refinements in body construction and finish as are found in many of the 1915 cars. Frequently more than a dozen alterations of one nature or another exist, all carried out with the one thought of giving greater comfort to the passengers. That this is essential is well borne out by the comment of a pioneer automobilist, who has been driving cars since the days of the early steam types, to the effect that comfort in riding is today one of the major considerations in an automobile, if not the great one!

Comfort has been increased for next season by a general improvement in seat design, the cushions in many cars being properly tilted to meet the needs of the passenger, as well as the upholstery being heavier in most low and medium-priced machines.

The low body is always desirable, and many of the new models are well featured in this respect. The underslung spring has played its part in this movement, so has the dropped frame, and so has the dropped front axle.

Four-passenger bodies give evidence of being slightly more popular than the present year, this tendency being in line with European trends previous to the war. The four-passenger body gives a much better design, getting away from the width at the back seat and making it possible to have the maximum body width between the front and rear seats, if so desired. This design adds to the streamline effect.

Early announcements point to more colors than this year, there being many more color options in medium and high-priced cars than formerly. The staid black will not be so dominating, notwithstanding the natural tendency the war would have toward somber colors. While black is the great predominating tone and greens, blues and grays in many varieties have large followings, there are many concerns that are giving other semi-gaudy color combinations that should suit the most fastidious.

Production and manufacturing requirements have produced a few tendencies for next season. In general there are fewer body models with many of the lower-priced cars, the one-body policy taking hold in not a few cases. With medium and higher-priced cars there are often more models than formerly, the cabriolet, coupelet or other new ideas being included as standard types and often listed as stock models. The number of limousines has not materially increased, but coupés and sedans are more in evidence.

Washington Road Men Want H.P. Tax

225 Delegates at State Good Roads Assn. Meeting Adopt Resolutions for Increasing Highway Funds

SEATTLE, WASH., Nov. 26—Closing the most interesting, educational and successful session in the 15 years of its existence, the annual convention of the Washington State Good Roads Assn. adjourned at Spokane last week to meet in November, 1915, at Ellensburg, Wash. Two hundred and twenty-five delegates representing twenty-two counties and representatives from Oregon, Idaho and Montana, were in attendance at all four sessions held during the 2 days' convention.

Serious consideration was given the subject of road maintenance, and the convention adopted resolutions urging the Washington legislature which meets in January to increase the present maintenance fund of 5 per cent. The resolutions also declared in favor of completing the comprehensive construction program begun in 1913 before additional appropriations are made for extensions and laterals; that the present levy of a mill for state roads and a mill and a half for permanent highways, which annually produce approximately $3,500,000, be continued; that automobiles be taxed in proportion to their horsepower, the receipts therefrom to go into a maintenance fund and returned to the counties from which the money comes; that a new and more modern automobile code be adopted; that a compulsory road dragging law be enacted; that danger signs and signals on all roads be standardized; and the continued use of convicts on roads under the present honor system was favored.

Never before in the history of the Pacific Northwest was so much genuine interest displayed in a good roads convention. Speeches, papers and stereopticon illustrated lectures were given by men of national prominence. The office of Public Roads, United States Dept. of Agriculture, was represented by E. W. James, who delivered an address on highway maintenance, which subject was the keynote of the convention. Others who spoke were Governor Ernest Lister, of Washington; Lieut. Governor Louis H. Hart; former Governor M. E. Hay; Governor-elect Alexander, of Idaho; Samuel Hill, president of the American Roads Builders' Assn.; and H. S. Earle, of Detroit.

Lincoln Highway Is Now Complete

DETROIT, MICH., Nov. 28—Every mile of the 3,389-mile Lincoln Highway is now in condition. A demonstration such as was never before made in connection with any good roads movement was made yesterday by all the consuls of the Lincoln Highway Association. Along the entire route, from coast to coast, each consul or some one representing him, drove over that section or part of the route over which he has jurisdiction, for the purpose of demonstrating that the road is fit for travel. Thus about 200 Lincoln Highway workers took part in the run, which was started as near as possible everywhere about 6 a. m. and completed as near as possible by 6 p. m., to make it a 12-hour run.

The runs ranged as to distance from 8 and 10 miles to over 300 miles, although this was quite exceptional. In addition to inspecting their territory the consuls and observers will later make detailed reports as to what is still to be done in their respective section. The principal object of the demonstration has however been to show that it does not require any longer that a tourist take side roads or other roads than the official Lincoln Highway route.

Wants Better Roads in Mt. Rainier Park

WASHINGTON, D. C., Nov. 30—Motor cars and motorcycles contribute so large a share of the revenues of the Mount Rainier national park in the state of Washington that Ethan Allen, superintendent of the park, in a report made today to the Secretary of the Interior, predicts that as soon as the roads are improved so that these vehicles can move with safety over all of them the revenues will be sufficient to meet the expenses of an economical administration of the park affairs.

Desirous of getting this revenue just as quickly as possible, Superintendent Allen recommends expenditure of funds for road improving, and suggests that an "engineer corps" be attached to the park service to prepare improvement and maintenance details.

The report shows that during the year ended September 30, 1914, 1,594 permits were issued to owners of private motor cars to use the roads of the park for travel. These permits are good for repeated entrances until December 31 of the year of issue. For each of these permits a fee of $5 was exacted, making the revenue collections from this source $7,970, while public motor cars paid $650. "It is confidently predicted," says Superintendent Allen, "that park revenues will be sufficient to meet the expenses of an economical administration of park affairs as soon as the present road is permanently improved and safety and comfort assured to motor car users."

59,507 Fords Sold in 3 Months

DETROIT, MICH., Nov. 30—During the first 3 months of the buyers' profit-sharing plan of the Ford Motor Co., which started August 1, 1914, a total of 59,507 Ford cars were sold, or an average of 19,835 cars per month.

The buyers' profit-sharing plant calling for a return or refund of $40 or $60, according to the car bought, provided that between August 1, 1914, and August 1, 1915, a total of 300,000 cars are sold and delivered, the 59,507 cars sold to October 31 represent a refund of at least $2,380,280 on the basis of a rebate of only $40 per car. By taking the average of $50 as the return to each buyer, the amount to be returned by the Ford company would be $2,975,350 for the first 3 months' business on the new plan. If the 300,000 cars are sold and delivered then the return to buyers will amount to between $12,000,000 and $15,000,000.

Argo Production 750 Per Month by March

JACKSON, MICH., Dec. 1—W. R. De Voe, of the Argo Motor Co., states that the first run of the company of 200 cars is in full swing and will be completed about the time material for the second lot, 500, reaches it around December 5. These are to be followed by 500 cars in January, and it is anticipated a production of 750 per month will be reached by March 1.

Canada's Imports 1,406 Cars Under 1913

OTTAWA, CAN., Nov. 30—Canada's imports of automobiles even in war times continue to increase. During September, the second month of the war, Canada imported from the United States 260 automobiles, as compared with 253 in September, 1913. Total imports for the 9 months of 1914, however, show a contraction of 1,406, this year's imports being 3,854, against 5,260 in 1913.

Canada Forbids Rubber and Graphite Exports

OTTAWA, ONT., Nov. 30—An order-in-council has been passed forbidding export from Canada to any country other than part of the British Empire of rubber and graphite. This action has been taken to prevent supplies of the commodities reaching Germany. Canada imports $4,000,000 worth of crude rubber each year and exports about $500,000. About $120,000 worth of graphite is exported, principally to the United States, and the production in Canada amounts to about $100,000 worth per year. It is produced at Buckingham, Que.; Calabogie and Port Emsley, Ont.

DETROIT, MICH., Nov. 30—Walter B. Brady, for the past 6 years special representative with the Studebaker sales department, has resigned to join the Maxwell forces in the same capacity beginning December 1. Mr. Brady was the oldest of the present Studebaker organization in point of years of service. He will travel the entire United States in the Maxwell interests.

Saxon Leases Abbott Factory

Adds 120,000 Square Feet—To Increase Production of Fours and New Six-Cylinder Car

DETROIT, MICH., Nov. 30—The Saxon Motor Co. has taken a 5-year lease of the plant of the Abbott Motor Co., and will occupy the premises January 1, 1915. This will give the Saxon company a total floorspace of 180,000 square feet, of which 60,000 are in the present plant of the Saxon company on Bellevue avenue.

For some time the manufacturers of the Saxon cars, whose business has increased very rapidly, have contemplated either locating in another city offering suitable inducements for a new plant, or building a new plant in Detroit. When it became known that the Abbott company contemplated locating in another plant negotiations were started with that company. Recently the Abbott plant at Beaufait avenue and Waterloo street was purchased by Wallace Bros., from the purchasers of the Abbott assets, but this deal also involved the transfer of subdivision real estate valued at $40,000 and the final transaction was only concluded last week.

It is rumored that the Saxon company will some time next year have a new modern plant erected on Bellevue avenue. At the present time this cannot be undertaken without interfering greatly with the general workings of the company.

The Saxon Motor Co. was organized the latter part of 1913 and has a capital stock of $350,000. The leasing of the Abbott plant involves, all told, about $140,000.

The Saxon company will for the time being continue to occupy its present plant at Bellevue avenue, but as soon as it will be possible the whole works will be located in the Abbott plant, which will be altered or such changes effected to suit the Saxon requirements.

Automobile Securities Quotations

NEW YORK CITY, Dec. 1—Automobile stocks in general experienced a slight increase in the trading on the curb and in private deals this week and tire securities made an even better showing. The following bid and asked quotations are those which a prominent brokerage house finds to obtain in private sales and are to be taken only as a guide until the re-opening of the Stock Exchange.

	1913		1914	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com	200	225	...	...
Ajex-Grieb Rubber Co., pfd	97	102	...	...
Aluminum Castings, pfd	98	101	...	...
J. I. Case preferred	...	...	...	...
Chalmers Motor Company, com	...	95	...	97
Chalmers Motor Company, pfd	...	96	...	...
Electric Storage Battery Co	...	...	...	...
Firestone Tire & Rubber Co., com	...	250	335	340
Firestone Tire & Rubber Co., pfd	102	104	109	112
Garford Company, preferred	80	90	...	...
General Motors Company, com	36	37	68	72
General Motors Company, pfd	73	74½	85	88
B. F. Goodrich Company, com	16	16½	23½	25½
B. F. Goodrich Company, pfd	77	78	...	...
Goodyear Tire & Rubber Co., com	200	210	180	184
Goodyear Tire & Rubber Co., pfd	93	95	99	99¼
Gray & Davis, Inc., preferred	95	100	...	...
International Motor Co., com	...	5	...	...
International Motor Co., pfd	...	15	...	...
Kelly-Springfield Tire Co., com	50	60	60	63
Kelly-Springfield Tire Co., 1st pfd	90	101	75	80
Kelly-Springfield Tire Co., 2nd pfd	...	...	90	95
Lozier Motor Company, com	...	16	...	...
Lozier Motor Company, pfd	...	90	...	...
Maxwell Motor Company, com	2	2½	13	17
Maxwell Motor Company, 1st pfd	18½	19½	44	47
Maxwell Motor Company, 2nd pfd	5½	6	17	19
Miller Rubber Company	120	130	133	138
New Departure Mfg. Co., com	145	160	...	...
New Departure Mfg. Co., pfd	100	102	...	...
Packard Motor Car Company, com	...	...	...	100
Packard Motor Car Company, pfd	91	94	89	...
Peerless Motor Car Company, com	15	25	...	...
Peerless Motor Car Company, pfd	75	85	...	...
Pope Manufacturing Co., com	...	3	...	...
Pope Manufacturing Co., pfd	10	15	...	...
Portage Rubber Co., com	...	35	...	...
Portage Rubber Co., pfd	...	90	...	...
Reo Motor Truck Company	...	7⅛	10½	11
Reo Motor Car Company	..	15½	21½	22½
Splitdorf Electric Co., pfd	...	...	...	...
Stewart-Warner Speedometer Corporation, com.	50	55	46	48
Stewart-Warner Speedometer Corporation, pfd.	96	97	96	99
Studebaker Corporation, com	15	16	...	...
Studebaker Corporation, pfd	66	69	...	...
Swinehart Tire & Rubber Company	78	80	82	85
Texas Company	...	...	...	...
U. S. Rubber Co., com	52½	54½	...	...
U. S. Rubber Co., pfd	98½	99	...	...
Vacuum Oil Company	191	193	202	...
White Company, preferred	104	110	...	...
Willys-Overland Co., com	60	63	70½	75
Willys-Overland Co., pfd	82	88	87	90

The par value of these stocks is $10.00, all **others** $100.00.

Buick Ships 125 Cars a Day

FLINT, MICH., Nov. 28—Although the working force of the Buick Motor Co., was reduced somewhat November 1, an average of 125 cars were made and shipped daily this month, with several higher marks of 150 to 175 and with a low mark of eighty. This was due to the shortage on freight cars as whenever a sufficient number of railroad cars were available they were generally all filled.

Up to the middle of this month the company was fully 10,000 cars ahead in production and sales over the number at that time of the year in 1913. The following figures show the actual number of the year's new models made during July, August, September and October, 1913 and 1914, and represent at the same time the number of cars delivered.

1913		1914
12	July	1,849
859	August	4,671
2,116	September	5,630
3,450	October	5,219
6,437		17,369

Thus in those 4 months of 1914 the company made 10,932 more cars than during the corresponding period in 1913.

Rubber Imports 5,476,049 Lbs. in 3 Weeks

NEW YORK CITY, Nov. 30—The imports of Para rubber at this port from October 29 to November 19 amounted to 5,476,049 pounds. The largest shipment was on October 29, when 1,379,626 pounds were brought in on the steamer Denis from Para and Manaos. The November 19 shipment amounted to 539,147 pounds by the steamer Sao Paulo from Para. The receipts of rubber from Para during the month of November amounted to 1,200 tons, with 400 tons more now afloat for December arrival. The receipts of plantation rubber amounted to 2,583 tons. It is estimated that there is now afloat from Ceylon to London about 700 tons of plantation, in three boats, namely, the St. Egbert, City Delhi and Kabinga, but under the present embargo, of course, none of this will reach the New York market. Advices from Germany are to the effect that all the crude rubber in that country is now being used for tires and other military equipment.

U. S. Rubber Export Co., Ltd., Incorporated

NEW YORK CITY, Nov. 30—The United States Rubber Export Co., Ltd., which has been incorporated under the laws of Delaware with an authorized capital of $100,000, will be a subsidiary of the United States Rubber Co. to handle the export business of the parent company and of its various subsidiary manufacturing companies.

The incorporators are: J. D. Carberry, assistant secretary of the United States Rubber Co.; Samuel Norris, secretary of that company, and F. V. Glynn, who is attached to the secretary's office. Next week the organization of the company will be completed by the election of directors and officers.

Lower Prices on Federal Casings

NEW YORK CITY, Nov. 30—The Federal Rubber Mfg. Co., Milwaukee, Wis., has announced a reduction in prices on its rugged tread casings. The new prices, effective December 1, 1914, are as follows:

SIZE	FORMER PRICE	PRESENT PRICE
30 x 3	$18.20	$13.80
30 x 3½	24.30	18.50
31 x 4	31.55	25.70
33 x 4	33.70	27.55
34 x 4	34.80	28.50
36 x 4½	45.65	40.95
36 x 5	55.60	47.65

Finds Western Conditions Greatly Improved

CLEVELAND, O., Nov. 25—C. A. Emise, sales manager of the Chandler Motor Car Co., has returned from a trip through the South and Pacific coast, during which he visited sixteen states. Everywhere conditions were found greatly improved, in fact they are quite normal, according to Mr. Emise. In the territory west of the Mississippi river the dealers declared themselves very optimistic over the business outlook for 1915. "The great irrigation projects in Arizona, New Mexico and Western Texas are inaugurating a wonderful era in agricultural prosperity, which is bound to have its effects on the sale of automobiles," said Mr. Emise. "In Texas and the other southwestern states the recent improvement in the cotton situation has started a renewal of business acivities all along the line. Cotton planters and brokers are confident that within a very short time the South will forget the temporary embarrassment which followed the fall in the cotton market."

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DETROIT, MICH., Nov. 30—The regular quarterly dividend of 1 3-4 per cent. upon preferred stock of the Packard Motor Car Co. will be paid December 15 to stockholders of record at the close of business on November 30.

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N. A. C. C. Co-operates with Congress

NEW YORK CITY, Dec. 2—At a meeting of the directors of the National Automobile Assn. of Commerce, Inc., held today all members were present excepting L. H. Kittredge, of the Peerless company. The question of what action the chamber shall take in fighting the present Kardo patent litigation was gone over thoroughly and definite action will be taken at the meeting of members tomorrow.

Today a trade committee was appointed, whose duties will be to co-operate with the federal authorities at Washington by furnishing them with any and all information they may be in need of with regard to the automobile industry. The feeling among the automobile makers is that there is no disposition on the part of Congress to inflict any hardships on the industry and the industry in turn is making every advancement to co-operate for the general benefit of trade.

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PIERRE, S. D., Nov. 28—As reflecting the conditions of prosperity in South Dakota the record of ownership of automobiles is significant. From Pierre comes the word that the total number of licenses taken out this year is 20,600 and that before the year is gone the number will undoubtedly pass 21,000.

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Gilbert Answers Allen in Patent Suit

NEW YORK CITY, Nov. 30—E. G. Baker, New York representative of the Gilbert Mfg. Co., New Haven, Conn., has filed an answer in the suit brought bv the Allen Auto Specialty Co. in the United States District Court in New York. He denies that the Gilbert tire cover infringes the Nathan tire cover patent No. 799,662, and declares the patent invalid. Aside from the usual denials in infringement actions Baker alleges that the claims of the Nathan patent, if properly restricted, do not cover the Gilbert device.

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Lozier Hearing Postponed Until Dec. 8

DETROIT, MICH., Nov. 27—Judge Tuttle, of the United States District Court, has postponed the hearing of the Lozier Motor Co. until December 8, or the day after the meeting of the stockholders of the company, who are to decide upon the reorganization plans at a meeting specially called for that purpose for December 7.

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Scarborough Co. Files Bankruptcy Petition

INDIANAPOLIS, IND., Nov. 18—The Scarborough Co., of this city, engaged in the business of manufacturing guide maps for use by automobile tourists, has filed an involuntary petition in bankruptcy and James W. Taylor has been appointed receiver for the concern.

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To Sell Benham Plant Dec. 8

DETROIT, MICH., Nov. 28—The plant of the bankrupt Benham Mfg. Co., at 1882 Mt. Elliott avenue, will be sold at public auction December 8 by the Union Trust Co., trustee. The sale will be subject to confirmation by the district court. The plant consists of a two-story brick and reinforced concrete building 90 by 170, a two-story frame building 53 bv 116, another frame building 40 by 93 and a heating plant. The main building is equipped with machinery and other equipment for automobile manufacturing, while the smaller of the two frame buildings contains machinery and equipment for a wood working plant. The total value of the plant is estimated to be $50,000.

Makers of New Fuel Incorporate

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Zoline Co., a $100,000 Corporation, to Proceed with Manufacture—Car Builders Interested

INDIANAPOLIS, IND., Nov. 30—The Zoline Co. has been incorporated with an authorized capitalization of one hundred thousand dollars. The company is to manufacture Zoline, a substitute fuel for gasoline, invented by John Andrus of McKeesport, Pa., which has been tested at the Indianapolis speedway as reported in THE AUTOMOBILE for November 26. The fuel was tried out in a 1,000-mile run by a Marmon six. The car made 7.42 miles per gallon.

All of the capital stock, except ten shares, will be issued to Mr. Andrus, Carl G. Fisher and Dr. W. H. Chambers of McKeesport, Pa., in consideration of an assignment by them to the corporation of all respective rights under a contract entered into by and between Mr. Andrus and Mr. Fisher on October 10, 1914.

Others interested in the company are James A. Allison, Ernest W. Bradford and Howard C. Marmon, Indianapolis, and Henry B. Joy, Detroit, Mich.

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Willems Is Dodge Foreign Representative

DETROIT, MICH., Dec. 2—*Special Telegram*—G. E. Willems has been appointed as foreign district representative for Dodge Bros., assigned to territory in the Far East. Mr. Willems' appointment is understood to be the first of similar steps to be taken by this company in the near future, looking toward the building up of a stable foreign export business. For several years he represented a large French company in Egypt. Later he left for India where he took up the importation and sale of motor cars.

Market Reports for the Week

Most of the changes in the market reports this week were of the usual order. A number, however, which have been quite steady of late, made changes. These were lead, cyanide potash and rubber. Lead went down $0.10 per 100 pounds, closing at $3.80; cyanide potash dropped from $0.25 to $0.23 and rubber closed at $0.71 a gain of $0.04. Both coppers went up $0.00 1-4 per pound. There was some buying for export to France and more sales to domestic consumers for December, January and February delivery. Tin dropped $0.85 per 100 pounds, closing at $33.15. The local market was quiet. The London market was, however, strong and higher. Since the first of January the imports of tin at New York City and outports have been 39,627 tons. The oils and lubricants markets remained unchanged. The petroleum markets continue steady. Cottonseed oil rose $0.21 a barrel, closing at $5.75.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.13½	.13½	.13½	.13½	.13½	.13½	......
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	1.21	......
Bessemer Steel, ton	18.00	18.00	18.00	18.00	18.00	18.00	......
Copper, Elec., lb.	.12⅜	.12⅜	.12⅜	.12⅜	.12⅜	.12⅝	+.00¼
Copper, Lake, lb.	.12½	.12½	.12½	.12½	.12½	.12¾	+.00¼
Cottonseed Oil, bbl.	5.54	5.60	5.60	5.91	5.86	5.75	+.21
Cyanide Potash, lb.	.25	.25	.25	.25	.23	.23	—.02
Fish Oil, Menhaden, Brown	.38	.38	.38	.38	.38	.38	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	.90	.90	......
Lead, 100 lbs.	3.90	3.90	3.90	3.90	3.80	3.80	—.10
Linseed Oil	.47	.47	.47	.47	.47	.47	......
Open-Hearth Steel, ton	18.00	18.00	18.00	18.00	18.00	18.00	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.71	.71	.71	.71	.71	.71	......
Rubber, Fine Up-River, Para	.67	.68	.71	.70	.71	.71	+.04
Silk raw, Ital.	..	..	..	..	3.90	3.90	......
Silk, raw, Japan	..	..	..	..	3.13	3.15	+.02
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	34.00	33.75	33.50	33.38	33.00	33.15	—.85
Tire Scrap	.05	.05	.05	.05	.05	.05	......

Peerless Gets Big Truck Order Abroad

London Firm Orders 250 and 50 Per Week Thereafter—Standard Also Reports Sales

NEW YORK CITY, Dec. 2—It was learned on good authority today that the Peerless Motor Car Co., Cleveland, O., has recently made a sale of 250 trucks in London through Gaston, Williams & Wigmore. The trucks are mostly 4-ton types to be fitted with conventional army body. Besides this initial order of 250 there is an order for fifty a week after this number has been fulfilled for a period until notification terminating such has been given.

It is also understood that the Standard Motor Truck Co., Detroit, has made a large sale of trucks in London and that shipments of these have been in progress for some time.

Four-Cylinder Pratt $1,950

ELKHARDT, IND., Nov. 30—Two new Pratt models will be marketed for 1915 by the Elkhart Carriage Mfg. Co., Elkhart, Ind. One is a four-cylinder Forty selling for $1,950 with five-passenger body and the other is a six-cylinder Fifty priced at $2,150 when equipped with five-passenger body. Four body styles will be offered with each chassis; two, four, five and seven-passenger types.

These cars are made from standard parts throughout. Continental motors with multiple-disk clutch and Brown-Lipe four-speed gearset with direct on third are used. The four-cylinder motor is an L-head design with cylinders 4.125 by 5.25 inches cast in a block. The six has a bore and stroke of 3.75 by 5.25 inches. The cylinders are cast in threes. The electrical system includes a Gray & Davis starting and lighting system and an Atwater Kent ignition outfit. Timken axles are used on all cars.

The equipment includes a one-man top, Collins curtains, Kellogg power tire pump, Troy clear-vision windshield, Jones speedometer, eight-day rim-wind clock, electric horn, nickel-plated bumper of channel steel, etc.

NEW YORK CITY, Dec. 2—Russell T. Kingsford, chief engineer of the Rushmore Dynamo Works of the Bosch Magneto Co., has tendered his resignation to accept a similar position in charge of the private laboratory now being fitted out by S. W. Rushmore, who recently sold the Plainfield works to the Bosch company.

NEW YORK CITY, Dec. 2—The Donnelly Motor Equipment Co., a local corporation dealing in automobile accessories, has made an assignment to Edward J. Walters. It was incorporated in June, 1913, with a capital stock of $5,000, and Richard F. Ely is president.

Engineer Petard Wounded at Meuse

RACINE, WIS., Nov. 28—Capt. Wm. Mitchell Lewis, president of the L. P. C. Motor Co., Racine, Wis., has received a cablegram from Paris that Capt. René Petard, chief engineer and vice-president of the Racine concern, has been seriously wounded in the fighting at Meuse. M. Petard is a captain of engineers in the French army and has taken part in practically all of the heavy fighting since the outbreak of the war. He was with the range-finding corps in the trenches, but is now in the hospital at Cote d'Or, southeast of Paris. Capt. Petard went to Europe last June to test out the Lewis six, but was pressed into service at once and the car commandered for use by staff officials.

S. A. E. Winter Session January 5-7

NEW YORK CITY, Dec. 2—A tentative program for the winter session of the Society of Automobile Engineers has been announced. The meeting will be held in this city Tuesday, Wednesday and Thursday, January 5, 6 and 7. The meeting on Tuesday will be for the standards committee in the morning, governing committees of sections in the afternoon and council in the evening. All members are invited to attend the session of the standards committee. These meetings will be held in the rooms of the society at 1790 Broadway. Thirteen papers and fourteen standards committee division reports will be submitted for discussion.

The remainder of the schedule will be held at the Engineering Societies Building. It is the regular professional session and is made up as follows:

WEDNESDAY, JANUARY 6, 10 A. M.

President's Address.
Treasurer's Report.
Report of Tellers of Election of Officers.
Report of Membership Committee.
New Business.
Report Ball and Roller Bearings Division.
Report Carbureter Fittings Division.

WEDNESDAY, JANUARY 6, 1 P. M.
In the Auditorium, Engineering Societies Building,
(29 West Thirty-ninth Street.)

PROFESSIONAL SESSION

Recording Devices for Commercial Power Wagons.—Bruce Ford.
Report of Truck Standards Division—Wm. P. Kennedy, Chairman.
Report of Commercial Car Wheels Division.—Wm. P. Kennedy, Chairman.
Report of Electric Vehicle Division.—A. J. Slade, Chairman.

INFORMAL DINNER, AT 6.30 P.M.
At the Engineers Club
(32 West Fortieth Street.)

WEDNESDAY, JANUARY 6, 8 P. M.
In the Auditorium, Engineering Societies Building,
(29 West Thirty-ninth Street.)

Pros and Cons of Correct Tire Inflation.—C. B. Whittelsey.
Report of Pleasure Car Wheels Division.—Henry Souther, Chairman.
Wire Wheels versus Wood Wheels.—R. B. Mudge.
Wire Wheels versus Wood Wheels.—Geo. W. Houk.
Report of Lock Washer Division,—J. E. Wilson, Chairman.
Report of Miscellaneous Division.—J. G. Utz, Chairman.

THURSDAY, JANUARY 7, 10 A. M. SHARP
In the Auditorium, Engineering Societies Building,
(29 West Thirty-ninth Street.)

PROFESSIONAL SESSION

Report of Electrical Equipment Division.—A. L. Riker, Chairman.
Railway Gasoline Locomotives.—A. H. Ehle.
Railway Motor Cars.—H. G. Chatain.
Warning Signals.—Alden L. McMurtry.
Report of Research Division.—David L. Gallup, Chairman.

THURSDAY, JANUARY 7, 1 P. M.
In the Auditorium, Engineering Societies Building,
(29 West Thirty-ninth Street.)

PROFESSIONAL SESSION

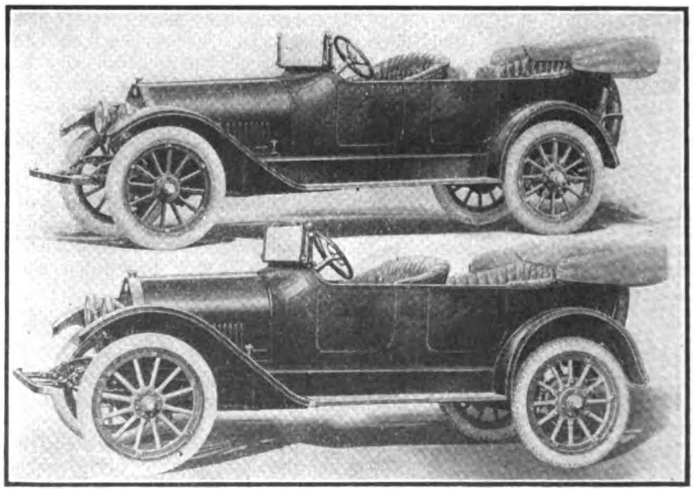
Malleable Iron Castings.—Dr. Richard Moldenke.
Report of Frame Sections Division.—J. G. Perrin, Chairman.
Report of Iron and Steel Division.—Henry Souther, Chairman.
Nomenclature of Car Parts.
Allowances for Piston Fits.—E. W. Weaver.
Worm Gears.—C. T. Myers.

INFORMAL DINNER, AT 6.30 P.M.
At the Engineers Club
(32 West Fortieth Street.)

THURSDAY, JANUARY 7, 8 P. M.
In the Auditorium, Engineering Societies Building,
(29 West Thirty-ninth Street.)

PROFESSIONAL SESSION

Automobile Engineering Curricula.—Prof. W. T. Fishleigh.
Motor Car Testing.—A. B. Browne.
Report of Springs Division.—C. W. McKinley, Chairman.
Report of Standards Exchange Division.—K. W. Zimmerschied, Chairman.
The European Situation as Affecting America.—A. Ludlow Clayden.



Upper—Pratt six-cylinder Fifty selling at $2,150 when equipped with five-passenger body. Four styles are furnished, two, four, five and seven-passenger for both this model and the four-cylinder chassis. Lower—Pratt four-cylinder Forty selling at $1,950 with five-passenger body

To Make Low-Priced Electrics and Trucks

Storms Company Organized to Build Passenger and Delivery Cars Selling at $650 to $950

DETROIT, MICH., Nov. 28—The Storms electric passenger and commercial cars which are to be placed upon the market in January will be made by the Storms Electric Car Co., a new concern, which has just been organized. William E. Storms, formerly with the Anderson Electric Car Co., is the designer and president of the company, Ferdinand H. Zilisch, a business man of Milwaukee, Wis., is vice-president and F. T. King, Detroit, is secretary and treasurer.

One standard chassis will be made by the new company, to take three different bodies, a coupé, a roadster and a delivery body. Wheelbase will be 90 inches and tread 44 inches. completely equipped with electric lights inside and outside, electric horn and other stock equipment, the coupé is to sell at $950, the roadster at $750 and the delivery car at $650. The coupé will be made to seat three persons and the roadster two. The vehicles will be fitted with a specially designed battery which will travel 40 to 50 miles on a single charge. The commercial car will have a body to carry a load of 500 pounds.

Temporarily the headquarters are with F. T. King, 340 Gratiot avenue. Negotiations are now pending concerning a plant.

PLAINFIELD, N. J., Nov. 28—The Spicer Mfg. Co., maker of universal joints in this city, has issued a series of five data sheets for the handbook of the Society of Automobile Engineers. These data sheets give complete illustrations and measurements of the different universal joints manufactured by this company. The illustrations show that only minor details have been made in these joints for 1915, but that radical changes are being made in propeller shafts in motor cars and trucks. The tubular construction has taken hold very strongly as it is lighter and stiffer than the solid shaft, thereby being less susceptible to whipping. With longer propeller shafts due to increased wheelbases in both passenger cars and trucks the time is opportune for greater development in the tubular propeller shaft.

BOSTON, MASS., Nov. 28—Massachusetts motor organizations are now planning a campaign to have the law regarding blowing horns changed so that there will not be such a constant din in the city streets day and night. Under the law the drivers must blow the horn at every cross street where the view is obscured, also to warn pedestrians of danger. Another section states that it must not be sounded so as to make a harsh, and unreasonble noise. But when a driver is in the thickly settled part of the cities he must blow the horn every few feet because of the cross streets.

Goodyear Safety Work Brings Good Results

AKRON, O., Nov. 28—A comprehensive report is being prepared by the Goodyear Tire & Rubber Co., showing the result, at the close of the fiscal year, of the Safety First movement in the factory.

For several years the company has had a safety engineer, whose business it is to install safeguards for machines and make safe places found dangerous. It is interesting to note that when the safety movement was first begun Goodyear factory employes were skeptical and some of them regarded the whole proposition as a joke. But, so greatly have factory accidents been cut down in number that the skepticism is all gone and nearly all of the 7,500 workmen are aiding the movement heartily. They are helped in this by a series of suggestion boxes, in which employes are requested to drop written recommendations, etc., the valuable ideas being rewarded accordingly.

The organization operates as follows: First there is a Central Committee, with the assistant to factory manager as chairman, and a membership of nine men from various parts of the plant who have opportunities for getting about. They report regularly on dangerous conditions found, and each Central Committeeman is chairman of a division inspection committee, so the work is very thorough. One result is that only four out of the 307 men on the committees have been victims, of injury, serious or otherwise.

A new development of the welfare work is a school for foremen,—two lessons a week for 6 months on Organization and Management. Other movements firmly established are lunch room, factory newspaper, library, labor department, hospital and police department, and fine results from all these movements for improving working conditions are reported.

Oldsmobile Co. Advances Pioneer Employees

LANSING, MICH., Nov. 28—Statistics prepared under the direction of D. F. Edwards, comptroller of the Olds Motor Works, reveal that the automobile business holds out assurance of just reward for employees who apply themselves diligently and display intelligence in their work.

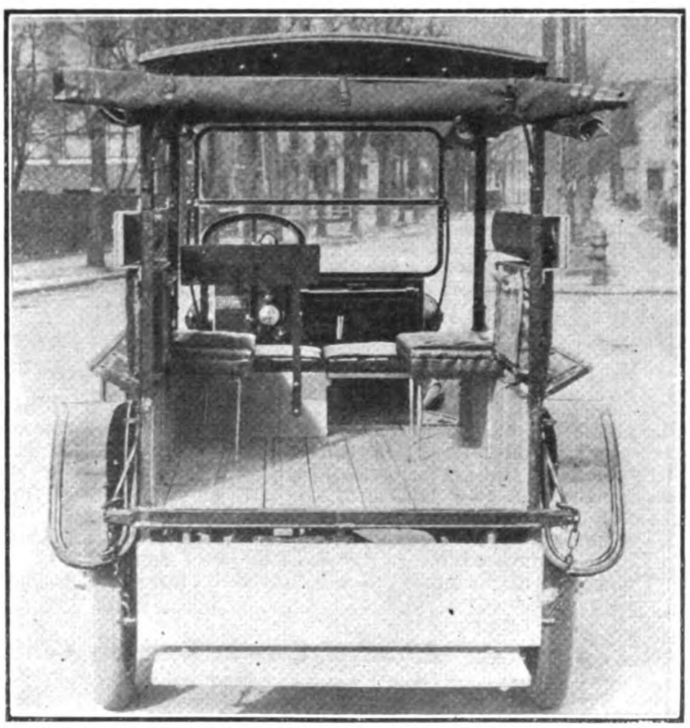
It was shown by Mr. Edwards in the course of his investigation that approximately 30 per cent. of the money paid in salaries and wages by the company since August 1 was paid to employees who had been identified with the company for a period of 3 years or longer.

It was also pointed out that 37 per cent. of the people on its payroll for the period ending October 31 had been in the employ of the company for 3 or more years, and that 30.9 per cent. of its employees had been on the payroll for 5 years or more.

What was even more noteworthy was the fact that 7 per cent. of the employees had been constantly connected for 10 years or longer with this company.

Reasonable remuneration of employees was a point touched upon by Mr. Edwards. To pay in proportion to the worth of an employee and to promote men long identified with the organization in preference to men secured from outside sources is a policy which, Edwards states, has resulted in keeping employees satisfied and living up to their best possibilities.

SPRINGFIELD, ILL., Nov. 28—The officers of the Wilson Tire and Rubber Co. announce that the stock in that concern, which has been selling at a par value of $10 per share, was advanced 25 per cent. on November 24. They state that the factory building in Harvard Park is practically completed, that some of the machinery has already arrived and that much equipment is on the way.



The Studebaker Corp., Detroit, Mich., is now furnishing its dealers with the ten-passenger car of convertible type illustrated above. This vehicle is identical in general construction as far as the chassis is concerned with the four-cylinder delivery car, the only difference being the body. The latter has collapsible seats running lengthwise, and if there are no passengers these seats may be pulled up and the entire body used as a baggage car. Even with all the seats occupied there is still enough room to carry extra luggage

306-Mile Open Race for Oklahoma City

Road Contest for $5,000 Purse Planned for May 1 as Annual Event

OKLAHOMA CITY, OKLA., Nov. 30—A 306-mile road race for a $5,000 purse, to be known as the Southwest Sweepstakes, open to automobiles of every make and horsepower to be held in Oklahoma City May 1 of next year, and annually thereafter is the plan now under way to completion by the Automobile Dealers' Assn., Oklahoma City.

Other purses and other races are being planned by the members of the association to arouse interest in automobile affairs in the southwest. George W. Woods, a publicity agent, conferred with a number of local automobile dealers and the plans for the races are now in progress. Dick Carhart, Overland agent and vice-president of the association, proposes that the event shall be made an annual affair. It is his proposal that the Oklahoma City 26-mile boulevard be linked with a portion of the Gulf-to-Winnipeg road, making a 9.9 mile course for the races.

Surveyors have been employed and are making blueprints of the proposed course which will be submitted to the A. A. A. for approval. It is the plan of those boosting the races that many of the dealers and manufacturers shall be interested in the Oklahoma City race as an opportunity to tune up their cars for the 500-mile Indianapolis race on Decoration Day.

Definite plans have been arranged already, however, for a 99-mile, free-for-all road race for stock cars, to be held here Thursday, April 29, or two days before the proposed Southwest Sweepstakes. To make the races a success an association to be known as the Southwest Racing Assn. is being organized.

To put the course in shape for fast time, the association plans to resurface many of the soft spots at a cost of several thousand dollars, eliminating a few bad turns and banking others, as well as dragging and rolling the entire course. In addition the entire course will be oiled. The automobile clubs of several of the Southwestern states have already written that they would assist.

Race Planned for San Diego, Jan. 9

LOS ANGELES, CAL., Nov. 27—A road race has been projected for San Diego which may take on the color of one of the big speed events of the 1915 season. The date as named by the boosters for the event is January 9, and it is believed that the racers entered at Corona will remain in Southern California for the San Diego event and then go north for the Vanderbilt and Grank Prix races, which are to be held on the exposition course February 22 and 27. The San Diego purse is to come from private individuals. The plan as outlined is for 100 sportsmen to give $100 each, making one of the largest purses ever offered for a motor racing event in the Pacific coast.

Maxwell First Entrant for Indianapolis Race

INDIANAPOLIS, IND., Nov. 28—First entry for the next Indianapolis 500-mile race has already been made, three Maxwells being sent to the post 6 months ahead of the contest. Billy Carlson, the Los Angeles veteran, is the only driver to be named thus far, however, the rest being reserved for choice later on, with Tetzlaff and Oldfield as favorites.

The design of the Maxwells, as last year, is attributable to Ray Harroun, winner of the 1911 500-mile contest.

The piston displacement of the cars falls barely under 300 cubic inches, the limit prescribed by the speedway management. Their bore and stroke is 3 3-4 by 6 3-4, classifying them as of the so-called long-stroke type.

One of the machines will be finished shortly and taken to the speedway for a thorough tryout, lasting a week or 10 days. Harroun himself will conduct these tests.

Originally Harroun planned to produce a double set of cars, reserving one for entry in the French Grand Prix. The European war, however, called a halt to that program.

Hudson 6-54 Wins Harrisburg Economy Run

HARRISBURG, PA., Nov. 26—Eighteen cars were entered in the annual Economy Contest of the Motor Club of Harrisburg held on Thanksgiving Day when the 111-mile run over Pennsylvania hills, a Hudson 6-54 carried off first honors by a narrow margin over a Buick six. A Hudson 6-40 finished third and a Haynes six fourth.

The trip included a route from Harrisburg to Gettysburg, Abbottstown, York, Columbia and Elizabethtown. An average speed of 18 miles an hour was set, but nearly every car made the trip in an average better than 20 miles an hour. The cars were examined, weighed and filled early in the morning by a technical committee under the supervision of Referee W. R. Douglas. Atlantic Refining automobile gasoline of 63-64 gravity was used.

The awards were made according to the weight carried for the gasoline consumed and the heavier loaded cars had something on their lighter rivals. Honors for gasoline consumption went to a little Metz roadster with an average of 32.9 miles to a gallon, but in the touring car class an Overland took first honors with 26.9 miles. The Haynes sixes also made splendid records. Much interest centered in the Cadillac eight, which made an average of 16.9 miles to a gallon. An Autocar truck with passengers also made a successful trip.

The cars that checked at the final control and their records are given in the accompanying table.

Trucks to Be Exhibited at Detroit Automobile Show

DETROIT, MICH., Nov. 30—The annual automobile show of the Detroit Automobile Dealers' Assn. will be held in the plant of the Detroit Lumber Co., West Jefferson avenue, between Campbell and Junction avenues, January 16 to 23.

The building where the show was held in former years was found entirely inadequate for the ever-increasing automobile industry and it was not deemed advisable to take several buildings located far from each other.

The local show will be held in two buildings separated from each other by only 30 feet. The first building from Jefferson avenue, which will be reached from a 100-foot covered walk, is a frame structure one story high, 210 by 136 feet. The trucks, delivery wagons, traction engines, marine motors and motor boats are to be shown there also, and, if possible, the latest Wright biplane. The main building is a three-story concrete structure with two floors 210 by 138 and the third floor 210 by 40. The passenger cars and the accessories are to be shown on the first two floors, all the stands for parts and accessories being against the walls. The third floor will have a café, a cabaret and a dancing pavilion.

One of the features of the show is to be a historical section in the main building where manufacturers will be urged to show their earliest models, either of passenger or of racing cars. Oldfield has promised to have his famous "999" on display and the Winton company is to send its Winton Bullet.

J. C. Ayres, Detroit manager of the General Motors Truck

Scores of Cars in Economy Contest of Harrisburg, Pa., Motor Club

Car	Entrant	Weight	Carbureter	Bore	Stroke	Cylr.	Gas consumed gal.	Gas consumed qt.	Gas consumed pt.	M.P.G.	Percentage by weight
Hudson 6-54	F. O. Horting	5,750	Zenith	4⅛	5½	6	5	1	¼	21.0	.11757
Buick Six	G. B. Zech	5,510	Marvel	3¾	5	6	5	0	1	21.7	.12178
Hudson 6-40	I. W. Dill	4,425	Zenith	3½	5	6	4	3	1¼	22.6	.14192
Haynes	A. McElwain	3,980	Rayfield	3½	5	6	4	2	½	24.3	.14674
Cadillac	Crispen Motor Car Co.	5,582	Cadillac	3⅛	5⅛	8	6	2	½	16.9	.15193
Overland No. 81	A. Redmond	3,500	Schebler	4	4½	4	4	0	1	26.9	.15555
Haynes	Harrisburg Auto Co.	4,100	Rayfield	3½	5	6	5	0	0	22.2	.15609
Overland No. 80	A. Redmond	3,920	Schebler	4⅛	4½	4	5	3	0	19.3	.16225
Paige	G. R. Bentley	4,030	Stewart	4	5	4	6	1	0	17.8	.19859
Hupmobile	Ensminger Motor Co.	3,465	Zenith	3¼	5½	4	6	⅔	0	18.0	.22770
Jeffrey	C. H. Conrad	3,890	Stromberg	3	5½	6	7	0	0	15.8	.23033
Metz	Monn Bros.	1,805	Holly	3¾	4	4	3	1	⅞	32.9	.23823
Autocar Truck, 1½-ton	A. Redmond	5,475	Stromberg	4⅛	5	2	10	0	0	11.1	.23379

Co., is in charge of the truck section and it is reported that thus far manufacturers of the Buick, Commerce, Federal, General Motors Truck, Packard, Pierce and Standard trucks have applied for space.

Eleven More Exhibitors for Big Shows

NEW YORK CITY, Nov. 28—More accessory exhibitors for the Fifteenth National Automobile Shows in the Grand Central Palace, New York, and the Coliseum and First Regiment Armory, Chicago, next January have been allotted space. During the past week room for the following concerns were found at both shows: Cox Brass Co., Albany, N. Y., and the Standard Roller Bearing Co., Philadelphia, Pa. Additions to the New York show only include the Commercial Lubricating Co., Meadow and Jackson streets, Philadelphia, Pa.; B. W. Spitter, Dorchester, Mass.; Mutual Auto Accessory Co., 58 W. Sixty-fifth street, New York; Zenith Carbureter Co., Detroit, Mich.; New York Sporting Goods Co., 15 Warren street, New York; Dujardin Rubber Co., Brooklyn, N. Y.; Hampton Kerosene Carbureter Co., 1876 Broadway, New York, and Van Norman Machine Tool Co., Springfield, Mass.

There is still some space being made available in Grand Central Palace, New York, but the Chicago buildings are about filled to capacity.

Germany's Export Trade—1912 Foreign Business

(*Continued from page* 1013)

many and one eight from the United States. The statistics for the years from 1909 to 1912 inclusive are:

PASSENGER CARS

	1912	1911	1910	1909
763	$1,663,000	$671,750	$313,000	$35,750

COMMERCIAL VEHICLES

144	411,500	155,000	111,250	48,000
907	$2,077,500	$826,750	$424,250	$83,750

PARTS

...	*$349,250	....	....	....

*Of which $216,750 for automobile tire covers and tubes.

MOTORCYCLES

97	$21,250	$8,000	$6,500	$3,250

British India Important

The British India business is becoming more and more important every year. During the last 7 years ending March 31, 1914, the total value of the cars and parts imported, according to British reports, was $21,055,000 of which $2,-110,000 was credited to the year 1907-1908 and $5,750,000 to the year 1913-1914. Exports from Germany for 1909, 1910, 1911 and 1912 were:

PASSENGER CARS

	1912	1911	1910	1909
48	$83,250	$47,750	$56,000	$20,000

MOTORCYCLES

22	$4 000	$6,250	$3,500	$5,000

PARTS

...	*$312,500	....	....	....

*Including automobile covers and tubes for $176,250.

A $4,275,000 Total

During the 12 months ending March 31, 1914, there were imported a total of 4,419 motor cars and motorcycles, having a total value of $4,275,000, while during the 12 months ending March, 1913, the total was 3,089 cars and motorcycles, having a value of $2,985,000. Out of the 2,880 passenger cars and seventy-six commercial vehicles imported in 1914, 1,669 of the former and forty-two commercial vehicles came from Great Britain, whose share out of the total imports in 1914 was $3,035,000 or three-quarters of the total imports.

The average value of the British car or chassis imported was $1,540, while the average value of the other foreign cars imported was $1,000.

The value of the imports from other countries in 1914 was $370,000 for the United States; $265,000 for Germany; $240,-000 for Belgium; $165,000 for France, and $15,000 for Italy.

Germany's Australasian Share $1,000,000

While total value of the German cars, parts, motor cycles imported into Australasia in 1912 represent a value of a little more than $1,000,000, the total value of these imports from all countries of the world totaled very nearly $9,000,000. The appended chart gives the total value for chassis or complete cars, automobile bodies only, and motorcycles and all parts, either for cars or motorcycles. The total value of imports into Australasia are:

CHASSIS OR COMPLETE CARS

1912	1911	1910	1909	1908
$7,257,475	$5,090,100	$3,471,230	$2,177,570	$1,414,515

BODIES

1,100,440	802,710	480,015	313,210	215,990

MOTORCYCLES AND PARTS

623,270	292,290	229,905	168,290	90,750
$8,981,185	$6,185,090	$4,181,150	$2,659,070	$1,721,255

England has been the biggest supplying country for Australasia. The United States are second on the list, then comes France, Belgium, Italy, Canada, Germany, as far as the imports during the first 6 months of 1912 indicate.

$2,889,620 South Africa's Total

The total value of the automobiles and automobile parts imported into South Africa in 1912 was $2,889,620 of which $1,549,575 is credited to Great Britain, while the United States are next with the total of $720,025. Canada follows with $251,110, then comes Germany with imports totaling $166,960, then France and Italy.

The total value of the motorcycles and motorcycle parts imported in 1912 was $771,180 of which $682,765 is to the credit of the British manufacturers. Germany follows, then France and the United States.

The increase of the automobile imports in 1912 over 1911 represents in value more than $1,000,000 while the motorcycle imports increased by over $400,000.

British consular reports give some interesting data about the imports of chassis and bodies into New Zealand for the years 1910 to 1913 and, while the details per country are not shown, it will allow those interested to get a good idea of the increasing business in that country.

CHASSIS

Year	Number	Total Value	Average Value
1910	772	$900.325	$1,166
1911	1,524	1,581,925	1,030
1912	2.340	2.113 300	903
1913	2,428	2,199,610	906
Total	7,064	$6,795,160	962

BODIES

Year	Number	Total Value	Average Value
1910	726	$206.250	284
1911	1,473	433,625	294
1912	2,265	697,115	307
1913	2,331	712.815	305
Total	6,795	$2,049,805	301

The imports of chassis from the United States increased in value from $96,607 in 1910 to $438,983 in 1911 and to $681,269 in 1912. During those 3 years the imports from Great Britain increased respectively from $126,586 to $905,-692 in 1911 and to $957,097 in 1912. Thus the American business increased nearly $250,000 in 1912 as against an increase of only $50,000 for the British business. The imports of cars and parts from the United States represented nearly one-third out of the total imports in 1912.

Factory Miscellany

WILL Enlarge Hudson Factory—Evidence of satisfactory business conditions is shown by the announcement of additions to be made to the factory of the Hudson Motor Car Co., Detroit. It has, therefore, been decided to add a third story to the main factory building and to three of the largest wings, an addition of floor space 2,200 feet long by 60 feet wide. In construction the addition will conform to the present style of pressed brick and concrete. Work on the additional story will begin at once. It is to be completed on March 1, 1915.

Sevison's $5,000 Fire Loss—The factory of the Sevison Electric Co., Elkhart, Ind., maker of automobile fixtures, suffered $5,000 loss from fire November 17.

Xenia Rubber Adding—The Xenia Rubber Co., Xenia, O., is installing a new mill at its plant on West Main street which will increase the factory of the plant four or five times.

Morrill & Morley Move—The Morrill & Morley Co., Benton Harbor, Mich., manufacturer of automobile parts and spray pumps, has moved into its new plant and is now also making automobile body castings.

Chester Co. to Make Trucks—The Chester County Motor Co., Coatesville, Pa., has increased its captial stock to $500,000 and plans the construction of a factory for the manufacture of commercial trucks. J. Edwin Brinton is president.

Mercury Cyclecars at $200.—The Michigan State Auto School, 11 Selden avenue, Detroit, Mich., which has purchased the Mercury Cyclecar Co., will continue to make the Mercury cyclecars. They will be sold at $200 instead of $375, the old price.

Louisville Co. to Make Inner Tubes—The Southern Rubber Products Co., Louisville, Ky., has been incorporated with $25,000 capital stock by A. F. Wolke and others and will establish a plant for the manufacture of inner tubes for automobiles.

Silver Ray Makes Lamps—The Silver Ray Lamp Co., Cleveland, O., recently incorporated, has leased a two-story building from the Cleveland Fixture Co., 1315 East 40th street, and will install a factory for the manufacture of automobile lamps.

New Truck Factory in Columbus—It is reported that Weller & Thomas have had plans prepared for a motor truck factory, 100 by 190 ft., two stories, of brick construction, to be erected at Columbus, O. J. A. Thomas, 287 Dryden avenue, Zanesville, O., can furnish full particulars.

Stutz Buys Two Lots—The Stutz Motor Car Co., Indianapolis, Ind., has bought two lots adjoining its plant on the north at Tenth street and Capitol avenue, to provide for further expansion. The lots front 100 feet in Capitol avenue and have a depth of 208 feet. The consideration was $10,000.

Ford Plant Ready in January—The Ford Motor Co. expects to have its assembling plant in Atlanta, Ga., now in course of construction at Ponce de Leon avenue and the Southern railway belt line, completed by the middle of January. The Ford people will employ some 200 or 300 men in the new plant and will materially increase the banking business of Atlanta's banks, as well as add the spending capacity of its help to the city's mercantile business.

Gallup in New Tire Co.—E. E. Gallup, of the Gallup Rubber Co., Pittsburgh, Pa., and several associates have arranged for the purchase of a large manufacturing location in the southwest part of Minerva, O. It is the intention of the company to immediately begin the erection of a large rubber and automobile tire plant with a capacity of 500 casings and inner tubes per day, demanding the employment of from 300 to 500 men. The company that will in all probability be incorporated under the laws of Ohio with a capitalization of $200,000, will be named in honor of Minerva as the Minerva Rubber Co.

Maxwell Charters Boat for Shipment—Recently the Maxwell Motor Co., Detroit, Mich., chartered the White Star Line steamer Wauketa to carry fifty Maxwell cars to its Toledo distributors, Landman & Griffith. It is claimed that this is the first time that an entire boat load of automobiles have been shipped by one concern.

Midgley Tires in December—The Midgley Tire & Rubber Co., Lancaster, O., is busily engaged in installing the calender, the last piece of mill machinery to arrive. This piece of machinery is to roll the rubber into strips. The boilers and engine are all ready to run, although several small pipes are yet to be connected. While the plant will likely be running by December 1, no tires will be produced until the 15th, it is believed.

Universal Oxygen Doubling Output—The Universal Oxygen Co., Sheboygan, Wis., which established a plant for the production of gas for concerns operating welding and cutting apparatus about 8 months ago, is preparing to double the output. For 2½ months the plant has been working day, night and Sunday shifts and the monthly production of gas has reached nearly 90,000 cubic feet. This is being shipped in steel drums to all parts of the country. Until recently the supply of containers was derived from Germany, but this has now been stopped by the war and in doubling the size of the gas producers, the company is planning to add a machine shop for the manufacture of drums. About 1,500 German-made drums are now in use. The company operates under the Rowlands-Mueller gas producer patents.

The Automobile Calendar

Dec. 1-4.........New York City, Annual Meeting of the American Society of Mechanical Engineers.

Dec. 12-19.......Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.

Dec. 14-18.......Chicago, Ill., American Good Roads Congress.

Jan. 2-9.........New York City, Annual Automobile Show, Grand Central Palace.

Jan. 2-9.........New York City, Automobile Salon, Grand Ball Room of Astor Hotel, Automobile Importers' Alliance, E. Lascaris, Pres.

Jan. 5-7.........New York City, Engineering Societies' Bldg., Winter Meeting Society of Automobile Engineers.

Jan. 9-16........Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.

Jan. 16..........Detroit, Mich., Show.

Jan. 16-23.......Cleveland, O., Show, Cleveland Automobile Show Co., F. H. Caley, Mgr.

Jan. 23-30.......Chicago, Ill., Automobile Show, First Regiment Armory.

Jan. 23-30.......Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.

Jan. 25-30.......Fall River, Mass., Show.

Jan. 25-30.......Buffalo, N. Y., Show, Broadway Auditorium, Buffalo Automobile Dealers' Assn.

Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.

Feb..............Portland, Ore., Show, Portland Auto. Trade Assn.

Feb..............Toledo, O., Show, Toledo Auto Show Co.

Feb. 15..........Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids *Herald*, C. S. Merriman.

Feb. 15-20.......Omaha, Neb., Show, Auditorium, C. G. Powell.

Feb. 22..........San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

Feb. 23-27.......Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.

Feb. 23-27.......Syracuse, N. Y., Show, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.

Feb. 27..........San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

Mar. 6-13........Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.

Mar. 9-15........Des Moines, Ia., Show, C. G. Van Vliet.

Mar. 14..........San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.

April............Calumet, Mich., Show, Coliseum.

May 29...........Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.

Sept. 20-25.......San Francisco, Cal., International Engineering Congress.

The Week in  the Industry

Motor Men in New Roles

AUGHE Chalmers Treasurer—H. J. Aughe has been elected treasurer of the Chalmers Motor Co., Detroit, Mich., succeeding C. A. Pfeffer, who was recently appointed assistant general manager.

Mr. Aughe has been associated with the company for the past 6 years and has won his way from the clerical ranks of the treasurer's department to his present position. He was previously general auditor. He assumes the duties of treasurer immediately.

Hopkins Heads Cadillac in Atlanta—Lindsey Hopkins will become on or about December 1 executive head of the Atlanta Cadillac Co., Atlanta, Ga.

Jessup District Sales Manager—C. A. Jessup has been made Southern district sales manager for the Kelly-Springfield Tire Co., with headquarters in Los Angeles, Cal.

Jackson Resigns from Bailey Electric—L. B. Jackson, chief engineer of S. R. Bailey & Co., Inc., Amesbury, Mass., has resigned. His future plans are not definitely decided.

Loomis Heads Southern Motors—G. S. Loomis, formerly department head in the sales division of the Packard Motor Car Co., Detroit, Mich., is now general manager of the Southern Motors Co., Louisville, Ky., one of the most important automobile business concerns in the South and which handles the Packard, Hudson, Dodge gasoline cars and Detroit electrics.

Copley Franklin's Spokane Manager—L. B. Copley arrived in Spokane, Wash., during the past week to take the management of the Franklin Auto Sales Co., distributor of the Franklin car and Kelly-Springfield trucks.

Allyn Tacoma Speedway Pres.—At the annual meeting of the Tacoma Speedway Assn., Tacoma, Wash, Frank Allyn was re-elected president; F. E. Jeffries, vice-president; H. E. O'Neal, treasurer, and George Dunn, secretary.

Harshberger J.-M. Agent—The H. W. Johns-Manville Co. has named Z. F. Harshberger its agent for Indiana, with headquarters in Indianapolis. Under the Indiana law an outside corporation must name an official agent upon whom court papers may be served.

Brown Seattle Firestone Manager—C. W. Brown, for several years a member of the Firestone sales staff in San Francisco and formerly manager of the Oakland branch of the Continental Tire Co., has been named manager of the Seattle branch of the Firestone Tire & Rubber Co., succeeding Ed. L. Campion, who resigned to become sales manager of the Marathon Tire Co.

Lemley Seattle Manager—G. G. Lemley, for 2 years purchasing agent and treasurer of the automobile and accessory firm of Ballou & Wright, has been named manager of the Seattle, Wash., store of the company, succeeding A. H. Jones, who has retired to devote his time to developing a new non-skid tire.

Jack's Former Position—It was stated in these columns last week that R. F. Jack, formerly assistant chief engineer of the Cadillac Motor Car Co., Detroit, had been appointed chief engineer of the Russell Motor Car Co., Ltd., Toronto, Ont. The name should have been R. K. Jack and his former position was assistant to the Cadillac chassis engineer, Mr. Snell.

Bauer Edison's Chicago Manager—F. Bauer has been appointed manager of the Chicago office, Edison Storage Battery Co., Orange, N. J., succeeding C. B. Frayer, who retired November 30 to devote himself to private interests. Mr. Bauer has been with the Edison company about a year as assistant manager of the railway department. He is president of the Railway Electrical Supply Manufacturers Assn., an organization in which he has been active since its formation.

Recent Incorporations in the Automobile Field

Canada

QUEBEC—Safety Tire Co.; capital, $1,000,000; to manufacture wheels, rims, tires, etc. Incorporators: Joseph G. Frenette, Arthur Moisan, Ernest Taschereau and others.

SUMMERSIDE, P. E. I.—Canadian Auto-Pneumatic Pump & Machinery Co.; capital, $35,000. Incorporators: J. A. Van Tilburg, F. A. Johnson and D. A. Pickering.

TORONTO, ONT.—Anglo-Canadian Motor Sales Co.; capital, $50,000; to manufacture and deal in automobiles. Incorporators: A. G. Browning, A. Fry, G. E. Buchanan, all of Toronto.

Connecticut

STAMFORD—Motor Sales Co.; capital, $50,000. Incorporators: Allen Selden, A. K. Shaw and Floyd Bartram, all of Stamford.

WATERBURY—International Top Co.; capital, $100,000; to manufacture automobile tops. Incorporators: W. R. Upson, A. W. Chenoweth, G. W. Seaton.

Delaware

WILMINGTON—Pneumatic-Hub-Tire-Wheel Co.; capital, $500,000; to manufacture motor car wheels and tires. Incorporators: G. J. Lampton, N. M. Rowland and L. C. Evans, all of Louisville, Ky.

Illinois

CASEY—K. L. Mfg. Co.; capital, $100,000; to manufacture gasolene dispensers. Incorporators: W. B. Linn, C. E. Bennett and J. H. Barker, all of Casey.

CHICAGO—Advance Garage Co.; capital, $2,500; to manufacture and deal in, store and repair motor vehicles. Incorporators: Samuel Topliff, Sigrid Erickson and Homer H. Cooper.

CHICAGO—Automobile Securities Co.; capital, $2,500; to deal in, repair and rebuild motor cars, parts and accessories. Incorporators: H. T. Potter, K. M. Lorenz and L. I. Bretz.

LIBERTYVILLE—Maher Mfg. Co.; capital, $50,000; to manufacture and deal in motor car accessories, lighting fixtures, etc. Incorporators: Nathan L. Maher, Lucas W. Maher and Elton C. Armitage.

Indiana

SOUTH BEND—Standard Auto Supply Co.; capital, $10,000; motor car supplies. Incorporators: Ignatius K. Werwinski, James E. Scott, Joseph Kish, Jr., Julius Fodar and Charles Jones.

SOUTH BEND—South Bend Garage Co.; capital, $5,000. Incorporators: A. D. Parker, G. W. DeClements, D. C. Rogers.

Kentucky

LOUISVILLE—Falls City Auto Co.; capital, $6,000; to supply automobile hearses and carriages for funerals. Incorporators: E. C. Pearson, S. J. McElliott, John Schlidt, Henry Bosse, L. E. Cralle.

PADUCAH—Baker Auto Co.; capital, $5,000; to deal in automobiles. Incorporators: C. N. Baker, E. M. Baker, E. H. Boss.

Massachusetts

BOSTON—Needham Tire Co.; capital, $350,000; to manufacture automobile tires. Incorporators: J. S. Patterson, and others.

Michigan

DETROIT—Electric Welder Co.; capital, $50,000. Incorporators: A. W. Mairs, William F. Schultz, A. F. Sellers and E. A. Buckman.

DETROIT—Michigan Storage Battery Co.; capital, $50,000; to manufacture storage batteries. Incorporators: L. C. and S. G. Knop, N. T. Lawson.

DETROIT—Park Motor Works; capital, $5,000. Incorporators: George Gilmore, Clarence G. Hill and Agnes Callahan.

DETROIT—Rob Roy Mfg. Co.; capital, $20,000; to manufacture motor car parts. Incorporators: Robert Wachman, A. Leroy May, Harry Katz, Gilbert Holmwood, Henry Platz and William E. Burns.

DETROIT—Wolverine Motor Specialty Co.; capital, $1,000; to deal in motor car supplies. Incorporators: Ada S. and Roy W. Kumler and Chas. R. Robertson.

SAGINAW—Letts Auto & Taxi Co.; capital, $7,500; general motor vehicle business. Incorporators: William F. and Charlena D. Letts.

Minnesota

MINNEAPOLIS—Brasie Motor Car Sales Co.; capital, $50,000; deal in automobiles. Incorporators: C. H. Walker, Ole Martinson, Oscar Hellum.

MINNEAPOLIS—Hartsough Tractor Co.; capital, $1,000,000; to manufacture the Lion tractor, a new two-wheel engine invented by D. M. Hartsough.

MINNEAPOLIS—Jackson Motor Co.; capital, $15,000; to deal in automobiles. Incorporators: Fred Darling, N. S. Davis, A. A. Wilson.

MINNEAPOLIS—Simplex Tractor Co.; capital, $250,000; to manufacture tractors. Incorporators: J. W. Muir, G. H. Wilson, C. E. Cottrell, H. J. Hollister.

MINNEAPOLIS—Young Motor Sales Co.; capital $50,000; deal in automobiles. Incorporators: E. N. Young, H. J. Murphy, F. N. Furber.

Missouri

ST. LOUIS—East Side Motor Truck, Transfer & Baggage Co.; capital, $2,000. Incorporators: A. O. Middleton, E. K. Brown and John O. Schwaner.

ST. LOUIS—More Automobile Co.; capital, $15,000; to manufacture, sell, deal in and repair motor cars and accessories. Incorporators: Edward A. More, John B. Strauch, John T. Salisbury and Cyrus B. More.

North Dakota

BISMARCK—Missouri Valley Motor Co.; capital, $25,000; general motor vehicle business. Incorporators: Louis A. Tavis and Joseph P. Hess, both of Mandan; Howard H. Moore, Minneapolis, Minn.

WILLISTON—Williston Motor Co.; capital, $25,000; to deal in motor cars. Incorporators: C. A. McKinney, F. N. Fuller and M. L. McKinney, all of Williston.

New York

BROOKLYN—Hanson Peacock Corporation: capital, $1,000; to manufacture motors, tires, etc. Incorporators: Joseph L. Young, 209 Adelphi street; Selma Hietenstein, 841 Beck street; E. Katherine Payne, 430 Main street, New Rochelle.

BROOKLYN—Overfield Auto Co.; capital, $1,000; to deal in motor cars. Incorporators: Ferris A. Overfield and Eda D. Overfield, both of 204 Sunnyside avenue; George S. Hice, 43 Jerome street.

BROOKLYN—Arthur R. Tator Co.; capital, $1,000; to deal in motor cars, tires, etc. Incorporators: Arthur R. Tator, 1051 Prospect place; Hugh Foster 617 McDonough street; John F. Undutsch, 1051 Halsey street.

BUFFALO—Western Sales Corporation; capital, $15,000; to manufacture and deal in tire fillers, motor car accessories, etc. Incorporators: Charles H. Taylor, Thomas Catlin and Sherman A. Hooker, all of 1330 Marine Bank building.

NEW YORK—Fireproof Garage Co.; capital, $5,000; to operate a garage. Incorporators: James R. Pierson and Samuel Riger, both of 29 Broadway; Thomas McD. Caffrey, Hohokus, N. J.

NEW YORK—Globe Garage Co.; capital, $3,000; to operate a garage. Incorporators: Philip Lauter, 813 E. 163rd street; Ignatz Lauter, 152 W. 90th street; Morris M. Gruber, 800 E. 168th street.

Automobile Agencies Recently Established

PASSENGER CARS

California

Berkeley	Oldsmobile	G. W. Rodehaver
Coalinga	Oldsmobile	Martin's Garage
Hanford	Oldsmobile	Marak & Hayes
Hollister	Oldsmobile	Hollister Auto & Mch. Co.
Los Angeles	National	Hawley, King & Co.
Oakland	Detroit	Electric Vehicle Co.
Oakland	Oldsmobile	R. W. Drum
Rialto	Moon	B. Buxton
Richmond	Oldsmobile	Hayes & Hopping
San Francisco	Detroit	Electric Vehicle Co.
San Pedro	Moon	Pacific Garage
Santa Ana	Cole	Wisdon & Co.
Santa Monica	Oldsmobile	R. C. Silvernale
Ventura	Moon	C. H. Judd

Canada

Dawson City, Yukon Territory	Franklin	Peter Rost
Montreal	Saxon	The Stockwell Motor Co.
Montreal	Hupp	The Gareau Motor Car Co.
Regina	Franklin	Store & Company
Shaunavon	King	Locklin & Eckhart
Sherbrooke	Saxon	Cadillac Motor Sales Co.
Underwood	Saxon	Roppel Bros.
Winnipeg	Briscoe	Jos. Maw & Company
Winnipeg	Peerless	Jos. Maw & Company
Winnipeg	English Wolseley	The Breen Motor Co.

Colorado

Denver	Stearns-Knight	A. K. Vickery
Denver	Chevrolet	H. E. Maines
Denver	Zip	Carl Johnston
Grand Junction	Saxon	Western Slope Auto Co.

Connecticut

Bridgeport	Scripps-Booth	Arthur L. Clark Co.
Bristol	Moon	L. B. Snyder
Hartford	Scripps-Booth	Universal Auto Co.
New Haven	Scripps-Booth	The Holcomb Co.
New Haven	Apperson	N. B. Whitefield
Norwalk	Oldsmobile	O. H. Banks Co.
Stamford	Moon	H. R. Hendrie

Delaware

Wilmington	Dodge Bros.	Cahill & Co.
Wilmington	General Motor Truck	Hansen Automobile Co.
Wilmington	Grant	French Street Garage

Florida

Dade	McFarlan SIX	S. M. Tatum
Gainesville	Overland & Maxwell	Colte W. Hill
West Palm Beach	McFarlan SIX	S. M. Tatum

Georgia

Atlanta	Scripps-Booth	S. E. Davidson
Cornelia	Saxon	The Cornelia Garage
McDonough	Saxon	Smith & Amis
Savannah	Saxon	Savannah Motor Car Co.

Illinois

Abingdon	Oldsmobile	C. G. Slough & Co.
Aledo	Moon	J. L. Buckley
Barry	Moon	H. M. Royalty Co.
Batavia	Cole	Lundeen & More
Bloomington	Ford	Blair & Lockwood
Bloomington	Oldsmobile	Trott & Stubblefield
Dana	Glide	H. Koenagen & J. J. Klesath
Freeburg	Moon	X. H. Heiligenstein
Freeport	Oldsmobile	Maurrer Bros.
Joliet	Moon	Goodwin & Hill
Lakewood	Glide	L. B. Morgan
London Mills	Glide	E. E. Terwilliger
Marissa	Moon	J. A. Hamilton
Pearl City	Oldsmobile	J. M. Aurand
Polo	Oldsmobile	J. T. Mulnix, Jr.
Robinson	Moon	G. M. Allison
Rushville	Glide	R. A. Lawler
San Jose	Moon	Fred. Zimmerman
Witt	Reo	W. S. Baxter

Indiana

Logansport	Oldsmobile	Oakland Motor Co.
Marion	Franklin	M. L. Swayzey

Iowa

Algonia	King	Wilson Motor Co.
Bloomfield	Moon	Bruce & Bonar
Boise	King	Howard Hunter
Cedar Rapids	King	Hawkeye Dis. Co.
Colo	Moon	R. W. Bronhard
Des Moines	Oldsmobile	Iowa Oldsmobile Co.
Des Moines	Saxon	Payne Motor Co.
Dodge	Paige	E. Kubuck
Eagle Grove	Moon	Wm. Fletcher
Livermore	King	Carl Weise
Malcolm	King	Malcolm Garage
Milton	Moon	Moon Auto Co.
Monroe	Saxon	J. Lowe
Nevada	King	Nevada Auto Co.
Radcliffe	Glide	Glide Auto Co.
St. Anthony	Glide	J. Mayer & Son
Sigourney	Oldsmobile	Dupuis & Freres
Sioux City	Glide	Glide Motor Car Co.
State Center	King	Eckhart & Hilliman
Story City	Glide	Alsvig & Thompson
Traer	Oldsmobile	Jasper Wilson
W. Burlington	Glide	E. Rheinschmidt
Wellsburg	Moon	D. J. Riekena
Zearing	King	Hease Bros.

Kansas

Gorham	Oldsmobile	T. M. French
Jennings	Oldsmobile	Smith & Feely

Kentucky

Eminence	King	D. L. Rickett
Hopkinsville	Oldsmobile	Hopkinsville Cadillac Co.
Louisville	Peerless	Yager Motor Car Co.
Louisville	Briscoe	Louisville Motor Co.
Mayville	Oldsmobile	J. D. Keith

Louisiana

Fullerton	King	H. S. Anderson, Jr.

Maryland

Baltimore	Scripps-Booth	Randall Mfg. Co.

Massachusetts

Boston	Paige	Paige Motor Car Co.
Boston	Rauch & Lang	Rauch & Lang Co.
Boston	Peerless	Beacon Motor Car Co.
Boston	Pullman	Leo W. Schlegmelmilch
Boston	Scripps-Booth	Franklin Motor Car Co.
Brockton	Oldsmobile	L. J. Jazelton
Haverhill	Studebaker	Ellison Motor S. Co.
Malden	Haynes	W. M. Bean
New Bedford	Scripps-Booth	S. C. Lowe Supply Co.
Newburyport	Studebaker	James Dickens
North Adams	Ford	Van Sleet Motor Co.
Somerville	Ford	Hill-Michie Co.
Springfield	Jeffery	Hampden Auto Co.
Taunton	Saxon	H. C. Perry
Wakefield	Saxon	J. E. Pray
Worcester	Maxwell	L. J. Rondeau
Worcester	Oldsmobile	J. M. Slattery & Co.
Worcester	Pullman	Peter Welin
Worcester	Vim	Franklin Square Garage

Maine

Houlton	Oldsmobile	G. H. Wiggins
Portland	Case	Taxicab Service Co.
Portland	Scripps-Booth	Franklin Motor Car Co.
Rockland	Oldsmobile	C. Doherty

Michigan

Adrian	Oldsmobile	S. W. Raymond Auto Sales Co.
Battle Creek	Saxon	American Motor Co.
Big Rapids	Ford	L. F. Berteau
Big Rapids	Studebaker	L. F. Berteau
Bronson	Buick	Carl & Holcomb
Caledonia	Studebaker	Roy Dodge
Calumet	Imperial	Weider Harness Co.
Flint	Oldsmobile	Marshall Auto Co.
Flint	Saxon	Bowler Auto Sales Co.
Grand Rapids	Dodge Bros.	Valley City Motorcar Co.
Grand Rapids	Franklin	The Security Auto Sales Co.
Grand Rapids	Franklin	Sanders & Jackson
Ionia	Oldsmobile	E. H. Kerstetter
Kalamazoo	Oldsmobile	Newton Root
Ludington	Oldsmobile	Ludington Auto & S. Co.
Muskegon	Oldsmobile	Koelber-Bennett Auto & S. Co.
Newaygo	Oldsmobile	Koelber & Bennett Auto Co.
Oceana	Oldsmobile	Koelbel & Bennett Auto Co.
Ottawa	Oldsmobile	Koelbel & Bennett Auto Co.
Port Huron	Dodge	Frank S. Church
Port Huron	Cadillac	Frank S. Church
Sheboygan	Oldsmobile	Schulz Bros. Garage
South Haven	Ford	Christian Niffenegger
Traverse City	Oldsmobile	W. Michigan Garage
Traverse City	Maxwell	P. Burden & John Ott

Minnesota

Austin	Oldsmobile	Laman A. Mott
Brewster	Oldsmobile	J. C. Ahrens
Chatfield	Oldsmobile	Smith & Woodruff
Duluth	King	Burton Sykes
Fergus Falls	Oldsmobile	Bergerud & Miller
Lanesboro	Oldsmobile	Christenson & Lund
Minneapolis	Ohio Electric	Minneapolis Battery Co.
Minneapolis	Davis	White Garage
Minneapolis	Vulcan	Metropolitan Motor Co.
St. James	Oldsmobile	Schoffman & Crowley
Thief River Falls	Oldsmobile	Weiland & Crandall
Webster	King	W. Keske

Mississippi

Indianola	Oldsmobile	I. D. Benson
Merigold	Oldsmobile	Guy E. Waldrop

Missouri

Bolckow	Moon	G. E. Middleton
Columbia	Reo	J. N. Taylor
Higginsville	Cole	Emil C. Lefmann
Huntsville	Reo	J. N. Taylor
Kansas City	Cole	Myers Ebersole Motors Co.
Macon	Reo	J. N. Taylor
St. Charles	Moon	Hy Werminghaus
St. Joseph	Imperial	The Grand Center Motor Co.
St. Joseph	Empire	Weider Harness Co.
St. Joseph	Moon	J. A. Suddarth & Co.
St. Joseph	Briscoe	Leslie Motor Car Co.
St. Louis	Maxwell	Johnston Auto. Co.

Montana

Fallon	King	Carl Anderson
Malta	Franklin	Shody & LeVesconte

Nebraska

Columbus	Paige	J. Luxa
Friend	Hupmobile	Wm. Vossler
Grand Island	Cole	Brandes Motor Car Co.
Lincoln	Oldsmobile	E. A. Everett
Norfolk	Oldsmobile	E. A. Harms
York	Chandler	E. S. Clarke

New Hampshire

Dover	Pullman	George Athorn
E. Haverhill	Saxon	H. D. Gannett

New Jersey

Frenchtown	Saxon	T. W. Zillstorff
Newark	Scripps-Booth	Light Car Distributing Co.
Plainfield	Oldsmobile	O. A. R. Motor Co.
Trenton	Franklin	Richards & Sykes

New Mexico

Santa Fe	Oldsmobile	Auto Trouble Shop

New York

Albany	Scripps-Booth	Franklin Motor Car Co.
Albion	Krit	S. T. Strouse
Batavia	King	H. R. Langworthy
Binghamton	Moon	Binghamton Motor Car Co.
Brooklyn	Saxon	J. L. Peacock & Chas. Hanson
Canandaigua	Krit	Foley & Giddings
Canisteo	Krit	W. S. Meeks
Cohocton	Krit	M. C. Silsbee
Clyde	Krit	F. E. Finch
East Aurora	King	B. A. Burzette
Geneva	Oldsmobile	D. M. Dorman
Hilton	Krit	Jos. Ingham
Honeoye Falls	Krit	Jobes & Caggill
Hudson Falls	Oldsmobile	Smith & McCoy Motor Co.
Hudson	Saxon	H. L. Andrews
Ithaca	Franklin	H. L. Cobb
LeRoy	Krit	Ernest Townsend & S
Livonia	Krit	E. C. Stone
Lockport	King	A. L. Hoag
Lyons	Krit	P. Deutschler & Son
Nunda	Krit	P. J. Cuddebac
Penn Yan	Krit	E. L. Geer
Phelps	Krit	Joel Caves
Rochester	King	McKinney & Gilpin
Rochester	Cole	Cole Motor Co.
Rochester	Cole	Robert Thomson
Seneca Falls	Krit	C. E. Conkey
Syracuse	Scripps-Booth	Scripps-Booth Sales Co.
Utica	Scripps-Booth	Franklin Motor Car Co.
Utica	Cole	Oneida County Auto Co.
Warsaw	Krit	Edwin Fargo
Warsaw	Oldsmobile	A. F. Mills
Waterloo	Krit	Waterloo Auto Co.

North Carolina

Wilmington	Moon	J. B. Farmer

North Dakota

Mandan	Oldsmobile	G. A. Dailey

Ohio

Ada	Franklin	Stample & Smith
Alliance	King	Alliance Motor & S.
Ashland	Oldsmobile	Curry & Roberts
Ashville	Studebaker	C. F. Brinker
Bucyrus	Krit	S. G. Hertz
Buffalo	Krit	A. S. Secrest
Canal Dover	Oldsmobile	Dover Auto Co.
Canton	Ford	Monnot & Sacher
Cardington	Allen	Buckingham Auto Co.
Cedarville	Allen	Nagley Bros.
Cincinnati	Hudson	Welbon Motor Car Co.
Circleville	Allen	Edward Helwagen
Clarington	Allen	Clarington Auto Co.
Columbus	Enger	The Twyman Motor Car Co.
Columbus	White	Brasher Motor Car Co.
Columbus	Stutz	Neil Auto Livery Co.
Columbus	Oldsmobile	W. W. Muzzy
Columbus	Moon	W. W. Muzzy Garage
Columbus	Westcott	Fisher & Foster
Conneaut	Oldsmobile	C. E. Laizure
Coshocton	Maxwell	A. L. Crowthers
Dayton	Allen	Kenneth & Hahn Motor Car Co.
Dayton	Cole	C. J. Wagner
Dayton	Oldsmobile	Stroop & Haning
Findlay	Oldsmobile	Decker & Flinchbaugh
Dillonvale	King	Roy H. Gehrke
Gibsonburg	Oldsmobile	Delow & Gerwin
Jeromesville	King	E. A. Christman
Jessup	King	Miller Brothers
Lancaster	Allen	Bowman & Bookman
Lima	Moon	Moon Garage
Logan	Allen	G. W. Stallsmith
Lorain	Buick	Lorain Elec. & Auto Co.
Louisville	Oldsmobile	Star Motor Car Co.
Marietta	Allen	Jacob Spindler
Marietta	Cole	C. R. Williamson
Miamisburg	Oldsmobile	W. C. Swartsel
Middleport	Oakland	Williamson & Miller
Mt. Vernon	Allen	Spindler & Hunt
New Paris	Allen	C. H. Barton
Niles	Saxon	J. H. Forler
Oak Harbor	Oldsmobile	G. L. Tilton
Prairie Depot	Oldsmobile	Harry Hoiles
Radnor	Allen	C. & D. F. Coonfare
Rushlyvania	Krit	L. W. Faucet
Springfield	Allen	The Nash-Baird Motor Car Co.
Steubenville	Oldsmobile	Steubenville H'dware & S. Co.

Cold Weather Accessories for Motorists

Garage Heaters, Foot Warmers, Electric Mixture Heaters and Primers All Valuable to Winter Drivers

WITH the coming of Winter the automobilist naturally desires to fortify himself and the car against the ravages of the freezing weather. There are five kinds of heaters which he may use: the garage heater, which may be an ordinary stove or furnace, or a special gas heater of compact design built for the purpose; the electric mixture heater to insure easy starting; the radiator heater to prevent freezing; the foot warmer or car heater; the hand warmer.

Scientific Safety Garage Heater—A heater, Fig. 1, using gas as fuel and which will not set fire to inflammable vapors in the atmosphere, is made by the Scientific Heater Co., 1075 Power avenue, Cleveland, O. The device is made in three sizes: for garages 18 by 20 feet, 22 by 26 feet, and 26 by 36 feet. The respective prices are $25, $32.50 and $45. A larger garage may be heated by installing additional heaters.

A small pilot light just below the door of the heater is lighted during the first cold days of the season, and this becomes the control, no more matches being necessary.

Superior Safe Garage Heater—A garage heater made by the Superior Mfg. Co., N. S. Pittsburgh, Pa., and which operates on gas is shown in Fig. 2. It consists of a small furnace and a tubular radiator inside a heavy galvanized casing, the outside side dimensions of which are: length, 40; height, 33, and width, 12 inches. It is stated that the combustion chamber is so arranged that the gas is completely burned and none is wasted. Safety is secured by completely inclosing the combustion chamber from the outside air. The air to the heater is brought from outside the building through a suitable pipe and the burned gases are exhausted through a chimney pipe. The heater is lit at the beginning of the season and after that a small pilot light is kept burning continuously so that the heat may be turned on at any time afterwards without running the risk of lighting a match. The price is $25, f.o.b. Pittsburgh.

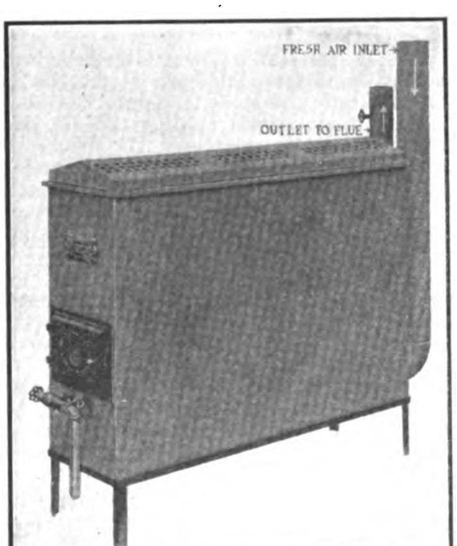


Fig. 2—Superior Safe garage heater

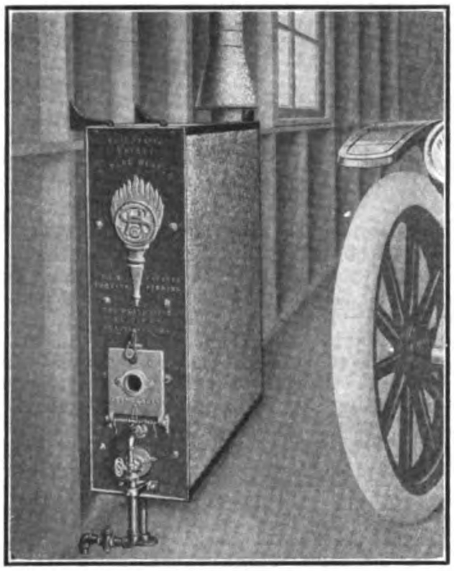


Fig. 1—Scientific Safety garage heater

Lehman Heater—A special form of coal is used in the heater shown in Fig. 3. This heater is made in various sizes and styles, and is offered at prices ranging from $1.75 to $10. As the heat comes from within and is not derived from the exhaust or cooling system, these foot warmers are easily portable and may be carried from one car to another. The fuel is made up into briquettes and is introduced into the heater by putting it into a drawer.

This heater is made by Lehman Bros., 10 Bond street, New York City.

Samson Foot Warmer—The American Electric Co., State and Sixty-fourth streets, Chicago, Ill., is manufacturing a foot warmer, Fig. 5, which uses a special form of fuel.

The device is easily portable. It is fireproof and the products of combustion are odorless. One filling of fuel will supply heat for over 6 hours. The warmer cannot be tipped over, and is provided with a handle for convenient carrying. The price is $4.50, and the fuel bricquettes sell for 50 cents per dozen.

Clark Heater—A carbon-burning foot warmer, is manufactured by the Chicago Flexible Shaft Co., Chicago, Ill. Briquettes of specially prepared coal which last from 12 to 16 hours are used. The heaters are miniature metal stoves. Each consists of a strongly reinforced oval or triangular metal case, solidly riveted. This is lined with asbestos and then covered with a carpet. A sliding metal drawer held in place by a strong spring contains the fuel. The heat is regulated by a damper in the front. The prices of the heaters vary from $1.75 to $10. A dozen bricks sell for 75 cents.

Lytle Auto Heater—The installation of the exhaust tonneau heater made by the Lytle Auto Heater Co., Memphis, Tenn., is shown in Fig. 4. A flexible steel tube 1 inch in diameter taps the exhaust pipe just before entering the muffler, and by-passes the gas through the passages in the heater, and from thence to the open air. Air flows from under the car up around these heated passages and is warmed, thus supplying heat to the passengers.

K. P. Foot-Rest Heater—An exhaust heater which takes the place of the foot rest, is made by the K. P. Foot Rest Heater Motor Mart, Park Square, Boston.

Its construction is clearly shown, the heat being taken from the exhaust pipe, passed through the heater and finally into the air. The heat is regulated by a valve at one end. The device is finished in nickel, brass, or is oxidized, and it is furnished in lengths to fit any car. It sells for $25, including all parts for attaching.

American Auto Heater—Another exhaust heater which is placed in the floor of the car is made by the American Auto Heater Co., 160 Fourteenth street, Buffalo, N. Y. It is made of aluminum and is 10 inches square by 3 inches deep. It sells for $28.50.

Radio Auto Heater—An exhaust heater of simple design is made by the Milwaukee Auto Specialty Co., 715 Chestnut street, Milwaukee, Wis. It is designed to be countersunk in the floor and consists of a hollow casting inclosed in a sheet metal box which measures 14.5

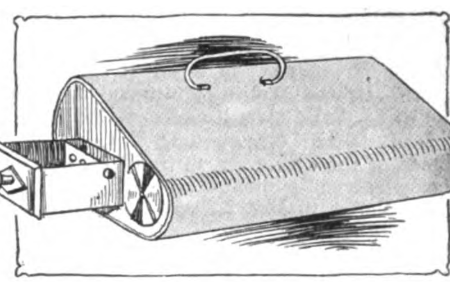


Fig. 3—Lehman foot warmer. It burns a special coal

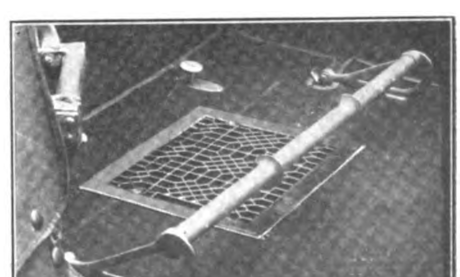


Fig. 4—Lytle Auto Heater

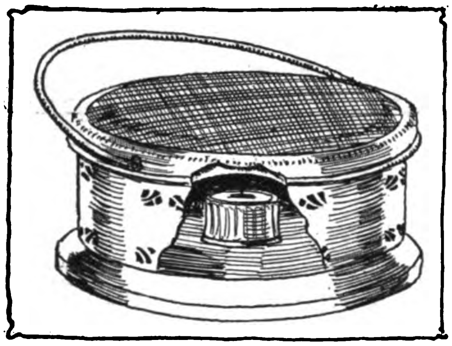


Fig. 5—Samson foot warmer

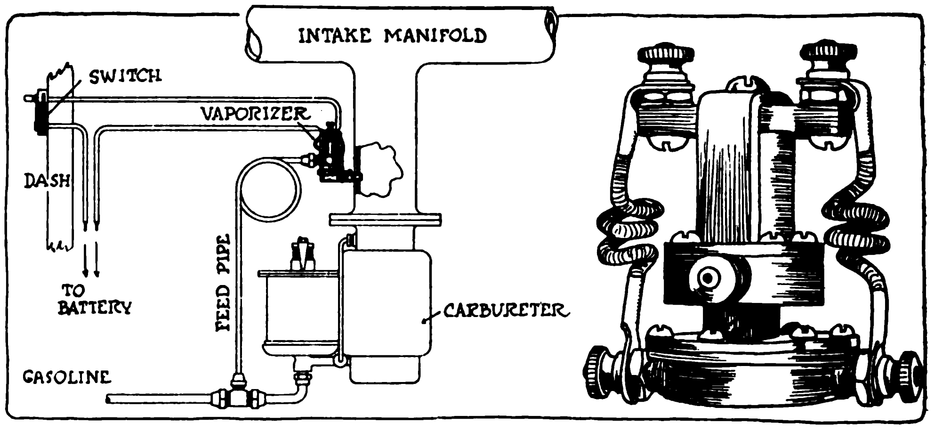


Fig. 6—Sure-start electric vaporizer. Left—Complete diagram showing connections. Right—vaporizer itself

by 5 by 3 inches. The top of the radiator has a grilled, nickel-plated surface. The heat is regulated by a lever that actuates a three-way valve in the branch from the exhaust pipe.

Consolidated Heater—A small electric heater that does away with the necessity of draining the water from the radiator when the car is left in an unheated garage is being advanced by the Consolidated Car Heating Co., Singer Tower, New York City. This heater is placed on the top of the cylinders, the hood put down and the current switched on. Sufficient heat is generated to keep the mechanism inside the bonnet warm, prevent freezing and make starting easy. The necessary current may be obtained from an ordinary lamp socket and the cost of operating is 1 cent per hour. Alternating or direct current at 110 volts can be used. The price complete with attaching plug is $7.50.

Sure-Start Electric Vaporizer—The Sure-Start Electric Vaporizer, Fig. 6, is a device which supplies hot gasoline vapor to the intake manifold, thus insuring easy starting in the coldest weather. It is independent of the carbureter. A small switch on the dash controls both the supply of gasoline and the electric current, which requires a 6-volt battery. When the switch is turned on, the suction of the motor draws the fuel through the heated portion of the device, vaporizing the fuel. The gasoline feed may be either gravity or pressure.

It is stated that the device may be installed in less than an hour by any ordinary mechanic. The diagram of connections is clearly illustrated. The price of the device is $8, and it is made by the United Motor Equipment Co., 19 South La Salle street, Chicago, Ill.

Ieco Hand Warmers—To keep the hands of the driver warm in cold weather the electrically heated steering wheel grips shown in Fig. 7, have been brought out by the Interstate Electric Co., New Orleans, La. The grips are covered with leather, laced on. Under the leather of each grip are two copper plates between which is a coil of wire. Current for these grips may be supplied from the lighting system or, in the case of the Ford, from the magneto. It is stated that the grips only consume 18 watts.

Ieco Manifold Plug—This concern also offers a manifold plug, Fig. 8, which makes starting easy by warming up the charge as it passes to the cylinders. In addition it performs the ordinary functions of a primer by admitting auxiliary air to the manifold at high speeds. Gasoline may be introduced through it for starting, and kerosene or alcohol for removing carbon from the cylinders. It is made in 6 and 12-volt styles and sells for $5.

Neverout Radiator Heater—With the idea of obviating the danger of a freeze-up and at the same time making starting easy, without installing a complete garage heating system, the Rose Mfg. Co., 910 Arch street, Philadelphia, Pa., has designed a radiator heater suitable for any car. It can be quickly attached to the cooling system when the car comes in at night. It consists of a small hot water heater, which is operated from the city gas or electric light mains, the device being furnished with either type of heater.

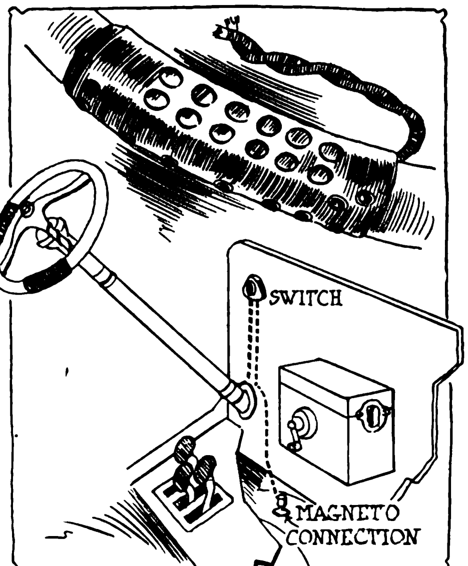


Fig. 7—Ieco hand warmers showing connections

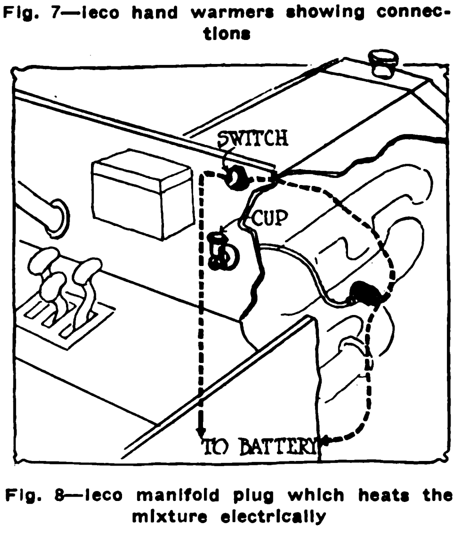


Fig. 8—Ieco manifold plug which heats the mixture electrically

The heater warms the water, which passes up from it into the top of the radiator. The return connection to the heater is through a small rubber tube which may be attached to the drain cock at the bottom of the radiator. Circulation is automatic because the heated water, being lighter, rises, and the colder water rushes in to take its place.

Victory Primer Pump—A priming pump for introducing a vaporized fuel to the manifold for starting motors in cold weather or for priming motors that are hard to start is shown in Fig. 13. The pump consists of a cylinder .625 inch diameter by 5 inches length.

The pump is designed to be fastened to the dash or heel board by screws. A connection is made from the pump to the gasoline pipe line by brass tubing, and from the pump to the intake manifold.

It is put out by the Perkins Appliance Co., Springfield, Mass.

Warm Hand Wheel—A steering wheel, Fig. 9, with electrically heated grips is made by the Warm Hand Steering Wheel Corp., Poughkeepsie, N. Y. The wheel is slightly countersunk at each side so as to allow the tubing forming the heater to be wound flush with the balance of the rim. In the tubing is a heavily-insulated wire, one end of which runs to the current source while the other is grounded on one of the spider arms. The necessary electric energy may be obtained from a storage battery, lighting generator or Ford magneto.

The Warm Hand Wheel is installed on a Ford or any machine where the rim is screwed onto the spider by simply removing the four screws holding the old rim and putting on the new. On machines where the rim is integral with the spokes the whole wheel is furnished.

Chi-Fau-Co Primer—Fuel injection into the manifold is accomplished by means of a hand-operated plunger pump mounted horizontally on the dash in the primer, Fig. 11, made by the Chicago Faucet Co., 313 South Clinton street, Chicago, Ill. By reciprocating the pump plunger, the fuel is first sucked from the main fuel line and then forced into the manifold. The price of the device is $6 and when arranged to draw gasoline from a separate reservoir, the price complete is $6.50.

Injex Primer—The Reflex Ignition Co., 211 High avenue, Cleveland, O., has brought out the primer shown in Fig. 11 for $2.50.

By pulling a ring on the steering post

Vol. XXXI — New York—Thursday, December 10, 1914—Chicago — No. 24

The Automobile

War Stops Olympia, But Not Car Development

Automobile Industry in England Shows Marked Trends in Spite of Interruption in Buying—Light Fours the Feature—Sixes Hold Their Own

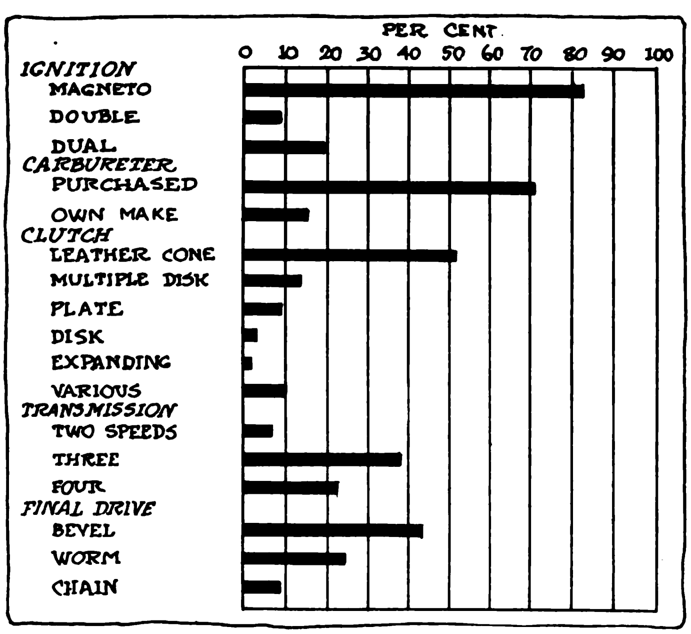
By J. Edward Schipper

THERE is no Olympia show this year in London. The Gods of War have so ordered. Yet this dictum cannot stop entirely the wheels of progress and thought. We still turn toward Olympia and, though war has laid its staying hand upon the exposition, nevertheless, the 1915 announcements of the English factories show that cardinal trends would have been brought out by the show. When war was declared, the plans of the designers were already well formulated and the 1915 test chassis were on the road. Consequently there has been little falling off in the number of announcements for the new season, and as far as the engineering development of the industry is concerned, there has been no interruption in progress.

More Small Cars

Most important is the increase of the number of small cars listed in the neighborhood of $875. The Ford in Great Britain sells for $610, which will give a comparative idea of the prices of the small British products. A number of the small cars are developments of the cyclecar movement of the past 2 years. These cars are now miniature automobiles built along the same lines as the larger cars, with a standard tread but with shorter wheelbase and generally smaller lines. The upholstery and equipment are as luxurious as on the larger cars, extreme lightness in the power plant and structural work providing maximum economy.

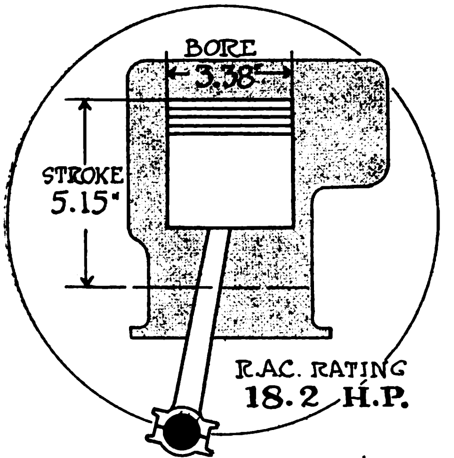
These small cars have a piston displacement averaging close to 65 cubic inches. The bore ranges from 60 to 70 millimeters, or 2.36 to 2.75 inches, with a stroke approximating 3 inches. Makers, who have had cars in this field before, are endeavoring to secure more power for a given piston displacement. The result has been an increase in the valve sizes and in the compression. Throughout the entire light car practice the manufacturer is endeavoring to get as much power as he can from an engine that will give him the maximum fuel economy. The result is that the little machine is apt to be somewhat overloaded with the fully equipped body.



Predominating features of British cars may be mentionad as magneto ignition, cone clutches and bevel drive. The percentage of three-speed gearset is not greatly in excess of four-speed types

Sell Cars Equipped

Still another tendency is that of selling the car with full equipment. In this respect the British manufacturers are following the American lead, as well as the example set by Renault a year ago in France. We now find it customary for British cars



AVERAGE PRICE OF CAR $2000

The average British car would sell for $2,000 and would have an R.A.C. rating of 18.2 horsepower. Dimensions would be 3.38 by 5.15

to be advertised as equipped with electric lighting and starting. Although it is not true that cars selling as low as $750 are so equipped as yet, the rapid trend in that direction indicates that if normal progress is not interfered with in the next year or 2, British cars will be fitted with the same electric equipment as the American at approximately the same price. Last year less than 15 per cent. of the exhibitors at Olympia had electric starters, but were a show held this year the percentage would approximate 40.

Thermo-syphon cooling is used on 90 per cent. of the cars having a piston displacement of 200 cubic inches or less. Above this displacement the pump system of cooling is used on more than 50 per cent. of the motors. In British practice, as in American, there has been a growing tendency towards increasing the volume of water surrounding the cylinders, and large jacket spaces are the rule for even the smallest motor.

Electric lighting is found on practically every car marketed as low as $975. In some instances acetylene headlights are supplied with electric lamps for the side and tail; in the latter case a storage battery is used.

In general the tendencies of design are but continuations of those noted last season. The body maker in his efforts to meet the fashions of the day in coach work has made changes which stand out more prominently than any of those of a mechanical nature. The efforts to meet American competition in the low-priced car have been continued, and as a result the fully equipped, small four-cylinder car at a modern price is becoming rapidly the biggest factor in British automobile engineering.

The numerous small models produced on every hand last season by the well-known manufacturers have been continued, and in addition many others have entered the ranks. Those who built cars rated as low as 7 horsepower for 1914 have in many instances increased the size of the motor and altered various features of design to bring the car up to a rating of 10 or 12 horsepower.

Some Two-Cylinder Types

The two-cylinder car which lost considerable ground in 1914 has lost more for this season, although several concerns such as Aldays, Enfield, Gordon, etc., still continue its manufacture.

Using Stock Parts

In analyzing the changes made for 1915 it is necessary to go deeply into the minor features of the cars, but there are a few marked trends in such features as ignition, cooling, etc.

SINGLE MAGNETO IGNITION IS EMPLOYED ON NEARLY 85 PER CENT. OF THE CARS MARKETED IN GREAT BRITAIN.

THE TENDENCY NOTED THIS YEAR ON THE PART OF THE MAKERS TO USE CARBURETERS MADE BY SPECIALISTS, INSTEAD OF THEIR OWN, HAS BEEN CONTINUED. WHILE SEVERAL OFFER OPTIONAL MAKES, FULLY 85 PER CENT. PROVIDE THEIR CARS WITH CARBURETERS MADE BY MANUFACTURERS WHO ARE ONLY IN THIS FIELD.

The movement toward worm drive is continued, and those announcing new cars are in a fair percentage of instances specifying worm drive as stock. The new Vulcan and the 11.9 Phoenix are good examples of this.

The Colonial Model

All the larger British manufacturers design their cars with an eye toward a distribution in the Colonies and foreign countries. British cars have a considerable sale in Australia, Canada, throughout Africa and in Russia, as well as South America. Requirements of these countries are different from those for home consumption. Rougher roads and steeper grades have resulted in the adoption of a colonial model in the lines of the important manufacturers. Concerns such as Argyll, Armstrong, Bell, Daimler, Napier, Sheffield-Simplex, etc., make a specialty of these models.

The colonial models have longer wheelbases, higher clearances, larger wheels and tires and bigger power plants. Throughout they are of heavier design, and while not equaling the chassis design for the English roads, in economy they are of more rugged structure with a corresponding longer life.

20 Per Cent. Are Sixes

THE SIX-CYLINDER CAR IS HOLDING ITS OWN. THE PERCENTAGE OF SIXES FOR THE BRITISH MANUFACTURERS IS NOT NEARLY SO HIGH AS IN THIS COUNTRY, WHERE APPROXIMATELY ONE-HALF THE CHASSIS ARE FITTED WITH POWER PLANTS OF THIS DESCRIPTION. OF THE CARS LISTED AS ON THE BRITISH MARKET, 20 PER CENT. ARE SIXES.

This proportion has not altered materially in the past season. It is significant that only one concern of importance has brought out a new six for this season. The specifications of the sixes that were on the market for 1914 have not changed materially, all the refinements being in the nature of body changes.

23 New Builders

In spite of the fact that only one new six is announced there are more than twenty-three new concerns which have made their appearance in the British industry. Most of these make small cars, fifteen of the twenty-three having motors that have a bore of less than 2.5 inches.

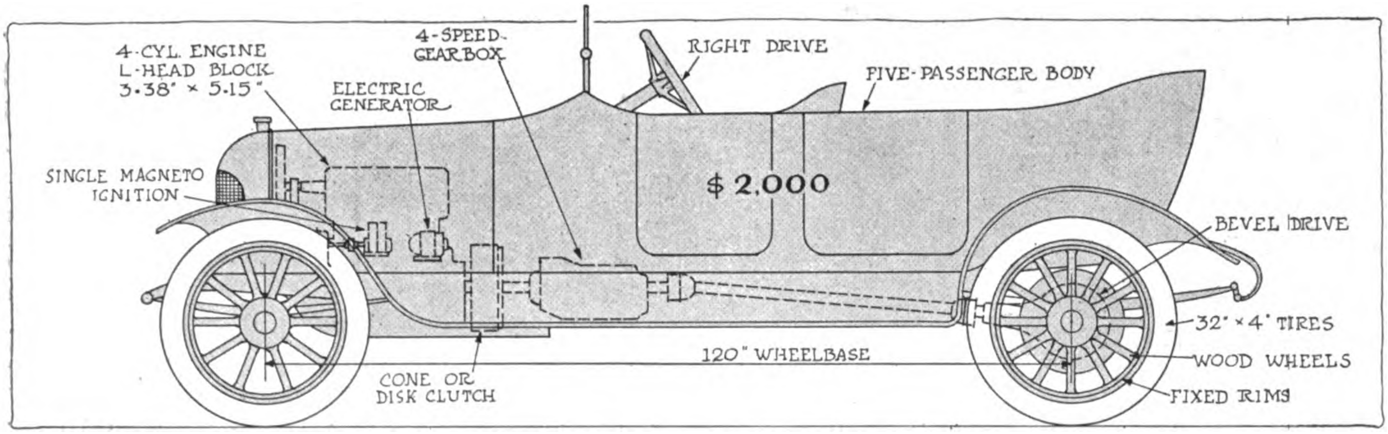
The number of concerns making cars this year has not materially increased, however, as according to the latest published reports there are fifteen who have not issued 1915 specifications. The discontinuance of the sale of Austrian and German makes in the British Isles has lessened the available supply of the larger cars, as in nearly every case cars imported from these two countries were of the heavy type with big power plants and capacious bodies.

Bodies Are Changed

Those companies that have announced their new models within the last 2 months, with very few exceptions have made their refinements in the bodies. This is not only true of the cars manufactured in the British Isles, but of those manufactured in France, which are generally announced at Olympia. The 1915 Darracq has been announced but is a direct continuation of the 1914 with the exception of body changes. The Humber has made no changes. Daimler continues to market the same two sixes and its four.

Typical British Car

Other companies have announced new models. A typical instance of a new car which brings out the trend of British industry very strongly is the Riley. It has a 2.48 by 3.46 motor with the four cylinders cast in a block. Mounted on a



The above chart is the car that would result were all the averages combined into one chassis

chassis of 96-inch wheelbase with a body of two-passenger capacity, it sells for $975. Thermo-syphon cooling, pressure-feed oiling, four-speed gearbox and 28 x 3-inch tires are used. The use of pressure-feed oiling and four-speed gearbox on a car of this size shows the strong line of demarcation between foreign and American practice.

Daimler is continuing the same lines of cars as in 1914 with the exception of improvements in the body work. Swift has a new car, bringing its line up to three chassis. The new model is a small four with a 2.48 by 3.54 motor, these dimensions being practically the same as those of the Riley. This car, while different in almost every particular, is an outgrowth of the two-cylinder light car marketed by this concern this season. The cylinders are block cast, lubrication is by pressure, and the axle a bevel gear.

New Napier Model

Napier has added to its range of models a chassis with a four-cylinder 3.5 by 5 motor. A feature of the chassis construction which illustrates a growing practice in British design is the use of tubular cross-members throughout. The engine, clutch and gearbox are in a unit power plant with three-point suspension. The cylinders are cast in pairs with the valves on the left and inclosed by a cover plate. In many respects the motor resembles American practice. The timing gears have helical teeth. Pressure lubrication is also used, and cooling is by thermo-syphon. The final drive is by an underhung worm, carried in double ball bearings with ball thrusts. The wheelbase is 124 inches.

Another well-known concern which has announced a new model is the Vulcan company. This again is an example of the low-priced car at $975 with a 2.67 by 3.93 motor. This concern has gone over to the method of incorporating the gearbox with the axle. In connection with this there is an overhead worm drive, and the tail end of the worm shaft has been selected to carry the drum for the service brake. This practice of mounting the brake drum on the rear end of the final drive shaft attracted considerable attention last year, and seems to be holding its own. An electric starting and lighting system is fitted to all the Vulcan chassis except this new model. The chain which drives the timing gears is adjustable, the magneto being carried in a brass tray, which also holds the bearings for the magneto drive pinion. By means of a screw the entire assembly can be moved to tighten the tension on the drive chain.

Star is another of the well-known manufacturers who put upon the market a new small car with a four-cylinder engine. The power plant is a 2.59 by 5 L-head block and follows the general practice of the British industry. Lubrication is by a combination splash and pressure system, cooling by thermo-syphon and the gearbox is a three-speed type.

The Calthorpe Minor is another of these small cars which, while introduced last year, has been considerably redesigned. It has motor dimensions of 2.44 by 3.54, and is a good example of how the makers have endeavored to secure more power from the small engines. The size of the valve has been increased, and also the bearing surfaces of the motor. The price of this car with acetylene head lamps and electric side and tail lights is $950.

New Wolseley Body

Wolseley has put itself on record as against the annual model idea, but from time to time changes are made as the cars are passing through the factory. A new open touring body is the latest addition. The bonnet has a slope and the cowl is of a streamline type with unbroken lines at the point of juncture to the bonnet. In the matter of equipment, a triple jointed windshield has been added and a ventilator which is the same as that used in marine work can be turned in any direction for ventilation of the forward compartment.

The Phoenix is also in the light car class, with its 2.71 by 3.93 cylinders cast in a block according to the universal practice of these small cars.

Another practice which is now common in cars of small piston displacement on the British market is the use of connecting-rods of H section.

The use of leather couplings for the magneto drive is continuing on the other side and is employed on this car. It is slotted to provide an adjustment. Another feature that is worthy of note is a detachable aluminum plate which is provided to afford access to the water-jacketing just above the exhaust manifold. A leather disk coupling is used between the clutch and the gearbox. Final drive is provided by an overhead worm, the worm wheel and the differential gear being contained in the same housing.

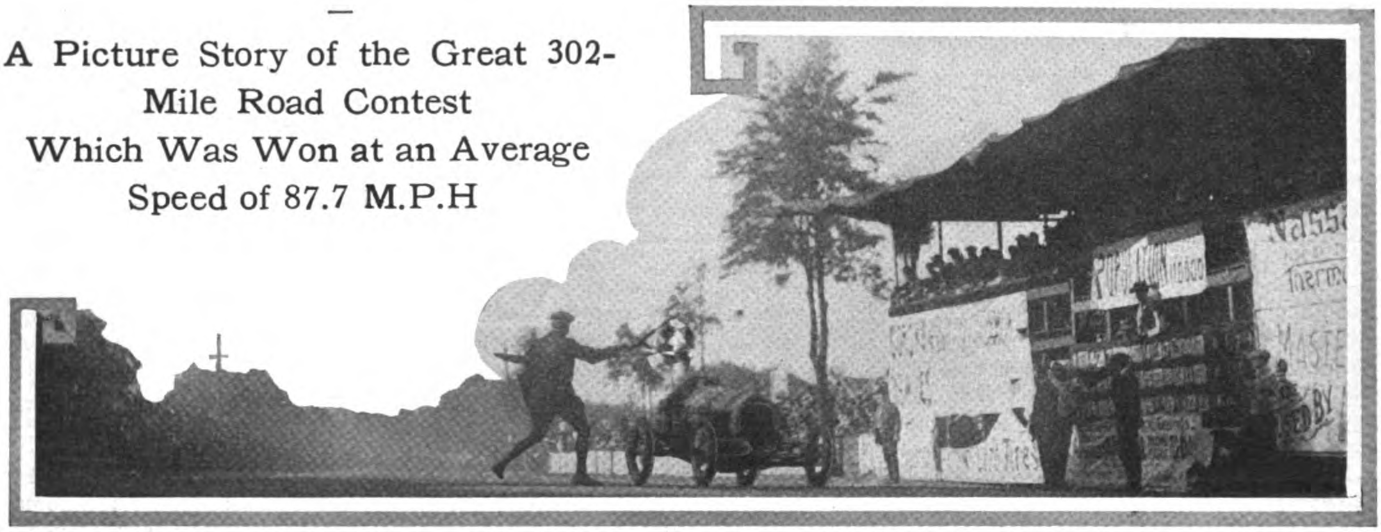
New Singer Model

A particularly good example of where a concern has developed a small car from a model which is still lighter is the Singer. The light car of last year has been discontinued and in its place a new model with a four-cylinder 3.14 by 5.10 motor. The L-head cylinders are cast in a block. American practice in the use of but two piston rings is another growing tendency on the other side and finds an example in the Singer. This motor also has an oiling system which is similar to that which is used in most American cars, the oil being taken from the reservoir in the crankcase to a dash gauge and then to the three main bearings. Oil is also fed to splash troughs which take care of the interior of the motor. Gasoline is fed by pressure from a little air-cooled pump driven by an eccentric from the camshaft.

One of the earliest concerns to announce a new 1915 model was Swift. The car is a four-cylinder 2.48 by 3.54 L-head design with the cylinders in blocks. This follows the general practice in this light class of car very closely, an interesting departure being made in placing the intake passage integral with the cylinder casting. The carbureter is bolted directly to the wall of the cylinder on the side opposite the intake valve.

Breaking the Record at Corona

A Picture Story of the Great 302-Mile Road Contest Which Was Won at an Average Speed of 87.7 M.P.H



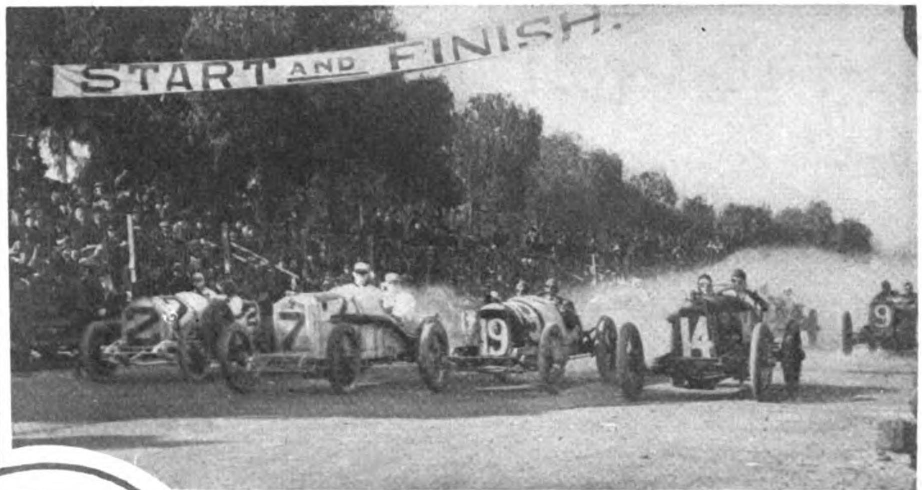
Starter Wagner giving Ed. Pullen in the Mercer the checkered flag marking the winning of the Corona race on Thanksgiving Day

A RACE in which the drivers averaged 98.6 miles per hour throughout the first thirty laps and which was finally won at an average speed of 87.7 miles per hour is bound to be of the greatest interest to every automobilist, engineer, manufacturer and dealer who takes the slightest interest in racing or in the lessons in car construction which are brought out by the gruelling grind of the road and track.

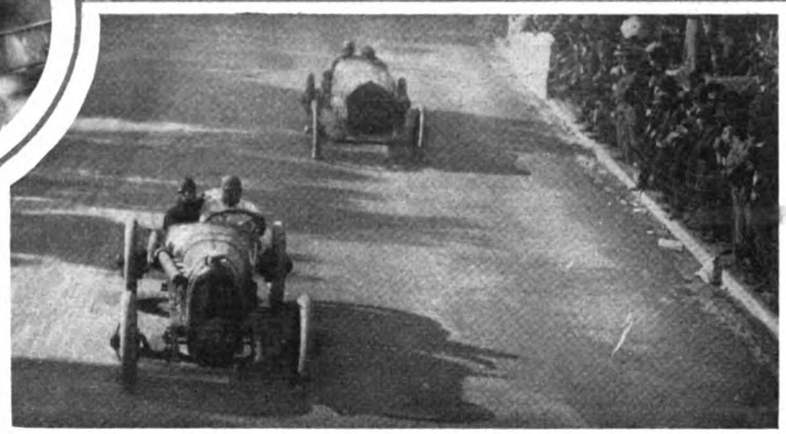
Herewith are illustrations reproduced from photographs of scenes at the great Corona Road Race held on Thanksgiving Day over a course 301.89 miles in length where the speed mentioned was attained as reported in THE AUTOMOBILE *for December 3, and where the first four drivers to finish broke the world's speedway record and the road race record as well. One of the features of the contest was the new non-stop record established by Oldfield's Maxwell, going through the entire race without making a stop of any kind.*

There were 100,000 spectators and around the course were parked 15,000 automobiles.

Cars and drivers at the starting point on the course just before the start of the 301.89-mile road race at Corona, Cal.



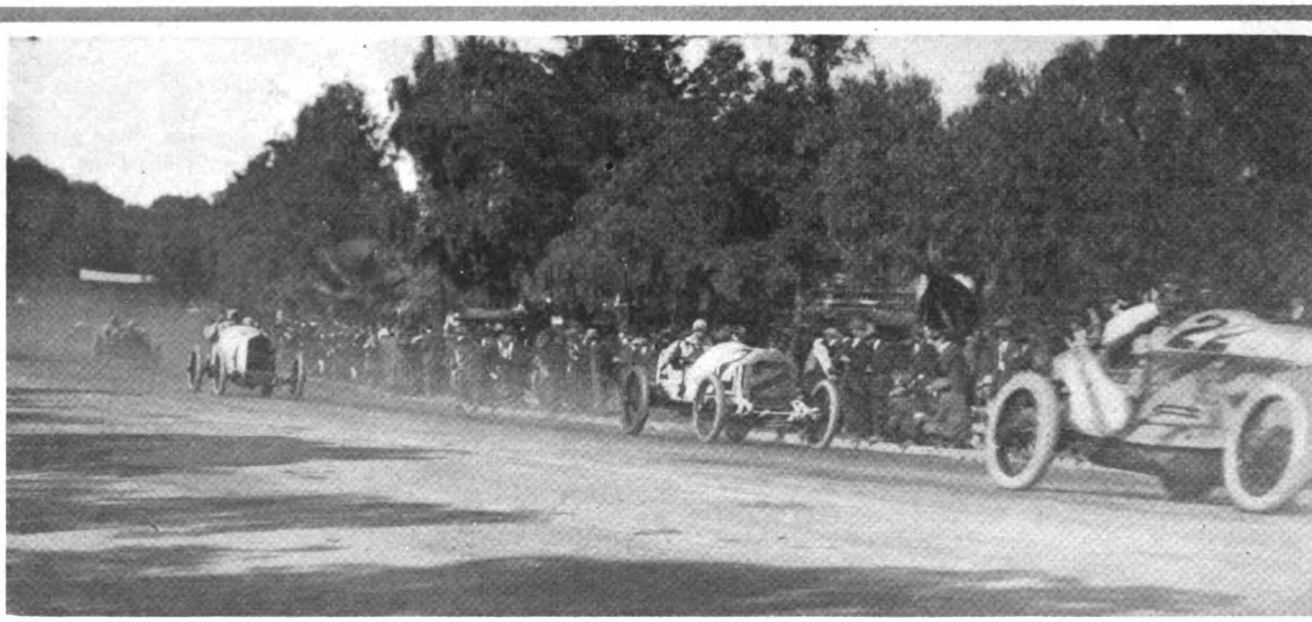
Above—The start of the 301.89-mile road race at Corona on Thanksgiving Day. Barney Oldfield's Maxwell has the pole. The flying speedway start was absolutely even



Above—George Bentel, manager of the Mercer team, signaling to Pullen on the course. Richenbacher is seen at the right of the signal board, his car having been disabled

Circle—Barney Oldfield, who finished second, establishing a new non-stop record, removes his cigar while he takes a drink of water

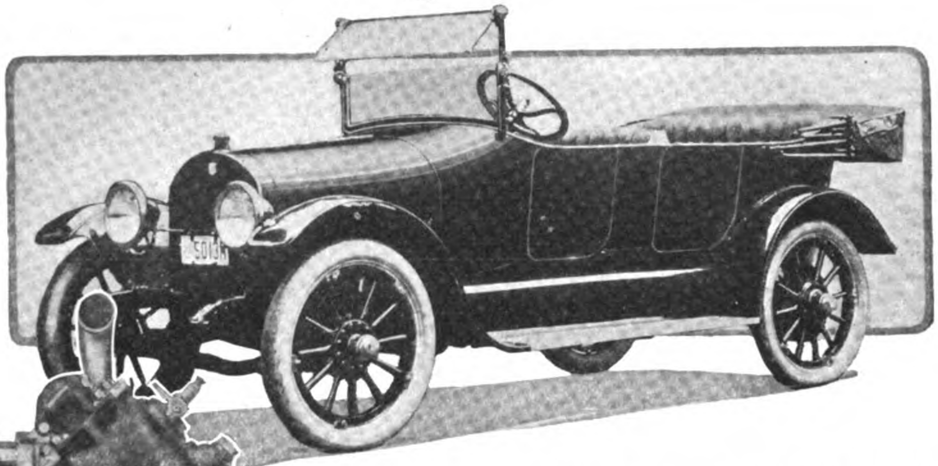
Right—Oldfield in the Maxwell passing Cadwell in the Marmon in an exciting part of the race. Oldfield, veteran of countless speed contests, admitted after the race that he never saw such a contest, the drivers circling the course like crazed demons, each carried on by the speed of the others, realizing that it was risky to do it and expecting an accident at every turn. Up to the thirtieth lap the speed average was 98.6 miles per hour. An idea of the tremendous pace maintained may be gained from the fact that the averages of the seven drivers allowed to finish varied from 87.7 to 77.2 miles per hour



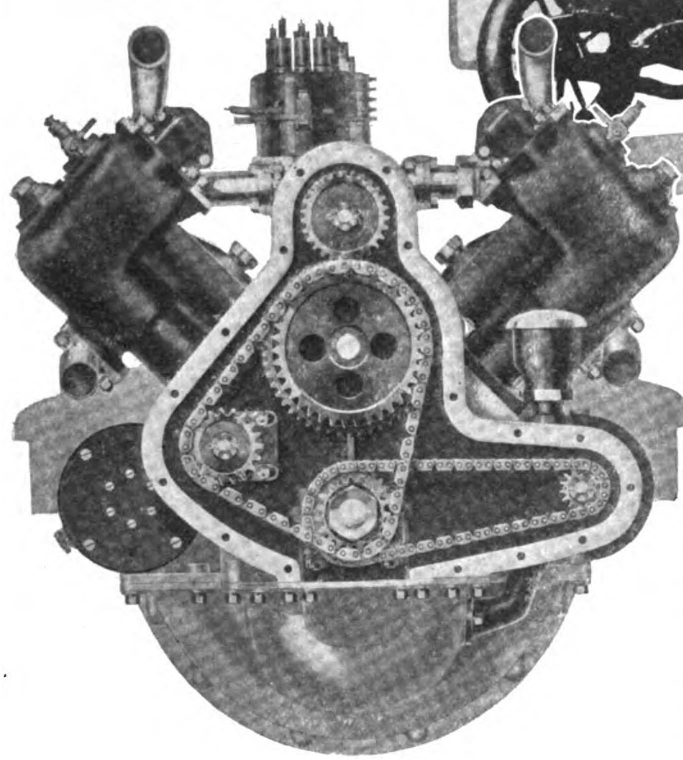
De Palma's Mercedes, Klein's Stutz, Richenbacher's Mercer and Oldfield's Maxwell in a speed brush in the tenth lap. All through the early part of the race the drivers averaged 98.6 miles per hour, rendering it intensely interesting to the 100,000 spectators

Eight-Cylinder King for $1,350

V-Type Motor 2 3-4 by 5—113-Inch Wheelbase—15 Miles per Gallon of Gasoline



Eight-cylinder five-passenger King touring car, which, with complete equipment, electric starting and lighting, etc., sells for $1,350



Front view of King V-type eight-cylinder motor with timing gear cover removed, showing silent chain drive. Note mounting of ignition distributer in center; also note compact and accessible design of motor

TO the King Motor Car Co., Detroit, Mich., goes the distinction of placing on the market the second American automobile equipped with an eight-cylinder engine. This concern has designed a remarkably compact and accessible V-type motor with cylinders 2 3-4 by 5. This is installed in a chassis of 113-inch wheelbase, and sold at $1,350 with a roomy five-passenger touring body.

It is not surprising that another eight-cylinder machine should appear, for the popularity of this type is gaining and the merits of the construction are becoming well-known. Performance is undoubtedly the eight's greatest merit, this referring not only to flexibility but to fuel consumption as well, and there is a great class of buyers which takes kindly to any type of engine that will make necessary the minimum of gearshifting no matter how simple that operation may be.

It was demonstrated to the representative of THE AUTOMOBILE that the new King will start readily from a standing position in high gear, and it can be accelerated to 35 miles an hour from a speed equivalent to a slow walking pace within half a city block. Unofficial fuel tests show that the engine will run under ordinary conditions 15 miles on a gallon.

The general chassis design does not depart from that of the four-cylinder model. The gearbox, of three-speed form, is in unit with the engine, and other specifications include a propeller shaft inclosed within a torsion tube, floating axle, 33 by 4 tires and the special form of cantilever rear springs which have always featured King cars.

In designing its eight, the King company has adhered to the usual form in that the two blocks of four cylinders are mounted at 90 degrees to each other on the crankcase with valves facing. One is impressed with the accessibility of the parts. All tappets may be readily reached for adjustment, the carbureter being practically the only thing placed in the V between the cylinder blocks. The electric cranking and lighting units are carried on opposite sides of the crankcase, and the ignition distributer is mounted at the front of the space between and out of the way.

The stroke, 5 inches, is nearly twice the bore, 2 3-4 inches. The exact stroke-bore ratio is 1.82 to 1, and the piston displacement 237.5 cubic inches. Thus the advantages of a long-stroke are added to those of continuous turning effort. The motor operates at moderately high speed and this is accomplished by the use of light reciprocating parts along with well-balanced construction.

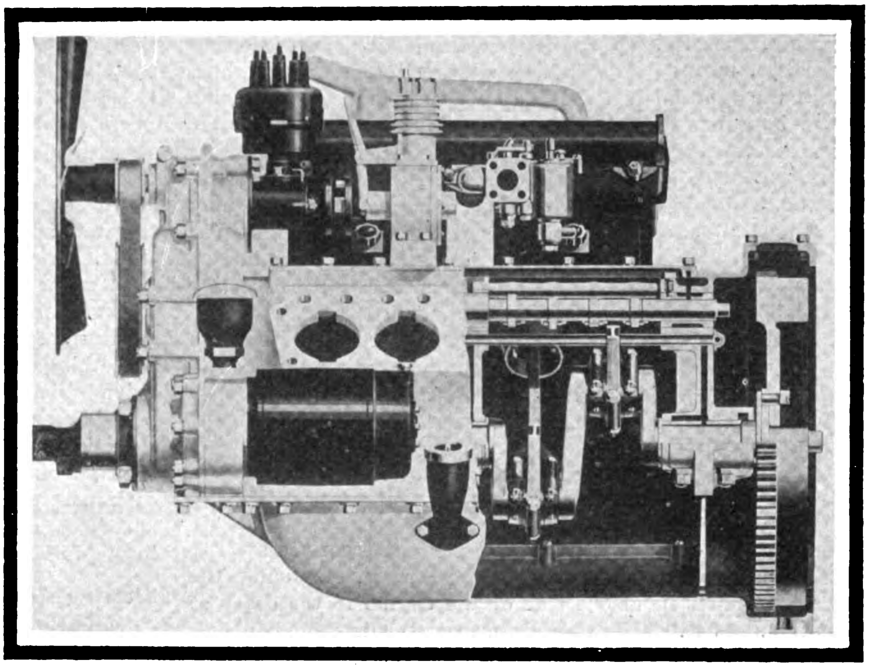
Power Plant Very Short

Compactness is also to be noted, for the power plant unit is really practically the same length overall as the four-cylinder King engine. In fact, for test purposes, one of these eights has been installed in a standard four-cylinder chassis without making any changes save the removing of the four-cylinder power plant. As a result of this compactness and lightness of parts, the engine is said to weigh approximately the same as the four. Of course, they are smaller cylinders, the four-cylinder motor having a bore of 3 15-16 inches.

In the general motor design, the aluminum crankcase is common to both blocks of cylinders, the upper half carrying the crankshaft, and the lower part forming the oil pan. The removal of this pan gives access to the bearings just as in any two-part crankcase design.

Yoke-End Rods Used

The crankshaft is a simple three-bearing type with the throws all in one plane, in fact, it is in the crankshaft that an eight of the V-type has a distinct advantage over a six. By coupling two connecting-rods to each throw bearing, it is possible to use a shaft exactly similar in form to that required for a four. In order to fasten the connecting-rods of each opposing pair of cylinders to the same bearing, one rod has a yoke end, and the other rod is made with a small end which goes between the arms of the yoke. Each of these arms is provided with its cap to go around the bushing. Pins fasten the rod to the bushing so that it oscillates with the rod on the shaft bearing. The small-end connecting rod is free to move on the bushing, its bearing therefore being the outer surface of that portion of the bushing between the arms of the yoke. Both the main bearings and the connecting-rod bearings are babbitt-lined bronze. All have a diameter of 1 11-16 inch with the following lengths: front main, 3 inches; center main, 1 3-4 inch; rear main, 4 inches; connecting-rods, 2 3-4 inches.



Part sectional view of King eight-cylinder motor. The two rear cylinders on the left side have been cut away entirely to show the camshaft in the center of the engine and also the crankshaft and connecting-rods of the corresponding cylinders on the right. The two front cylinders are removed to show the mounting of the ignition distributer, the carbureter, etc., between the cylinder blocks

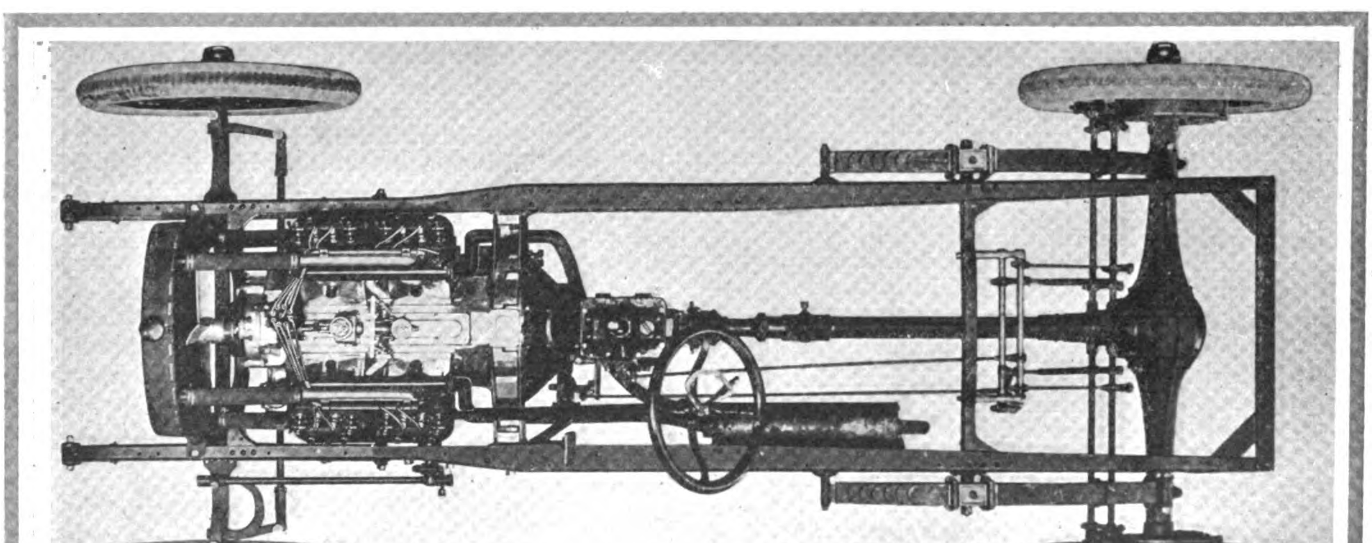
Access to Camshaft

The camshaft is mounted on three bearings vertically above the crankshaft. Its bearings are in the crankcase, and a plate bolting to the top of the crankcase between the two cylinder blocks gives access to the cam assembly. Like the crankshaft, the camshaft is the same type as would be used in a four-cylinder motor, having eight cams, each of which operates two opposite inlet valves or two exhausts. Pivoted to the crankcase are small rocker arms which go between the valve tappets and the cams. These are necessary so that the valve lift will be straight upward on the valves, the rockers through their small rollers bearing against the cams, taking the side thrust. The front camshaft bearing is phosphor bronze, measuring 1 inch diameter by 3 3-4 inches length. The center and rear bearings are of babbitt and their dimensions are respectively 1 11-16 by 1 3-4 inch, and 1 by 2 1-2 inches.

Valves are conventional bevel-seated types 1 3-8 inches diameter and 15-32 inch lift. With a motor of this kind where each cam does double duty in operating two valves, there is only one practicable timing, in which the inlets open at top dead center and close 45 degrees past bottom dead center, and the exhausts open 45 degrees before bottom center and close at top center. Intake and exhaust valves are interchangeable.

The camshaft is driven by a Link-Belt silent chain which in addition to working over sprockets on camshaft and crankshaft is carried over a small third sprocket to the right of the two main ones. This serves two purposes; first for driving the pressure oil pump, and second to give a means of adjusting the chain. The latter is accomplished by moving the small sprocket slightly to the right so as to increase the distance from the centers of this sprocket and the two main sprockets.

Back of the sprocket driving the camshaft and oil pump, the crankshaft carries another sprocket over which another chain runs to the left to the generator sprocket. The position



Plan of King eight-cylinder chassis, showing mounting of motor and gearbox, inclosed driveshaft, characteristic cantilever rear springs, rear axle, etc. Note duplicate water connections for cooling the two cylinder blocks. The thermo-syphon method is employed of the generator may also be shifted slightly to take care of wear on this chain. On the camshaft and back of its sprocket there is a spiral gear meshing with a smaller gear which drives the ignition distributer shaft that is directly in line above both camshaft and crankshaft. As the distributer proper is vertical, a worm-and-gear mechanism transmits the horizontal drive into vertical. On the end of the horizontal part of the distributer driveshaft is a dog clutch which may be shifted to engage the single-cylinder tire pump on the top plate of the crankcase between the cylinder blocks. Chains and distributer driving gears are all completely housed by an aluminum plate, and they run in oil.

The carbureter is a specially-designed type having two openings, one connecting directly to the straight horizontal intake tube running to the single opening in each cylinder block. Distribution to the several ports is effected within the casting. The carbureter is fitted with a hot-air pipe, and gets its fuel from a tank carried at the rear of the chassis.

The Firing Order

The ignition distributer takes its current from the storage battery, and has hand and automatic control. In firing, the order alternates from one side of the engine to the other so that impulses will balance and an even turning effort result. Calling the first cylinder on the right No. 1, the second on the right No. 2, and so on, and considering the first on the left as No. 5, the firing order is 1, 8, 3, 6, 4, 5, 2, 7.

The motor is lubricated by pressure feed by means of the chain-driven pump which is of the gear type, and lifts oil from the oil base up through a horizontal supply tube lying along the inside of the crankcase, this delivering oil directly to each of the three main crankshaft bearings, from which it is forced through the holes drilled in the crankarms to the connecting-rod bearings. The center main bearing in this way delivers oil to rod bearings Nos. 2 and 3, while the front cares for No. 1 and the rear for No. 4. The oil thrown off by the crank bearings lubricates the cylinders and the camshaft bearings.

Thermo-syphon cooling is used. There are separate outlets and inlets from each cylinder block to the cellular radiator, which is aided in its work by a 16-inch fan. Free circulation is furthered by the 5-8-inch water space in the jaekets. The absence of water pumps is a factor in securing simplicity.

The electric cranking and lighting system, of Ward-Leonard make, is a 6-volt two-unit type with the generator attached to the outer left side of the crankcase and driven at twice crankshaft speed by a silent chain. The cranking unit is on the right rear side of the crankcase next to the flywheel to which it connects in the usual way. There is no intermediate gear, the starter pinion meshing directly with the flywheel teeth. The ratio is 10.5 to 1; that is, the electric motor runs at ten and one-half times the velocity of the crankshaft.

In connection with the system a Willard 80 ampere-hour battery is placed under the right front seat, where it is readily accessible. The system operates on 6 volts.

Nothing new to King design appears in the chassis and drive system. Clutch and gearset are in unit with the motor, a bell-housing bolting to the flywheel housing by flange construction inclosing the mechanism compactly. The clutch, a multiple-disk type running in oil, has bronze plates against cork-inserted steel ones. The gearset is a conventional three-speed, selective type with its shafts carried on roller bearings. It has center control levers.

Floating Axle Details

The drive shaft is fitted with a universal at its front end, and back of it enters a compactly-designed torsion tube which is in unit with the pressed steel housing of the floating axle. This has a large cover plate at the rear to give access to the differential and driving gears. Ball bearings are used throughout the axle.

The braking system is of the usual external contracting service and internal expanding emergency type acting on rear drums, which are 14 inches in diameter by 2 inches wide. The brake operating rods are a part of the axle unit.

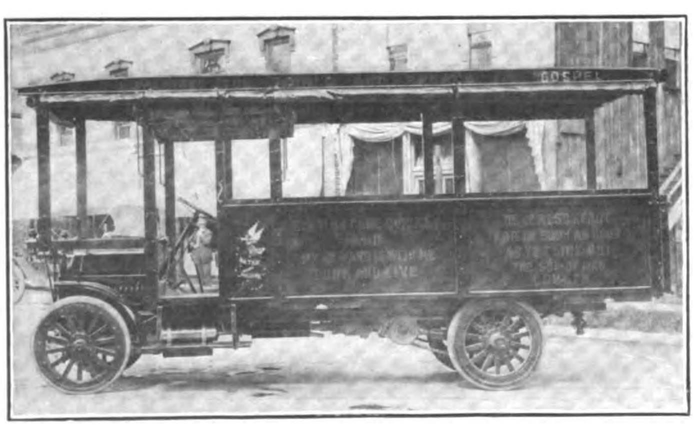
In this new car, the cantilever form of rear springs is still adhered to, the King company having used them since it brought out its first car some years ago. They have a trunnion mounting to the frame rail a little forward of the center of length, shackle at the rear to the axle housing, and at the front to the frame.

The frame is a bottle-neck design which is light and strong. Three cross-members in addition to the bracing given by the motor make it rigid. There is a slight kick-up at the rear to clear the axle.

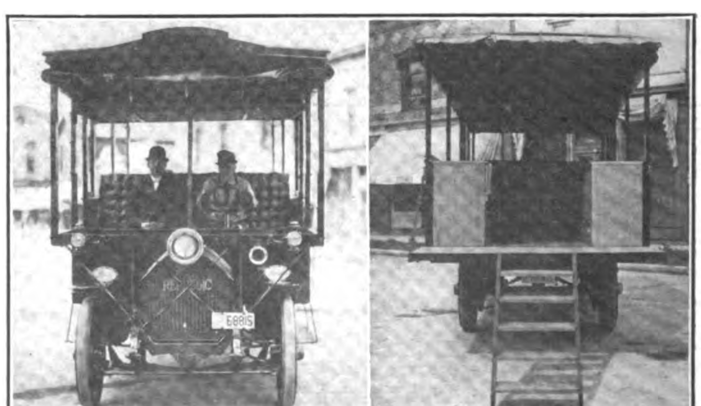
Alma Truck Used as a Gospel Wagon

Nowadays when the wise promoters of motor trucks as a commercial necessity have decided that they have been put to every kind of service imaginable, it is interesting to discover a new use for them. It has remained for one of the leading Evangelistic church organizations of the United States to press them into their service as "gospel wagons." Recently the Alma Motor Truck Co., Alma, Mich. was called upon to construct a special type of body on one of its standard truck chassis which would serve both as a home for the Evangelists and a pulpit as well.

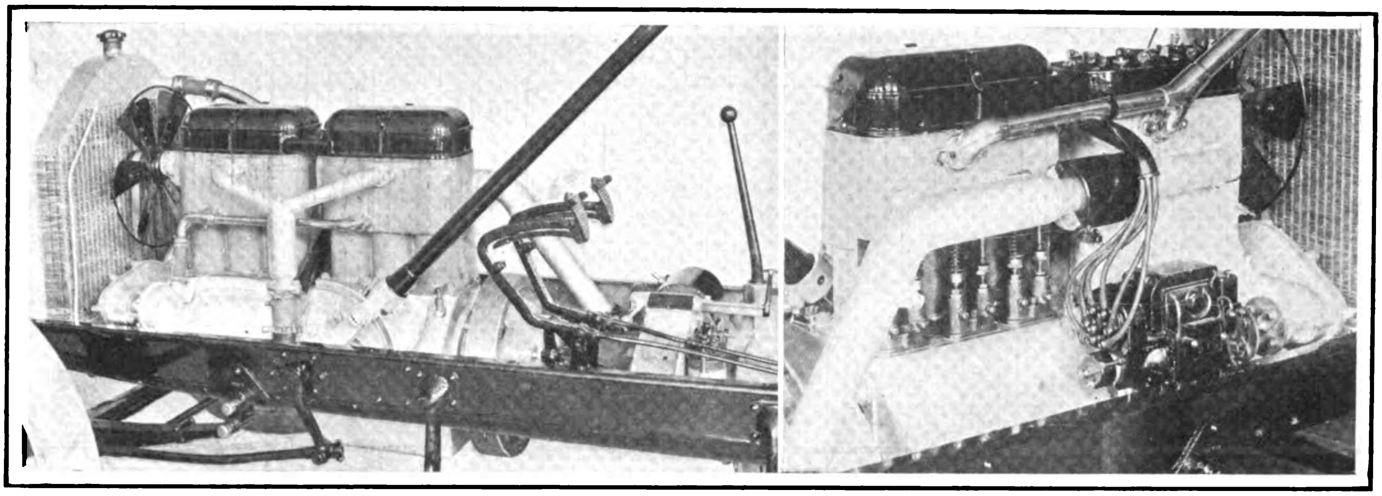
The truck was recently delivered and is now doing service throughout the South. Mr. Diehl, driver of the unique truck will travel all through Florida, Tennessee, Kentucky, Alabama and neighboring states spreading the gospel.



Side view of the Alma truck used as a gospel wagon



Front and rear views of truck, showing wide body



Reo six motor. Left view shows the left side of the motor illustrating the position of the carbureter, manifold construction and rack and pinion steering gear. The right view shows the valve mechanism and lighting and ignition generator mounting

Five-Passenger Reo Six for $1,385

Cylinders Cast in Threes and Cantilever Springs, Features —Price of Four Reduced to $1,050—Coupé Added to Line

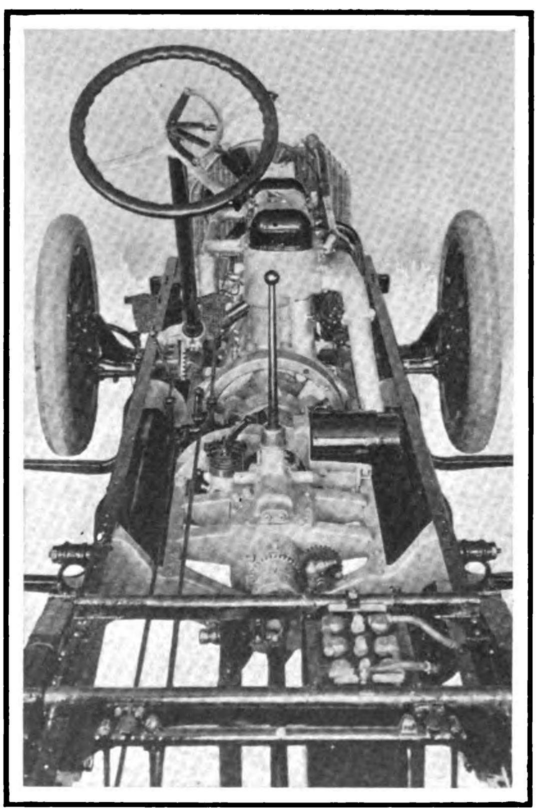
A SIX-CYLINDER, five-passenger car with a wheelbase of 122 inches and selling at $1,385 will be made for 1915, by the Reo Motor Car Co., Lansing, Mich. In the main it follows the design of the Reo four, the two main points of difference being the complete inclosure of the valves and the adoption of cantilever rear springs.

A substantial price reduction has been made on the four and a coupé has been added to the line which formerly consisted of two-passenger and five-passenger open cars. This year the price of both touring car and roadster was $1,175, but next year the touring car will sell for $1,050 and the runabout for $1,000. The coupé sells for $1,575.

Cylinders in Threes

In the six, cylinders are cast in threes. The bore and stroke are 3.563 by 5.125 which gives a piston displacement of 306.4 cubic inches and a stroke bore ratio of 1.43 which places this new Reo distinctly in the long-stroke class as distinguished from the new four which has cylinders 4.125 by 4.5 giving a ratio of 1.09. The S. A. E. rating is 30.4.

The chassis is divided into three units, the motor, gearset and rear axle being separate. The motor and gearset, following standard Reo construction, are mounted on a sub-frame. The electric equipment is furnished by the Remy company. The combined ignition and lighting generator is situated on the right side of the motor, while the starting motor is between the clutch and gearset. The wheelbase is 122 inches and the tires are 34 by 4. The tread is standard, being 56 inches.



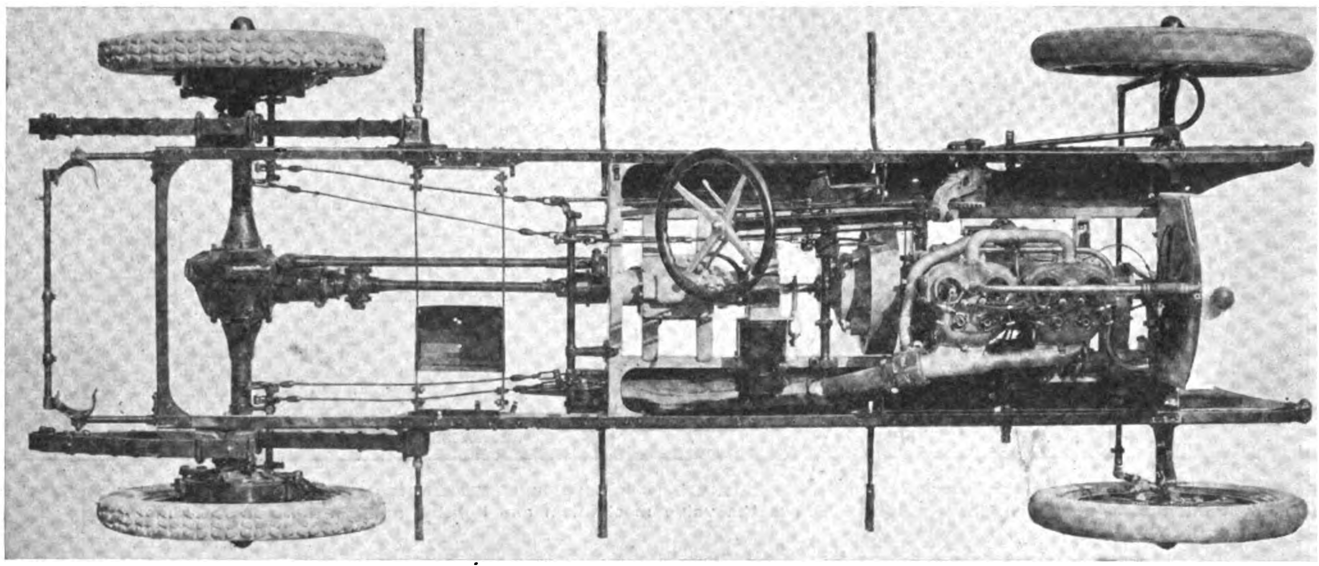
Reo six chassis, looking forward, showing the mounting of the control levers, the position of the starting motor to the right of the gearcase and the suspension of the storage battery from the frame

The six motor has its cylinders cast in threes, and is supported at four points. These dimensions give an S. A. E. rating of 30.4 horsepower. It follows Reo construction in that the intake valves are situated in the head and the exhausts are on the right. This motor differs from its smaller brother, however, in that the rocker mechanism on the cylinder tops is inclosed by sheet metal covers held in place by two coil tension springs. Cover plates also inclose the push rods and valve stems. The crankshaft is carried on four main bearings and the camshaft on three. Both are one-piece drop-forgings. The camshaft is driven directly from the crankshaft by helical gearing. Cooling is provided for by a vertical tube radiator through which water is circulated by a centrifugal pump situated on the left side of the motor. It is driven from the crankshaft by a special pair of gears. The flow of air through the radiator is aided by a six-bladed belt-driven fan. Motor lubrication is by means of a circulating-splash system in which a plunger pump is used.

Mixture is supplied through a Johnson carbureter which is placed very low, a long water-jacketed manifold connecting it with the motor. Fuel feed is by gravity. Additional heat is supplied by means of a hot air connection on the exhaust pipe.

Remy Electrical Equipment

The electrical equipment consists of a 6-volt Remy two-unit system and a Willard 100-ampere-



Bird's-eye view of Reo six chassis showing the arrangement of the different members. Motor and gearset are suspended on the sub-frame from four points. The axis of the armature shaft is at right angles to the crankshaft and drives the motor through a worm gear. Since the driving gearing is behind the clutch the latter must be engaged when the motor is to be started. Note the cantilever rear spring suspension and the floating rear axle

hour storage battery. A single instrument combines the ignition and lighting functions. It is located on the right side of the motor and is driven through a leather coupling. The starting motor location is unusual in that it is placed just in front of the gearbox and to the right of it. It drives the engine through worm gearing and when cranking is to be done the clutch must be engaged, because the starter drive is behind the clutch.

The clutch is a dry-plate type and is situated in a housing bolted to the flywheel. The friction surface is steel against asbestos.

Three speeds are afforded by the gearset which is suspended from the sub-frame by four arms. The shifting lever is mounted directly on the top of the gearcase cover, which also contains the shifting rods. The gear lever is carried in a ball and socket joint. Hyatt roller bearings are employed in the mounting of both main and countershafts.

From the gearset the power is transmitted to the rear axle through a drive shaft fitted with two universals. A torque rod which is attached to a cross member of the main frame relieves the springs from the torque reaction of driving the wheels. No radius rods, however, are fitted, the cantilever springs taking the driving thrust. The cantilever springs are pivoted to the frame at their centers and are shackled at the front ends.

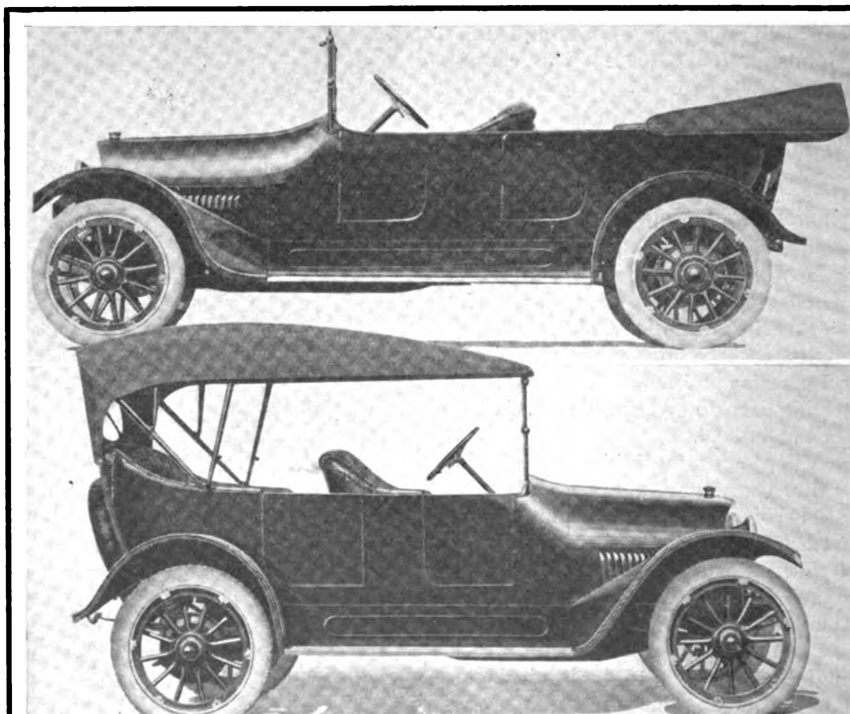
Floating Axle

The axle is a floating design, fitted with Timken bearings and notable because of the use of a spiral bevel gear and pinion to insure silence of operation. The ratio is 3.7 to 1. The brakes operate on the rear wheel drums which are 14 by 2.25 inches. The tires are 34 by 4 and are fitted with demountable rims which are mounted on wooden wheels. Front springs are semi-elliptic.

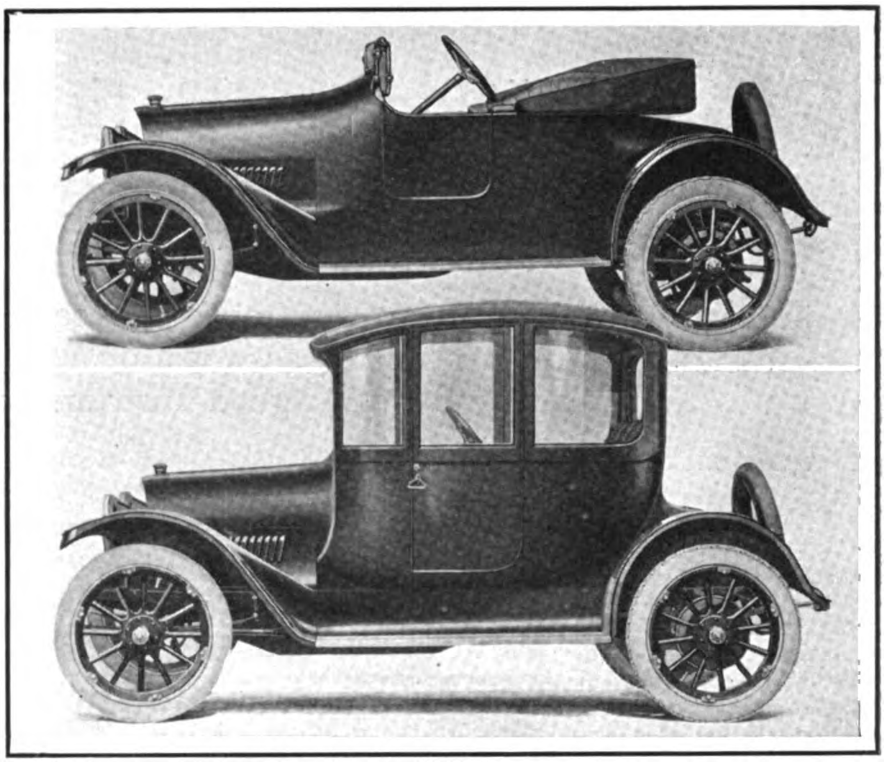
Left drive and center control have been adopted. The steering gear is a rack and pinion design. The emergency brake is controlled by the right pedal which usually actuates the service brake. This pedal is provided with a ratchet to hold it locked. The left pedal operates both clutch and service brake, the outward movement of the pedal first disengages the clutch and then applies the brake. This pedal is also provided with a ratchet lock.

The equipment includes a Stewart-Warner speedometer, one-man top with quick-detachable curtains, rain-vision, ventilating windshield, tools, extra rim, tire carriers, etc.

Smooth curves and clean running boards characterize the body design of the Reo six. As in this year's four, the top of the radiator points outward in a way that makes the car



Above—New Reo six. Below—Four-cylinder Reo with top up



Upper—Reo four runabout. Lower—Reo coupé

easily distinguishable. A feature is noted in the shaping of the front fenders. The inside of the fender is a straight line running to the frame, while the outside is curved to follow the wheel. This not only gives a pleasing effect, but also affords maximum protection against the spattering of mud. The smoothness of the body lines is accentuated by carrying the sides of the body down over the frame side members.

An increase of .125 inch in the bore is the principal difference in the new four. The cylinders now measure 4.125 by 4.5 inches, the S. A. E. rating being 27.2 horsepower. As in the case of the six, motor and gearset are mounted on a sub-frame, each being suspended from four points.

The cylinders are cast in pairs, the intake valves being mounted in the center of the head and the exhaust valves at the right side. Both crankshaft and camshaft are supported on three bearings, the camshaft being driven by helical gearing. Cooling is maintained by a tubular radiator assisted by a centrifugal pump and a six-bladed fan. Lubrication is by means of a circulating splash system in which a plunger pump is employed.

The electrical equipment is the same as that used on the six, while the carbureter is a Holley. The intake manifold is not water jacketed but a hot air pipe is fitted. Fuel feed is by gravity from a 16-gallon tank under the front seat.

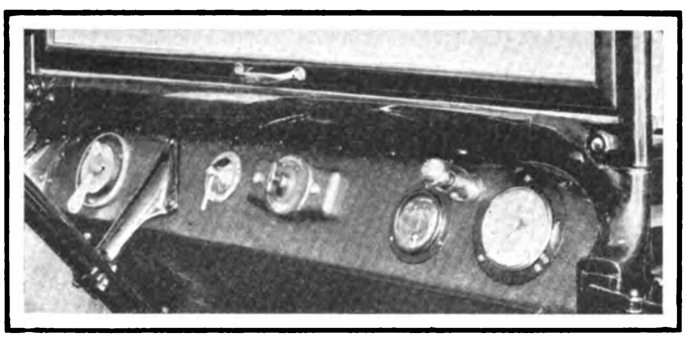
The clutch and gearset and the mounting of the electrical units are the same as on the larger car. Drive is transmitted to the rear axle through two universals, and a torque tube is fitted. The gear ratio is 4 to 1. The rear axle is a semi-floating design on which are mounted three-quarter elliptic springs. The brakes eare 14 by 2 inches, both sets acting on the rear wheel drums. Timken and Hyatt roller bearings are used in the rear axle and in the front axle Timken bearings are used exclusively.

The equipment includes a Stewart-Warner speedometer, three-bow extension top with quick-detachable curtains, rain-vision, ventilating windshield, tools, extra rim, tire carriers, etc.

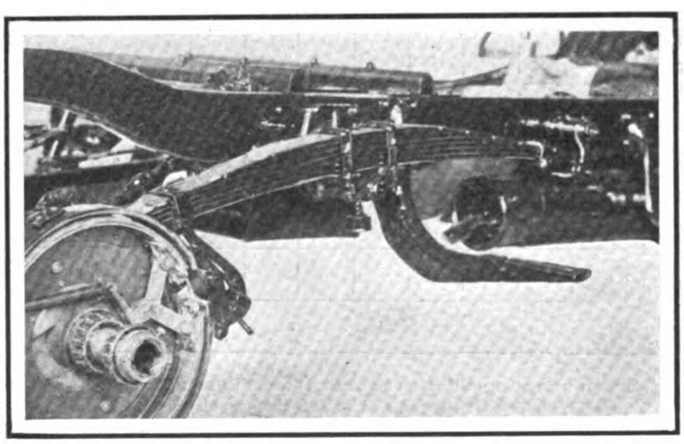
The body design of the four resembles that of the six and follows Reo design of this year except that the shape of the rear door is fuller, instead of the lower rear corner being cut off to make room for the fender.

Four Body Like Six

The body on the new runabout is the same as that of this year, but with slight refinements which add to its appearance. The coupé is a design in which the details have been thoroughly worked out. The upholstery is cloth and the windows are frameless. A rain-vision glass front allows the driver to see the road properly even in rainy weather. There is a space at the rear for tools and tubes and back of this is the tire carrier and spare rim.



Arrangement of instruments on Reo cowl board



Reo six cantilever spring suspension showing how it is pivoted at its center and shackeled at its front

Vanadium Discovered Near Lake Superior

DETROIT, MICH., Dec. 7—Vanadium has been discovered by J. N. Thompson, a mineralogist, near the shore of Lake Superior, about 35 miles northwest of L'Anse, it is reported.

The mineralogist has been prospecting for a number of Chicago iron interests and made the discovery of a vein of vanadium several weeks ago. The matter was kept secret, but arrangements were made at once for the construction of a shaft and crew of men was put to work to further investigate the grounds. The vein is reported to be 24 inches thick and runs for a very great distance. In fact it is estimated that the output will be exceptionally large in quantity and value. Although vanadium has been found in five Western States, in only two has it been found worth the while to mine it, but even so, the quantity produced is quite small and practically all of the vanadium used in the United States comes from Europe and most of it from Sweden.

Vacuum-Velocity Ratio Not Constant

The Automobile Engineers' Forum

Carbureter Inventor Cites Simultaneous Readings in Mixing Chamber and Venturi Throat as Basis of a Mathematically Designed Instrument

NEW YORK CITY, Dec. 5—Much discussion has arisen over the principles of operation in the new Browne carbureter recently described in these pages and A. B. Browne, inventor of this carbureter, answers many of these criticisms in the following communication and shows wherein the carbureting conditions in his design differ from those in other types:

BRANFORD, CONN.—Editor THE AUTOMOBILE:—In discussing the principles used in the Browne carbureter we must first recognize that in the ordinary auxiliary-valve carbureter, the force acting on the valve is not the same as the force acting on the mouth of the fuel jet.

In proof of this, turn a stream of compressed air through the primary inlet of any carbureter. Fuel will be inspirated by the velocity of the air passing the fuel jet, although the pressure in the carbureter is above, rather than below, that of the atmosphere. This is the well-known principle of the atomizer. Because the pressure within the carbureter is above atmospheric, the common auxiliary valve is pressed tightly against its seat.

If now, suction is applied, instead of pressure, and the primary inlet closed, fuel will again be inspirated, this time by the static vacuum, for because the inlet is closed, there will, in this case, be no air passing the fuel nozzle to exert its inspirating effect. In this case the auxiliary valve opens.

Velocity and Vacuum Actuate Fuel Flow

By these two experiments we have proved that the fuel flow is actuated by velocity and vacuum while the auxiliary valve operates by vacuum alone.

It is next necessary to prove that although the vacuum induces the velocity, that:

A—The combined forces of vacuum and velocity are greater than either acting alone.

B—That the relationship between the two forces is not constant.

In proof of A, I cite actual simultaneous readings of injecting force in inches of water.

On the auxiliary valve in the mixing chamber		On the fuel at the throat of the venturi	
0.5	inch	1.31	inch
0.875	inch	1.93	inch
1.0625	inch	2.875	inches
2.5	inches	5.5	inches

B—The foregoing readings were taken during a period of no barometric or temperature change and hence the relationship remained practically constant.

Suppose, however, as an exaggerated illustration, that in one case the velocity over the fuel jet was that of entering air while in the second case it was that of mercury vapor. The vacuum in both cases could be maintained the same but the velocity effect of the heavier mercury vapor would be very different from that of the lighter air.

This is clear, mathematically, when we remember that density is a factor of head and that head is proportional to the square of the velocity and not velocity direct.

Constantly Varying Factors

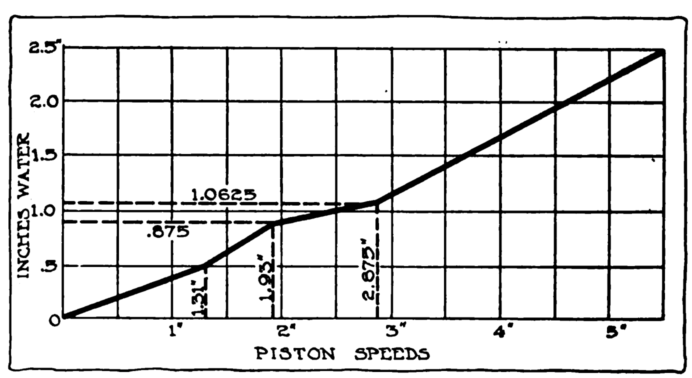
Summarized then, we must admit that there is no constant kinetic characteristic of air, so far as carburetion is concerned. Temperature, pressure and consequently volume, are constantly changing and hence the relationship between the forces acting on the fuel nozzle and upon the auxiliary valve are constantly varying. The best we can do is to eliminate this variation instrumentally, by causing the same forces, whatever they are, to act on both fuel and air supply. This the Browne does and, repeating our first experiment as above, we find the flow of compressed air actually opens the auxiliary valve instead of forcing it shut as in the ordinary carbureter.

Velocity Determines Curve of Inlet Areas

Having accomplished elimination of variables it becomes an easy matter of design to so proportion the total air inlet area as to maintain constancy of composition. Both the primary and auxiliary inlets must be considered as a unit, but in the Browne, because of greater mechanical convenience, the total area is properly modified by varying the auxiliary inlet only, and inasmuch as the varying degrees of vacuum are fixed, velocity alone enters into the determination of the curve of inlet areas.

Because the areas corresponding to given quantities of air can be and are so accurately determined, it becomes necessary to use a spring accurately calibrated for each instrument, precisely as the spring of a spring balance is calibrated. This is done by passing compressed air through the primary inlet at velocities determined by a venturi meter.

This accuracy would be unobtainable with differing air densities if the disk-type valve were used. The inertia, or the wind, of the incoming air at different densities would change the position of such a valve relative to the curve of

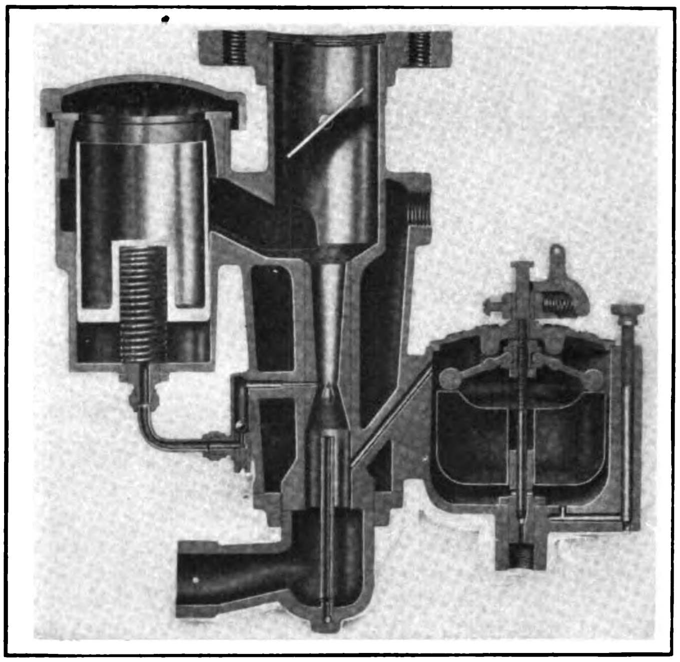


Curve illustrating the theory that the combined forces of vacuum and velocity in a carbureter are greater than either acting alone, as deduced from a test comprising actual simultaneous readings of injecting force in inches of water on the auxiliary valve in the mixing chamber and on the fuel at the throat of the venturi admission areas and hence our valve is made cup shaped, presenting practically no surface to the inrushing air. In effect this is an adaptation of the bug used by Western miners where a candle inserted through the side of an open ended can, fails to be blown out, even with a stiff gale blowing directly into the open mouth of the can.

Keeping Out Dirt and Preventing Air Leaks

One more point is worthy of consideration. The air current passing from the auxiliary opening in the mixing chamber traverses a path at an approximate right angle to the vertical axis of the valve. The velocity is here again utilized to exert a suction where the valve enters its cylinder, in this way preventing dirt from entering and counteracting possible air leakage past the valve. The effectiveness of this is proven by the fact that I have driven one of these carbureters 16,000 miles, with no cover on the auxiliary opening, and the valve today is nearly as bright as when first put in, and shows not the slightest sign of wear.

Our instrument is the embodiment of a conception of natural law and frankly I have spent the greater part of 3 years attempting to prove some weakness in this conception but absolutely without success. Deviations always led us directly back to the original basis and this given, design was a simple matter.—ARTHUR B. BROWNE, designer of the Browne carbureter.



Section through Browne carbureter, which has vacuum air control

Court Decisions—Motorist Recovers Damages

By George F. Kaiser

THAT a purchaser of a motor car on his rescission of the purchase for false representations is entitled to recover back the entire amount he paid for the car, although part of that amount was given as a commission to agents, was recently decided by the highest court in Texas.

In 1913 a motorist, desiring to get a better and more up-to-date car than the one he owned, applied to a garage owner in the town where he lived and told him that he was impressed with a certain car and, although the latter was the agent for another car, he undertook to get the agency for the car desired.

The garage man took the matter up with the agents of the factory and was told by them that if a commission was made they would divide it. He succeeded in selling a new car to the motorist and allowed him $550 for the old car in part payment. The new car was represented to be a four-cylinder, four-passenger, 30 horsepower car, first class in all respects, and a good hill climber and able to go from Dallas to Celeste on high gear. The car turned out to be defective and not as represented. The purchaser therefore attempted to rescind the contract and get back the money which had been paid by him.

The Court held that he was entitled to do this notwithstanding the fact that $200 commission had been divided between the garage man and the agents.—*Halff vs. Jones*, 169 *S. W.*, 906.

Must Stop After Accident

California Court of Appeals decides that motorists must stop and give their addresses whenever an accident occurs.

California has a statute somewhat similar to the statute in New York and other states, which provides that whenever an automobile strikes a person or collides with another vehicle, the driver shall stop the automobile, attempt to give assistance to the other vehicle and furnish the number of the offending car, together with the name and address of the driver and owner and the names of the passengers.

While a car was being operated by a motorist in California, it collided with another automobile and the chauffeur of the first car did not stop, nor give his name, number, etc. He was convicted of violation of the above statute and it was held that his argument that such a collision might occur under such circumstances as to render him criminally liable and that therefore the statute was unconstitutional could not avail him, as it was the right of the Legislature of the state to attach any restrictions or conditions to the operation of motor car vehicles on the highways that it thought necessary.—*People vs. Diller*, 142 *Pacific* (*California*), 797.

Chauffeur Acting for Owner

When a person seeks damages from an automobile owner whose car is driven by a chauffeur at the time of a collision, he must set up that the chauffeur is acting for the owner at the time of the accident.

A person was struck and injured by an automobile which was driven by the owner's chauffeur and subsequently he brought suit against the owner for damages for his injuries. The Court held that the action against the motorist could not be sustained because although the chauffeur was named, the injured party did not allege that at the time of the accident the chauffeur was the motorist's servant, or that the chauffeur was acting for the owner at that time.—*Ruban vs. Bierman*, 149 *N. Y. Sup.* (*New York*), 483.

NEWCASTLE, IND., Dec. 7—The fact that an automobile dealer has machines on the freight track, with a sight draft attached to a bill of lading does not in any way impair his financial credit. This point was brought out in receivership proceedings at the Henry Circuit Court here. Charles W. Mouch, president of the Farmers' National Bank of this city, and a minority stockholder in the Rose City Auto Co., filed a petition for the appointment of a receiver for this company. Judge Fred C. Gause, in an oral decision handed down, refused to appoint a receiver and stated that the corporation was entirely solvent, the evidence showing a healthy condition of affairs.

The Improvement of Spring Suspension—II

By M. C. K.

(Continued from issue of November 26)

The basic idea: To express the requirements in the springing of motor vehicles in definite mechanical terms; to do this by ascertaining and describing the movements and actions occurring under different conditions and comparing them with those desired; to ignore refinements until the fundamentals seem clear—in brief, to make the subject accessible.

IN trying to determine the movements to which a vehicle is subject by reason of inequalities of the road surface, with a view to ascertaining the best means for getting only such movements as are consistent with security and comfort, it is found necessary to examine first (1) the movements made by a vehicle entirely devoid of spring suspension elements of any description, then (2) those of a vehicle fitted only with ordinary vehicle springs, thereafter (3) those of a vehicle fitted with springs and elastic tires and finally (4) those of vehicles equipped with springs, elastic tires and representative selections among the auxiliary devices which have been developed specially for the requirements of speedy motor vehicles. In this instalment only a part of the foundation for subsequent comparisons can be laid, consisting in an examination of the action which must follow when an entirely unelastic vehicle strikes an obstacle of the simplest shape on a level road. As entirely unelastic vehicles do not exist in reality, the result of this preliminary examination cannot be anything more than a contribution to the clearing up of the ideas which subsequently enter in the more practical phases of the large subject. It should, however, dispose of the rather widespread impression, which is frequently countenanced unthinkingly even by those who are deeply versed in other aspects of spring suspension matters, to the effect that the jouncing and the shocks of vehicles, which are both sources of danger and discomfort, are also due to the same causes and can be obviated by the same means.

In each of the four classes not only the movements caused by simple road obstacles but also those caused by depressions in the road surface and by successions of humps and of hollows at various distances apart, as well as of humps and hollows in combination, must eventually be considered with reference to different vehicle speeds and road gradients, but this will be postponed until the more fundamental comparisons shall have been disposed of; whereafter the reasoning becomes easier.

(1) Movements of Vehicle Devoid of Springs and Other Elastic Elements

The suppositions are: A vehicle weighing 3,000 pounds, of which the rear wheels and axle with the load thereon represent 2,000 pounds and the front wheels and axle with load make up the remaining 1,000 pounds; the wheels are 40 inches in diameter; a speed of this vehicle of 50 feet per second, which corresponds to about 35 miles per hour; a level road with an entirely unyielding transverse ridge of triangular section, 3 inches high with a base of 6 inches.

What happens to an absolutely unelastic vehicle when it strikes a road obstacle is not unlike that which happens to the running-gear, with hard tires on the wheels, of a motor truck for example, if the action of the running-gear is considered separately from that of the springs and the load supported on it; that is, the forces are similar, but the resulting movements are made to vary through the reactions of the load and the springs upon the running-gear; also, the running-gear is in practice never absolutely unelastic. The similarity nevertheless becomes of interest in the subsequent development of the subject and especially for a comparison of the relative merits of two spring suspensions, one composed of ordinary vehicle springs eased by means of elastic tires and the other of more specific spring arrangements in connection with tires of scarcely any elasticity.

The laws of gravitation must be constantly consulted to determine the movements of the vehicles in all four classes. For convenience there is therefore given herewith in Fig. 2, a scale of the time t in fractions of a second which it takes for a weight to drop back to the level of a road from different heights h. It gives the time for heights from 1 inch to 12 inches, and thereafter for even feet from 2 to 16. In figuring this scale and in all other cases, the factor of acceleration by gravity, g, has been taken as 32 instead of 32.16 or 32.20, this giving $t = 1/4\sqrt{h}$ from the basic formula, $h = 1/2gt^2$.

Gravitation Data

Acceleration by gravity $= g = 32.16$ feet per second
Time in seconds $= t$
Velocity acquired $= v = gt$
Height of fall or rise $= h = \frac{1}{2}gt^2$
Initial velocity $= c$
Height of rise against gravity $= h = \dfrac{c^2}{2g}$
With g taken as 32, $t = \frac{1}{4}\sqrt{h}$

SCALE OF $t = \frac{1}{4}\sqrt{h}$ FOR DIFFERENT VALUES OF h

h	t	h	t
1 inch	0.072	3 feet	0.434
2 inches	0.102	4 feet	0.500
3 inches	0.125	5 feet	0.559
4 inches	0.145	6 feet	0.612
5 inches	0.161	7 feet	0.661
6 inches	0.177	8 feet	0.707
7 inches	0.191	9 feet	0.750
8 inches	0.204	10 feet	0.791
9 inches	0.216	11 feet	0.829
10 inches	0.228	12 feet	0.866
11 inches	0.239	13 feet	0.901
1 foot	0.250	14 feet	0.935
2 feet	0.353	15 feet	0.968
		16 feet	1.000

Fig. 2—Reference formulas and figures related to the movements of vehicles in rising from or returning to the road level after a shock

Beginning with front wheel action, to climb the ridge means to raise the weight of 1,000 pounds to the height of 3 inches in the time elapsing from the moment when the wheels strike the ridge till they are squarely on top of it. For simplicity, the two wheels may hereafter be referred to as one.

By reference to Fig. 3 it is seen that the distance covered by the vehicle in this time is b and that this is one side of a right-angled triangle; hence $b = \sqrt{20^2 - 17^2} = \sqrt{111} = 10.53$ inches.

Moving at the rate of 50 feet per second, and considering that retardation due to the shock received by striking the ridge is negligible, the vehicle covers 10.53 inches in 0.01755 second and imparts an upward movement of 3 inches to the front portion of the vehicle.

At this point in the reasoning the current opinions part, and for the sake of clearness the view of the action most commonly entertained must be presented first. According to it, it is assumed that the upward movement at high velocity results in a bound and that the extent of the bound—the vertical movement being so far the only component considered—depends on the velocity. The height of the bound is in this manner easily figured:

It is determined from the formula, $h = \frac{c^2}{2g}$, in which c is the initial speed in a vertical direction imparted to an object and h the total height reached by the object with gravitation constantly acting against its rise. In the present case $c = 3$ inches in 0.01755 second, which is the same as 171 inches or 14.25 feet in 1 second. The formula thus gives:

$$h = \frac{14.25^2}{64} = \frac{203.0625}{64} = 3.18 \text{ feet.}$$

The front portion of the vehicle is thus thrown up in the air to a height of 3.18 feet, if it may be assumed that its connection with the rear portion does not hinder or assist the movement.

The time occupied in going up is the same as for coming down again, as the velocity decreases in going up exactly at the same rate as it increases in coming down. The drop from a height of 3.18 feet, (according to: $t = 1/4 \sqrt{h}$ or by interpolation from scale in Fig. 2) takes 0.445 second, and the total time of the bound is therefore 2×0.445 sec. $=$ 0.890 sec. This gives the width of the leap, for in 0.890 second the whole vehicle advances—still on the supposition that its momentum is not appreciably reduced by the impact—at the rate of 50 feet per second, consequently a distance of $50 \times 0.890 = 44.5$ feet, and the movement made is therefore a leap 44.5 feet long and 3.18 feet high, describing a parabola.

Before the front portion has finished this leap, the rear wheels strike the ridge, and this causes the rear portion to make a similar leap, so that the whole vehicle is in the air for a distance of 44.5 feet minus the length of the wheelbase.

Misapplied Reasoning

These figures seem extraordinary, but it is remembered that racing cars, after striking a *caniveau*, have sometimes made leaps described as even more wonderful, and some explanation is perhaps found in the assumption of completely unelastic wheels and vehicle structure acting against an entirely unyielding obstacle, it being remembered that in any sort of practice where no springs are used, as for artillery, for sulkies or in the Russian telega, large forces are always absorbed, in the case of a shock, in deformations and heat generation, while the road obstacle is also more or less crushed by the impact, so that the forces remaining to cause a great bound with these vehicles are considerably cut down. In the discrepancy between theory and practice an explanation has thus been found for the observed fact that unsprung vehicles after all do not make such leaps as described. But there is little comfort in this explanation, because only the velocities and not the masses have been considered in figuring out the trajectory of the vehicle after striking, and it follows from this that the leaps made in practice should equal those declared by theory with only an extra allowance in the matter of the severity of the conditions. For example, a hard obstacle, such as a scantling or a frozen ridge or a railway track 5 inches high, should under that explanation have a similar effect on the trajectory as a theoretical hump 3 inches high.

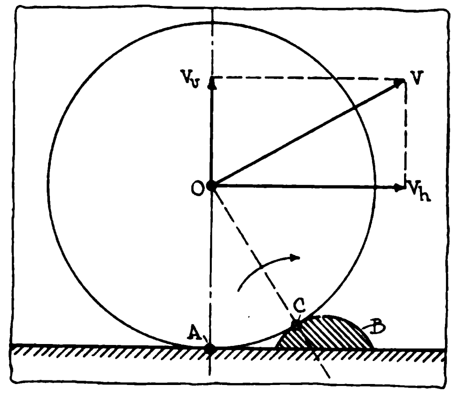


Fig. 4—Dr. Bobeth's illustration

Even Specialists Confused

That the theory which would determine the bouncing of a vehicle from the velocities employed and the height of the obstacle encountered is not purely a popular fallacy or set up merely as a man of straw to be knocked down, is evidenced in one instance. Dwelling on the severity of the vertical component of a road shock, Doctor-engineer Erich Bobeth, whose treatise on *Die Leistungsverluste und die Abfederung von Kraftfahrzeugen* (The Efficiency Losses and the Spring Suspension of Motor Vehicles), 1913, constitutes the most recent exposition of spring suspension requirements and is based on many elaborate tests, has the following to say (page 70 of the work mentioned): "If in accordance with Fig. 37 [reproduced as Fig. 4 in this text] it is assumed that a wheel moves with uniform horizontal velocity v_h and, when reaching the point A, meets the obstacle B, it is compelled to leap over this obstacle. At the moment of striking, the wheel must execute a turning movement around the point C of the obstacle. If the wheel has a perfectly rigid tire and the horizontal speed v_h is to remain constant during the leap, there must at the moment of striking be created a vertical velocity v_v of finite magnitude determined by the parallelogram of forces, while before the striking the vertical velocity was nil. This means however that the acceleration of the wheel in the

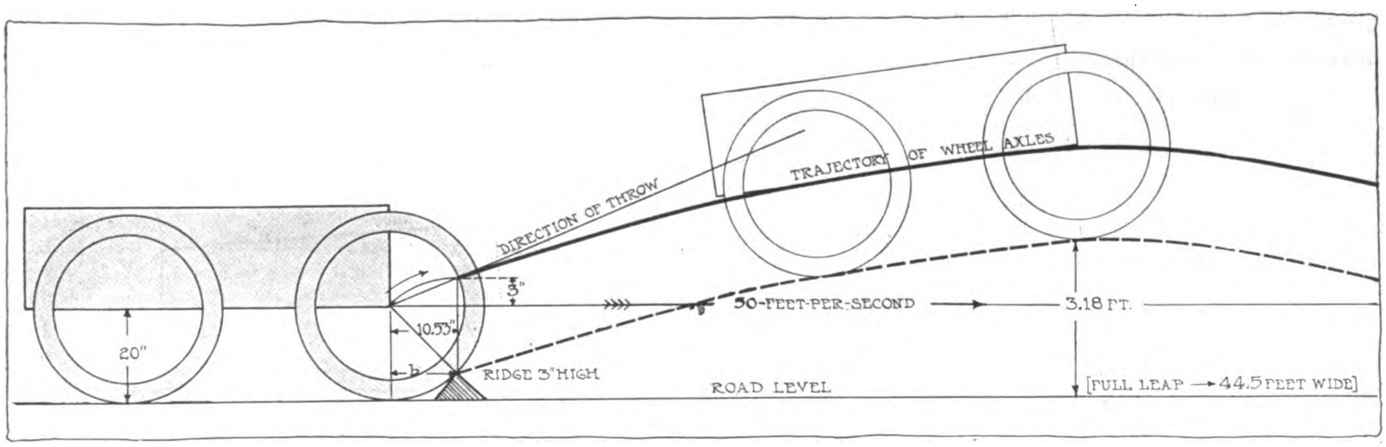


Fig. 3—Representing a graphic translation, based on figures, of a commonly accepted theory, as to what occurs when a fast-moving vehicle without springs or elasticity strikes an obstacle in the road—Not drawn to scale—Curve marked by arrow is part of the wheel axle trajectory, and the lack of continuity where the two portions join suggests the error of the theory

vertical direction must be infinitely great [since O must be multiplied by infinite to produce a finite value]. And an infinitely great acceleration calls for infinite forces, which cannot exist in practice; moreover, destruction of the obstacle or the wheel is first to be looked for.

"It was assumed in this reasoning that the horizontal velocity v_h of the vehicle frame and axle remained unchanged while the wheel passed over the obstacle, and this supposition is generally justified, as the mass of the vehicle is of such magnitude that the retardation at the moment of the shock can be considered as negligible.

"There exist, however, vehicle constructions with which a momentary retardation of the axle with relation to the frame is possible; namely by the use of resilient radius rods [or "driving through the springs"]. The velocity v_h of the axle can then become O at the moment of impact, and this will permit also the vertical velocity v_v to begin at O and to increase gradually, so that excessive vertical acceleration is avoided. It must nevetheless be considered that even with such construction the relative movement of axle and frame is very small and that therefore the mitigating effect of yielding axle struts must be small also.

"A suitable means for holding the vertical acceleration within bounds while the horizontal velocity remains constant [so as to avoid jerky progress] is found in the use of elastic tires. The obstacle impresses itself in some measure in the tire, and the vertical forces, beginning with O, are increased gradually and impart to the axle likewise a gradually increasing vertical velocity."

Dr. Bobeth does not trace the trajectory of an entirely "unsprung" vehicle and perhaps by reason of this omission is not induced to investigate further if the theory of the vertical acceleration due to the shock, which he applies and which is the same that has been applied to construct Fig. 3, is after all properly applicable for any kind of vehicle, with or without spring suspension and tires.

In what else there has been published on the subject similar uncertainty and hesitation prevail on this point, the theoretical conclusions being apparently hard to accept, as they should be, but the hesitation may be ascribed in part to the fact that unsprung vehicles have seldom been seen running at 35 miles per hour against hard obstacles 3 inches high, so that the actual results of such practice are little known. The impact would result in breakage in most cases. Also, a slight reduction of speed, which might escape the estimate in practice, figures out a considerable moderation in results. The writer remembers, however, one instance which might be interpreted either way. A cannon under his command was driven at the highest obtainable horse speed down a steep hill and struck a ridge, higher at one side than at the other, near the foot of the slope, and the leap made was astounding in height, throwing the soldiers a considerable distance, while the unevenness of the shock resulted in twisting the steel plates of the carriage probably 10 degrees.

Reasoning for True Theory

As it is evidently of considerable importance to know what actually does or must take place, with different sorts of impacts, in the case of unsprung vehicles, so as to be better able to appreciate the effects of spring suspension elements, an attempt shall now be made to determine if there is not after all a momentary retardation or other factor of some magnitude at the reception of a shock, which will allow the trajectory described by an unsprung vehicle after striking an obstacle to be drawn more in accordance with natural expectations and practical experience than that which is exemplified in Fig. 3.

Fig. 5 serves to illustrate the reasoning. As the vertical acceleration of the front portion of the vehicle must be produced during the very brief period while the axle B is being deflected from its horizontal course and turned around the point A where the impact takes place and cannot be continued after the point A of the wheelrim has ceased to be actuated, either the whole acceleration is communicated instantaneously or else the possibility exists that it, the acceleration, may be cut short the moment the impulse received becomes sufficiently strong to raise the wheel from contact with the obstacle before B has reached C. An instantaneous acceleration is out of the question, as it implies infinite forces. The inference is therefore that acceleration is received all the way from B to C, provided A remains in contact with the ridge. But it is observed that the tangent of curve BC at C is horizontal, so that, if axle B followed this curve, its upward course would here be finished; also, that any intermediate point of curve BC, such as F, represents a greater rise above the horizontal BD, considered in proportion to the corresponding horizontal progress BG of the vehicle, than the total rise at C to which the horizontal progress b corresponds. The vertical acceleration is therefore stronger nearer the moment of impact and results at one moment or another in raising B above the curve BC; that is, it results in raising A from the ridge, thereby cutting short further acceleration until gravitation takes the wheelrim back into contact with A. As this action operates on the principle of a governor, it is seen that in reality the theory of a violent vertical acceleration and a high leap as the result of an impact of an absolutely unelastic wheeled structure with an entirely unyielding ridge is inconsistent with itself, and that the wheel on the contrary must skim closely—in a series of infinitesimal bounds, it might be said—around the contours of the obstacle till its summit is passed, whereafter the trajectory to the road level depends upon its horizontal velocity. And a corrollary to this conclusion must be that where in practice an unsprung vehicle bounces considerably in passing over a hump or ridge, such action is due to whatever elasticity such a vehicle—or the ridge—possesses despite the absence of springs.

Retardation Not Negligible

It remains a fact that B is raised 3 inches in a certain time and that this time in the present case would be 0.01755 second if no retardation took place. With or without retardation, a force equal to such an acceleration of 1,000 pounds must have been abstracted from the kinetic energy of the vehicle, which is $1/2mv^2 = 1/2 \times \frac{3,000}{32} \times 50^2$. But as it has now been shown that the front axle cannot acquire the vertical velocity mentioned, the wheels on the contrary being compelled to hug the obstacle closely—if elastic elements are absolutely absent—it becomes necessary to conclude that the force of the im-

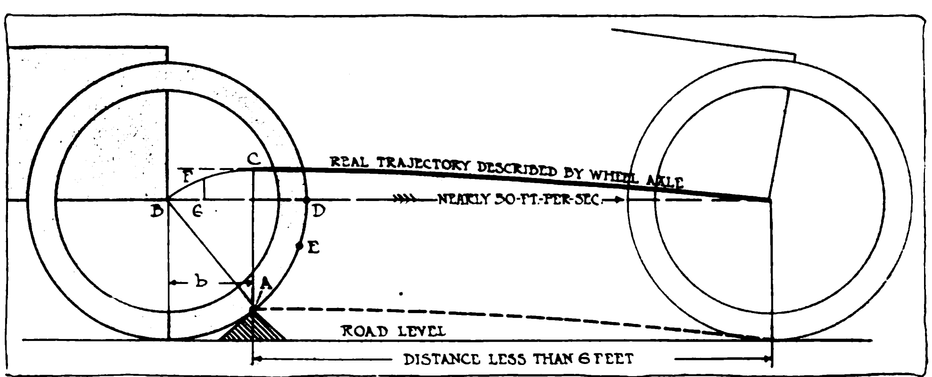


Fig. 5—Representing the movement really made by front wheel of vehicle without springs or elasticity, when it strikes a road obstacle at 35 miles per hour

pact must have been spent mostly in shock of the structure and, furthermore, that this shock means an actual and considerable retardation of the vehicle, resulting in just such a vertical component of the force as makes the wheel rise over the obstacle without surplus velocity for a leap.

The nature of the retardation, resulting, as it does, from converting the rectilinear movement of B into a circular movement for a very brief period is here a difficult element to bring in line with the laws of kinetic energy, whereof later.

As all ideas on the subject are associated with materials and structures having a more or less pronounced capacity for rebounding—in many cases coming into play only when the impact has great force—it is an effort to conceive the situation in the abstract and to realize that whether the front end of the vehicle is light or heavy, provided it is absolutely unresilient, the striking of an obstacle must retard the whole vehicle, which may be very heavy in proportion to the weight of its front portion, sufficiently to prevent this front portion from being thrown into the air more than just enough to clear the obstacle. Some experience with the driving of common unsprung farm wagons at a lively clip over rough ground helps the realization, however.

Transforming Shock Into Movement

It is also plain that if the unyielding obstacle is so shaped and so high as to resist the wheel at D, Fig. 5, it will stop the vehicle completely, and that the component of resistance which tends to arrest the vehicle simply gets gradually smaller below this point. There is thus always retardation. In fact the horizontal component of the force of impact is retardation, usually not so pronounced as to be felt as a shock, and the vertical component is the shock proper, which again is dissolved into destructive shock and motion, the motion being in the case of the unelastic vehicle only that of raising the vehicle over the obstruction and coming down to the road level again, and in all other cases only such additional movement as the constructive conditions permit. The mechanical object of spring suspension is therefore always to transform shock into movement by making movement possible, and to make the movement unobjectionable by extending it as much as possible in the direction of the travel. This becomes especially difficult when shocks are received in quick succession, as the shock forces then, in whatever manner they have been dissolved, accumulate upon a small amount of the forward movement of the vehicle in which they have to be absorbed—that is, which they have to be permitted to modify.

Load Distribution Secondary Without Springs

Somewhere between D and A, as at E, there is a point where the vertical component involved in the turning-movement of B around A as a center becomes so large that it must depend upon the relations between the mass of the whole vehicle and that of the front end whether the movement can be executed or the vehicle will be stopped, as a bumper consisting of curved-up rails stops a train of cars in a station yard. The relation of the masses—which is the same as the load distribution of the vehicle—thus enters into the question of the nature of the movements which will result, but, so far as unelastic vehicles are concerned, this is true only in case of large road obstructions, which have little to do with the main purposes of spring suspension. That the same factor, the distribution of masses, enters strongly the moment springs are used is another matter. On the other hand, speaking of the unelastic vehicle, as the force of an impact, other things equal, increases when a high obstacle is encountered and a relatively large vertical component is required for mounting the obstacle, there is apparently nothing to hinder acceptance of the inevitable conclusion that the force of the impact always automatically divides itself into one force causing a turning movement of B around A, just sufficient to clear the obstacle, and another force which is spent destructively in opposite directions from A and which retards the vehicle and the turning movement.

Perhaps an exception should be noted for the case that the ridge is slippery, so that A affords no reliable fulcrum for the turning movement, but consideration of what will happen in that case must here be deferred.

A Paradox Conclusion

The main theory, which could also be proved by applying the laws for the parallelogram of forces, seems to agree better than the one more commonly accepted with the practical results accomplished in the driving of unsprung vehicles—the shocks being much more objectionable in them than their movements over obstacles—and out of it there arises a certain general and preliminary view of spring suspensions, to the effect that the bounding of spring-suspended vehicles is wholly due to the use of springs while the shocks, if objectionable, are due to insufficient or wrong use of them, and that therefore any improvement looking to the reduction of both bouncing and shocks must consist in the limiting of spring action in some respects as well as to the extension or enlargement of it in other respects.

In motor vehicles the bouncing has, through speed, become as objectionable as the shocks, and the practical development has very properly taken up the work of providing for the limiting of the action as well as for extending the use and range of springs at the same time. But in theory the acceptance of this viewpoint has been less common.

An examination of the movements of a spring-suspended vehicle in passing over the 3-inch ridge of Fig. 3 should show, however, that the viewpoint has a practical value for steering further improvement into the best course. But first the retardations taking place with the unsprung vehicle may be briefly considered for comparison with the smaller retardations usually occurring with the use of spring suspensions.

(To be continued)

Narrowly Averted Famine in Tungsten Due to the War

At the outbreak of war a tungsten famine was threatened in England, and it looked as if it would be impossible for the Sheffield steel makers to supply not only the profitable export trade in high-speed steel but also their home market. Though Cornwall has considerable wolfram deposits, from which tungsten may be produced, and India and other British colonies have illimitable quantities of this raw material, it was found that somehow the method of producing the tungsten had been allowed to become a German monopoly. In the first days of alarm at the shortage, prices ran up to very fancy figures, but have since with the aid of some small imports from the United States dropped to about 5 shillings per pound, which is still twice as high as normally. Two British metallurgical concerns were at once started to provide metallic tungsten powder, and they promise to supply the market adequately in the spring of next year and forever after.

Molybdenum, which can take the place of tungsten in high-speed steels, though the latter is usually preferred, has also become very scarce. For a few years back the Krupps have been buying up this metal, as it is used in the making of big guns.

The first attempts at producing metallic tungsten powder, by the new British concerns, were not wholly successful, but all difficulties are said to have been overcome later.

Tungsten enters largely not only in high-speed steel but also in that used for magnetos, and to some extent in most steels of which extraordinary strength and anti-fatigue qualities are required.—From *The Engineer*, November 6.

Large Radiator Capacity Does Not Mean Efficiency

Ideal Radiator Is Unattainable—Aim Is Lightest Type That Will Do Greatest Amount of Work for Greatest Length of Time at Least Manufacturing Cost—Factors in Radiator Design

By Howard Greer, Jr.,
Chief Engineer, McCord Mfg. Co.

AN IDEAL RADIATOR IS NOT ATTAINABLE. OBVIOUSLY, THEREFORE, THE AIM SHOULD BE TO GET, AT LEAST COST, THE LIGHTEST RADIATOR THAT WOULD DO THE GREATEST AMOUNT OF WORK FOR THE GREATEST LENGTH OF TIME.

There are few if any parts of a car dependent upon so many factors as this one adjunct. It may not be out of place to mention some of the conditions which bear upon motor cooling:

Number of cylinders of motor; diameter of cylinders; length of stroke; speed of motor; whether motors are tight or free running; size and location of water-jackets in motor; dust guards on motor proper; efficiency of motor; efficiency of carbureter; sparking conditions; pump or thermo syphon; total quantity of water in system; quantity of water circulated; size of fan; location of fan; speed of fan; efficiency of fan; whether fan is housed; whether air has straight and free circulation under the hood; frontal area of radiator; efficiency of type of radiator; thickness of core; whether radiator is cased or integral tank; whether hood has louvres; relative size of water tubes and air passages; size, shape and location of air outlets under the hood; efficiency of radiator baffling; temperature of atmosphere; altitude where car is run; humidity of air; skill of operator; opinion of car builder as to amount of cooling necessary; road conditions; speed of car, and the weight of car.

Radiator Demands

Many of the foregoing items are indeterminable, except in specific cases. Therefore, the maxima have to be anticipated by giving the radiator capacity to meet their demands. But what these demands will be is largely a matter of opinion, as, for instance,

Editor's Note—Paper read by Howard Greer, Jr., Chief Engineer, McCord Mfg. Co., Detroit, Mich., before the S. A. E., Indianapolis, Ind., November 10, 1914.

For how many minutes should a car run on low gear, under full motor load, at 10 miles an hour without boiling?

At 15 miles an hour without boiling?

At 20 miles an hour without boiling?

For how many minutes should a car run on second gear, under full motor load, at 10 miles an hour without boiling?

At 15 miles an hour without boiling?

At 20 miles an hour without boiling?

For how many minutes should a car run on high, under full motor load, at 10 miles an hour without boiling?

At 15 miles an hour without boiling?

At 20 miles an hour without boiling?

Mathematics in Cooling

The answers to these questions vary as widely as do political opinions. To put these questions into concrete form: How many British thermal units must be absorbed to satisfactorily cool a given motor working through the full range of possible demands?

After that is decided, then it becomes necessary to consider the arrangement of the car whose motor is to be cooled, and how much of a radiator it will require to dissipate the determined amount of heat, and that means deciding on such points as:

What space is available for the radiator.

Quantity of water to be in the system.

Size and location of the waterways.

Rate at which the water is to be circulated.

Size, location and efficiency of fan and velocity of air through the radiator.

Whether air has sufficient outlet from the hood, and whether the passages are sufficient to allow an unobstructed flow of air through the radiator in its expanded condition.

It is often found that the air conditions are such that in a car speed up to 20 miles per hour the air goes in through part of the radiator and part of the same air comes out through another part of the radiator. The consequence is lack of uniform circulation of water.

Faulty Circulation

Often the bulk of the water circulating passes through a comparatively small section of the radiator core, while part of the water in the core stands still and part actually rises. This is due to irregular cooling, whether caused by the radiator or fan or conditions beyond them. These evils can all be due to causes outside of the radiator, though part of them may be due to improper or inadequate baffling in the radiator itself.

Fan Location

Fans should be so located and so arranged that they will draw air through every air passage of the radiator at the highest velocity commensurate with its cooling values; and to do this the fan must be rotated for its best efficiency. This is usually a rotation so high at low and medium speed of the motor that none of the ordinary pleasure car fans would hold together at motor speeds possible today if the fan belts did not slip.

Capacity Vs. Efficiency

Frequently radiator cooling efficiency is discussed when radiator cooling capacity is what is meant, for it is not uncommon to find a satisfactorily cooled car with a radiator of ample capacity but of abominable cooling efficiency. None the less, this very radiator may have great merit, because of its simplicity of construction, its freedom from clogging, its ruggedness of build and the fewness of its seams.

A radiator 24 by 24-inch, of the .25-

inch cellular type, has about 10,000 lineal inches of seams that must be watertight, while there are tubular types that have but 750 inches of seams that must be watertight. These latter, however, are frequently so inefficient, bulky and heavy that their adoption for pleasure cars is almost out of the question. Therefore, some lighter, efficient, though delicate cellular type is necessary, because of the restricted space available, even though such a radiator costs more and is less durable.

From this important angle, then, it is best to choose the radiator of proper capacity, which has the fewest possible number of places where leaks can occur, always keeping in mind which has the best type of joint.

Don'ts in Construction

Car designs, or demands for appearance, are so restrictive that ruggedness of construction within reasonable limits of cost is today almost impossible.

For structural reasons the following should be avoided:

1—*Shafts should not go through the bottom tank.*

2—*No wrought iron or steel of any kind should be used in a radiator where it comes in contact with water, because of the excessive rusting.*

3—*Crooked inlets and outlets should be avoided. They are expensive to make, difficult to apply and frequently it is impossible to attach them with as many rivets as necessary.*

4—*Long inlets and outlets are objectionable, because if they are strained at all the leverage on rather a weak radiator tank is so great as to probably injure the joint.*

5—*Inlets and outlets or their flanges should always be kept as far away from the edges or seams of the tank as possible, else in soldering the inlet the seam be loosened, or in soldering the seam the inlet be loosened.*

6—*It is always well to have a top tank of not less than 3 inches in depth, so as far as possible to insure always having enough water to cover the top of the tubes. If the radiator is to be used for thermo-syphon circulation the top tank ought not to be less than 4½ inches deep, so as to get a head of water over the tubes and of the extended tank type so as to have sufficient water in the radiator to insure as far as possible always having the tubes covered with an ample head.*

7—*Extended tanks which overhang more than 3½ inches are objectionable, because of the difficulty of supporting them in their overhung position.*

8—*Shallow bottom tanks are objectionable, primarily because they do not, as a rule, present enough surface to which to properly apply the outlet casting.*

9—*Radiator holding down studs should be on the center line of the center of gravity of the radiator when it is in its working position and of such a distance apart that if the lower tank deflects at all the deflection will be no greater between the studs than beyond them and vice versa.*

10—*Often for the sake of design the frontal shape of the radiator is such as to necessitate the use of side tanks in the top corners, and in some instances also side tanks in the bottom corners. Such an arrangement increases the number of joints in the radiator and introduces the tubes into the tanks at such an acute angle that making and maintaining them tight is very difficult.*

11—*Where possible it is best not to have a hood ledge offset greater than 1-8 inch, because of the difficulty of getting material for casings that will stand greater offset.*

12—*Core face offset of the radiator casing had best be never over 1-4 inch deep, on account of the difficulty of drawing such frames.*

13—*When a casing is made with too much taper great difficulty is encountered in the drawing, and the expense of the drawing tools runs up enormously. Frequently many thousands of dollars on radiator casing tools could be saved if a few comparatively insignificant angles and tapers could be brought within mechanical limits.*

Rivets, Then Solder

All castings that are to be soldered to a radiator should be held in place by rivets and applied to the flat face of the sheet where possible, always avoiding going around the corners.

To properly solder two metals, they must both be of such a heat as to bring the solder to its greatest fluidity and, obviously, any parts that are not in such contact as to prevent the solder running through their joints are not properly fitted. A radiator should be so mechanically constructed that it will hold together without any solder, and thus leave the solder to perform the function of a gasket.

Solder is a weak soft metal that crystallizes readily under vibration, but makes an excellent gasket if it is not strained in holding parts together.

Mounting the Radiator

The failure of radiator joints is by no means an indication of poor workmanship or improper design. Often the member employed to support the radiator is inadequate, and sometimes troubles from poor supporting are augmented by unnecessary hood strains through the kind of latches used or strains brought about by the inlet and outlet being connected to the motor, while the radiator itself is mounted upon the frame of the car.

To properly mount a radiator a suitable support or suspension for the particular design must be provided or else the proper design of radiator for the supports available must be selected. If a radiator is to have stud mounting, its bottom tank reinforcement should rest upon soft pads which will retain their elasticity, and these pads should never be over 2 1-2 inches by 2 1-2 inches and should come between the tank and the supporting member on the car. This member must deflect a minimum and twist the car frame rather than be twisted by it if you want to save the radiator.

If the car design requires a trunnion or bracket support attached directly to the frame channels, it is advisable, if not essential, to have the road strains come upon a separate casing into which the radiator proper is bolted, so as to save it from the direct road shocks.

Enamelling Problems

As cars have become lighter and more flexible, more demands have been put upon the radiator, and as in America where the blue black body colors have become popular, it is necessary to match them with the radiator, and to do this and have the finish last it is necessary to enamel by baking. To enamel satisfactorily, without injury to the soldered joints, a detachable casing which may be baked at a temperature which would injure soldered joints is desirable.

Since there are so many limitations imposed upon the radiator manufacturer by materials, tools and the ability and class of labor to be had, it would doubtless be of mutual benefit to both the manufacturer and the car builder if they would, in every instance before a radiator is needed, get together for mutual assistance and exchange of views.

Radiator Suits Car

Every car should be fitted with a radiator particularly designed to meet the cooling conditions encountered, and should be constructed in such way as to meet, as fully as possible, the strains which may be brought upon it through its particular method of support.

Materials for Radiators

In the selection of materials for radiator construction great care must always be exercised to insure their being proper for the work required. Brass must be free from defects and of proper hardness or softness, dependent upon the purpose for which it is to be used. The percentage of tin in the solder must be different for the different kinds of work the solder is to do, and the castings, particularly those that are to be watertight, must be made and tinned with the greatest possible care to insure their not rusting out and that they will always be tight.

The internal baffling in a radiator is of great importance, particularly because the water almost invariably enters the center of the top tank and goes out of but one corner of the bottom tank. If the baffling is not such as to insure the proper distribution of the water in the top tank so that it will go down uniformly through the radiator, in spite of the fact that it is taken out irregularly at one end of the bottom tank, then the baffling is not correct.

Locating Baffles

And if it happens that the fan to be used in conjunction with the particular radiator takes its air through the core in such way as to cool it more in one section than in the other, then the baffling should be arranged so as to pass through this section of the core a proper amount of water to insure obtaining the highest total efficiency from the apparatus.

The radiator cap has been a subject of much discussion and great variety of design, and today it has reached the point where practically all caps have their threads on the inside, so as to save them from abrasion if they are dropped, and this puts the thread in the filler tube on the outside tc save it from abrasion from funnels, etc., used in filling the radiator.

The finish of the cap varies from the condition left by the sand in the mold, through polishing and plating, up to coatings of hard rubber or Bakelite, which latter is a synthetic rubber made from carbolic acid and formaldehyde, and a pigment to give it color, and an asbestos or wood fiber filler to give it body. It has many characteristics which make it more valuable for the purpose than hard rubber. Its cost is about the same as gutta percha. It is somewhat stronger, though a little less elastic; will withstand all the heat that can ever be brought upon it in a radiator cap. It takes a high polish, and has the merit of not bleaching out.

Protect Filler Screen

An important part of a radiator is its filler screen, and yet it is frequently not used, or if it is left in the filler tube, it has a hole punched by a funnel, which makes it ineffective. If users could be made to realize the importance of straining the water that goes into the radiator, they certainly would take much better care of the screens.

In the city of Detroit a radiator, presumably using nothing but city water, was so clogged in 6 months, that in a thermal test it showed a dissipation of only about 720 B.t.u.'s; but after its core was removed and thoroughly cleaned, and the radiator rebuilt, the same radiator in its clean condition dissipated 1100 B.t.u.'s.

The overflow tube which is usually looked upon as an unimportant adjunct, not infrequently is the cause of much annoyance, for should a slight leak occur where this tube enters the tank, the water will flow down the tube on the outside, giving all the appearance of taking care of an overflow from an over-full tank; while as a matter of fact, the tank may be nearly empty.

On the other hand, very frequently a radiator which is far from full, but is improperly baffled, swirls its water in its top tank, so that a large portion of it is lost down the overflow, unless the overflow tube is closed at the top and the vent hole into it put on the side up against the inside of the filler tube.

Water Surging

Even though a top tank be properly baffled, for the distribution of the water, it is not at all certain that it is properly baffled to prevent surging, which almost invariably occurs when a car is started or stopped suddenly. In one instance a car was driven over country roads at an average speed of 26 miles an hour for 1 hour and 10 minutes, and lost no appreciable amount of water, either through evaporation or lost down the overflow tube. But 3 pints of water were lost in the next 30 minutes by the same car, which was driven through a highly congested district of a large city, where the stopping and starting was very frequent, for every time this car started and stopped, the water swashed, and some ran out at the overflow.

Testing Radiators

Testing apparatus for determining the relative efficiency and capacity of radiators is comparatively inexpensive and easily had, and invaluable to both the car builder and the radiator manufacturer. The best type of apparatus consists of some kind of water heater with thermostatic control, a pump and a meter to measure the quantity of water circulated; scales to weigh the total quantity of water in the system; thermometers to take the temperature of the inlet and outlet air, and the inlet and outlet water; variable speed motors which can be set at a wide range of speed for both pump and fan; humidor to maintain a standard humidity in the testing room: airometer for taking the velocity of the air through the radiator, and tachometer by which to register the variation in the speeds of the motors due to change of voltage of current. And by thermal calculations it is not difficult to tell the number of B.t.u.'s dissipated in a given time by a given radiator under conditions held practically constant and standard.

In testing radiators for capacity, it is necessary to compare them with some known standard. Such a standard can be easily established by taking a car which acceptably cools for every one, and running it with a given load, a given distance up a certain hill on its different gears,—first at 5 miles, then 10 miles, then 15 miles, then 20 miles per hour, starting each time at the bottom with the water in the system about 120 degrees, and noting the rise in temperature when the car finishes its run, which run should not be less than a mile.

By making this series of runs on various gears and at various speeds, it is possible to establish a standard by which to compare other cars' performances.

Glass Radiators

Observing circulating water carrying fine sawdust in a glass radiator, a number of interesting phenomena appear which are valuable guides in pointing the way to proper baffling and proper fan location, for to get the best capacity out of the radiator, it is necessary to have a suitable proportion of the water passing through the zones of the radiator, through which a given quantity of air travels. And if these proportions are not obtained, and there is either an excess of air, or such an excess of water that the proper amount of heat is not absorbed, the circulation is immediately affected.

There have been radiators constructed in which the water was made to circulate through horizontal passages a number of times across the face of the core. These have the objection of being difficult and expensive to construct, and more or less difficult to drain. There have also been radiators constructed in which all the water went through a series of passages on the back of the radiator, and up through a series of passages in the middle of the core, and down through a series of passages at the front of the core. Such a radiator has a cooling advantage over the straight-flow type, showing, in some instances, more than 8 per cent. increased capacity.

The larger the quantity of water is in a cooling system, the more uniform can the temperature of that system be kept. Quantity is particularly advantageous in hill-climbing, on the principle that it takes longer to boil a big teakettle than it does to boil a small one.

Thermostatic Control

From a purely theoretical standpoint, thermosyphon system of cooling is best, but in actual practice such a system, restricted in its application as it must be on a motor car, does not fulfil expectations on account of the wide range of demand put upon it. The time is probably not far distant when cars will be equipped with some type of thermostatic control in their cooling system, so as to maintain the water in the motor jackets at as nearly a constant temperature as possible, irrespective of the work the motor is doing. And it is not beyond reasonable expectation to anticipate the introduction of an effective and cheap fan regulator which will assist in this thermostatic control, by furnishing the proper proportion of air to cool the water to the required degree.

A Testing Plant for Spark Plugs

Toledo Firm Has Experimental Department for Improving Manufacturing Methods, Etc.

UP in an isolated part of the top floor of the big plant of the Champion Spark Plug Co., Toledo, O., where 25,000 spark plugs are born each day, they have an experimental and testing department which would do credit to a motor manufacturer, to say nothing of a concern which does nothing but make the small, but essential, spark plugs that cause the firing of the charges in an engine.

To the average automobilist, a spark plug is simply a little device which brings two terminals of an electric circuit close together so that a spark can jump from one to the other and thus ignite a compressed charge of gas. But to the specialist in this line it means more. He knows it to be a highly perfected article which he is constantly trying to improve by testing and experimentation.

A spark plug is subject to a number of maladies. It may be given to prematurely igniting the charges; it may be so constructed that there is not the hot spark necessary to greatest power; it may develop leakage under compression and heating.

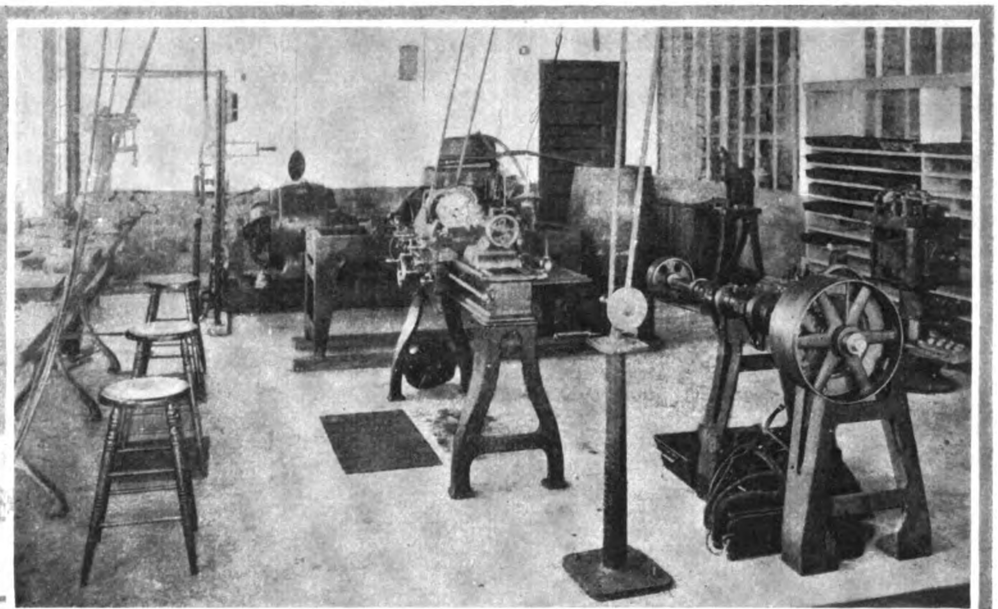
It is primarily for studying the effects of various factors entering into the ignition problem and for purposes of comparing the power output of a motor equipped with its plugs and with other makers' plugs that Champion has installed this new department which is in reality a miniature machine shop and testing room.

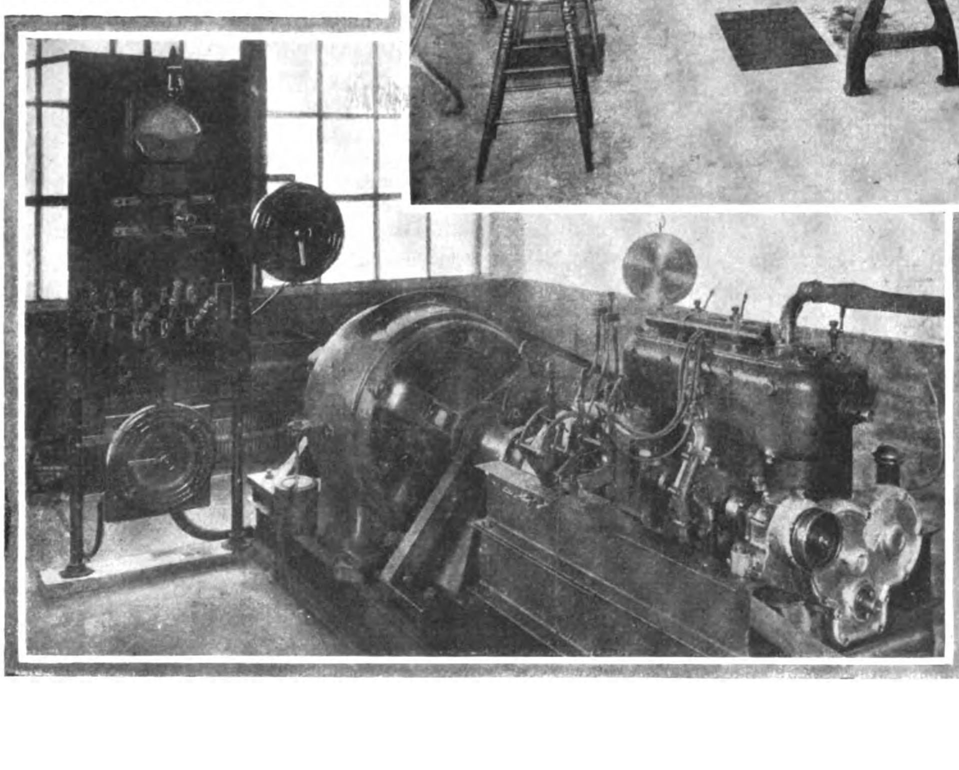
There is a complete electric dynamometer set with a capacity of 70 horsepower which is driven by a gasoline engine tuned up so as to run as high as 2,000 revolutions per minute. The factory simply regards this engine and equipment as apparatus to try its plugs out on. The generator is a Sprague, rated at 42 1-2 k. w. at 1,800 revolutions per minute. It operates with 250 volts and the amperage is 170. In addition to this apparatus there is a separate gasoline motor used only for idling tests, to say nothing of the lathes and other machine tools.

This experimental department is constantly at work on the development of new machinery to lessen the labor cost throughout the plant. For instance, at this time it is working on an automatic electric welder which will do away with the present method of welding by hand. When perfected, this complicated machine will automatically feed the spindles and wires to be joined to make the center electrodes of a plug, the sparking point being platinum and the main wire steel.

If any new type of plug is developed, it falls to the lot of this recently established section of the Champion works to devise the best and cheapest method of making it. Consequently it is made in this department in all the possible ways, and the best of them decided upon as the method to recommend to the manufacturing departments.

Every so often a batch of the regular run of plugs is taken at random from the product coming through the factory, and these sent up to the testing department. Here they are first put on the gasoline engine, with its electric dynamometer for load, and tested for all conditions of running. Then they are set in the idling motor and run some more, this idling test being the hardest to which the plug can be subjected.

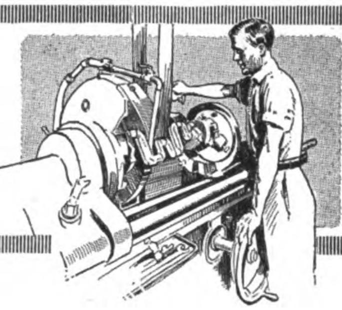




Above—A corner of the testing and experimental room of a concern making only one thing—spark plugs. In this department are all machines necessary to development of new machinery; to the production of a spark plug, etc. Here any new plug is first made and best methods of manufacture worked out before it is turned over to the manufacturing department for production in quantity

Left—A complete electric dynamometer testing outfit used only in testing spark plugs. The gasoline engine is capable of 70 horsepower and is tuned to run as high as 2000 r.p.m. Thus almost any motor operative conditions are obtainable and plugs can be observed when firing the motor under any of these conditions

The Rostrum



This department is for the instruction of the readers and all are at liberty to ask questions. Be sure to give full name and address that we may send you a reply by letter if there is no space in the Rostrum. If you wish to sign a fictitious name, also sign your own.

Claims Cyclecar Is Still the Future Means of Transportation

EDITOR THE AUTOMOBILE:—Before the ashes are sifted over the grave of the sporadic cyclecar movement of 1914 (as is being suggested in some quarters), a few words might be of interest from one who has studied these sporadic cyclecars, ridden in several, nursed the troubles of one of the most troublesome, and still believes more strongly than ever that the pure cyclecars developed within the past year are nearer to the future means of light transportation than any other type yet constructed. The cyclecar here referred to is the vehicle defined by the original limits of 71 cubic inches displacement and 750 pounds weight, with the usual principles of two air-cooled cylinders, friction or planetary transmission, belt or chain drive, light rear axle, narrow tread and tandem seating.

The motor-buying public is now in a different frame of mind than when the automobile and motorcycle came out. The motor vehicle of the present day is no longer a toy to be taken out to see how far it will run; it is a means of getting somewhere. If the early automobiles had been judged by this standard, they would have died much sooner than the cyclecars have. But they were given time to develop, and the successes of the present are built on the failures of the past. This does not prove that cyclecars should be made and bought whether they are reliable or not, but it suggests that they may not yet be permanently dead just because many of those hitherto built have been far from trouble-proof.

A few of the facts and accomplishments of the cyclecar may be enumerated, lest we forget: They have been driven at speeds higher than practicable in any but the highest-priced automobiles, over rough and rutty roads, with extraordinary comfort to the occupants, at a fuel economy of over 40 miles per gallon (my own experience without any special adjustments or economizers), and a tire economy and reliability represented by a weight of less than 250 pounds per tire, in a car requiring much less attention in normal use (lubrication, tire work, etc.) than the ordinary automobile.

There has been a noticeable absence of dangerous accidents, in spite of the flimsy construction employed on many of them. Cyclecars do not turn turtle.

If it is claimed that flimsy construction is a necessary companion of light weight, we have but to refer to the motorcycles, which, laden down with heavy equipment, so strong that they can carry up to six passengers, weigh less than half the standard cyclecar figure of 750 pounds. In fact, there are few of the objections advanced against the cyclecar which do not apply with equal force to the motorcycle.

The cyclecar has been regarded as an automobile made up of freak parts, when it is really constructed of parts already absolutely standardized, partly in automobiles, and partly in motorcycles. I do not know of a principle or device used to any extent on the cyclecars of the past year which has not a long and honorable record in either the two- or four-wheeled field, with the possible exception of two which are by no means representative.

Why then have the cykes been brought into disrepute? Not because air-cooled V-engines are bad—they are still standard on motorcycles. Not because friction transmissions are bad—they won the 1913 Glidden tour. Not because the narrow tread is bad—such statements are made only by those who have never tested it. Simply because the correct combination of these features requires better engineering than has been put into it in most cases. Because the field has been invaded by get-rich-quick parties, and the movement fought by both the motorcycle and automobile interests, and because if any company has yet invested the necessary large capital in the right way to bring out a real cyclecar, it has not yet reached the publicity stage.

Tandem seating is perhaps the hardest pill for the average motorist to swallow. It is not a necessary cyclecar feature, but it will be better liked with an increased appreciation of low centers of gravity, center drive, and the handiness of the narrow tread in traffic.

The writer believes on the whole that the supposed objections to the cyclecar type are not fundamental, and would like to read expressions of others on this question.

H. KURTZ RANDALL, M.E.

Best Position for Spark

Editor THE AUTOMOBILE:—1—In four-cycle internal combustion motors is there an exact relative time at which the spark should occur to produce the highest efficiency of the motor? In other words, what is the correct relation in degrees of spark advance or retard to the speed of the motor?

2—Should the advance or retard of the spark be in absolute (predetermined) synchronism with the motor throughout its entire range of speed?

3—Which will give the best results for general road driving, an automatically controlled or a manually controlled spark, and why?

4—In an electrically equipped car, is there any logical reason for having two electric generators? One supplying current to the storage battery for lighting and operating the cranking motor; the other for generating current for the ignition system?

5—Under all conditions is a magneto spark as efficient as a spark obtained from a storage battery?

6—For general touring purposes in a mountainous country over all kinds of roads, which is the more efficient and economical: A small-bore, long-stroke, high-speed motor, or a larger-bore, shorter-stroke, slower-speed motor, both having the same relative horsepower and operating under the same load conditions? What, if any, advantages has the one over the other?

Bloomsburg, Pa. C. S. Van Horn, D.D.S.

—1—Yes, there is a time when the spark is most effective but it is impossible to state this in degrees because it depends on the size and shape of the combustion chamber, the speed of the motor, the mixture, the compression, the location of the spark plug and the intensity of the spark.

2—No. The advance should vary roughly according to the speed. At low speeds the spark should be retarded and at high speeds it should be advanced. In any case less advance is required as the throttle is opened because the speed of combustion increases with the working compression which depends directly on the amount of throttle opening.

The necessity for advancing the spark is brought about by the fact that it takes a definite time to produce the spark, that is, from the instant the breaker points separate on the magneto until the spark occurs in the cylinder a small amount of time is consumed, this interval being the same whether the motor is running fast or slow. Therefore, if the magneto is set to give a spark just on dead center when the motor is running 300 revolutions per minute then the spark will occur too late when the motor is operating at 2,500, for the speed of the motor has increased eight times yet the interval in which the spark is produced has not been reduced at all. It is to compensate for this lag that the spark must be advanced as the motor speed increases.

3—This is an unsettled question. For the automatic spark control it is argued that the average driver is not sufficiently skilful to set the spark lever in the place for best efficiency under different conditions of driving and that therefore the set spark is superior.

Those in favor of the manual control generally admit that the automatic control is preferable for the unskilful driver but for the experienced motorist better results can be obtained from the hand control.

4—Some makers believe it better to have the ignition system independent because there is a greater safety factor.

5—See The Automobile for December 3, page 1020.

6—The advantage of the small-bore, high-speed motor is that it is more economical and lighter, on the other hand it must be somewhat noisier perhaps the noise is not appreciably greater, and it may not stand up as well although this is largely a matter of design.

Two-Story Garage Design

Editor The Automobile:—Kindly give me a layout for a two-story garage, 60 by 100 with elevator.

Little Falls, N. Y. C. F. Ross.

—The plan of your garage should largely be determined by what you desire to use it for, and although you are not an architect, you, probably better than anyone else, can select the best plan. First of all decide just what you desire to use it for. Are you going to have a supply store in connection with it, and will you need a salesroom for cars? Will your repair trade be heavy? When you have all the facts governing the design of this building before you, you can easily make a plan that will be found suitable and convenient.

Fig. 1 shows a plan that will be found good. In this design it is assumed that you are to run a supply store but not a salesroom. The office and store are put at the front of the building along the street. Directly back of them is the stairs which may be reached conveniently from the office or the main floor of the garage. In the other corner at the front is the elevator, which may be entered from the street as well as from the main floor of the garage. The elevator should be made large enough to take the largest pleasure car comfortably but need not have capacity enough for trucks as any of these you may have may be stored on the ground floor.

At the rear of the main floor, extending all across the back is the repair shop. The machine tools are grouped at one side, and the forge is placed against the wall. There is a bench along the back wall where the light is good and the rest of the space is for accommodating the cars that are being repaired.

Ignition Current Negligible

Editor The Automobile:—1—When using a six-cylinder automobile engine of 2.5 bore by 5 stroke, with two 15-candlepower, 7-volt headlights switched on full, one tail light and one dash light, each 4 candlepower and 3.5-volt, what proportion of the total current being drawn from storage battery is consumed for ignition of the engine.

2—Is the amount of current consumed for ignition constant or do different engine speeds or different road conditions cause it to vary?

3—What is the approximate saving in current when using the two headlights switched on as dimmers instead of switched on full?

4—Which furnishes the hotter spark at slow engine speeds—a storage battery or a high-tension magneto, assuming both are working efficiently?

New Orleans, La. D. Williams.

—1—The proportion of current is negligible.

According to some data given on page 1021 of The Automobile for December 3 the average battery spark has an ampere flow which reaches a maximum of .04. The shape of the wave is triangular, therefore the average flow is one-half this or .02. The time is .006 seconds. Assuming that the motor is running 1,000 revolutions per minute, 1,500 sparks are generated. Therefore the average current flow during 1 minute is $1{,}500 \times .02 \times .006 \div 60 = .003$ ampere.

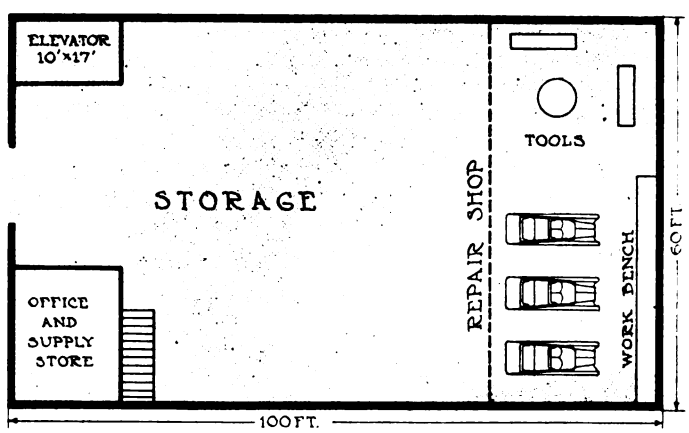


Fig. 1—Plan of ground floor of public garage 60 by 100 feet

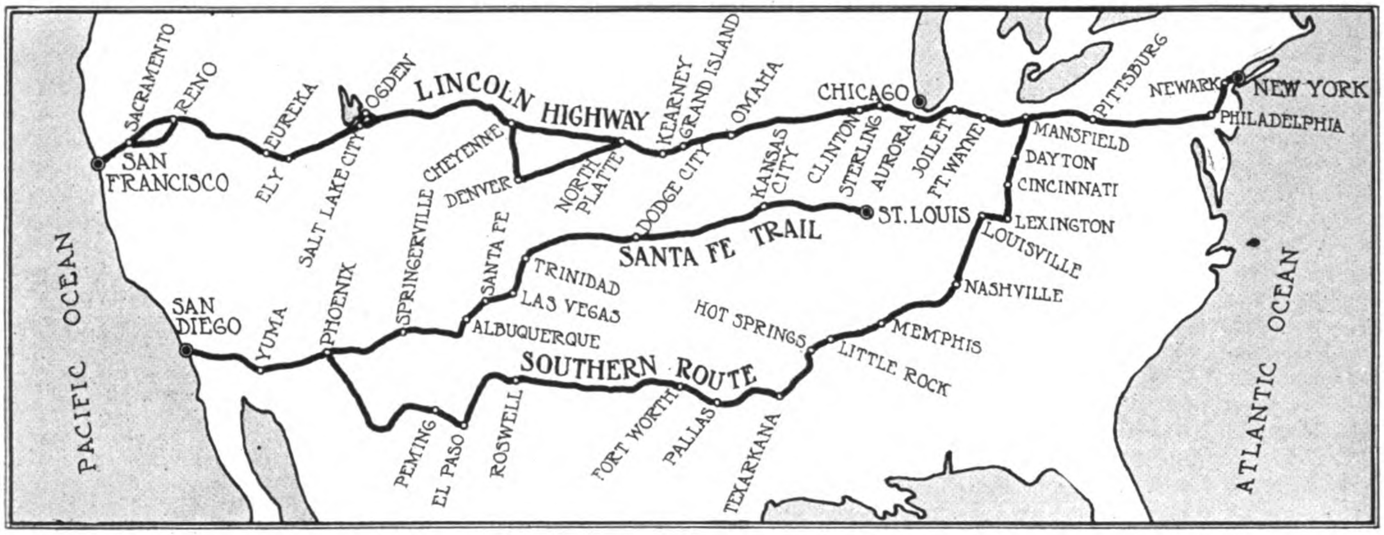


Fig. 2—Three routes to the Pacific Coast: The Lincoln Highway, The Santa Fé Trail and the Borderland or Southern Route

2—The consumpfion of current is proportional to the motor speed—for instance, at 600 revolutions twice as many sparks are required as at 300. However, no more current is required to produce a single spark at 600 or 3,000 for that matter than is required at 300.

3—This all depends on the method of dimming used. If the lamps are dimmed by connecting them in series, then the current consumption is cut in half if the resistance in the wires is neglected, and since this is small it may be. If two bulbs are used in the headlight, a large one in focus for country driving and a small one out of focus for city driving, the saving may be much greater, the small bulb taking about one-fourth the current of the large one.

4—Under favorable conditions there should be little difference.

Heavy Car Requires Large Motor

Editor THE AUTOMOBILE:—I am considering installing a new power plant in my seven-passenger car, 128-inch wheelbase, weighing 3,450 pounds and with gears adapted to 45 horsepower. What size motor would you advise for all-around service especially where roads are sandy and hilly, generally rough going?

Would the economy of say a 4.25 by 5.25 be offset by more lower gear running or would a 5 by 6 even with greater gas consumption give more general satisfaction?

Springfield, Mass. W. B. S.

—A motor measuring 5 by 6 would give an excellent performance and would certainly be advisable unless the increased gasoline consumption is objectionable. If you adopt this motor be sure that it is not too powerful for the transmitting mechanism because if it is it may cause undue wear or breakage. Again, there may not be room to place a motor of this size in the chassis.

The 4.25 by 5.25 motor would be rather small although there are many cars of this size using a motor no larger.

Possibly the most satisfactory would be a 4.5 by 5.5-inch motor. It would not unduly strain the parts, its gasoline consumption would not be too great and yet it would develop power enough to satisfy most motorists.

Fire Comes from Cut-Out

Editor THE AUTOMOBILE:—Please advise me regarding the following: I am troubled with fire coming from the exhaust cut-out underneath my car when running rapidly and shutting off quickly. Also when pulling hard. It is not the regular exhaust from the engine, but a large blaze like gasoline fire which comes clear to the ground and spreads out several feet each way.

I am at a loss to know whether or not I am using too much gasoline or whether the valves are not seating properly, or whether too much lubricant, which comes through and catches fire?

Petersburg, Ill. I. R. ABBOTT.

—It is difficult to say exactly what is causing this trouble without seeing the car. However, it may be that the valves are improperly timed or the mixture may not be correct. If the valves have been reset lately it would be wise to make certain that the timing is correct, but if they have not been reset, they probably are all right.

If the mixture is at fault it is a simple matter to adjust the carbureter.

Possibly there is carbon in the exhaust pipe or it may be that you are running with the spark too late.

How to Mix Graphite with Oil

Editor THE AUTOMOBILE:—1—We have a 1912 car that has a unit power plant using one grade of oil for crankcase multiple disk clutch and gearset. The oiling system is circulating splash with pump, and we understand that some car owners put graphite with the cylinder oil for better lubrication. Can we use graphite in our power plant? If so, how much graphite to the gallon of cylinder oil and what make of graphite is the best?

2—Will graphite make the clutch slip and is the use of graphite in the power plant good practice?

Rockland, Me. E. O. P.

—1—Us one teaspoonful of flake graphite to each quart of oil. Do not throw the graphite in loose, but mix it into a soft paste first and then add it to the oil. In buying the graphite be careful to obtain a good motor graphite as some graphites are not suited for motor lubrication. Some are too coarse, others too fine and some contain grit. Therefore, be certain you obtain a good motor graphite.

2—The graphite will not make the clutch slip. It is generally considered that the use of flake graphite will improve lubrication by cutting down friction and reducing wear.

Abbott Gearing 3.5 to 1

Editor THE AUTOMOBILE:—1—Please tell me the gearing when on direct drive of our 1913 Abbott, seven-passenger touring car, model E 44-50. We use 37 by 5-inch tires.

2—What is the maximum speed?

3—Which is the more nearly correct horsepower rating; the S. A. E. or the A. L. A. M.?

4—Our motor has a bore of 4.5 and a stroke of 5.5 inches. What is the S. A. E. and the A. L. A. M. rating of it?

5—When either of the axle shafts are removed from the rear wheels the wheel can be wabbled around on the bearing. Schaffer annular ball bearings are in the wheels. Please explain why this happens?

New York. LAWRENCE A. DIETZ.

—1—The gear ratio is 3.5 to 1. The size of the tires has nothing to do with the gear ratio. The gear ratio is the ratio between the size of the bevel pinion and crown gear in the rear axle. The size of the tires has an influence on the maximum speed that may be obtained but it is not connected in any way with the gear ratio. If bicycle practice were followed we might obtain a figure representing the total gearing by multiplying the size of the tire by the gear ratio, but this is never done.

2—The maximum speed is between 50 and 55 miles per hour.

3—These two ratings are identical. When the A. L. A. M. went out of existence several years ago, the name S. A. E. was gradually given to the rating as this method of figuring horsepower was recognized by the Society of Automobile Engineers. The A. L. A. M. formula was imported from Great Britain where it is known as the R. A. C. or Royal Automobile Club formula.

The formula in question is, horsepower $= \dfrac{D^2N}{2.5}$, where D = bore in inches and N = number of cylinders.

3—Answered above.

4—The S. A. E. rating is 32.4.

5—This is as it should be. A certain amount of play is allowed when the shafts are removed. As long as the shafts are tight there should be no play, however.

Three Routes Offered to Pacific Coast Tourists

Editor THE AUTOMOBILE:—I am figuring on touring out to the Panama Pacific Exposition next summer and one of the things which will determine whether or not I make this trip is the length of time involved. I would, therefore, be glad if you could inform me on this point and perhaps map out a route. Some of the readers who have made extensive tours might be able to offer information in regard to the eastern conditions and also the much more valuable suggestions relating to the equipment of a car. I would like to hear from readers on this latter point as many others who are going and expect to make their car their hotel, might be able to obtain valuable information through your columns.

Cleveland, O. READER.

—You might make the trip in 1 month although this would be traveling fast.

Details concerning the different transcontinental routes and other information regarding the trip are given below, the material being taken from the Automobile Blue Book.

Only conditions west of the Mississippi River will be taken up. In point of road conditions, accommodations and supplies this article might be restricted to the territory west of Kansas and Nebraska, for under ordinary touring conditions met with in the summer there is probably no section where better time can be made than on any of the well-known routes across Iowa, Missouri, Nebraska and Kansas. Although the distances between towns are a little greater than on most of the routes east of the Mississippi River, plenty of accommodations and garages will be found along these routes to answer the needs of the most exacting motorists. The only precaution at all necessary is that in western Kansas and Nebraska during midsummer it is advisable to carry a full African water bag at all times simply for the comfort of the tourists.

Just as soon as the motorist goes west from Cheyenne or Denver it is advisable to make a few other additions in equipment and supplies. If there are four in the party at least two water bags should be carried, as some cars will need an extra supply of water for radiator in climbing to higher altitudes or in hard pulls through sand. It is always well to be prepared. Also some food supply should be carried at all times, with a blanket for each one in the party: another thing, warm clothing should be provided, for with the sun below the horizon the temperature drops very fast in high altitudes, and the nights are surprisingly cool even in the summer time.

If everything goes all right, as it does with the majority of tourists, the trip will be comparatively easy, but if breakdowns or stops due to lack of gasoline occur, as they sometimes do out in the barren places, then serious results are sure to happen unless there is another car in the party to go back for supplies, which may be thirty, forty or fifty miles distant. Such long stretches with hardly a habitation occur on any transcontinental route in some part or other, but even these are no drawbacks in themselves to the trip if, as stated above, proper precautions are taken not only in supplies and equipment, but that the tourist drive in accordance with local conditions.

Going west from Cheyenne along the Lincoln Highway little difficulty will be found in crossing the Continental Divide, for the rise is gradual, and many people will not know when they are crossing the backbone of the continent. For the most part southern Wyoming offers a very good natural road material of a gravelly dirt in sufficient quantities to surface the whole road. This is being done rapidly; moreover, the fords and dry washes are being bridged, especially those that may have given difficulty a year or two ago. West of Salt Lake City or Ogden there is a choice of two routes. There is a short line along the route of the Lincoln Highway to Ely, but this presents two difficulties. First, this route, although shorter than the northern one, crosses one of the most barren parts of the Great American Desert, and soon after leaving Salt Lake City practically no habitation of any kind is encountered for over eighty miles, but for present conditions the northern route around Great Salt Lake is to be preferred, as it follows for the most part the line of the railroad, accommodations are more frequent, and as a whole road conditions are better. Both of these routes join at Eureka and continue west, with generally good going into California. Natural road conditions in Nevada are excellent, and soon after entering California modern improved roads are followed to the Coast.

Where the Scenery Is

The above route, which for the most part is along the line of the Lincoln Highway, will probably receive the greatest amount of travel, but to those desiring to get the full benefit of a trip in the West little opportunity is given of seeing Rocky Mountain scenery. To those who have a little more time and like magnificent scenery, the trip across Colorado offers wonderful possibilities. The most serious drawback to this route is not the road conditions in Colorado, but the conditions after the Colorado line is crossed, and from there most of the way into Salt Lake City. The desert must be crossed for nearly two hundred miles. Those who by experience and equipment are prepared for such a trip will find the scenery of Colorado well worth the slightly increased hardships of crossing Utah.

To those desiring to follow the more southern route there are two optionals presented, the best known being the Old Santa Fe Trail, which continues westward along the route of the Ocean-to-Ocean Highway across New Mexico and Arizona. Here again the Continental Divide is crossed so easily that the stranger would have to be told the exact point of highest altitude. The route for the most part, especially across New Mexico, has received a great deal of improvement, and accommodations and supplies are of just about the right interval for each day's run. In Arizona one or two sections are still in need of improvement, but this is going forward rapidly and really no serious difficulties will be had on the trip as far west as Phœnix. From there on greater caution should be used in both equipment and driving, although as far as Yuma quite frequent accommodations and supplies are to be had. The short stretch between Yuma and El Centro is the most difficult part of the southern route, and really no permanent location has been determined for this link at present.

The other route spoken of as a southern link for transcontinental travel is one of the latest developments, known as the Borderland Route, which leaves the Old Santa Fe Trail in western Kansas, going through the Panhandle of Texas and crossing southern New Mexico and Arizona. Due to the mining industry the southern portions of these two latter states is being developed very rapidly with corresponding road improvement.

June the Best Time

If going by the central routes, about the only practical time is between May and the latter part of September, and even then if it happens to be a late spring with heavy rains conditions may not be favorable, and it is really best not to leave until after the middle of June, taking the trip as a whole. There is also a possibility of early storms in high altitudes even in September, although many years the routes are open clear to late October. On the southern route, if not starting too late so as to get west of Kansas and Nebraska before the fall rains set in, the route across Arizona and New Mexico can be traveled almost any month in the year, probably the best time being in September, October and November. The spring is also good, as the rainy season there is in July and August. The objection to the summer months is not so much on account of rain, which is quickly over in that part of the country, but on account of the exceedingly warm days.

In tire equipment it is advisable to have practically new tires all around, and two extra casings with about four tubes. Take a few small repair parts that you have found from experience to be of most use on your particular car. Above all do not try to take along enough to rebuild the whole car. Remember that extra weight is the worst possible thing you can carry. This brings us to the all important point of **keeping the load light**. Remember that, no matter how large or powerful the car it is just as bad to have it overloaded as it is a light car.

There are only a few sections where an extra provision is at all necessary in the way of gasoline, although some people find it advisable to provide an extra tank. Usually one or two 5-gallon cans are sufficient for any emergency.

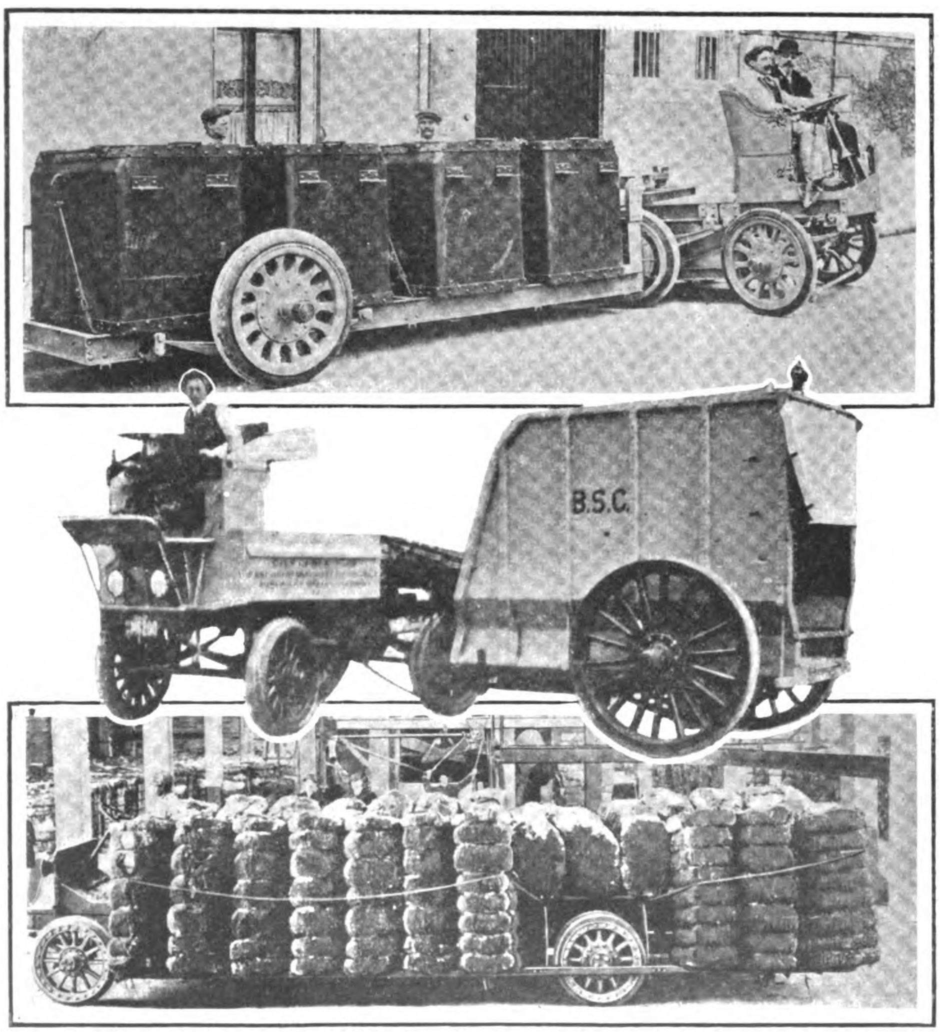
It is always advisable to have a one-gallon can of lubricating oil. There is no telling when this will come in handy. At least two two-gallon African water bags should be provided. These can be hung on the outside of the car, and it is surprising to find how cool the water will remain no matter how hot the sun. It is important to remember that in filling the water bags make inquiry from local people whether the water is good to drink or alkali. A little of the latter will not hurt for radiator use, but it is very disagreeable to the average constitution.

The most useful thing not only for sand, but because it comes in handy for other things, is 100 feet of 1-inch manilla rope.

Two-ton electric lumber tractor with trailer. The batteries are situated in a single front compartment and the lumber is mounted on a two-wheeled truck. The old and new methods are contrasted

Commercial Electrics for Special Needs

Electric Vehicles for Hauling Lumber and Cotton; for Freight Handling; Road Making and Garbage Disposal



Upper—The modern way of collecting garbage. The low frame allows easy loading
Middle—Five-ton electric street cleaning tractor made by the General Vehicle company for use in New York City
Lower—Six-ton electric built especially for moving cotton. Loading is facilitated by the underslung frame

THE adaptability of the electric truck to individual needs is well illustrated by the accompanying photographs which show electric machines in various lines of work. There are tractors for moving lumber, and for hauling garbage and refuse; electric street sprinklers, and road makers equipped with crane and roller; an electric curb-laying machine; small freight trucks for transporting goods from freight car to delivery truck and for carrying goods from department to department in large factories; there are underslung trucks for carrying large loads of cotton, and many other types.

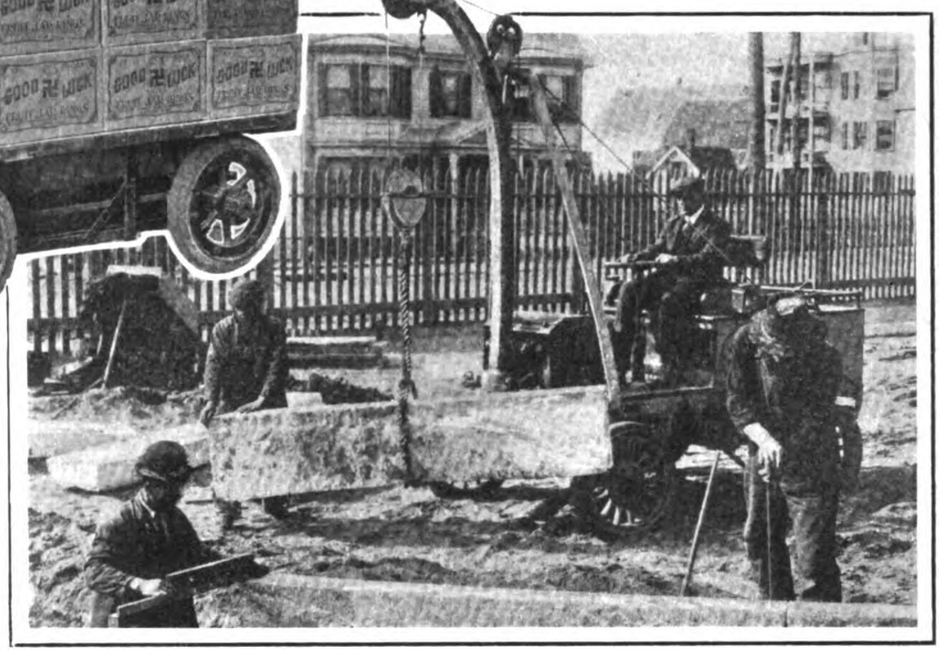
Consider the handling of cotton, for instance. Down in Savannah cotton is moved by electric stevedores across the great piers into the holds of the steamers which take it North. At the Bush docks in Brooklyn the same cotton is placed in freight cars by battery truck cranes. It is taken out of the cars at the mills by industrial trucks and moved to storage and then to the spinning room by them. Later the bobbins, dye tubs, and beams are moved from mill to mill by small electrics, while in the mill yards the 2 and 3.5-ton trucks are delivering supplies or loading finished goods.

The building of special trucks began over 10 years ago, although rapid development has only occurred in the past 6 years. Electric coal trucks with hand-operated dumping bodies appeared in 1902 and winch-equipped trucks for handling safes in 1903.

NOTE — The accompanying illustrations and information are taken from the paper entitled "Special Applications of the Electric Truck" read by F. Nelson Carle before the Electric Vehicle Assn. of America at the convention held in Philadelphia October 19-21.

Top—Fleet of 1-ton electric freight trucks. It is these machines that allow the rapid handling of freight, thus relieving congestion and providing greater freight capacity

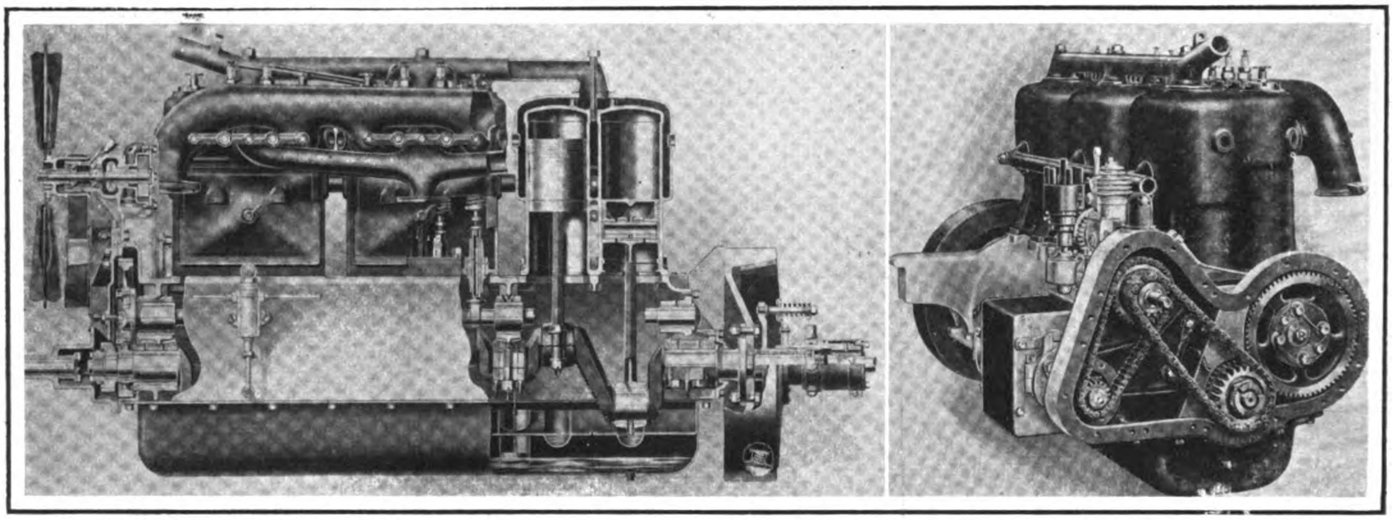
Right—One-ton freight truck moving goods from a freight car to the delivery platform



One-ton truck laying curb stone. The stones are picked up by the crane, carried to the trench in which the curb is laid and carefully lowered in place. With this device more curb can be laid with less men

Two applications of the electric to municipal work. At the left is a one-ton machine used in road making and at the right a street sprinkler. The crane on the former may be used for laying curbing or flagging, installing fire hydrants, etc.

Mitchell Adds Six Selling for $1,585



Left—Part section of new Mitchell six motor. Note exhaust carried forward. Right—Another view, with timing gear cover removed

Accessibility a Feature—L-Head Motor 4 by 5.5 Inches Used—Three Body Styles Offered

A NEW six at $1,585 has been brought out by the Mitchell-Lewis Motor Co., Racine, Wis. It has an L-head motor with cylinders 4 by 5.5 inches and is made in two, five and six-passenger body-styles. The wheelbase is 128 inches and 36 by 4 tires with demountable rims are used.

In addition to this model, the Mitchell company will continue the four-cylinder car at $1,250, the special six at $1,895 and the de luxe six at $2,350 which constitute the remainder of the line.

Several new features are found on the new six. The water pump is mounted behind the fan and is driven from the fan spindle. Adjustable inclosed silent chains are employed to drive the motor generator and ignition shafts. A power tire pump is standard equipment, being operated through sliding gears from the ignition shaft. More uniform cooling and great accessibility are obtained by reversing the position of the exhaust manifold so that the gases leave at the front end instead of at the rear. It is stated that the extensive use of chrome-vanadium steel and steel stampings have been big factors in reducing weight and at the same time increasing the strength and economy of this car.

Accessibility a Feature

Accessibility has been made a feature, it is stated, it being possible to remove the whole power plant and gearshift without disturbing the body. Each unit and portions thereof can be lifted out without touching adjacent units.

The motor of the new six has the cylinders cast in pairs. The crankcase is a barrel type aluminum casting having a removable lower cover of pressed steel which forms the splash basins and oil reservoir of the circulating oil system.

The crankshaft which is offset 1 inch from the center of the cylinders is mounted on four babbitt bearings 2.12 inches in diameter. The front one is 3 inches long, the two center ones 2.25 inches and the rear one 3.5 inches. Connecting-rods are I-beam sections having 2.12 by 2.25-inch babbitt bearings on the crankshaft. The piston pins are 1.12 inches in diameter and 1.813 inches long, are bushed with bronze, and are hollow. They are prevented from turning by Woodruff keys and brass disks separate the ends from the cylinder walls. Ground cast iron pistons are employed each having three rings with staggered joints. Small holes are drilled through the machined oil grooves around the pistons to allow the surplus oil to drain back into the crank chamber instead of working up into the combustion chamber.

Chrome nickel steel valves 1.93 inches in diameter and with 45-degree bevel seats are used. The inlet valves have .3125-inch lift and the exhaust .375-inch lift. The push rods have mushroom ends and adjustable tops.

The camshaft is a one-piece drop-forging It is driven from the crankshaft by helical gears. The four bearings have the following dimensions: Front, 2.56 by 2.03; two center, 1.75 by 2.03; rear, 2.436 by 1.25.

Lubrication of the motor is by means of a circulating splash system in which a plunger pump mounted at the right of the motor in an accessible position and driven by an eccentric on the camshaft draws oil from the base of the motor and distributes it through two leads through the engine gearcase and sight on the dash to the troughs and splash basins.

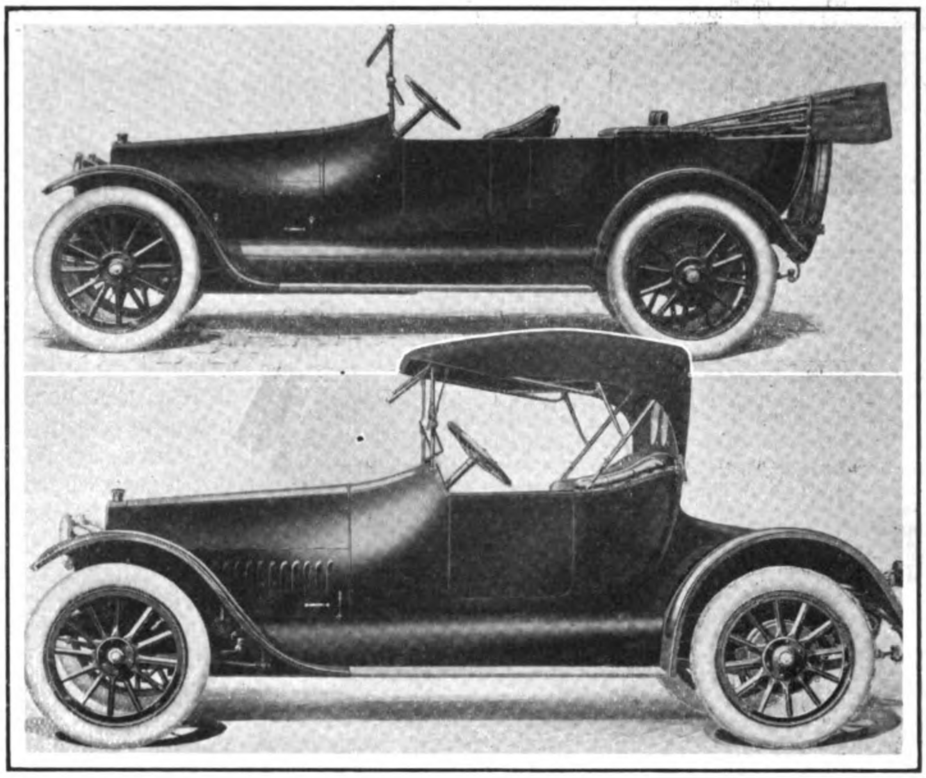
The overflow from these basins returns to the reservoir in the base of the motor. There is a float indicator on the side of the crankcase to show the amount of oil and nearby is the oil filler.

A feature of this system is that a separate lead with an adjustable feed valve branches off from the main return lead from the sight feed on the dash and conducts oil to the clutch bearing. Another feature is the arrangement of the breather openings in the valve spring compartments, thus lubricating the valve mechanism.

New Cooling Features

Several new details are noted in the cooling system. As previously pointed out, the centrifugal pump is mounted on the fanshaft where it is accessible and, should the fan belt break, the circulation would be maintained automatically, as the system is designed to operate on the thermo-syphon system in such event. Better cooling is said to be obtained by carrying the exhaust pipe forward, producing more uniform cooling of the different cylinders. In addition it prevents the undue heating of the floorboards. The radiator has a removable shell which is built entirely separate from the radiator, which makes it possible to give the removable shell three coats of oven-baked enamel, thus insuring a durable finish. The radiator is mounted on flexible brackets.

Ignition is by means of a high-tension breaker and distributer system of Continental make in which the battery furnishes the current until the electric generator cuts into operation and supplies current. Starting and lighting are accomplished by means of a single unit motor-generator mounted on the right side of the crankcase at the front. It is a Splitdorf-Apple 12-volt design. The battery is suspended inside the frame under the rear floorboards. The head lights are wired so as to be operated in series or parallel, the former giving dimmed lights for city driving.



Above—Six-passenger touring body on new Mitchell six chassis
Lower—Two-passenger roadster

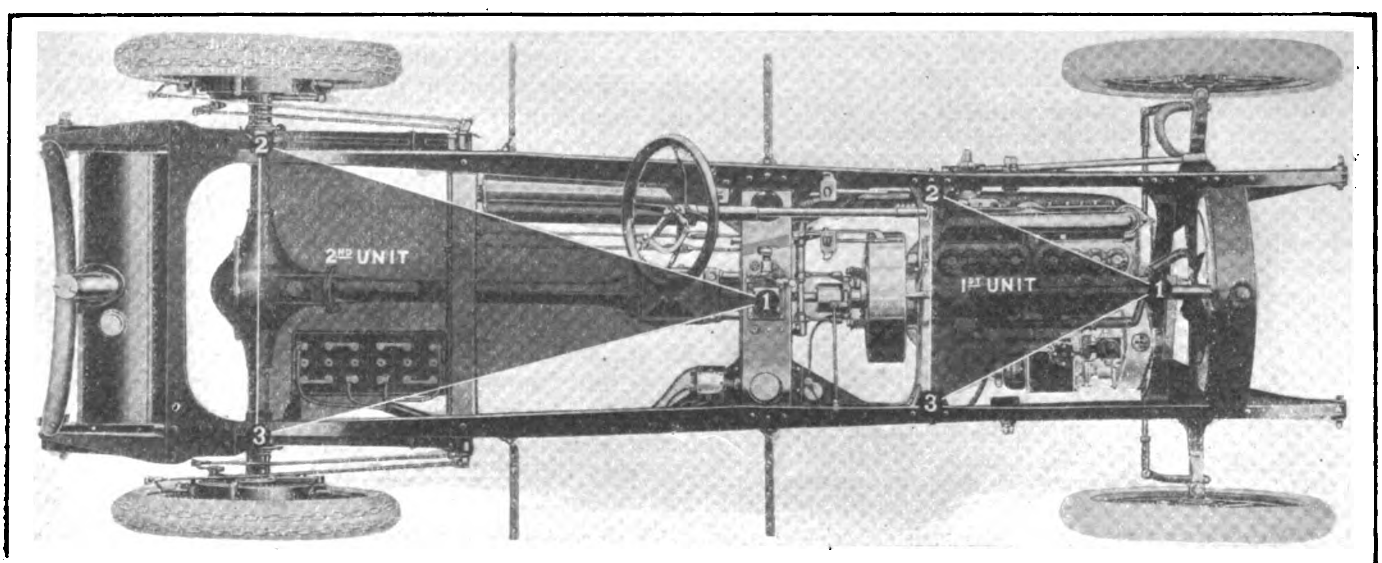
A special Rayfield carbureter is employed which may be easily primed or adjusted from the driver's seat. Fuel feed is by means of the Stewart-Warner vacuum gravity system from an 18-gallon tank mounted at the rear of the chassis. A gasoline gauge is fitted.

The clutch is a pressed steel cone, faced with leather and provided with springs to give an easy engagement.

The gearset is located at the front of the torsion tube thus dividing the power plant into two units, one the motor and clutch and the other the gearset and rear axle. The gearset is a sliding gear selective type having three speeds forward and one reverse. The gearbox is mounted at the front end of the torsion tube and is supported by a trunnion from the cross member of the frame. The countershaft is placed below the mainshaft which is squared to carry the sliding gears. Single and double row annular ball bearings and roller bearings are employed in the gearbox. The gears are made of chrome-vanadium steel and have 1-inch faces.

The driveshaft is bolted to both the gearset and rear axle housing. The axle is floating and accessible through a large cover plate at the back of the housing. The pinion is mounted on a double-row ball bearing in front and a double one behind, and has ball thrust bearings as well. The bevel gear and differential unit is mounted on roller bearings provided with a ball thrust. Driveshafts have splined ends and are easily removable. A standard gear ratio of 4 to 1 is furnished, but there are several others to order. The brakes act on 14-inch drums on the rear wheels, the pedal operating the external set and the lever the internal. The bands are lined with a non-burnable asbestos fabric, and conveniently located turnbuckles are provided to facilitate adjustment.

Three-quarter elliptic springs 2.25 inches wide and 50 inches long are used in the rear and the front springs are flat, half-elliptics 2 inches wide and 40 inches long. Steering is by means of an irreversible worm and gear.



Mitchell four chassis, showing three-point suspended double unit construction used in new six

The AUTOMOBILE

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Truck Trash?

IN no more euphonious terms than "truck trash" are some English makers and publications designating much of the truck purchases made in America by some of the Allies.

England, or any other country, has got incorrect information on much of the American buying. One ally sent her representatives here and today has purchased over 2,500 trucks from reputable makers which cannot be considered trash, neither can any of these makers be considered as getting rid of products, rather, they are manufacturing their best goods for the foreign trade. They are testing them out perhaps a little better than might be done for home use, due solely to the extreme service in view.

It is certain that if foreigners form their conceptions of American trucks from the opinions expressed by many of the hordes of so-called brokers at present infesting our cities and looking for large middle-man profits there might be some possibility of some trash finding its way to the other side. But neither the Germans and Austrians, nor the Allies require to do business through such sources. Our truck makers are big enough to do business direct. All of the belligerent countries can feel safe in sending their emissaries direct to our factories. Our factories will stand inspection, the materials will stand analyses, the workmanship will stand the micrometer, in fact, they will find honestly made articles and not trash.

Patent Reciprocity

LAST week's action of the members of the National Automobile Chamber of Commerce, Inc., in which over half agreed to grant privileges on the patents they hold to others in the chamber holding patents and also granting reciprocal privileges, should go a long way toward limiting wholesale patent litigation, which is such a destructive force in any growing industry.

This new system, cross-licensing, is really patent reciprocity among those makers who control patents relating to automobile construction. There are over ninety members in this one association, and if all agree to patent reciprocity, it will at least assure for 10 years, the period of the agreement, that the patent legal mill will not be working so consistently on an over-time schedule as has been the case in the past.

No other agreement could better indicate the high spirit pervading the American automobile field, than this reciprocity one. It is how business men should get together. It is in harmony with the petitions presented before the Inter-State committee a year or so ago, when the automobile makers asked for a "peace policy," a time when they would be free to pursue the course of manufacture and merchandise, in contrast to a period when they would be irritated with the over-hanging cloud of over-legislation. The present act is a commendable step in the direction of eliminating an over-crop of automobile patent litigation.

This patent reciprocity is in line with the dominant thought with many automobile makers that they want patents as means of protection against those, who securing patents, might demand tribute from others who might have had a prior right to the patents. There is no thought in the present reciprocity program of diminishing the intrinsic value of a patent, there is not any thought of trying to reduce the value of a patent to the inventor, rather that patents will continue to be applied for and used as in the past, but that the individual automobile companies will use these patents for personal protection, against those who might demand tribute from the entire industry for their privileges.

It is estimated that at present there are over 900 patents controlled by those automobile makers, who are members of the present chamber, and under the proposed régime, the reciprocal use of these, or some of them, will be shared only by those companies that agree to pool their patents in this reciprocal scheme. Such a pooling of mutual interests should go a long way toward better protection for the makers so concerned, and it should result in a very considerable reduction in expenditures on patent litigation. In the last 2 decades there are examples of industries that have sapped much of their life blood by patent matters, and if this can be avoided it would seem a rational undertaking to avoid such. The working out of the present reciprocity scheme will be watched with more than ordinary interest, not only in the automobile field, but in other industries that have been long disturbed by the legal difficulties connected with patent suits.

Makers Cannot Maintain Prices Through Contracts with Dealers

Cincinnati Court Holds That License Contracts Involved Are Not of a Form Approved by Supreme Court

CINCINNATI, O., Dec. 8—Manufacturers' efforts to enforce price maintenance on their cars by means of contracts with their dealers are futile, according to the decision of the United States District court in Cincinnati, O. Judge Hollister of this court last week dismissed a bill of complaint brought by the Ford Motor Co., against the Union Motor Sales Co., Dayton, O., the basis of which was price-cutting.

The Union Motor Sales Co. is in a way a co-operative organization; customers are supposed to be stockholders, taking a $10 share of stock before sharing in the benefits of the company; goods were advertised at less than regular prices, and one of the favored items had been Ford cars.

Ford had declined to sell this company cars and in the suit which was brought about a year and a half ago charged that the Union Motor Sales Co. had conspired to obtain cars from regular Ford dealers, which cars were sold at less than list; this suit asked $50,000 damages and an injunction restraining the Motor Sales from selling any more Fords. A preliminary injunction was granted July 1, 1912.

A year later Ford charged Lucien A. Howard and O. D. Noble, of the Motor Sales, with contempt of court in continuing the forbidden practices; the charge was sustained in court. But within the past year or so there have been numerous high court opinions on price maintenance and these undoubtedly had much to do with Judge Hollister's ruling. He dismissed the Ford suit in its entirety.

Contracts Held Invalid

In the trial of the action it was proved that the Motor Sales had secured Fords and sold them to stock members at from 10 to 15 per cent. less than list. The Ford contracts, however, were declared invalid by Judge Hollister, whose opinion covers fourteen typewritten pages. He declared that the license contracts involved are not of a form approved by the United States Supreme Court. The Ford company's licenses are in connection with patents on its cars.

"The rights of the parties," ruled the court, "depend upon the construction to be given the written contracts entered into between the Ford Motor Co. and its so-called 'dealer licensees,' and so far no case involving a contract precisely like the agreement between the complainant and the dealers who sell cars made by it and covered by its patents has been presented to the Supreme Court.

"An agreement by the patentee, giving to another the rights to manufacture under the patent and to sell at a fixed price on a small royalty has been held not to come within the jurisdiction of the Sherman anti-trust act. (Bement vs. Harrow Co.)

"It is conceded that contracts such as made by the complainant with its dealers would, were it not for the fact that the article sold was made by the complainant under its patents, be contrary to public policy under the decisions in Dr. Miles Chemical Co. vs. Parke. But it is claimed that since the complainant does manufacture its cars under its own patents it has the right to maintain a monopoly of the exclusive right to sell, granted by the patent law, by a contract of sale with its dealers, fixing the price on resale at which the dealers may sell to the user, although by so doing the competition between the dealers is thereby effectually prevented.

"There is, however, a marked difference between these contracts and the license contracts to which the Supreme Court has given its approval. For, in this case, the patentee is the maker and does not, in terms at least, receive a royalty, but actually sells each machine at a price fixed by itself and is paid by the dealer all that the maker asks for the article sold. There is no question of restricted use in this case as in that of Henry vs. Dick, for the contract is either a complete sale of the exclusive right to sell given the complainant under the patent laws, or a license to sell, which involves a reservation of some part of the exclusive right to sell, or, as contradistinguished from these, amounts to a sale.

"For the purpose of this case it may be assumed that if the contract partakes of the quality of a sale of the exclusive right to sell, or of a license to sell, it is a good contract which the complainant may legally enter into with its dealers and, under the facts proved in this case, an injunction must be issued against the defendants.

"But if, under the terms of the contract, the complainant has sold the automobile made by it and delivered the sale to its dealers, passing the title upon the receipt of the contract price, then, under the decisions of the Supreme Court, and on principle, the conclusion in my judgment must be that by such sale the complainant * * * cannot legally fix the price at which the dealer shall re-sell. The contract does not deal with the use of the automobile sold; hence, to call it a contract for 'restricted sale' is a misnomer, and the adoption of such a definition is, as said by Mr. Justice Day, 'a mere play upon words' (Bauer vs. O'Donnell)." The latter is the famous Sanatogen case.

Besides the Union Motor Sales Co. the defendants were: Lucien A. Howard, J. Carl Horton, Early S. Sorsley and William T. S. Yokum, all of Dayton.

Horn Patent Litigation Draws to Close

NEW YORK CITY, Dec. 5—The order extending the term of the court for all purposes of the suit of the Lovell-McConnell Mfg. Co. against the Automobile Supply Mfg. Co. for 6 months from the date of the final decree was vacated yesterday by a memorandum issued by Judge Veeder.

It was brought out in the memorandum that, while an extension of the term was not required for the assertion of any rights remaining to the Lovell-McConnell company, the publicity given to the order had injuriously affected the Automobile Supply Mfg. Co. This suit is now at an end, unless the Klaxon makers petition for a hearing before the Supreme Court of the United States. The order in question was granted by Judge Chatfield October 31 on motion of the Klaxon counsel following the confirmation by the Circuit Court of Appeals of the decision of Judge Coxe handed down on June 8 in favor of the Automobile Supply Mfg. Co.

The memorandum was issued in the United States District Court for the Eastern District of New York.

Savage Motor Officials Freed of Fraud Charge

CINCINNATI, O., Dec. 7—The trial of Delbert H. Cummings, Robert W. Fishback and Edwin E. Taylor, president, vice-president and secretary respectively of the Savage Motor Co., charged with using the mails in a scheme to defraud was brought to an abrupt close in the United States court at Cincinnati last week when Judge Hollister ordered the jury to bring in a verdict for the defendants. He held that there was not sufficient evidence adduced showing an intent to defraud. The three men had received on an average about $200 in deposit each from about 300 agencies to handle the Savage 20 which was never placed on the market. The defendants claimed that it was because of their arrest that they were unable to place the car on the market.

DETROIT, MICH., Dec. 8—Henry B. Joy, president of the Packard Motor Car Co. and director of the Federal Reserve Bank, Chicago District, is convalescing in Roosevelt Hospital, this city, after having undergone a minor operation.

Mr. Joy recently sustained a bump on his head while on a test trip with an experimental car, resulting in a painful bruise. It was found several days later, after other symptoms had developed, that a slight surgical treatment was necessary. Reports indicate that the Packard executive will be discharged from the hospital within a very short period.

N. A. C. C. Recommends Interchange of Patent Licenses by Makers

Reciprocal Agreement Urged to Prevent Litigation Over the 900 Patents Owned by Members — Chamber Votes to Defend Axle Patent Suit

NEW YORK CITY, Dec. 5—Yesterday, at an important meeting held by the National Automobile Chamber of Commerce, the members showed the united condition of the automobile industry by recommending for general adoption by the industry a cross-licensing agreement which provides for makers to interchange licenses on patents which they own.

This interchange or cross-licensing system, which was signed by practically one-half of the companies present, is one of the most important steps taken by the chamber since its organization. There are now over 900 patents owned by the members, and by this cross-license scheme each maker grants the permission to use his patents to every other maker who reciprocates. The agreement takes effect January 1 and is for a 10-year period. The object of the cross-licensing system is to avoid patent litigation among members, who have patents taken out more for protective measures than for the purpose of securing revenue from them.

To Defend Axle Patent Suit

At the same session the members voted to take over the defense of the suit on rear axle patents brought by the Kardo Co. against the Studebaker Corp. in Chicago, as reported in THE AUTOMOBILE for November 19. It is stated that the members of the Chamber will follow the same course in the event of any other similar suits being brought against companies belonging to the organization.

Henry B. Joy, president of the Packard company, read a letter he had addressed to E. R. Benson of the Studebaker Corp., which was more or less in explanation of the Kardo litigation against the Studebaker company, which litigation was the real cause of the meeting. The latter was largely a reply to a circular distributed among the Chamber members and in which the statement had been made that the Kardo company was really organized to exact tribute by way of patent royalties from the industry. Mr. Joy refuted this and stated that if ninety-three of the largest automobile manufacturers are to band themselves together for the purpose of ignoring the rights of inventors that inventors should really seek the patent courts. Mr. Joy referred to the meeting of the Chamber on May 6, in which it outlined the policy of patent peace and referred to the present action as a complete change of direction in this matter. He said that the Kardo company soon after the May meeting sent to every member of the Chamber a list of Packard patents with an expressed willingness to grant licenses under any and all of them under reasonable terms, and that the company was ready and willing at all times to accord others exactly the same recognition of their patents that he asked for those of his company.

In regard to the recommendation for a cross-licensing agreement on patents, the thought was expressed that the industry has prospered by scientific manufacturing of a product of excellent quality, and that, while each company held some patents of great value, it would be better for the industry at large that each concern, while developing its own ideas and standards with the idea of building the best possible machines, should be free from attack on patents owned by the others. As General Manager Alfred Reeves of the Chamber expressed it, the whole thing resolved itself down to the question whether one maker's patents are more important than the entire balance of the industry. An idea of the disastrous possibilities in the way of patent litigation which are possible may be gained from the fact that members of the Chamber own between 900 and 1,000 patents and that there are at least six or seven important patents on each part used in car construction. Naturally, when the cross-licensing idea was proposed, there was an animated discussion although this was all along the same lines.

Trade Conditions Favorable

The discussion of general trade showed that the industry, aided by the favorable weather conditions and returning business prosperity, has more than held its own, even during the fall months. Export trade has suffered considerable, so far as passenger cars are concerned, on account of the war, although this is offset to a large degree by the sale of motor trucks to foreign countries.

President Clifton presided over the meeting at which were represented practically all the leading automobile manufacturers, as indicated by the accompanying list.

Aluminum and Petroleum Show Big Gains

NEW YORK CITY, Dec. 8—The Department of Commerce, Washington, D. C., has issued a statistical record of the progress of the United States from 1800 to 1914 and also the monetary, commercial, and financial statistics of the principal countries.

A number of the principal commodities show a remarkable growth, for instance, aluminum, whose production rose from the modest figure of 83 pounds in 1883 to 65,607,000 in 1912,

Attendance at the Meeting of Members N. A. C. C., December 3, 1914

Members	Representatives
Abbott Motor Car Co	Alfred Reeves
Allen Motor Co	J. E. Wright
Anderson Electric Car Co	Wilson Kritzer
Argo Electric Veh. Co	Wm. E. Metzger
Apperson Bros. Auto Co	J. B. Eccleston
Autocar Company	John S. Clarke
Avery Company	F. A. Gundlach
Baker Motor Veh. Co	Geo. H. Kelly
Borland-Grannis Co	Wm. E. Metzger
Briscoe Motor Co	Horace DeLisser
Broc Electric Veh. Co	Wm. E. Metzger
Buick Motor Co	Wilfred C. Leland
Cadillac Motor Car Co	Wilfred C. Leland
Chalmers Motor Co	Hugh Chalmers
Cartercar Company	Wilfred C. Leland
Chandler Motor Car Co	F. C. Chandler
Cole Motor Car Co	Wm. L. Colt
Jas. Cunningham, Son & Co.	F. E. Cunningham
Federal Motor Truck Co	M. L. Pulcher
Dodge Brothers	A. I. Philp
F. I. A. T.	A. E. Schaaf
Garford Company	J. N. Willys
General Vehicle Co	P. D. Wagoner
General Vehicle Co	A. F. Macdonald
Gramm Motor Truck Co	J. N. Willys
General Motors Truck Co	Wilfred C. Leland
Hudson Motor Car Co	H. E .Coffin
Hupp Motor Car Co	J. Walter Drake
Inter-State Motor Co	B. W. Twyman
King Motor Car Co	Artemas Ward
Krit Motor Car Co	H. W. Standard
Locomobile Co. of America	S. T. Davis, Jr.
Mack Bros. Motor Car Co	Vernon Monroe
Maxwell Motor Co., Inc	Carl H. Pelton
Maxwell Motor Co., Inc	Carll Tucker
McFarlan Motor Co	B. I. Barrows
Mercer Automobile Co	Wm. T. White
Moline Automobile Co	Wm. H. Van DerVort
Moon Motor Car Co	E. J. Moon
Moon Motor Car Co	W. J. Coghlan
National Motor Vehicle Co	Geo. M. Dickson
Nordyke & Marmon Co	C. C. Hanch
Oakland Motor Car Co	Wilfred C. Leland
Ohio Electric Car Co	H. P. Dodge
Olds Motor Works	Wilfred C. Leland
Packard Motor Car Co	Alvan Macauley
Packard Motor Car Co	Henry B. Joy
Packard Motor Car Co	M. J. Budlong
Paige-Detroit Motor Car Co	J. F. Bourquin
Pierce-Arrow Motor Car Co	Charles Clifton
Premier Motor Mfg. Co	H. O. Smith
Rauch & Lang Carriage Co	E. J. Stahl
Reo Motor Car Co	H. T. Thomas
Selden Motor Vehicle Co	R. H. Salmons
Studebaker Corporation	E. R. Benson
Stutz Motor Car Co	H. F. Campbell
Walter Motor Truck Co	C. W. Fletcher
Waverley Company	H. H. Rice
Willys-Overland Company	John N. Willys
Winton Motor Car Co	C. W. Churchill
Alfred Reeves	General Manager

the latest estimate. This metal, which was first manufactured commercially in 1889, showed a production that year of 47,468 pounds. In 2 years it jumped to 150,000 and in 1896, went over the million mark, the exact figures being 1,300,000. In 1906, the production reached 14,910,000 pounds, and that mark was practically doubled in 2 more years, the figures being 34,210,000.

Petroleum also showed a large increase. In 1859, the first year it was used in this country for commercial purposes, 84,000 gallons were produced. This product immediately showed signs of a tremendous production, the next year's production being 21,000,000 gallons. In 1862 the production jumped to 128,380,980 gallons. In addition to this amount it is estimated that 10,000,000 barrels ran to waste in and prior to that year. The next 3 years showed a decrease, after which the production picked up and a gradual increase occurred up to 1875, when the production was 510,825,588 gallons. This included all the production prior to 1876 in Ohio, West Virginia, and California. The 2,000,000,000-gallon mark was reached in 1891, the exact figures being 2,280,291,510. From then on the increase was steady, the latest figures being in 1913 with a production of 10,434,741,660 gallons.

N. Y. Garagemen Confer on Fire Regulations

NEW YORK CITY, Dec. 9—The Automobile Trade Assn. of New York State has compiled data as to the effect if the temporarily suspended rules of State Fire Marshal John F. Ahearn were enforced and will meet that official today in Albany, prepared to help revise the regulations so that the drastic features will be eliminated. It will be proposed that certain sections be struck out and that others be altered.

The association sent to garagemen a question blank, asking what the enforcement of the rules would mean. The replies indicate that it would cost more to remodel existing buildings in accordance with the rules than it would to build new structures; the cost in many cases was from $10,000 to $15,000.

This morning, Wednesday, December 9, the Board of Directors of the association will meet in Albany and will discuss plans for the meeting with the fire marshal in the afternoon. Besides the directors the conference will be attended by President R. H. Johnston, Secretary Charles A. Stewart and Attorney Charles Thaddeus Terry.

Boston Dealers Continue Separator Fight

BOSTON, MASS., Dec. 5—Next week it is expected that the matter of whether or not all the garages and service stations of the motor dealers in what is termed Metropolitan Boston, which embraces Boston and surrounding cities and towns within an area of about 15 miles, will have to install separators at a cost of several hundred dollars each. It would not be surprising if Fire Hazard Commissioner John A. O'Keefe, who has the last say in the matter, would compromise with the motor organizations and frame rules guaranteed to prevent danger without the necessity of every one installing a separator. If that is done it will be the result of energetic, intelligent action on the part of the officers of the automobile organizations, who have been working on the matter.

Chester I. Campbell of the Boston Automobile Dealers' Assn. has prepared a series of questions which have been printed on blanks that will be circulated to all garages in the city. These questions aim at securing complete information relative to Boston garages, gasoline storage systems, pumps, etc., and should assist in reaching a definite conclusion regarding whether separators are necessary or not.

New York Men Form State Federation

NEW YORK CITY, Dec. 8—There is being organized today in Syracuse, N. Y., the New York State Federation, an organization of motorists, which is breaking away from the New York State Automobile Assn., the state body federated with the American Automobile Assn. The new organization is a result of opposition to the older organization and it is expected that the three big motor organizations of the state, namely, clubs from Buffalo, Rochester, Syracuse and the Metropolitan Consulate of this city will combine in the new organization, giving a total membership of approximately 10,000. With this loss the old organization will have approximately 6,000 remaining members. The new Federation will affiliate itself with the A. A. A. by its clubs joining individually.

California Has New H.P. Formula

State Officials Devise Way to Raise Its Long-Stroke Motor Fees for 1915—A War Tax

LOS ANGELES, CAL., Dec. 3—P. F. Meckes of the Los Angeles branch of the California State Motor Vehicle Dept., returned from Sacramento yesterday afternoon with the formula that is to be used next year for determining horsepower on motors to be taxed in this state. The formula is: Bore + stroke × bore × number of cylinders × .224.

The owner of a long-stroke motor pays from $5 to $10 more under this system. Local dealers and prominent motorists are greatly opposed to the new formula and there is a lot of talk about taking the matter to court to get a decision on what is a horsepower.

It is argued that either the State of California was flimflammed out of $150,000 last year, or the motorists are to lose that amount this season.

War Tax for Car Owners

NEW YORK CITY, Dec. 4—Automobile owners and applicants for chauffeurs' licenses must help pay the new revenue tax, J. A. Parsons, Attorney General, decided today. The Secretary of State was uncertain as to the application of the new law to his office, and asked Mr. Parsons for a ruling.

The tax will be 10 cents more for the 1915 privileges than was paid last year. There are 166,961 automobiles registered and about 75,000 chauffeurs; this will give the Government about $25,000. This is in pursuance of the stamp tax law passed by Congress, October 22.

Every applicant must send with his application a 10-cent revenue stamp, left loose for affixing by the office issuing the papers.

Over in New Jersey Commissioner of Motor Vehicles J. H. Lippincott, acting under an opinion of Attorney-General Westcott, announced recently that war revenue stamps were required on the application for license cards.

The special taxes are as follows:

Car registration certificate, 10 cents; motorcycle registration certificate, 10 cents; driver's license certificate, 10 cents; learner's permit certificate, 10 cents; all duplicates and transfers, 10 cents; power of attorney for non-residents, 25 cents and affidavit on application, 10 cents.

The State of Maryland is also demanding from each applicant for registration a tax of 10 cents. This went into effect December 1. Each application must bear a 10-cent stamp hereafter.

Pennsylvanians Want State Road Tax

PHILADELPHIA, PA., Dec. 4—At a special meeting called yesterday to consider prospective new legislation at Harrisburg of interest to automobilists, various methods of providing for early improvement of Pennsylvania's roads were discussed by the Executive Committee of the Pennsylvania Motor Federation at the Automobile Club of Philadelphia.

After several speakers had been heard, ex-State Senator Adams, chairman of the legislative committee, was instructed to draft a bill at the coming session of the state legislature providing for the levying of a special state road tax on all taxables, individual and corporation, who now pay a state tax, and including real estate that pays no state tax.

States Want Uniform Traffic Regulations

NEW YORK CITY, Dec. 7—Conferences recently held in this city and Trenton, N. J., by representatives from this state, New Jersey, Pennsylvania, Maryland, Delaware, the District of Columbia and the New England States, point towards the adoption in the near future of uniform traffic regulations there.

A commission has been appointed in New Jersey by Governor Fielder composed of J. H. Lippincott, commissioner of motor vehicles, chairman; A. V. Hamburg, president of the Newark board of trade, and G. B. LaBarre, director of public safety of Trenton.

October Exports Total $3,055,351

672 Trucks and 732 Passenger Cars Are Shipped—Trucks Gain 593 Machines Over 1913

WASHINGTON, D. C., Dec. 8—The large demand for commercial cars as a result of the European war is shown in the October exports, made public today by the Federal Bureau of Statistics. In that month 672 commercial cars, valued at $2,286,964, and 732 pleasure cars, valued at $768,387, were exported, as against seventy-nine commercial cars, valued at $129,506 and 1,697 pleasure cars valued at $1,663,716, exported in the same month last year. The exports for the 10 months ended October last were, 1,309 commercial cars valued at $3,353,509 and 20,262 pleasure cars, valued at $17,888,351.

P. O. Dept. Bids for Tires Dec. 16

WASHINGTON, D. C., Dec. 8—The Postoffice Dept. will open bids on December 16 for furnishing pneumatic, solid or cushion tires for the postoffice motor cars. Information for the bidders will be furnished by the purchasing agent of the department, this city.

WASHINGTON, D. C., Dec. 8—The Duplex Power Co., Charlotte, Mich., has been awarded a contract to furnish the Quartermaster Dept. of the War Dept., two four-wheel-drive trucks.

LIMA, O., Dec. 8—The Gramm-Bernstein Co., Lima, O., has booked an order for twenty-five trucks to be used by the departments of the Federal Government at Washington, D. C.

Two $1,900 Worm-Driven Federal Trucks

DETROIT, MICH., Dec. 5—The Federal Motor Truck Co., which thus far has made only chain-driven trucks, is now placing on the market two worm-driven models, both of 1 1-2 ton capacity.

Both models sell at $1,900 and while model J has a wheelbase of 120 inches, Model K's wheelbase is 144 inches. Both have a Continental motor, 4 1-8 by 5 1-4. The sizes of the tires are 36 by 3 1-2 on the front wheels and 36 by 5 on the rear wheels, or dual tires.

$725 Crow with Electric Starting and Lighting

ELKHART, IND., Dec. 8—The Crow Motor Car Co., Elkhart, Ind., has made public the first details of a new five-passenger model which is to sell for $725 with electric lighting and starting and otherwise fully equipped. It is fitted with a 25-28 horsepower block motor, supported at three points, a multiple disk clutch, a four-speed selective gearset and a full floating axle. The body conforms to the modern streamline principles and is built on a wheelbase of 104 inches. The gasoline tank is in the cowl and the spring suspension includes the usual semi-elliptic front members with underslung three-quarter elliptics in the rear. The equipment includes electric horn, top, windshield, Stewart speedometer and oversize tires.

Waverley Shop Trucks for Government

INDIANAPOLIS, IND., Dec. 8—The Waverley company of Indianapolis has under construction for the Navy Yard on Puget Sound, Washington, a 3-ton electric shop truck with 3-ton trailer for handling plates and angles from storage to machines and from machine to machine through the Naval Repair Shop.

The tractor is of unusual design in that with a wheelbase of 66 inches the platform of the car is 5 by 11 feet, the principal overhang being in front of the front axle.

The battery of forty-two cells is divided between two battery boxes, one between the wheels and the other under the forward overhang.

Mounted on the platform of each car is a turntable 5 feet 2 inches in diameter running on rollers and operated by hand spikes for the quick and convenient unloading of the heavy plates or beams it is designed to carry.

The construction of both cars is very substantial, wheels axles, frames, turntables and all being of heavy steel. A single motor is used and the power is transmitted to the rear axle by means of a worm-gear-shaft drive.

A mileage of 30 miles on a single charge of the battery is provided and a speed of 5 1-2 miles an hour with both cars fully loaded.

Storms Electric Leases Mercury Plant

DETROIT, MICH., Dec. 5—The Storms Electric Car Co., which was organized last week, has leased the plant formerly occupied by the Mercury Cyclecar Co., 807 Scotten avenue. This is a two-story structure having about 25,000 square feet of floorspace. The first models of the Storms electrics are now being completed and will be shown at the Detroit automobile show, in January.

N. Y. Stock Exchange Opens Dec. 12

NEW YORK CITY, Dec. 8—The New York Stock Exchange will open Saturday, December 12. The Governors have voted to permit restricted trading in stocks on the floor of the Exchange starting that day, after being closed 19 weeks, since July 30.

Approximately 175 stocks will be traded in cash or regular way only. Dealings in stocks as such shall be specified by, and be under the supervision and regulation of, the committee of five, shall be for cash or regular way only and not below the minimum prices authorized by the committee from time to time. Transactions at prices below those allowed by the committee, or in evasion of its rules, are prohibited.

Automobile Securities Quotations

NEW YORK CITY, Dec. 8—A general strengthening of the automobile security market was perceptible during the past week. Kelly-Springfield Tire established a new high record and several other stocks showed substantial gains. The following bid and asked quotations are those which a prominent brokerage house finds to obtain in private sales and are to be taken only as a guide until the reopening of the Stock Exchange.

	1913		1914	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co. com	200	225	250	..
Ajax-Grieb Rubber Co. pfd	97	102	100	..
Aluminum Castings pfd	98	101	95	100
J. I. Case pfd	..	..	..	..
Chalmers Motor Co. com	..	95	..	94
Chalmers Motor Co. pfd	..	96	87½	92½
Electric Storage Battery Co	..	..	48	49
Firestone Tire & Rubber Co. com	..	250	340	..
Firestone Tire & Rubber Co. pfd	102	104	110	110
Garford Co. pfd	80	90	..	..
General Motors Co. com	36	37	75	75
General Motors Co. pfd	73	74½	86	87½
B. F. Goodrich Co. com	16	17	25½	26½
B. F. Goodrich Co. pfd	78	79	88	..
Goodyear Tire & Rubber Co. com	200	210	180	185
Goodyear Tire & Rubber Co. pfd	93	95	100	102
Gray & Davis, Inc., pfd	95	100	..	..
International Motor Co. com	..	5	..	..
International Motor Co. pfd	..	15	..	..
Kelly-Springfield Tire Co. com	..	..	66½	68
Kelly-Springfield Tire Co. 1st pfd	..	..	75	80
Kelly-Springfield Tire Co. 2d pfd	..	..	90	95
Lozier Motor Co. com	..	16	..	..
Lozier Motor Co. pfd	..	90	..	..
Maxwell Motor Co. com	2	2½	13¾	14
Maxwell Motor Co. 1st pfd	18	19½	43	44
Maxwell Motor Co., 2d pfd	5½	6¼	16	18
Miller Rubber Co	120	130	160	..
New Departure Mfg. Co. com	..	..	..	..
New Departure Mfg. Co. pfd	..	..	..	..
Packard Motor Car Co. com	..	..	..	100
Packard Motor Car Co. pfd	91	94	90	..
Peerless Motor Car Co. com	..	25	15	20
Peerless Motor Car Co. pfd	..	85	..	55
Pope Manufacturing Co. com	..	3	..	..
Pope Manufacturing Co. pfd	..	15	..	..
Portage Rubber Co. com	..	35	25	30
Portage Rubber Co. pfd	..	90	80	85
*Reo Motor Truck Co	..	7⅛	10¼	11¼
*Reo Motor Car Co	..	15½	21½	22¾
Splitdorf Electric Co. pfd	..	..	..	..
Stewart-Warner Speedometer Corp. com	50	55	46¾	47¾
Stewart-Warner Speedometer Corp. pfd	96	97	97	100
Studebaker Corporation com	14½	15¾	35	37
Studebaker Corporation pfd	65½	68	86	88
Swinehart Tire & Rubber Co	78	80	69	71
Texas Company	..	..	126	..
U. S. Rubber Co. com	53½	54½	45	47
U. S. Rubber Co. pfd	98½	99	95	97
Vacuum Oil Co	..	..	203	208
White Company pfd	104	110	108	110
Willys-Overland Co. com	58	60	76½	80
Willys-Overland Co. pfd	82	88	86	88

*Par value $10; all others $100 par value.

Goodyear Profits $3,391,165 for Year

$1,183,418 Is Reserved for Depreciation—Unappropriated Surplus of $4,052,395 Remaining

AKRON, O., Dec. 8—The Goodyear Tire & Rubber Co.'s net income for the year amounted to $3,391,165. Additional credits not applicable to the operations for the current year amounted to $38,062. Additional debits not applicable to the current earnings amounted to $154,560. There remains an unappropriated surplus of $4,052,395.

F. A. Seiberling, president of the Goodyear company, in his remarks to the stockholders at their annual meeting says:

"Increases to the plant have been carefully received. The reserve for depreciation amounting to $1,183,418 is equivalent to 18.63 per cent. of the plant value of $6,351,250 as of October 31, 1913. The inventory was taken by the company by actual count, weight or measurement under the supervision of the company's factory superintendent and has been certified by him. It is priced at cost or under including crude rubber, which latter commodity is priced both under cost and under the present market value."

In 1913 the company did a gross business amounting to $32,500,000, an increase of $7,000,000 over 1912. The net profits were $2,041,000, equal to 33 per cent. on the common stock.

During 1914, by charter amendment the authorized preferred capital stock was increased from $5,000,000 to $7,000,000 and the common capital stock reduced from $10,000,000 to $7,991,110. In 1913 the company had outstanding $5,000,000 preferred and $5,033,800 common. The balance sheet as of October 31, 1913, shows a reserve for accounts and depreciation of $1,367,390, and a surplus of $2,820,071. The company during 1913 built large additions to its factory costing $2,495,680.

The balance sheet as of Oct. 31 last compares as follows:

Assets	1914	1913
Real estate and buildings	$3,606,537	$3,493,535
Machinery and fixtures	3,208,107	2,857,714
Patents, trade marks designed	1	1
Securities owned	777,649	804,904
Notes receivable of officers and employers for capital stock	805,283	136,882
Pfd. stock purchased and held in treasury	343,593	....
Inventory	4,567,460	4,677,426
Accts. and notes receivable	3,328,693	4,117,086
Advances to agents, salesmen and companies	280,665	137,313
Cash on deposit and on hand	2,862,706	1,141,220
Advances to Goodyear Improv. Co. and Goodyear Heights Realty Co	885,315	719,312
Suspended assets	440,438	430,156
Prepaid rentals, insurance, etc	352,893	342,698
Total	$21,459,335	$18,858,251
Liabilities		
Preferred stock	$7,000,000	$5,000,000
Common stock	7,991,110	5,033,800
Purchase accounts payable	410,575	702,384
Notes payable	....	3,653,000
Sundry other accounts payable	257,509	281,606
Reserve for doubtful accounts	564,327	508,481
Reserve for depreciation of plant	1,183,418	858,909
Surplus	4,052,395	2,820,071
Total	$21,459,335	$18,858,251

Studebaker 1914 Profits Estimated Double 1913

NEW YORK CITY, Dec. 7—Net profits of the Studebaker Corp. for 1914 will be more than twice as great as in 1913, according to information. On the basis of actual figures for the 9 months ending September 30, it is estimated the profits, after depreciation and interest charges, will be about $4,000,000, comparing with $1,904,823 last year. Accordingly the surplus available for dividends on the common stock would be equal to 11 per cent. on the $27,931,600 stock outstanding.

Since January 1 the company's serial notes outstanding have been reduced from $6,800,000 to $5,800,000. In addition to the $800,000 that matured, the company cancelled $200,000 bought in the open market.

E. H. Huxley Heads U. S. Rubber Export Co.

NEW YORK CITY, Dec. 4—Organization of the United States Rubber Export Co., Ltd., incorporated last week with a capital of $100,000 under the laws of Delaware, was completed yesterday by the election of these directors: S. P. Colt, president of the U. S. Rubber Co.; Lester Leland and J. B. Ford, vice-presidents of the same concern; E. S. Williams, president of the Rubber Goods Mfg. Co.; H. E. Sawyer, general manager of the United States Rubber Co.; R. B. Rice, C. C. Case, W. E. Barker, J. C. Weston, E. H. Huxley, H. S. Hotchkiss and W. J. Maloney.

These directors elected the following officers: President, E. H. Huxley; treasurer, W. C. Parson; assistant treasurer, H. S. Hotchkiss, and secretary, J. D. Carberry. The new export company has been organized for the purpose of consolidating the export business of the United States Rubber Co. and its associate companies.

Indianapolis to List Used Car Sales

INDIANAPOLIS, IND., Dec. 8—If an ordinance which the Indianapolis council has under consideration becomes effective, dealers in used cars, parts and accessories will be required to list all purchases with the police department. The ordinance contemplates detailed reports which must be made out within 24 hours after every purchase. A heavy fine, to which a jail sentence may be added, is provided for conviction for violations.

NEWARK, O., Dec. 8—The board of trade of Newark, O., at a recent meeting pledged both moral and financial support to the Blair Motor Truck Co., which was recently organized to manufacture motor buses. A committee of five was named to confer with the officials of the company with reference to its needs. It was stated that about $60,000 additional capital was needed to take care of orders which have been booked.

Market Reports for the Week

Market reports this week remained generally unchanged. There were a few unimportant changes such as the drop of $0.25 per 100 pounds for tin, the slight decline of both coppers, the rise of rapeseed oil to $0.72, rubber closing at $0.71 at a gain of $0.01 and the raw Japanese silk gain of $0.02. The sales in tin were few with very little demand for either spot or future positions. The demand for copper was light and selling interests were more anxious to make sales, especially for nearby delivery. Even late futures were weaker in tone. In Europe apparently prices of electrolytic were nominally unchanged, but slightly easier in tone. Antimony is steady for spot and firmer for future delivery. Lead remained quiet but steady. Cottonseed oil, which went up $0.22 per barrel held a better tone this week with an improved consuming demand. There was absence of new developments of importance in the crude rubber market. Though there was a gain of $0.01, prices were generally steady. The demand from manufacturers was reported as light. In discussing the embargo placed by England on shipments of plantation rubber a large manufacturer of tires states that two ships bearing crude rubber reached this country during the last few days, and that there is only one other ship bearing rubber on the high seas bound for the United States. This ship left Singapore before the establishment of the embargo.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.13½	.13½	.13½	.13½	.13½	.13½	......
Beams & Channels, 100 lbs	1.21	1.21	1.21	1.21	1.21	1.21	......
Bessemer Steel, ton	18.00	18.00	18.00	18.00	18.00	18.00	......
Copper, Elec., lb.	.12¾	.12¾	.12¾	.12⅘	.12 7/10	.12 7/10	—.00 1/20
Copper, Lake, lb.	.12⅞	.12⅞	.12⅞	.12 9/10	.12⅘	.12⅘	—.00 3/40
Cottonseed Oil, bbl.	5.63	5.68	5.86	6.00	5.91	5.85	+.22
Cyanide Potash, lb.	.23	.23	.23	.23	.23	.23	......
Fish Oil, Menhaden, Brown	.38	.38	.38	.38	.38	.38	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	.90	.90	......
Lead, 100 lbs.	3.80	3.80	3.80	3.80	3.80	3.80	......
Linseed Oil	.47	.47	.47	.47	.47	.47	......
Open-Hearth Steel, ton	18.00	18.00	18.00	18.00	18.00	18.00	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.71	.71	.71	.71	.71	.72	+.01
Rubber, Fine Up-River, Para	.70	.70	.70	.70	.72	.71	+.01
Silk, raw, Ital.	..	3.90	..	..	3.90	3.90	......
Silk, raw, Japan	..	3.13	..	..	3.12½	3.15	+.02
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	33.00	33.50	33.60	33.50	32.75	32.75	—.25
Tire Scrap	.05	.05	.05	.05	.05	.05	......

Race Dates for 1915

Contest Board of A. A. A. Reports 120 Sanctions for 1914—Official Records Announced

NEW YORK CITY, Dec. 4—At today's meeting of the Contest Board tentative dates for 1915 speed contests were allowed as follows:

Indianapolis Speedway	May 29
Galesburg, Ill., 200-miles	June 16
Sioux City Speedway	June 25
Tacoma Road Race	July 4
Elgin Races	August 20 and 21

Applications were made for dates from the recently organized Minneapolis Speedway, also the Sheepshead Bay Speedway promoters and the Detroit speedway, but owing to construction not having started on some of these no consideration was given the dates.

The official summary of sanctions issued by the Contest Board for the present year shows a total of 120 as compared with 101 last year, 132 in 1912, 117 in 1911, and 166 in 1910. In the last 5 years 1910 stood first in the contest field, 1912 was next, followed by 1914. The two poorest years were 1911 and 1913.

A further analysis of the 120 sanctions issued this year show that fifty-two were on 1-2-mile dirt tracks, thirty-six on 1-mile dirt tracks, ten were road races, eight reliability tests, two hill-climbs, four certified trials, and one each of beach races, commercial vehicle tests. Sanctions were issued to two speedways during the year, Indianapolis and Sioux City.

Many records made on speedways and tracks for the year were allowed, these including Indianapolis speedway records up to 500 miles made on May 30. Oldfield in the Stutz gets two of these marks, namely 20 and 25 miles, and all of the others above this go to the foreign cars. Other records were granted including 15 miles, 20 miles, 25 miles, and 75 miles to Burman on 1-mile dirt tracks, and 100 miles to Alley on a dirt track.

The annual statement of the Contest Board showed total receipts of $16,777.51, as against total expenses of $10,688.10, leaving a surplus for the year of slightly over $6,000. The receipts were from five sources, namely, sanction fees, drivers' registration fees, track licenses, fines and appeals. The sanction fees totaled $13,640 and the fees from the registration of drivers, $2,257.

Following are the claims for records:

CLAIMS FOR RECORDS

SPEEDWAY RECORDS, REGARDLESS OF CLASS

Distance	*Time*	*Driver*	*Car*	*Place*	*Date*
20 miles	13:58:14	Oldfield	Stutz	Indianapolis	May 30, 1914
25 “	17:30:40	Oldfield	Stutz	Indianapolis	May 30, 1914
50 “	33:45:32	Christiaens	Excelsior	Indianapolis	May 30, 1914
75 “	50:21:24	Christiaens	Excelsior	Indianapolis	May 30, 1914
100 “	1:10:46:50	Duray	Peugeot	Indianapolis	May 30, 1914
150 “	1:46:20	Duray	Peugeot	Indianapolis	May 30, 1914
200 “	2:25:11	Duray	Peugeot	Indianapolis	May 30, 1914
250 “	3:00:58.48	Thomas	Delage	Indianapolis	May 30, 1914
300 “	3:38:29:59	Thomas	Delage	Indianapolis	May 30, 1914
350 “	4:15:22:69	Boillot	Peugeot	Indianapolis	May 30, 1914
400 “	4:52:02:10	Thomas	Delage	Indianapolis	May 30, 1914
450 “	5:27:33.50	Thomas	Delage	Indianapolis	May 30, 1914
500 “	6:03:45:94	Thomas	Delage	Indianapolis	May 30, 1914

ONE MILE CIRCULAR DIRT TRACK RECORDS

15 miles	12:47:00	Burman	Peugeot	Peoria, Ill	Sept. 12, 1914
20 “	17:10:60	Burman	Peugeot	Springfield, Ill	Sept. 19, 1914
25 “	21:37:60	Burman	Peugeot	Springfield, Ill	Sept. 19, 1914
75 “	1:08:56:00	Burman	Peugeot	Galesburg, Ill	Oct. 22, 1914
100 “	1:31:30:00	Alley	Duesenberg	Hamline, Minn	Oct. 24, 1914

The official record sheet of the contest board has been issued under date of November 4, 1914. The records listed are:

OFFICIAL RECORDS ALLOWED AND ACCEPTED BY A. A. A. CONTEST BOARD

STRAIGHTAWAY FREE-FOR-ALL RECORDS, REGARDLESS OF CLASS

Distance	*Time*	*Driver*	*Car*	*Place*	*Date*
1 kilo	15.88	Burman	Blitzen-Benz	Daytona	Apr. 23, 1911
1 mile	25.40	Burman	Blitzen-Benz	Daytona	Apr. 23, 1911
2 miles	51.28	Burman	Blitzen-Benz	Daytona	Apr. 23, 1911
5 “	2:34	Hemery	Darracq	Daytona	Jan. 24, 1906
10 “	5:14.40	Bruce-Brown	Benz	Daytona	Mar. 24, 1909
15 “	10:00	Lancia	Fiat	Daytona	Jan. 29, 1906
20 “	13:11.92	Burman	Buick Bug	Jacksonville	Mar. 30, 1911
50 “	35:52.31	Burman	Buick Bug	Jacksonville	Mar. 28, 1911
100 miles	1:12:45.20	Bernin	Renault	Daytona	Mar. 6, 1908
150 “	1:55:18	Disbrow	Special	Jacksonville	Mar. 31, 1911
200 “	2:34:12	Disbrow	Special	Jacksonville	Mar. 31, 1911
250 “	3:14:55	Disbrow	Special	Jacksonville	Mar. 31, 1911
300 “	3:53:33.50	Disbrow	Special	Jacksonville	Mar. 31, 1911
81.65 “	One Hour	Disbrow	Special	Jacksonville	Mar. 28, 1911

(Standing Start)

1 mile	40.53	Oldfield	Benz	Daytona	Mar. 16, 1910

CLASS "B" STOCK CHASSIS STRAIGHTAWAY RECORDS

161 TO 230 CUBIC INCHES

5 miles	4:24.13	Towers	Warren-Detroit	Jacksonville	Mar. 29, 1911
10 “	9:10.52	Towers	Warren-Detroit	Jacksonville	Mar. 30, 1911

231 TO 300 CUBIC INCHES

10 miles	8:16.35	Wilson	Cole	Jacksonville	Mar. 29, 1911

301 TO 450 CUBIC INCHES

1 kilo	26.75	Merz	National	Jacksonville	Mar. 29, 1911
1 mile	40.32	Wilcox	National	Jacksonville	Mar. 30, 1911
5 miles	3:56.82	Wilcox	National	Jacksonville	Mar. 30, 1911
10 “	8:03.67	Merz	National	Jacksonville	Mar. 29, 1911

SPEEDWAY RECORDS, REGARDLESS OF CLASS

¼ mile	8.16	Burman	Blitzen-Benz	Indianapolis	May 29, 1911
½ “	16.80	Burman	Blitzen-Benz	Indianapolis	May 29, 1911
1 kilo	21.40	Burman	Blitzen-Benz	Indianapolis	May 29, 1911
1 mile	35.35	Burman	Blitzen-Benz	Indianapolis	May 29, 1911
2 miles	1:15.96	Bragg	Fiat	Los Angeles	Apr. 13, 1910
3 “	1:54:83	Bragg	Fiat	Los Angeles	May 5, 1912
4 “	2:33:37	Bragg	Fiat	Los Angeles	May 5, 1912
5 “	3:11:75	Bragg	Fiat	Los Angeles	May 5, 1912
10 “	6:35.62	Robertson	Simplex	Los Angeles	Apr. 9, 1910
15 “	10:25.17	Hearne	Benz	Indianapolis	July 4, 1910
20 “	13:58.14	Oldfield	Stutz	Indianapolis	May 30, 1914
25 “	17:30.40	Oldfield	Stutz	Indianapolis	May 30, 1914
50 “	33:45.32	Christiaens	Excelsior	Indianapolis	May 30, 1914
75 “	50:21.24	Christiaens	Excelsior	Indianapolis	May 30, 1914
100 “	1:10:46.50	Duray	Peugeot	Indianapolis	May 30, 1914
150 “	1:46:20	Duray	Peugeot	Indianapolis	May 30, 1914
200 “	2:25:11	Duray	Peugeot	Indianapolis	May 30, 1914
250 “	3:00:58.48	Thomas	Delage	Indianapolis	May 30, 1914
300 “	3:38:29.59	Thomas	Delage	Indianapolis	May 30, 1914
350 “	4:15:22.69	Boillot	Peugeot	Indianapolis	May 30, 1914
400 “	4:52:02.10	Thomas	Delage	Indianapolis	May 30, 1914
450 “	5:27:33.50	Thomas	Delage	Indianapolis	May 30, 1914
500 “	6:03:45.94	Thomas	Delage	Indianapolis	May 30, 1914

(Hour Records)

74 miles	1:00:00	Harroun	Marmon	Los Angeles	Apr. 16, 1910
148 “	2:00:00	Harroun	Marmon	Los Angeles	Apr. 16, 1910

ONE MILE CIRCULAR DIRT TRACK RECORDS

1 mile	46.20	Disbrow	Simplex	St. Louis, Mo	Aug. 8, 1914
2 miles	1:32.60	Disbrow	Simplex	St. Louis, Mo	Aug. 8, 1914
3 “	2:27.81	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
4 “	3:17.02	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
5 “	4:06.58	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
10 “	8:17.02	Disbrow	Simplex	Cleveland, O.	Sept. 14, 1912
15 “	12:47.00	Burman	Peugeot	Peoria, Ill	Sept. 12, 1914
20 “	17:10.60	Burman	Peugeot	Springfield, Ill	Sept. 19, 1914
25 “	21:37.60	Burman	Peugeot	Springfield, Ill	Sept. 19, 1914
50 “	45:32:00	Disbrow	Simplex	Detroit, Mich	Sept. 29, 1912
75 “	1:08:56.00	Burman	Peugeot	Galesburg, Ill	Oct. 22, 1914
100 “	1:31:30.00	Alley	Duesenberg	Hamline, Minn	Oct. 24, 1914
150 “	2:30:51.00	Wishart	Mercer	Columbus, O.	Aug. 25, 1912
200 “	3:21:48:00	Mulford	Mason Special	Columbus, O.	July 4, 1913

CLASS "B" SPEEDWAY RECORDS STOCK CHASSIS

451 TO 600 CUBIC INCHES

5 miles	4:01.36	Oldfield	Knox	Indianapolis	May 30, 1910
10 “	7:47.71	Robertson	Fiat	Atlanta	Nov. 11, 1909
20 “	15:57.41	De Palma	Fiat	Atlanta	May 5, 1910
50 “	42:02.98	Robertson	Fiat	Atlanta	Nov. 13, 1909
100 “	1:22:35.35	Robertson	Fiat	Atlanta	Nov. 13, 1909
150 “	2:05:00.63	Robertson	Fiat	Atlanta	Nov. 13, 1909
200 “	2:53:48.32	Disbrow	Rainier	Atlanta	Nov. 13, 1909

301 TO 450 CUBIC INCHES

5 miles	4:05.76	Kincaid	National	Indianapolis	May 27, 1910
10 “	7:55.12	Aitken	National	Indianapolis	July 2, 1910
15 “	11:48.78	Aitken	National	Indianapolis	July 1, 1910
20 “	15:57.63	Dawson	Marmon	Indianapolis	May 27, 1910
50 “	39:47.35	Dawson	Marmon	Atlanta	Nov. 3, 1910
75 “	1:00:16.34	Dawson	Marmon	Indianapolis	May 27, 1910
100 “	1:23:43.11	Kincaid	National	Indianapolis	May 27, 1910
150 “	2:05:02.17	Chevrolet	Buick	Atlanta	Nov. 9, 1909
200 “	2:46:48.47	Chevrolet	Buick	Atlanta	Nov. 9, 1909
250 “	4:38:57.40	Burman	Buick	Indianapolis	Aug. 19, 1909

231 TO 300 CUBIC INCHES

5 miles	4:16.00	Dawson	Marmon	Indianapolis	July 2, 1910
10 “	8:16.08	Harroun	Marmon	Indianapolis	May 27, 1910
20 “	17:10.70	Chevrolet	Buick	Atlanta	Nov. 11, 1909
25 “	21:48.92	Harroun	Marmon	Indianapolis	May 30, 1910
50 “	42:41.33	Harroun	Marmon	Indianapolis	May 30, 1910
75 “	67:31.07	Harroun	Marmon	Atlanta	Nov. 11, 1909
100 “	1:30:08.31	Harroun	Marmon	Atlanta	Nov. 11, 1909

161 TO 230 CUBIC INCHES

4 miles	3:49.00	Witt	E. M. F	Atlanta	Nov. 3, 1910
5 “	4:35.47	L. Chevrolet	Buick	Indianapolis	July 2, 1910
10 “	8:55.40	L. Chevrolet	Buick	Indianapolis	July 2, 1910
20 “	19:51.00	Knipper	Chalmers	Atlanta	Nov. 12, 1909
50 “	50:36.00	Nelson	Buick	Atlanta	Nov. 9, 1909
100 “	1:40:46.81	Knipper	Chalmers	Atlanta	Nov. 10, 1909

160 CUBIC INCHES AND UNDER

1 mile	0:56.80	Witt	Flanders	Indianapolis	Nov. 13, 1911
5 miles	4:22.98	Witt	Flanders	Indianapolis	Nov. 13, 1911
10 “	9:27.49	Witt	Flanders	Indianapolis	Nov. 13, 1911
15 “	14:13.26	Witt	Flanders	Indianapolis	Nov. 13, 1911
20 “	19:00.87	Witt	Flanders	Indianapolis	Nov. 13, 1911

CLASS "C" SPEEDWAY RECORDS

160 CUBIC INCHES AND UNDER					
5 miles	4:26.08	Evans	Flanders	Indianapolis	Nov. 13, 1911
10 "	8:53.97	Evans	Flanders	Indianapolis	Nov. 13, 1911
15 "	13,24.00	Evans	Flanders	Indianapolis	Nov. 13, 1911
20 "	17:54.82	Evans	Flanders	Indianapolis	Nov. 13, 1911
161 TO 230 CUBIC INCHES					
5 miles	4:20.20	J. Nikrent	Buick	Los Angeles	Apr. 15, 1910
10 "	8:40.17	J. Nikrent	Buick	Los Angeles	Apr. 15, 1910
15 "	13:14.52	J. Nikrent	Buick	Los Angeles	Apr. 9, 1910
20 "	17:37.36	J. Nikrent	Buick	Los Angeles	Apr. 9, 1910
25 "	21:12:42	Tower	Flanders Special	Los Angeles	May 5, 1912
50 "	43:49.69	Endicott	Cole	Los Angeles	Apr. 9, 1910
231 TO 300 CUBIC INCHES					
1 mile	0:45:60	De Palma	Mercer	Los Angeles	May 5, 1912
2 miles	1:31:53	De Palma	Mercer	Los Angeles	May 5, 1912
3 "	2:17:17	De Palma	Mercer	Los Angeles	May 5, 1912
4 "	3:02:70	De Palma	Mercer	Los Angeles	May 5, 1912
5 "	3:47:34	De Palma	Mercer	Los Angeles	May 5, 1912
10 "	7:27:33	De Palma	Mercer	Los Angeles	May 5, 1912
15 "	11:11:17	De Palma	Mercer	Los Angeles	May 5, 1912
20 "	14:56:05	De Palma	Mercer	Los Angeles	May 5, 1912
25 miles	18:53:20	J. Nikrent	Case	Los Angeles	May 5, 1912
50 "	42:30.08	Siefert	Dorris	Los Angeles	Apr. 8, 1910
75 "	1:03:54.28	Harroun	Marmon	Los Angeles	Apr. 8, 1910
100 "	1:25:22.07	Harroun	Marmon	Los Angeles	Apr. 8, 1910
301 TO 450 CUBIC INCHES					
5 miles	3:49.36	J. Nikrent	Buick	Los Angeles	Apr. 17, 1910
10 "	7:36.61	J. Nikrent	Buick	Los Angeles	Apr. 17, 1910
15 "	12:04.99	Dawson	Marmon	Los Angeles	Apr. 15, 1910
20 "	16:04.40	Harroun	Marmon	Los Angeles	Apr. 15, 1910
25 "	20:08.69	Harroun	Marmon	Los Angeles	Apr. 15, 1910
50 "	39:53.55	Harroun	Marmon	Los Angeles	Apr. 15, 1910
451 TO 600 CUBIC INCHES					
5 miles	3:38.61	Oldfield	Knox	Los Angeles	Apr. 16, 1910
10 "	7:20.66	Oldfield	Knox	Los Angeles	Apr. 16, 1910
15 "	11:32.34	Marquis	Isotta	Los Angeles	Apr. 10, 1910
20 "	15:29.18	Marquis	Isotta	Los Angeles	Apr. 10, 1910
25 "	19:24.92	Marquis	Isotta	Los Angeles	Apr. 10, 1910
50 "	39:20.69	Marquis	Isotta	Los Angeles	Apr. 10, 1910

24-HOUR TRACK RACES

Stock Chassis	Lozier	Patschke & Mulford	1,196 miles	Brighton Beach	Oct. 15, 1909
Cl. "C"	Stearns	Poole & Patschke	1,253 miles	Brighton Beach	Oct. 19, 1910
Cl. "C" Spdwy	Fiat	Verbeck & Hirsh	1,491 miles	Los Angeles	Apr. 8, 1911

San Diego To Have $10,000 Race

LOS ANGELES, CAL., Dec. 3—The entry blanks for the San Diego Exposition Road Race which is scheduled for January 9, were distributed today. The event is to be conducted under the auspices of the Al Bahr Temple, Mystic Shrine, San Diego, under official A. A. A. Sanction No. 786. The event is to be managed by A. M. Young of this city who managed the recent Corona road race.

The San Diego event is to be run over the spectacular Point Loma course which measures 5.982 miles to the circuit. The total distance for the race is 305.082 miles or 51 laps. There is to be but one event, the Class "D" non-stock free-for-all. The entry fee is $150 and $10,000 in cash prizes is to be awarded, with an additional $2,500 for a new world's record for a distance not less than 300 miles.

While no entries have been officially announced, the management stated today that it was practically assured that all the drivers who appeared at the Corona speed meet, would drive at San Diego and later go north to compete in the Vanderbilt and Grand Prix at San Francisco in February.

Earl Cooper left for the East yesterday in company with Fred J. Wagner, but is to return in time for the San Diego meet. Bob Burman is in Los Angeles, but Ed. Rickenbacher has gone to New York for parts for the Peugeot cars which were disabled at Corona.

Harry Grant and Harry Babcock with the two Sunbeams are repairing the machine which was wrecked by fire in the Corona race and Grant stated today that he believed the car would be ready for the San Diego race.

The Duesenberg team is still here and wil lenter the next California race.

Barney Oldfield is reported to be signed to drive a Maxwell at San Diego, but the veteran driver says that he will not know what car he will drive or if he will drive at San Diego at al lor not, until the practice starts on the Point Loma course, January 2, the day after the exposition opens.

Eddie Pullen went north to look over the San Francisco course today and said it was probable that he would pilot the Mercer at San Diego, although there was nothing certain.

The Stutz trio is to be in the race and the entries are to be filed early next week, according to the race management.

Ralph De Palma has returned to the East but is to be back for the San Diego event according to close friends here.

Race Course for San Bernardino

SAN BERNARDINO, CAL., Dec. 3—A 10-mile motor race course around Perris Hill, just north of this city, is being seriously considered by San Bernardino capitalists and automobile enthusiasts. The project has been placed before the local Chamber of Commerce and the Board of Supervisors and it is probable that construction will be commenced within a short time.

The proposition is being backed by Charles Rouse and John Anderson of this city. Anderson is the local representative for the Western Automobile Assn.

Haynes Six on 100-Mile Low Gear Test

NEWARK, N. J., Dec. 5—A severe test of the ability of the Haynes light six to stand the continuous use of the low gear was made on Friday, December 4, when a demonstrating car was given an all-day low-gear run by Clarence R. Schuyler, manager of the Haynes branch in Newark, N. J. The total distance covered was 180.4 miles, of which 166.1 miles were covered without stopping the motor. A stoppage in the 15th mile due to a clogged gasoline line was the only untoward incident of the trip.

The car was driven 100 miles, non-stop, in 6 hours 52 minutes, and the distance for 10 hours running was 151.2 miles, a little better than 15 miles an hour. The consumption of gasoline for the whole 180.4 miles was 23 gallons, 7.8 miles to the gallon, and the oil used was 7 quarts, 25.7 miles per quart. No water was added to the cooling system and the car returned at the end of the run with the radiator practically as full as when starting out; the actual drop of the water level was less than a quarter of an inch. A motometer showed that the temperature did not rise higher than 160 degrees Fahr. at any time; the average was about 115 degrees. The water did not boil at any time and the water jackets were not too hot to lay the bare hand on even at the tops of the worst of the many bad hills.

The touring car used was a stock model used as a demonstrator and had been run about 1,000 miles. It was loaded with full equipment and four passengers, and weighed en route, scaled 3,800 pounds with and 3,230 pounds without passengers. The low gear ratio is 11.75 to 1, intermediate 7 to 1 and high 4 to 1.

Two Sunbeams May Enter Indianapolis Race

INDIANAPOLIS, IND., Dec. 5—Despite the war, several European entries for the next Indianapolis 500-mile, May 29, already seem certain. Darius Resta, one of the best of the foreign pilots, has written the speedway management that he, together with either Jean Chassagne or K. Lee Guinness, expects to bring over a pair of Sunbeams that will guarantee some extremely fast competition.

All three of the drivers mentioned are ineligible for army service, and hence will have no trouble getting away. At present their only problem is to get the consent of Louis Coatalen, the Sunbeam designer, to the venture, which, however, they expect to do with little difficulty.

The cars are the ones which competed in the 1914 Grand Prix de France. Showing a piston displacement of approximately 276 cubic inches, they come well within the limits prescribed by the speedway management. They are capable of speeds up to 110 miles an hour.

Milwaukee Show, Jan. 8-14; 83 Exhibitors

MILWAUKEE, WIS., Dec. 8—The 1915 Milwaukee motor show, January 8 to 14, will occupy by far the largest area of any of the six expositions that have preceded it. The show committee of the Milwaukee Automobile Dealers' Assn. has arranged for the use of 51,750 square feet of floorspace in the Milwaukee Auditorium, the leases calling for the entire main arena, Juneau, Kilbourn and Walker halls, the main arena basement, north and south rest rooms and the entire corridors around the arena. Eighty-three firms will exhibit.

COLUMBUS, O., Dec. 8—The annual Columbus Automobile Show which will be held in the Memorial Hall the week starting January 30 will be under the auspices of the Columbus Automobile Club and the Columbus Auto Trades Assn. The joint committee in charge of the show consists of J. P. Gordon, chairman, Ira Madden, vice-chairman; E. B. Coats, secretary; L. M. Browne, treasurer, and M. A. Pixley. In all fifty-five different cars will be shown including electric and gasoline passenger cars and motor trucks. Accessories will be displayed in the balcony.

28 More Exhibitors for National Shows

3 Car Makers and 25 Accessory Firms Added—Decoration Plans Are Complete

NEW YORK CIITY, Dec. 8—The names of three makers of cars and twenty-five makers of accessories have been added to the already long line of exhibitors for the National shows in New York and Chicago. Of the car makers, only the Remington Motor Co. will exhibit at both shows, the other two will exhibit at Chicago only. The complete list is given herewith.

The work of decorating Grand Central Palace for the Fifteenth Annual National Automobile Show to be held January 2 to 9, began this week.

The dominant colors will be white, gold and crimson. As usual, the signs at each booth will contain merely the name of the car, and these will be uniform throughout. In the accessory department, the signs will contain the name of the exhibitor. More than 200 men are engaged in painting the signs, building the pillars and casts, and arranging the floral decorations.

Manager S. A. Miles plans to have the setting for the cars in the Coliseum and Armory in Chicago one of the most ornate ever devised for an automobile show in Chicago. An old English garden will be the theme of decorations at the Coliseum and no detail of the effect will be overlooked.

New Overman Tire Company Is Organized

NEW YORK CITY, Dec. 8—The Overman Cushion Tire Co., New York City, with $150,000 capitalization, has been formed to succeed the Overman Tire Co., which is in the hands of receivers. The officers of the new company are: President, C. A. Taussig, an attorney; vice-president and sales manager, J. B. Bleiler, formerly an Overman salesman; treasurer and general manager, Max C. Overman, founder of the defunct company; secretary, Alexander Clogher. The company will discontinue the pneumatic tire with which it supplemented its cushion tire and will manufacture the cushion type only. The old company's factory in Passaic, N. J., has been discontinued and the new company is working temporarily in Belleville, N. J., with a New York office and store rooms at 250 West Fifty-fourth street.

DETROIT, MICH., Dec. 4—The first meeting of creditors of the bankrupt Detroit Electric Appliance Co., was held yesterday at the office of referee in bankruptcy Lee E. Joslyn. The inventory of the defunct concern was made public and shows that according to the books of the company the assets are worth $324,967.94 while according to the Detroit Trust Co., receiver, the value of the assets is only $168,015.72. The liabilities are shown by the bankrupt company to be $324,-967.94 while the Detroit Trust Co. has placed them at $90,-957.19. According to three special appraisers the tangible assets are valued at $35,207.

Premier Assets $307,376.50—Liabilities $508,468.52

INDIANAPOLIS, IND., Dec. 7—Frank E. Smith, receiver, has filed with Albert Rabb, referee in bankruptcy, a statement of the assets and liabilities of the Premier Motor Mfg. Co. The report is a voluminous one, covering about 100 typewritten pages and goes into the most minute detail.

According to the report, the total liabilities are $508,468.52 and the total assets $307,376.50. The plant is being operated, under direction of the United States Court and the receiver has been doing a very satisfactory business.

The liabilities include unpaid wages amounting to $5,774.77; priority debts amounting to $13,846.96; secured debts amounting to $809,062.54 and unsecured debts amounting to $160,048.84. The Fletcher American National Bank of this city holds contingent notes amounting to $107,047.68, secured by unsold cars which the receiver estimates are worth $82,137.50.

The assets include real estate valued at $50,050. The receiver does not state at what value he holds the patents and copyrights. The remainder of the assets include sums due from agents and officers of the company and due from other sources.

The receiver has paid all current wages due since he has been operating the plant. The item of unpaid salaries and wages mentioned was contracted before the receiver was appointed.

CINCINNATI, O., Dec. 5—Edgar Daniels, doing business as "The Multi-Letter Shop," and the "Daniels Auto Supply Company," at Dayton, O., Saturday filed a petition of voluntary bankruptcy in the United States Court at Cincinnati. He has liabilities of $3,596.55 and assets of $2,883.94, of which he claims $500 exempt. His assets consist of stock in trade, $655; fixtures, etc., $809; debts due on open accounts, $343, and vehicles, $75.

INDIANAPOLIS, IND., Dec. 8—Adrian Hamersly, president, has brought suit in the superior court at Indianapolis asking the appointment of a receiver for the Hassler Shock Absorber Sales Co. on the ground that the concern is insolvent and owes him $1,435.90.

NEW YORK CITY, Dec. 9—Smith-Haines, dealers in automobile supplies in this city, at 176 Broadway, have assigned for the benefit of creditors to H. B. Wilson, Jr., H. S. Hechheimer and Elmer Engield. The firm is composed of D. R. Smith, F. A. Haines and Frederick Ray.

LISBON, O., Dec. 5—Charging that the East Palestine Rubber Co. is on the verge of insolvency and in imminent danger of becoming wholly insolvent through mismanagement, A. E. Burnett has filed an action in the common pleas court here asking that a receiver be appointed by the court to protect and manage the property of the company. The company manufactures automobile tires.

XENIA, O., Dec. 5—The Hawkins Cyclecar Co., has filed in the Common Pleas Court a dissolution suit, claiming that the purpose of the corporation had failed, in so much that it had been unable to sell a manufactured product.

In compliance with the law, which requires that 3 months elapse between the time of the petitions and the hearing, the date of the trial was set for February 27. W. L. McAllister was appointed by the court as Master Petitioner, to hear complaints and receive claims against the company.

Blomstrom Receiver Is Awarded $46,106.75

DETROIT, MICH., Dec. 5—A suit for alleged breach of contract yesterday ended in the Circuit Court in the awarding of $46,106.75 to Julian G. Dickinson, receiver for the defunct Blomstrom Mfg. Co., against Fred Postal, owner of the Griswold Hotel, Detroit, and against Henry Bowen, a business man of Saginaw, Mich.

The complaint of the receiver against Postal and Bowen was that they had agreed in 1909 to take over the assets of the Blomstrom concern and to form a new company to be known as the Lion Motor Car Co. All the gyroscope motors made by the Blomstrom company were to be taken over by the new concern but it is charged that this was not done by the new company which made another type of motor car.

The stockholders of the Blomstrom company were to receive stock to the full value in the Lion company. After the incorporation of the Lion Motor Car Co., it is alleged that Postal and Bowen did not keep their contract.

During the present trial which lasted about 1 week the gyroscope motor was tested before the court and the jury.

Additional Exhibitors of Cars and Accessories for New York and Chicago Shows

Cars

Remington Motor Co....... New York, N. Y.
Ogren Motor Car Co.......... Chicago, Ill.
Vulcan Mfg. Co.............. Painesville, O.

Accessories—New York and Chicago

Hayes Mfg. Co.............. Detroit, Mich.
Leece-Neville Co............ Cleveland, O.
Western Tire & Rubber Co.. Kansas City, Mo.
Victor Lamp Co............ Cincinnati, O.
Voorhees Rubber Mfg. Co.. Jersey City, N. J.

Accessories—Chicago Only

Hunter Auto Supply Co......... Chicago, Ill.
So-Sha-Belle Co.......... Los Angeles, Cal.
Simplex Short Turn Gear Co.. Anderson, Ind.
Right Motor Specialties Co..... Chicago, Ill.
H & D Co., Inc.............. Goodland, Ind.
Cutting & Smith Sales Co..... Detroit, Mich.
Vanguard Mfg. Co............ Detroit, Mich.

Accessories—New York Only

Sipp Machine Co............ Paterson, N. J.
K-T Lever Spring Co............ New York
Max Machine Co............. Clinton, Mass.
M. L. Dunham.................... New York
Motor Parts Co........... Philadelphia, Pa.
Woodbridge Chemical Co......... New York
Clincher Tire Plow Co............ New York
Mezzatesta & Fortier Co.... Brooklyn, N. Y.
E. U. Scoville Co........... Manlius, N. Y.
Dayton Rubber Mfg. Co.......... New York
Clarence N. Peacock Co.......... New York
National Oil & Supply Co...... Newark, N. J.
Wasson Piston Ring Co...... Hoboken, N. J.

Factory Miscellany

POPE Rents 13,000 Sq. Ft. Factory Space—Colonel George Pope, receiver of the Pope Mfg. Co. in the Connecticut jurisdiction, has rented the top floor of the Capitol avenue factory, Hartford, Conn., comprising about 13,000 square feet of floor space, to the Smith-Worthington Co., that city. The Smith-Worthington Co. is engaged in the manufacture of harnesses and saddles, and that this concern should need space in the Pope Building is explained by the fact that large orders for saddles, presumably from powers at war in Europe, have been received. For a long time past there have been various rumors as to the outcome of the property, part of which is now occupied by the Hartford Motor Car Co., the prime movers of which are Charles E. and Wilbur C. Walker, both former officers of the Pope company, who purchased of the receiver the parts making rights. Early this week it was stated that the Pratt & Whitney Co., a subsidiary of the Niles, Bement & Pond combination, wanted to rent a portion of the Pope factory. However, nothing came of the matter. The Pratt & Whitney company is now working off big orders for the Chinese, English and Russian governments, and needs room badly. Arthur L. Shipman, counsel for Receiver Pope, said this week that an offer to lease the factory had been made some time ago, the lease to run from 1½ to 2 years, but because the Pope real estate must be sold to satisfy creditors the counsel said that the offer had been turned down. The impression becomes the stronger from day to day that the Pope factories will eventually be acquired by some of Hartford's prosperous industries. It would not be at all surprising if the Pratt & Whitney company secured the property, as it adjoins their present big works.

New Bergdoll Plant in Trenton—The Bergdoll Automobile Co., Philadelphia, will erect a large manufacturing plant at Trenton Junction, N. J., near there.

Milwaukee Plant Suffers Fire Loss—The plant of the American Metal Products Co., 3102 Lisbon avenue, Milwaukee, Wis., was damaged $10,000 by fire on November 28. Arrangements are being made to resume production at once.

New Transmission Co.—J. G. Williams, of Trenton, Mich., and W. D. Gould, of Detroit, Mich., were in Sandusky, Mich., recently, trying to interest local business men in a new concern which is to make automobile transmissions. The company is to be known as the Ideal Gear Transmission Co., and will locate there if sufficient capital is raised by local business men.

Big Engine Shipment for Australia—The Affiliated Manufacturers' Co., 602 Caswell block, Milwaukee, Wis., a large selling organization handling a diversified line of products, has received an order for $10,000 worth of gasoline engines for shipment to Australia. It marks the resumption of the company's foreign business, interrupted in July by the outbreak of the war.

Ford Benefits Far-Reaching—As a result of 10 months' operation of the Ford profit-sharing plan, employees of the automobile manufacturer have purchased, on contract, homes valued at $5,000,000, upon which they have made payments aggregating $1,200,000, have taken life insurance to the amount of $3,000,000 and have saved on an average of $48.76 per month each, which is either in savings banks or invested in real estate. About 9,200 employees are under the profit-sharing plan. More of them are coming up to the qualifications constantly. Since the plan went into effect the average gain per man in bank deposits has been 130 per cent; in life insurance, 86 per cent; in homes owned, 87 per cent. There is a marked increase in the number of naturalized citizens and a radical improvement in their habits, morals, health, mentality and living conditions.

Manufacture Sheet Metal Wiring Machines—The Magee Sheet Metal Machinery Co., Detroit, Mich., recently incorporated, is going to manufacture sheet metal wiring machines specially used in wiring fenders. Several sample machines have been tried out by one of the largest automobile manufacturers, and it is stated, have resulted in the saving of more than $40 a day through their use. The new machine will run 1,750 feet of wire during a 9-hours working day, wiring 250 fenders of the particular type used on the cars made by that manufacturer. Where the cost had been 6 cents for wiring the fenders of those cars according to the old method, the new machine has brought this cost down to 1 1-2 cents. Another advantage of the Magee machine is that it requires but a rather small floorspace, one man operating the machine within a space of 16 square feet, it is claimed. For the time being the machines will be made only per contract and later a factory will be built.

The Automobile Calendar

Dec. 12-19.......**Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.**

Dec. 14-18.......**Chicago, Ill., American Good Roads Congress.**

Jan. 2-9.........**New York City, Annual Automobile Show, Grand Central Palace.**

Jan. 2-9.........**New York City, Automobile Salon, Grand Ball Room of Astor Hotel, Automobile Importers' Alliance, E. Lascaris, Pres.**

Jan. 3-10........Buenos-Aires, Argentina, Grand Prize of Argentina.

Jan. 5-7.........New York City, Engineering Societies' Bldg., Winter Meeting Society of Automobile Engineers.

Jan. 8-14........Milwaukee, Wis., Show, Auditorium, Milwaukee Auto. Dealers' Assn.

Jan. 8-18........Kansas City, Mo., Show.

Jan. 9...........San Diego, Cal., Road Race.

Jan. 9-16........**Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.**

Jan. 16..........**Detroit, Mich., Show.**

Jan. 16-23.......**Cleveland, O., Show, Cleveland Automobile Show Co., F. H. Caley, Mgr.**

Jan. 23-30.......**Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.**

Jan. 23-30.......**Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.**

Jan. 25-30.......Fall River, Mass., Show.

Jan. 25-30.......Buffalo, N. Y., Show, Broadway Auditorium, Buffalo Automobile Dealers' Assn.

Jan. 30-Feb. 6....Columbus, O., Show, Memorial Hall, Columbus Auto. Club and Columbus Auto. Trades Assn.

Jan. 30-Feb. 6....**Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.**

Feb.............Portland, Ore., Show, Portland Auto. Trade Assn.

Feb.............Toledo, O., Show, Toledo Auto Show Co.

Feb. 2-7.........Kalamazoo, Mich., Show, Armory.

Feb. 15..........Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids *Herald*, C. S. Merriman.

Feb. 15-20.......**Omaha, Neb., Show, Auditorium, C. G. Powell.**

Feb. 15-20.......Grand Rapids, Mich., Show, Klingman Bldg., Grand Rapids Herald.

Feb. 15-20.......Bridgeport, Conn., Show, State Armory, B. B. Sterber.

Feb. 22..........**San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.**

Feb. 23-27.......**Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.**

Feb. 23-27.......**Syracuse, N. Y., Show, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.**

Feb. 27..........**San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.**

Mar. 6-13........**Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.**

Mar. 9-15........**Des Moines, Ia., Show, C. G. Van Vliet.**

Mar. 14..........**San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.**

April...........**Calumet, Mich., Show, Coliseum.**

May 29..........**Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.**

June 16..........Galesburg, Ill., Two-mile Race-Track Meet.

June 25..........Sioux City, Ia., Track Meet.

July 4...........Tacoma, Wash., Road Race.

Aug. 20-21.......Elgin, Ill., Road Race.

Sept. 20-25.......**San Francisco, Cal., International Engineering Congress.**

The Week in  the Industry

Motor Men in New Roles

FERGUSON Heads Grant-Lees Sales—Richard Ferguson has been placed in charge of the sales of the Grant-Lees Machine Co., Cleveland, O. He remains also as manager of the buying and production departments.

New Apperson Branch Manager—C. E. Wilbar has been appointed manager of the Pittsburgh, Pa., branch of the Apperson Bros. Automobile Co., Kokomo, Ind.

Burke Joins Gray and Davis—W. W. Burke, better known as "Billy Burke," has been appointed New York branch manager of the Gray and Davis Co., of Boston.

LeCain in Business—Jack LeCain has formed a company in Boston, Mass., to handle the Master carbureter and other specialties with headquarters on Massachusetts avenue.

Homan Representing Gould Battery—C. C. Homan, who was general purchasing agent of the Willys-Overland Co., Toledo, O., is now a special sales representative of the Detroit, Mich., department of the Gould Storage Battery Co.

Lurie Joins Colt-Stratton—Robert Lurie, for a number of years connected with the used car business along automobile row in New York City, has been made manager of the used car department of the Colt-Stratton Co., that city, with headquarters at 1770 Broadway.

Neel Heads Philadelphia Corp.—The following officers of the Automobile Sales Corp., Philadelphia, Pa., distributer of the Cadillac, were elected recently to serve for the ensuing year: President, P. L. Neel; vice-president, S. Stankovitch, Jr.; secretary, J. B. Dickson, and treasurer, H. R. Shock.

McLaughlin Sales Manager—E. J. McLaughlin, formerly sales manager of the Saxon Co., in New York territory, has been appointed general sales manager of the Hudson-Bender Motor Car Co., Kane, Pa., distributor of the Hudson in thirteen counties of Pennsylvania and three in New York State.

Studebaker Firestone's N. Y. Manager—C. D. Studebaker has been appointed manager of the New York City branch of the Firestone Tire & Rubber Co., Akron, O., succeeding J. J. Jordan, who goes to Europe to take charge of the Firestone company's European department and develop its foreign business.

Coates Heads Kalamazoo Assn.—At a meeting of the Kalamazoo Automobile Dealers' Assn., Kalamazoo, Mich., G. A. Coates, representative of the Haynes Co., was re-elected president; J. M. Van Loon, representative of the Cadillac Motor Car Co., was elected secretary, and William Harlow, of the Ford company, treasurer.

Huyette Re-elected Quaker Club Pres.—The ninth annual election for officers of the Quaker City Motor Club held in the Hotel Walton, Philadelphia, resulted in the re-election to the presidency of P. B. Huyette. In addition to Mr. Huyette, the following were the other successful candidates: Vice-presidents, G. D. Bartlett and A. H. Wetherill; treasurer, R. L. Murray, and secretary, W. E. Stagg.

Fisher's Standard Truck Appointment—The Standard Motor Truck Co., Detroit, Mich., announces the appointment of F. J. Fisher to the position of secretary-treasurer in place of W. K. Ackerman, who is no longer an official of the company. The other officers of the Standard company are Albert Fisher, president; U. A. Fisher, vice-president, and E. M. Elliott, general sales manager.

New Empire Manager—J. B. Todd, who has been connected with the Empire Rubber Co. for more than 7 years and for several years manager of its New York branch, at 240 West Fifty-fifth street, has severed his connection with the concern to take an important position with Marshall, Wood & Co., of Plattsburg, N. Y., dealer in automobile supplies and hardware. The new manager of the New York branch of the Empire Rubber Co. will be Thomas O'Callaghan, Jr.

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Garage and Dealers' Field

Philadelphia Overland Moves—The Overland Motor Co., Philadelphia, Pa., will shortly move to much larger quarters at 323-325-327 North Broad street and 1339-1347 Wood street.

Remy Service Station Changed—The Remy Electric Co. has changed its service station in Los Angeles, Cal. The station is now conducted by the Hucks Auto Electric Co., 627 West Pico street.

Williams Co. Equipping—The plant of Williams & Co., 58 Parks street, Niagara Falls, Ont., is to be equipped with machinery for the manufacture of carbureters and equipment for general garage and automobile repairs.

Represents Master Carbureter—The Drenco Machine Co., Inc., New York City, has taken on the Master carbureter and will represent it in the metropolitan district, taking in Northern New Jersey, Southern New York counties, Long Island and adjoining Connecticut territory.

Fifty Hours' Service Free—E. M. Holmes, an Indianapolis, Ind., dealer, is giving a coupon book good for 50 hours of service to each person buying a motor car through his agency. The coupons are good any time during the life of the car. Mr. Holmes is agent for the Detroiter and Monarch.

Flanders Moves in Detroit—The F. E. Castle Co., Detroit, Mich., factory representatives of Edmunds & Jones Mfg. Co., the Rands Mfg. Co. and recently appointed representative for the Paris Tire & Rubber Co., Newark, O., and the Sterling Spring Co., has moved into new offices and salesrooms at 872 Woodward avenue.

Diamond Establishes Wholesale Depot—A wholesale depot for the distribution of Diamond tires to dealers located in Washington, Oregon, Idaho, Montana and the Canadian provinces of British Columbia and Alberta has been established in Seattle. Heretofore this field has been supplied from the Diamond branch in San Francisco.

Cleveland's New Accessory Firm—The Fen-Kar Co. has been organized in Cleveland, O., by H. J. Farr, J. A. Fenner, C. W. Fenner and W. F. Martin, respectively president, secretary, treasurer and manager of the company. The firm has salesrooms at 2121 East Fourth street, and does a wholesale and retail automobile accessory business.

Regal Agent's Novel Advertising Scheme—H. P. Lorbach, the Regal agent at Circleville, O., has hit upon a novel advertising scheme which has brought a lot of publicity. He held a guessing contest on the number of beans in a jar, giving to the winner a certain credit on the amount of money required for a new car. One man guessed the exact number of beans in the jar.

McClurg to Make Tires—The McClurg Rubber Co., Coshocton, O., has been incorporated with a capital of $250,000 to manufacture automobile tires and tubes by J. S. McClurg, W. A. Himebaugh, O. D. Tucker, J. M. McClurg and William L. Davis. Plans are being made to take over the plant of the S. & M. Rubber Co. and start operations on a large scale by January 1.

Goodyear Moves to L. I. City—The Goodyear Rubber Tire Co., of New York, has moved its headquarters from Broadway and 67th street, New York City, to its big warehouse and service station in Long Island City. This building occupies a plot of 50 by 268 feet, and is six stories in height. The company sells only at wholesale, but will continue to maintain a stock of tires and a branch service in Manhattan.

Overland's Seattle Branch Adds—The J. W. Leavitt & Co., Seattle, Wash., Pacific coast distributors of Overland automobiles, states that two stories will be added to the corporation's plant in Seattle. The present home of the Leavitt company in Seattle provides 21,000 square feet of floor space, and, with the two additional stories, there will be available a total of 36,000 square feet of room. The improvement will cost upwards of $12,000 and will be completed by spring. The building will be of brick and steel. The two new floors will be devoted to the rebuilding and painting of used cars.

Bartles Oil's New Station—The Bartles independent oil interests have decided to establish a large distributing station at Ashland, Wis., to serve the vast Northwest Wisconsin territory. The Bartles-Dadmun Oil Co., capital stock $25,000, has been organized by C. A. Maguire, of Duluth and John Dadmun, of Milwaukee, and will spend from $10,000 to $15,000 in the erection of permanent offices, tanks, warehouse, etc. Mr. Dadmun will be active manager and move to Ashland. The Bartles associated companies now have stations and offices in Milwaukee, St. Paul, Peoria, Dayton, Waterloo, Ia.; Stillwater, Wilman, Minn.; Grand Forks and Beach, N. D., and Crookston, Minn.

Accessories for the Automobilist

STEWART Warning Signal — The Stewart hand-operated warning signal which is made by the Stewart-Warner Speedometer Corp., Chicago, Ill., has been reduced to $5. This horn, Fig. 1, is of substantial construction, and each gear is furnished with a steel bushing on which the bearings are carried. Lubrication is effected by means of an oil-soaked, felt pad which rubs against the bearings and wheels continuously. This signal has a double bracket so that the horn remains solid no matter how severe the pressure. The bracket is made with a swivel, one part of which fastens to the rail of the car and the other part holding the horn is swiveled on it so that the horn can be adjusted to suit. A high gearing is employed so that one full depression of the plunger produces 192 distinct sound impulses.

C-C Shock Absorber—The Cox Brass Mfg. Co., Albany, N. Y., has bought out a new shock absorber for Fords to be sold at the unusually low price of $8 per set of four and $4.50 per pair.

The construction of the C-C is extremely simple—a slotted spring cage with two belt holes, through which the belts are run, displacing the Ford shackle belts, makes the attachment. Inside the spring cage, a sturdy helical spring of finely tempered steel carries the weight of the car, cushioning, softening and smoothing out irregularities of the road. Inside the big spring—a smaller one—a compensating spring wound in the opposite direction, assists the main spring. A nut at the top enables one to adjust, at will, the C-C shock absorbers to meet the peculiarities of any Ford.

The action of the C-C is such that when the car receives an extremely severe jolt, the rebound is checked by means of a spur so designed that automatically the entire capacity of both springs is brought into action.

The C-C shock absorbers can be attached without removing the wheels. The Cox Company claim that these shock absorbers can be put on by any one in less than an hour.

Johns-Manville Clocks—The H. W. Johns-Manville Company has just announced the addition of two new type clocks, Fig. 3, to their extensive line of automobile accessories, one for flush and one for dash board mounting, both embodying the latest approved ideas in clock construction in an 8-day fully-guaranteed time piece.

These clocks have been designed so that the mounting screws, winding keys and setting knobs are hidden from view and fully protected; therefore easily cleaned and practically proof against tampering.

The movement, which is of the lever escapement type, is enclosed in a dust,

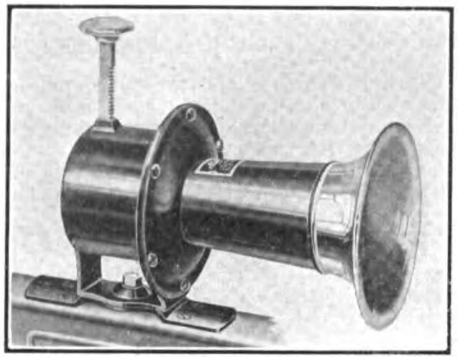

Fig. 1—Stewart warning signal selling for $5

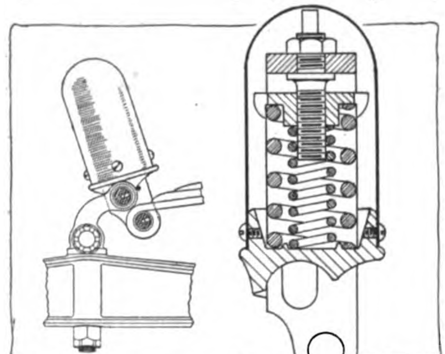

Fig. 2—Cox shock absorbers for Fords at $8 per sent of four

dirt and moisture proof case that is permanently secure to the clock bezel. This unit, in turn, is carried in an outer case and locked by a patented device that makes it possible to remove and replace same by a simple quarter-turn. Both winding key and setting knob are permanently attached to movement.

The purchaser of the J-M Automobile Clock has a choice of several finishes, in black with brass, nickel or gun metal flange, with either black figures on white porcelain or silver dial or with white figures and hand on black dial.

Kellog Turbine Muffler—Unlike the muffler now employed to silence the exhaust, the new Kellog turbine muffler, Fig. 4, not only destroys the explosive noise from the motor but materially helps the discharge of exhaust gases from the motor.

A simple turbine wheel A is mounted in the path of the exhaust. Just forward of this wheel is an opening or bypass which leads to the center of the turbine wheel. The rapid turning of the turbine wheel caused by the exhaust of one explosion produces a powerful suction which helps suck out the exhaust gas of the next. In other words the turbine is a flywheel which tends to make the flow of exhaust gas even, smoothing out the high-pressure waves that occur at the instant when the exhaust valves open. A simple baffle plate B further muffles the exhaust.

The device is manufactured by the Kellog Mfg. Co., Rochester, N. Y.

Graphalloy Self-Lubricating Bushings—Bearings which do not require lubrication are made by the Graphite Metallizing Corp., Yonkers, N. Y. Graphalloy is a product consisting of graphite impregnated with a molten metal and may be used wherever the duty is light. Light duty bearings include fan, timer, magneto and pump bearings. The basic element of graphalloy is pure graphite and the object in adding metal to it is to solidify the product so that it may be machined into bearings or bushings of any desired form and which will have the requisite strength and durability. The standard bearing consists of solid graphite rods impregnated with a babbitt of special composition. This metal has adequate strength and a low coefficient of friction.

Four-in-One Auto Heater—A heater of the same type is made by the Auto Heater Co., of America, 1148 Bedford avenue, Brooklyn, N. Y. It is known as the Four-in-One Heater, and is made supplied with either one or two registers, as desired. With two, one is placed in the panel under the front seat and the other is put in the tonneau floor. The heat is regulated by a valve which is placed in the exhaust line and which diverts more or less of the heat into the heater. Connection between the valve and the heater is through a large diameter flexible piece of tubing and the coils are suitably covered by a metal grating.

Fig. 3—J-M flush automobile clock

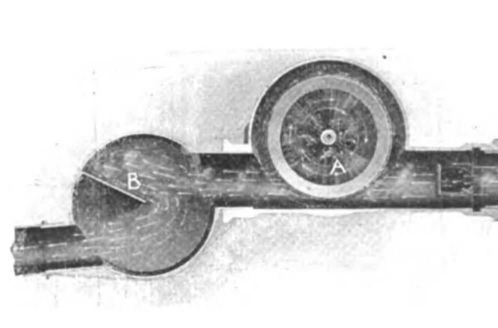

Fig. 4—Kellog turbine muffler

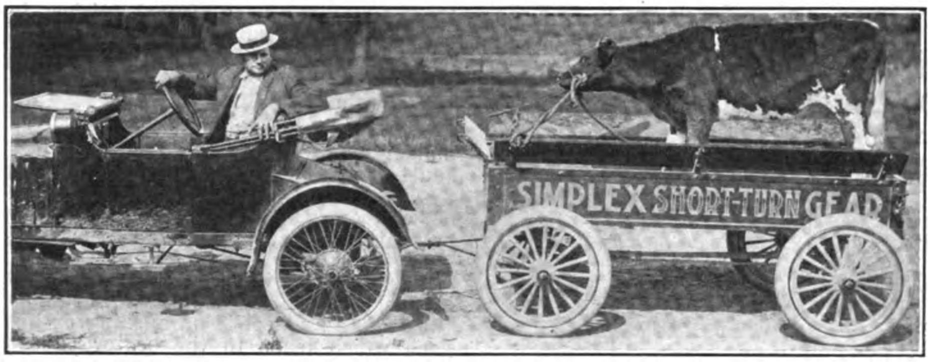

Fig. 5—Simplex trailer. The one illustrated is the 1,000-pound size

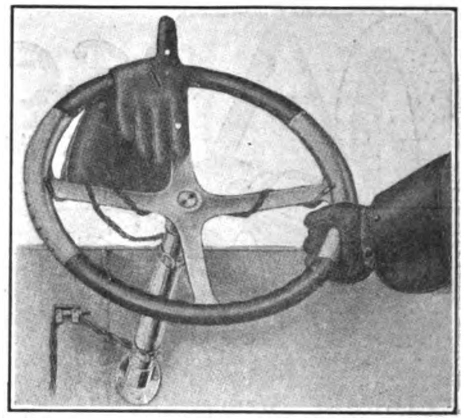

Fig. 6—Carron electrically heated gloves

Dash Board Primer—The type of primer made by the Indiana Accessories Co., Indianapolis, Ind., consists merely of a tank on the dash which connects with the manifold by a small pipe, the flow of fuel being controlled by a small valve at the base of the tank. It is priced at $2.50 finished in nickel.

Simplex Trailer—A four-wheel trailer adapted to light cars and fitted with rubber tires has been brought out by the Simplex Short-Turn Gear Co., Indianapolis, Ind. It is made in tow capacities, 700 and 1,000 pounds.

The smaller one is fitted with solid tires and is designed for speeds of 20 miles per hour while the larger one is equipped with pneumatics and may be hauled at speeds up to 30 miles per hour. One - thousand - mile plain bearing axles are used on the smaller model and ball bearings are employed on the larger.

Carron Electrically Warmed Gloves—Gloves, Fig. 6, which incorporate in the lining a tough but flexible electrical circuit are made by Carron & Co., 75 Beekman street, New York City. This electrical circuit terminates on the surface of each forefinger in a small metal disk and at the thumb in a similar disk. When the hand grasps the wheel these small disks are brought into contact with the thin plates on the upper and under surfaces of the steering wheel which form the terminals of the wires from the storage battery. This circuit is closed by this contact and the current is led through the lining and across the back of the hand and all of the fingers. A 6-volt circuit is required.

Fuel Indicator—A device to tell the fuel consumed on a given trip and also the total amount of fuel used since the installation of the device is shown in Fig. 8. In other words this device bears the same relation to the measurement of the fuel that an odometer bears to the mileage covered. There is an indicating mechanism on the dash on which are two dials, one for trip consumption and the other for season.

With this device and the speedometer it is easily possible to figure the mileage per gallon on any trip or the mileage per gallon for the whole season.

It is stated that the construction of the device is simple, and is based on a principle that has been used with success on water meters. The device is made by the Fuel Meter Co., 937 East 54th street, Chicago, Ill.

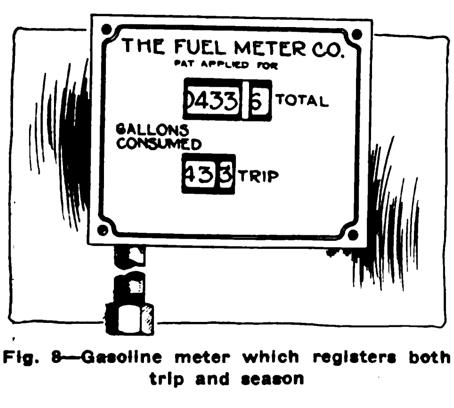

Fig. 8—Gasoline meter which registers both trip and season

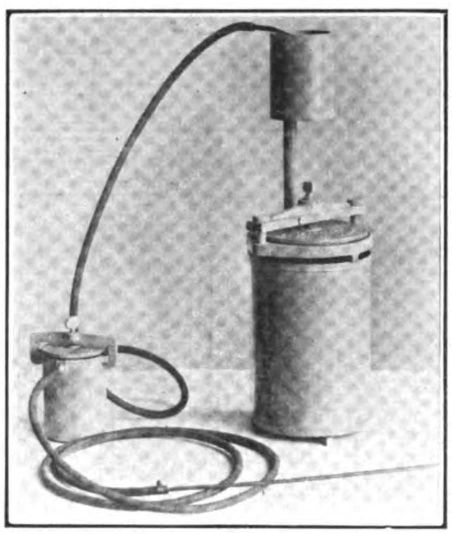

Fig. 7—Progressive carbon remover which generates its own gas

Progressive Carbon Remover—A complete oxygen-carbon removing outfit is manufactured for $7.50 by the Progressive Mfg. Co., Reading, Pa. It not only generates its own gas but forces it through a nozzle into the cylinders of the motor. The complete outfit is shown in Fig. 7. The main parts are a cylinder underneath which is an alcohol lamp. A special compound furnished with the outfit is placed in the cylinder and the alcohol lamp is lit. Then oxygen is generated and the gas passes to a water container where the oxygen is collected and then it is passed through another container where it is purified. From thence it is carried to the cylinders. The operation of burning out the carbon is done in the ordinary way. The cylinder is allowed to fill with oxygen and the carbon is lighted by a match or taper. Oxygen is supplied until the carbon is completely burned. It is wise to remove the spark plugs before the carbon is burned out because the heat may be sufficient to crack the porcelain although it is not enough to injure the motor. Additional compound may be obtained for 75 cents.

Apex Oil Cup—Claiming that bearings which do not revolve cannot be lubricated properly by grease, the J. E. Lonegran Co., 211 Race street, Philadelphia, Pa., has brought out the oil cup shown in Fig. 9. The cup consists of a suitable shell which contains cotton waste for holding the oil. This shell is provided with a cap which has a filling slide so that lubrication may be easily effected. It is stated that one filling every 500 to 1,000 miles is sufficient. The rate of feed is regulated by the amount of waste in the cup. For instance, it is recommended that for spring bolts the cup be half filled. Three finishes, dull brass, finished brass and nickel are offered and the cups are made in .125 and .25-inch sizes. Prices vary from 50 to 80 cents.

Disfice Fibre Specialties—Many vulcanized fibre specialties suitable for motor car construction are made by the Diamond State Fibre Co., Elsmere, Del. Vulcanized fibre high-tension wiring cleats are made for wiring installations and wiring tubes both straight and curved are manufactured for housing wiring. It is stated that this material is oil-proof and can therefore be used for gaskets and washers. It may be used for speedometer gears thus reducing the noise and increasing the life of the parts. It is stated that the sheet fiber may be used in place of leather or sheet metal for fenders or even bodies and that it may be made into mud pans.

Jiffy Primer—The Crary Co., 650 Woodward avenue, Detroit, Mich., is manufacturing a motor primer under the name of Jiffy. It consists of a fuel tank which is mounted on the dash and which connects with the manifold through a small pipe. The flow of fuel is controlled by a small needle valve. It sells for $2.50.

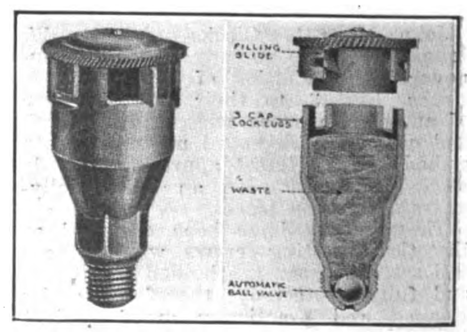

Fig. 9—Apex oil cup filled with cotton waste to hold oil

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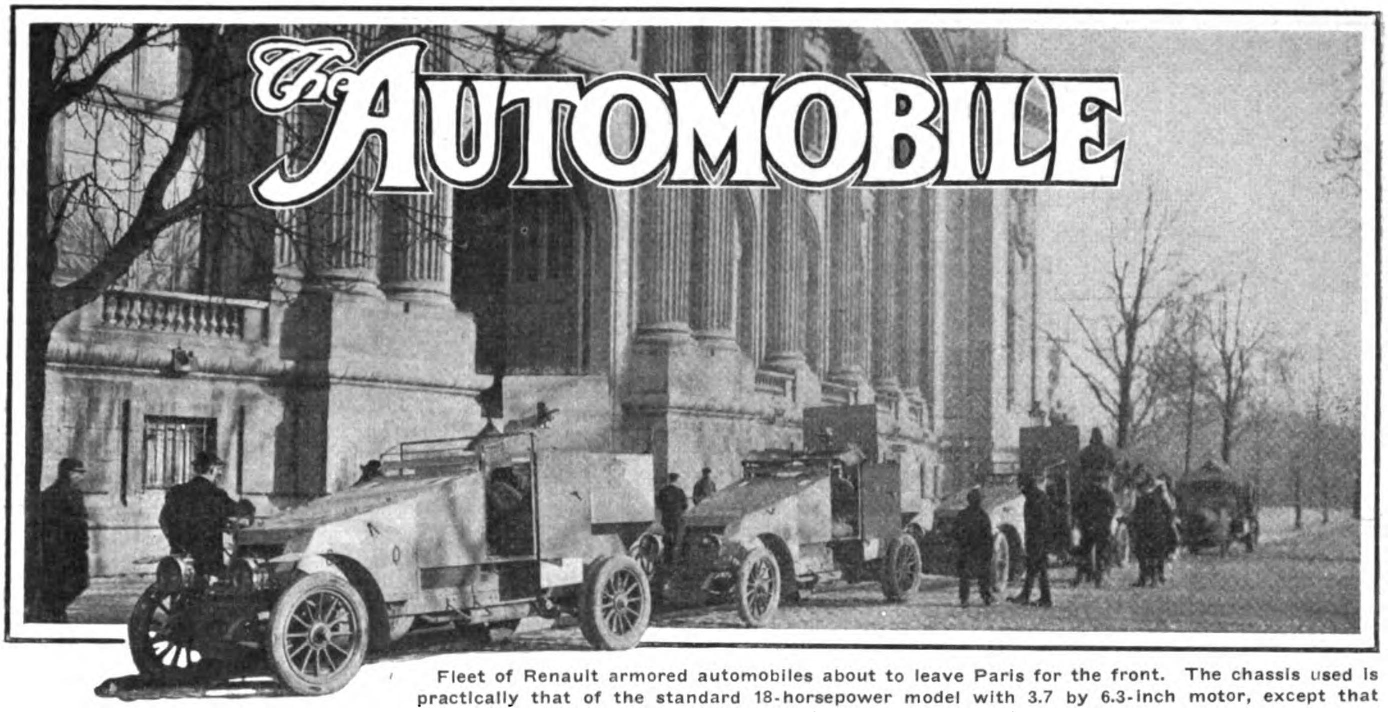


Fleet of Renault armored automobiles about to leave Paris for the front. The chassis used is practically that of the standard 18-horsepower model with 3.7 by 6.3-inch motor, except that the rear axle has been changed to permit the use of twin wheels

France Builds Armored Cars

Traveling Forts Prove Impractical Under Present Conditions —Light Weight Essential—Armored Touring Cars, 2-Ton Truck Chassis and Light Cars with Minimum Plating Do Best Work—Wheels Not Protectcd

By W. F. BRADLEY,
Special Representative of THE AUTOMOBILE *with the Allied Armies in France*

PARIS, Nov. 28—In common with many other French firms, the Renault company has received an important order for armored automobiles. The first series has just been delivered and has been taken over by the French naval brigade operating in Belgium along the coast line. The chassis is the firm's 18-horsepower model having a four-cylinder motor 3.7 by 6.3 inches bore and stroke. It is mounted on detachable wood wheels with pneumatic tires, twin wheels being used at the rear. With the exception of the change necessary in the rear axle to accommodate twin wheels, the chassis is practically standard.

Cars All Protected

Armor plating protects the whole of the car with the exception of the tires and wheels, which are left fully exposed. The method of construction is to place steel ribs at rather wide intervals from frame member to frame member, above the motor and as far to the rear as the steering wheel. Steel plates are attached to this framework by means of bolts and winged nuts. This makes it possible to quickly dismount any plate if it is necessary to examine the mechanism. The housing completely covers both the motor and the radiator, which is behind the power plant, as on all Renault cars.

As will be seen from the illustration the general shape of the Renault bonnet is maintained, but without the angles being rounded off. There is a gap in the forward portion of the housing to allow of air entering, the draft being assured by the flywheel fan. While this general arrangement might appear to be inefficient as regards cooling, it is worth noting that on the latest Renault models, intended to have been produced for the 1915 season, no radiator tubes are exposed, the sides and top of the bonnet being flush with the sides and top of the radiator. The capacity of this latter has

—*Copyright by Underwood & Underwood.*

Armored Autocars accompanying the Canadian troops at the time they were inspected by the King of England during his review of the forces at Bustard Camp, Salisbury Plain

been increased. While the cooling arrangements can hardly be considered ideal, they ought to be found sufficient for winter work.

A steel plate is carried in the extreme front, between the frame members, so as to protect the underpan, which with this system of cooling must be completely airtight so as to prevent the draft passing otherwise than through the radiator tubes. At the rear there is a similar plate, filling up the whole of the space between the frame members, and giving protection to the axle and differential housing.

Body Well Protected

The body is a box-like structure with a quick-firing gun pivoted in the center and having a rectangular shield. With the exception of a tool box under one of the overhanging panels on the left-hand side, the whole of the kit is under cover. The steering column is well raked so as to give the driver as low a position as possible. His protection consists of the scuttle dash, which consists of an inclined plane from the front of the motor to the steering wheel, where it is surmounted by steel louvres with a variable inclination. A complete set of spare tires is placed upright at the back of the driver's seat. No special seating accommodation is provided for the gunners. The crew of each car consists of three men.

Need for Armored Cars

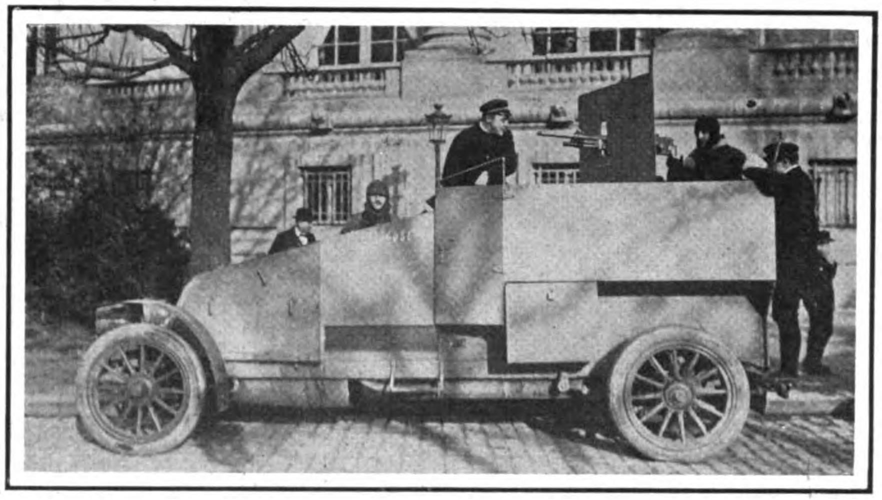
No type of automobile has proved more useful than the armored car. Yet it is this branch of automobile application to warfare which had received least attention before hostilities were declared, and on which the army authorities even now possess the least knowledge. Of all the powers engaged in this war, Germany alone seems to have appreciated the armored automobile; but she was the only power prepared for an offensive war. And even her machine had the disadvantage of having been developed in the drawing office, and not on the road. The other nations in the war adopted armored automobiles after the outbreak of hostilities, and when they had seen what Germany was doing.

French army automobilists at Clermont-en-Argonne, near the German frontier. The tall man on the right is M. Lacoste, director of the Hispano-Suiza company; next to him is Albert Guyot, the Delage racing driver, who recently had a narrow escape on the firing line

All Sorts of Cars Used

Every type of vehicle propelled by an internal combustion motor appears to have been thought suitable for receiving a gun and some armor plating. On the one hand we have the traveling German fortresses, standing 9 or 10 feet high, completely inclosed in steel, and probably weighing 8 or 9 tons, and on the other hand there are ordinary touring cars, taken out of private service and fitted with a quick-firing gun back of the rear seat, without an inch of protective plating. The German traveling fortresses might have been useful if the high road march to Paris had been carried out during the month of August, according to schedule. It is difficult to conceive of them making any progress on the secondary roads which have been cut up by 3 months' war, heavy rains, and some frost. The French touring cars with a gun in the rear might have been useful against savage tribes.

Armored cars generally have suffered by reason of their method of design. The artillery services have ordered or taken possession of a certain type of standard chassis, have put a gun on it and put plating around it without paying sufficient attention to the design as a whole. Weight is the enemy. Obviously it is a difficult matter to maintain a low weight if steel plating of adequate thickness has to be carried round men, gun and mechanical organs to make them proof against rifle bullets and shrapnel.



Renault armored automobile manned by French marines. The first series of these cars has just been delivered and taken over by the French naval brigade operating in Belgium. The chassis used is that of the 18-horsepower Renault model, the only change being the alteration of the rear axle to permit mounting dual tires

Two Types of Armored Cars

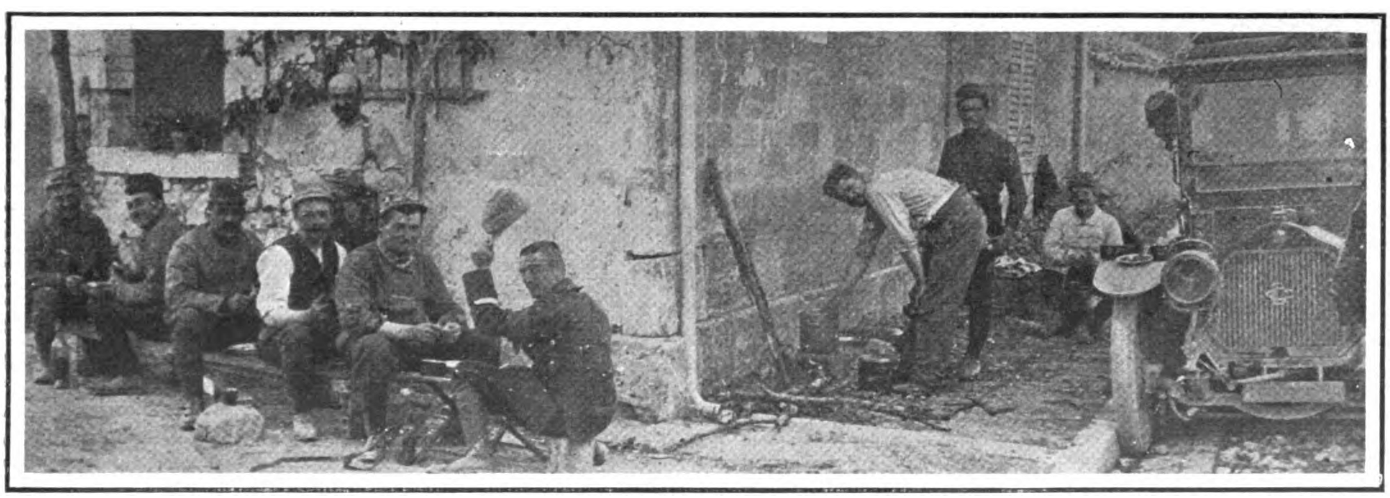
The extreme type, or traveling fortress is not suitable for warfare under the conditions pertaining at the present time. It must have first-class granite or macadam roads, and even in highly-developed Europe these are not always available. Results up to date show that two distinct types of armored automobile should be provided for. The first is a powerful touring car, or even a 2-ton truck chassis, completely incased, but without losing sight of the fact that weight must be kept down. The Belgians have some very good examples of this type of armored car. They have taken their more powerful touring car chassis, with motors approximately 4 by 6 inches bore and stroke and have built a suitable steel body on them. These machines are not intended to do cross-country work, but they will naturally have to operate on dirt roads and should have a reasonable clearance. In order to keep weight at a reasonable figure, the height should be as low as possible. It is quite possible to give all the protection required for the men and gun without exceeding a total height of 60 inches. The steering column is well inclined so as to bring the driver towards the center of the car, and in as low a position as possible. There is no difficulty regarding the seating accommodation, for the interior of the body is a single compartment. A roof is not required; while it is dispensed with on most of the cars now in the field, it is considered to be advantageous to have a partial roof, the center being open for the manipulation of the gun. Many of the Belgian machines have a turret revolving with the gun.

Protecting the Radiator

The motor and radiator must be completely protected. It has been proved that it is possible to do this without interfering with the cooling efficiency. With a correctly designed fan and a slightly larger radiator, enough air can be drawn in to keep the motor cool under the most disadvantageous circumstances. In most cases the bonnet is of such a design that it allows of the easy escape of the hot air under it without allowing shot to enter.

There is no necessity whatever to completely inclose the wheels, indeed to do so makes the car useless except on perfect roads, yet some protection should be provided. Detachable wheels are an absolute necessity. For war purposes wire detachable types have proved their superiority. On the heavier armored machines cast steel wheels are proving satisfactory.

A differential lock is proving to be a valuable



French army drivers preparing their dinner in a village near the firing line. The second man to the left of the water pipe is Albert Guyot, the Delage racing driver who drove in the Indianapolis race last May

Two 20-horsepower Daimler ambulance vans presented by Lord Furness to the Australian forces sent to the battle front in France

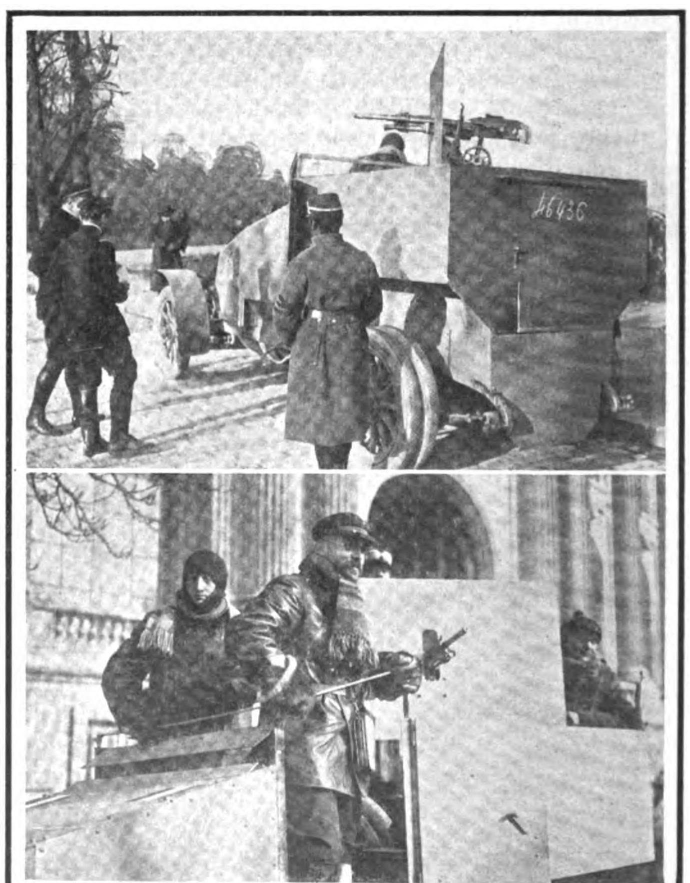
auxiliary. It is an obligatory fitting on certain types of French army tractors. The driver of an armored car soon asks for chains for his driving wheels, although he may never have used them in private service. Among the truck types which are being used as armored cars are the London omnibus chassis and French 2-ton trucks. While they are satisfactory as a whole, the bus chassis are unnecessarily big for carrying a single gun and three or four men. Their bulk is further increased by building the body with an overhang, so that it protects the wheels.

Light Armored Cars

The second type of armored automobile is the light car of the Ford class, with the minimum amount of plating. It is known that the French authorities have had a number of Fords under practical test, and it is quite possible that the order for them will have been placed before this story appears in print. These machines are intended to operate over any kind of road and to do a certain amount of cross-country work. The object of these cars is to extend the scope of the machine guns attached to cavalry and infantry regiments. The men who handle these guns carry them over every kind of country, and if the same work is to be done by an automobile, but of course with greater rapidity, ability to pass everywhere must be the main consideration. There cannot of necessity be much plating; protection of the main organs against rifle fire is the utmost that can be expected. Even this is not absolutely necessary. The machine gun sections make their way without any artificial protection, and the men who handle these cars will not run exceptional risks by doing the same.

Four-Wheel-Drive Suitable

Evidently there has been no time to produce the ideal armored automobile. It may be that plans are in hand, but if so, it will not be known until the completed machine has made its appearance. The four-wheel-drive has already proved its value and should be adapted to armored automobiles. A machine similar to the light four-wheel-drive tractors, of which the French are now making considerable numbers, would be ideal for this work. The present machine, however, is unnecessarily heavy, for it is designed to pull a useful load of about 6 tons. With the same design, however, and much lighter construction, an excellent fighting machine would be obtained. All on it need not weigh more than 3 tons.



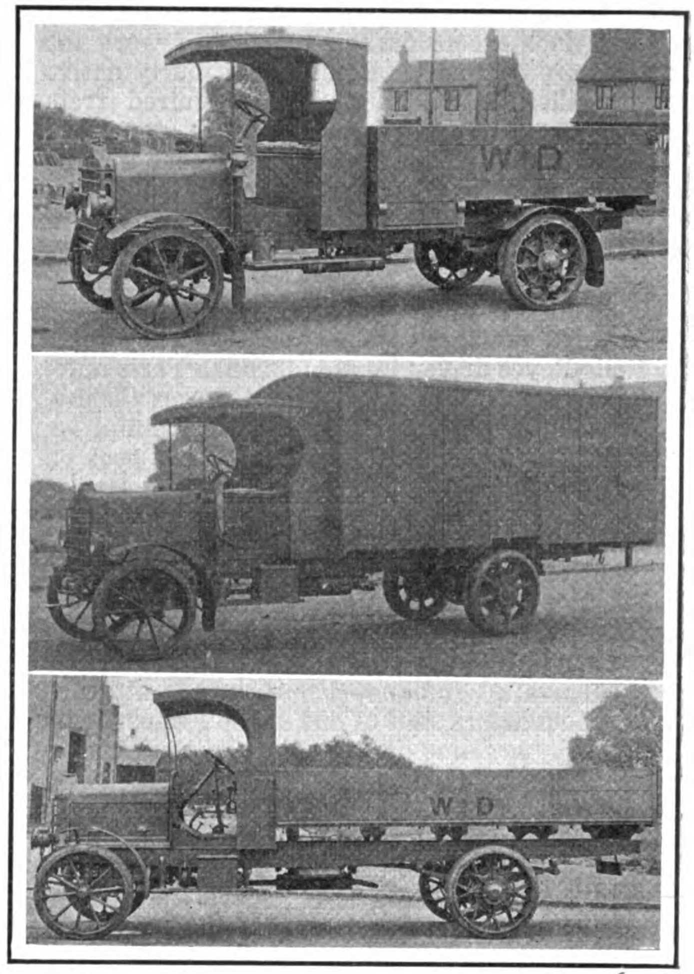
Upper—Another view of one of the new Renault armored cars, showing the mounting of the machine gun behind the armor plate
Lower—French naval officers in one of the armored cars built by the Renault company for service with the naval brigade on the coast of Belgium

Such a machine, driven and steered at both ends, could have a speed of 30 to 34 miles an hour, which is ample for war requirements, and would be capable of traveling over any country on which a horse can draw a load. In addition to driving at both ends, it should have duplicate steering, so that the driver has only to turn from one wheel to another to travel stern first. Instead of the six forward speeds now used on these light tractors, there should be four forward and two reverse speeds. This will enable the machine to travel ahead at a rapid pace and will enable it to get out of difficulties from which it would otherwise be inextricable.

It is somewhat surprising that a vehicle of this type has not been already produced. Events have moved with greater rapidity than designers. The four-wheel vehicle has only just been perfected, but the French, who are responsible for the pioneer work in Europe, have not got any further than its application to heavy loads. The double-steering car, with a low and a high reverse, has also been in use for some time, but only for the purposes of smuggling along the Franco-Belgian frontier.

Cars for Big Guns

There are other applications of the armored automobile to artillery, but they do not come under the category of armored cars. The French, for instance, have some of their heavy guns mounted on special automobile chassis fitted with four solid struts capable of lifting the wheels clear, thus providing a solid platform. Further, many of the 155-millimeter guns are drawn by four-wheel-drive tractors instead of by horses. These, however, are only successful attempts to give greater mobility to artillery than is possible with the use of horses. There is no attempt at armor plating the vehicles. When the tractors have brought the guns into position they are put into a place of shelter in just the same way as horses. They are more easily concealed, however, than animals, and by means of their winches they have the advantage of being able to haul the guns out of a difficult position without actually exposing themselves.



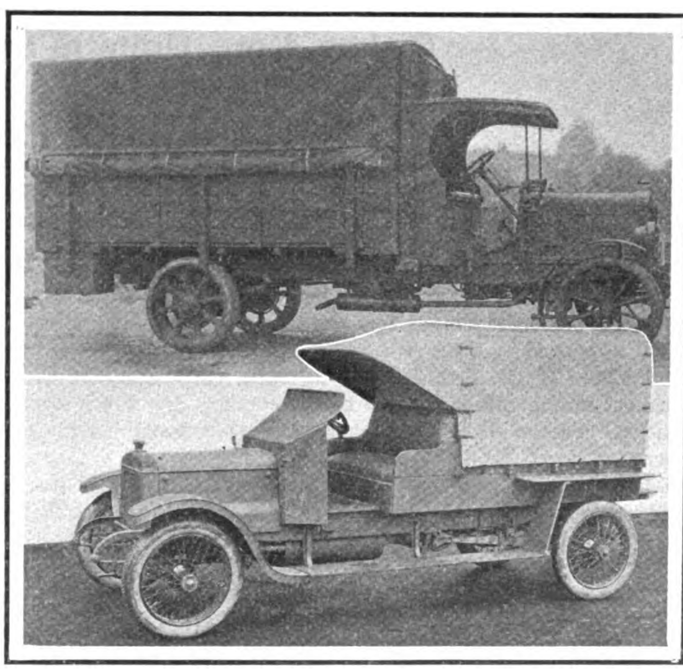
Upper—A Daimler 2-ton truck supplied to the British war department fitted with open box body. Note the simple and solid construction

Middle—A Daimler 3-ton type fitted up as a traveling stores. This vehicle carries a full complement of parts for a 3-ton Daimler

Lower—One of the numerous 4-ton Daimlers now in service with the British army

President of France Rides in German Car

PARIS, Nov. 27—President Poincaré left Paris this morning for his third visit to the troops in the firing line. As on the two previous occasions the French president traveled by automobile; indeed, Poincaré is such an enthusiastic motorist that he would not consent to any other means of locomotion. There is an entire absence of ceremony in these trips. The cortège consists of four automobiles. In the first is the director of the secret detective service and a couple of his assistants. He is followed by the president, riding on this occasion in a 70-horsepower Benz touring car—much to the displeasure of the ardent patriots aware of this fact. The presidential car is driven



Upper—The Daimler traveling workshop ready for the road. This carries a complete outfit for making repairs of all kinds

Lower—A 20-horsepower Daimler equipped with canopy top and shield for the driver. Note the shelf-type rear fenders by M. Romano, a well known French race driver who has done a considerable amount of work for the Gregoire company. Romano is a burly native of Marseilles, in which port he acquired from American sailors such a knowledge of American slang and such a refined American accent that he can easily pass for a citizen of the United States. Two officers of the presidential staff ride with Poincaré.

Non-Stop Runs Sure

The third car carries staff officers. The fourth is a Rolls-Royce driven by M. Journu, a Paris automobile salesman, accompanied by Georges Sizaire. The official function of Sizaire is presidential repairman. He has been selected for this post on account of his complete knowledge of automobiles, which enables him to discover the cause of a stoppage in less time than most men take to think about it. It should be mentioned, however, that Sizaire prides himself on the fact that the cars never have to stop on the road; at the end of each journey he gives them his personal attention and is certain of them making a non-stop run.

Preparations for the presidential visits to the army are kept secret; it is not until they are actually on the road that the drivers are given instructions as to direction. A fast pace is always maintained, the detectives' car running a certain distance ahead to warn sentinels of the approach of the president. These precautions are necessary in order to avoid attentions from hostile aeroplanes.

PARIS, Nov. 28—News has been received from the front of Albert Guyot, one of the leading French race drivers, who will be remembered as a competitor for Delage in the last Indianapolis 500-mile race and the driver of a Sunbeam in the 1913 speed carnival at Indianapolis. Guyot is attached to the headquarters staff of one of the French army corps in the Argonne district, close to the German frontier. He is a member of the motor corps, with the rank of sergeant.

After having been in hospital a few days with a slight attack of dysentery, Guyot recovered and resumed duties. There is a general impression among those who have not been at the front that the men in the motor corps run less danger and display less bravery than those occupying the trenches or fighting in the open. In this connection Guyot mentions that persons holding this view should pay a visit to the firing line. "Only yesterday," he writes, "we lost 500 men in half an hour in what was considered a very successful attack on the enemy's lines. Two men who were with me were killed outright. I can only suppose that it is my luck which brought me through without a scratch.

"We realize that it is going to be a long job, and that it will be months before we get back to racing cars again—if ever we do get back. But we have plenty of determination and plenty of patience, and in the end we shall win all along the line."

Defends Battery-Coil Ignition

Claims More Uniform Spark, Better Acceleration and More Power Are Obtained at Slow Speeds

By H. E. Rice
Atwater Kent Mfg. Works

PHILADELPHIA, PA.—Editor THE AUTOMOBILE:—While it is far from the writer's wish to place the question of magneto vs. battery ignition on a controversial basis, he cannot feel that Dr. Cunningham's letter which appeared in THE AUTOMOBILE issue of December 3 is conclusive. If Dr. Cunningham is right, then many of the foremost automobile engineers in the country are wrong and ignition practice is sliding backward at a most startling rate.

Before making comment in detail upon Dr. Cunningham's statements, it might be well to reflect that every radical change in automobile engineering or other fields generally passes through varying changes of ridicule, skepticism and prejudice, especially when such a change is of considerable commercial or economic significance. It is surely true, however, that if the change or development in question is a beneficial one, it ultimately wins its own battle on merit despite antagonism and negative criticism.

For several years the so-called high-tension magneto was generally used for ignition purposes. There can be no question that it served efficiently within its natural limitations, but about 2 years ago, coincident with the rapid development in electric lighting and starting equipment, the movement toward battery ignition (retrogressive according to Dr. Cunningham) set in and at the present time over 50 per cent. of all cars costing from $500 to $2,500 have retrogressed (?) so far as to adopt it. Some have used it for several seasons and are apparently content to keep right on retrogressing with outputs which have increased yearly.

Let us consider the statements for which Dr. Cunningham is authority. First he questions: "Why the magneto"? Why, indeed!

Why should it be necessary for a car to carry a special little generator or magneto which generates a current for ignition purposes only and in the reverse order to which it is required, when we already have on the car a generator and battery which constitute a dependable source of current, having the best possible characteristics for ignition requirements?

In a well-designed ignition equipment the spark should be uniform throughout the entire speed range of the motor. The spark should be at least as hot and dependable on the first half turn of the starting motor as when the car is running at 40 miles per hour.

Its inability to furnish an adequate spark at very low speeds is of course the chief limitation of the magneto. Its spark heat at 40 to 60 r.p.m., ordinary cranking speeds, is very low, if indeed, it will furnish a spark at all. Even at 100 to 150 r.p.m., the magneto is not likely to furnish a spark sufficient for positive starting unless it is quite new and in the pink of condition.

When it is considered that in cold weather with a cold motor, the speed at which the average starting equipment will spin the motor is considerably less than the minimum speed at which the magneto will generate a dependable spark, one of the biggest reasons for the widespread adoption of battery ignition will be obvious.

Battery Best to Accelerate

In addition to the advantage of easy starting, any car equipped with battery ignition will throttle down and idle at a very much lower speed, with better accelerating qualities.

The only fair basis of comparison between battery and magneto ignition is to consider a magneto of the dual type in which a battery is used for starting and the current generated from the magneto for running.

Most of the manufacturers who have retained the magneto are using this dual type, which is at least as complicated as to circuits and mechanism as any standard battery ignition system. As opposed to the dual magneto system; a simple, standard battery ignition system is more simple, has fewer parts and less wiring, is more effective and is at least as dependable. It is also considerably less expensive in first cost and maintenance.

With reference to battery reliability, the amount of energy required by a properly designed battery ignition system is so small as to be negligible; with the result that if the battery is so far exhausted that the cranking motor will not crank, lights will burn down to a dim red and even the electric horn will refuse to respond, yet there will be sufficient energy to furnish ignition for many hundreds of miles and a normal hot starting spark will be available at the first quarter turn of the crank.

Many of the criticisms occasionally directed against the starting motor and battery are the direct result of undependable ignition at cranking speeds. The starting motor and battery are called upon to deliver a large amount of energy in proportion to their normal capacity for brief periods of time. It therefore makes a big difference in mechanical strain and wasted energy whether the engine starts on the first or second turn or only after 10 to 15 seconds of churning.

Regardless of the question of gas ionization and the relative speed of flame propagation from different kinds of spark, the magneto unquestionably gives a hot spark at normal speeds, and, therefore, ignition efficiency; also at high speeds the magneto produces a much hotter spark than in direct proportion—in fact, if the magneto is built and adjusted to give a sufficiently hot spark at very low speeds, it will be so hot at high speeds as to damage the plugs or contact points in the course of a short time.

Battery Spark Amply Hot

It is the contention of the manufacturers of the one or two standard battery ignition systems which have been widely adopted, that the spark produced by these systems is amply hot to do the work at all speeds, and as a matter of fact, no magneto has been able to show any increase in efficiency from either standpoint of power produced or gasoline consumed than a battery ignition system of the type now being used by many of our foremost car manufacturers.

As a matter of fact, a properly designed modern ignition equipment provided with automatic spark control will show an increase in power, flexibility, acceleration and gasoline economy over any magneto. Many manufacturers will testify to this fact.

Dr. Cunningham is in error relative to the necessity for constant spark lever manipulation required in order to use battery ignition properly. He has overlooked the very successful use of the automatic spark advance feature now coming into widespread use.

The results obtained by some of the car manufacturers using this device led them to discard altogether the use of the spark lever. The automatic spark advance also affords a factor of increased safety by automatically retarding the spark for starting. It contributes to the pleasure and ease of handling the car by leaving the timing of the spark entirely to the automatic feature.

For anything like equal efficiency a magneto equipped car requires not only a spark control lever, but its intelligent handling.

Battery System Simpler

The writer feels that Dr. Cunningham errs in intimating that the reliability and lasting qualities of a properly designed battery ignition device are not equal to those of a magneto. There is less mechanism and far less mechanical energy involved in a properly designed battery system than in a magneto, also the speed of the former is but one-half that of the latter, thus saving somewhat in bearing wear. The battery system may be installed in a far simpler and less expensive manner than the magneto, and if its installation is attended with a tenth of the thought and care usually given to the installation of a magneto, it will last as long as any other part of the motor.

With reference to the canvass made by Dr. Cunningham among chauffeurs driving cars equipped with battery ignition, no comment is necessary other than to express a sincere conviction that the men questioned did not represent a fair average of the sentiment which is, without question, rapidly growing in favor of battery ignition.

If Dr. Cunningham could have extended his inquiry to sales managers, engineers and superintendents of several of the larger car manufacturers who have successfully used battery ignition for the past two or three seasons, together with some 300,000 pleased owners of cars equipped with ignition of this type, he would possibly have led the readers of his communication to a more accurate conclusion.—H. E. Rice, Atwater Kent Mfg. Works.

90 Per Cent. Aluminum in Piston

An aluminum piston made in Belgium has been analyzed for *The Autocar* and shows that an ordinary alloy of this metal can give good results for piston work. The analysis is as follows:

Copper	6.8 per cent.
Zinc	2.44 per cent.
Iron	0.14 per cent.
Silicon	0.22 per cent.
Aluminum	90.40 per cent.

The specific gravity of the sample is 2.87.

93% of Kansas Cars Owned by Farmers

Topeka, Kan., Dec. 11—Checking the list of new automobile licenses shows that 93 per cent. of the cars in this state are bought by farmers. Those who have sold their wheat are buying cars and those who have not sold their wheat are giving chattel mortgages on their crops to buy cars. Thus far in the fiscal year 47,200 automobiles and motor trucks have been licensed in this state. There are several hundred of the commercial vehicles, but the bulk of the registrations are of family touring cars. Automobile licenses are being recorded at the rate of nearly 100 a day, continuing the average struck during September and October.

Measuring Efficiency Correctly

Promptly Detailed Information of What Is Done Each Day Compared to What Has Been Done and What Can Be Done Is Best Method —The Two Great Fallacies in Gauging Results

By H. L. Gantt

¶Editor's Note—The following article is a digest of a paper prepared by H. L. Gantt for presentation before the annual meeting of the American Society of Mechanical Engineers held in the Engineering Societies' Building, New York City, December 1-4.

TO the engineer the word "efficiency" has a definite meaning, which may be expressed approximately as the ratio of the useful result produced to the effort utilized in producing it. To the public in general it means simply doing things better.

It is very unfortunate that the term "efficiency engineer" was ever invented, for every engineer is engaged in the work of promoting efficiency, and it seems presumptuous for any class of engineers to arrogate to themselves a title which implies that they are pre-eminently promoters of efficiency. A more correct appellation would be "management" or "industrial" engineers.

Waiving the subject of name, however, it is certainly a fact that the agitation of the subjects of management and efficiency during the past few years has caused many employers to study their management problems very much more closely than heretofore, with the result that there has undoubtedly been a marked improvement in the efficiency with which industrial operations as a whole are being conducted.

So far so good. But in spite of this increase in efficiency, the greatest of our industrial problems, the relation between the employer and the employee, seems but little nearer solution. While there has been a distinct improvement in isolated cases, these cases are few compared with the total number.

Widening the Gap

It is safe to say then, that the promotion of efficiency is not alone sufficient to serve the needs of a nation that aspires to be a leader in industrialism. As a matter of fact one of the most efficiently run plants I have ever seen promises, unless my theories are all wrong, to widen the gap between employer and employee. The solution lies deeper, and before we can make any real progress toward it, we must revise some of our fundamental conceptions.

The present system of railroad accounting had been developed, and certain ratios accepted as measures of efficiency of operation; notably among them the ratio of operating expense to total income.

Being accustomed to having the managerial efficiency of railroads expressed by a simple ratio, the financier demanded a similar simple measure of the efficiency for an industrial plant. The cost accountant promptly gave him what he called the ratio of "non-productive" to "productive" labor, which he said should be low for good management. By "non-productive" labor he meant salaries of all kinds, and all other labor that could not be charged directly to an order, including miscellaneous labor such as watchmen, sweepers, truckmen, etc. By "productive" labor was meant simply that labor which could be charged directly to an order.

While the ratio of operating expense to total income may be a fair measure of efficiency in a transportation company, the ratio of "non-productive" to "productive" labor is not only not a fair measure of the efficiency of operation in a manufacturing plant, but is often exactly the reverse.

The Two Fallacies

To my mind the widespread use of this ratio as a measure of efficiency, has been more effective in producing inefficiency than any other single factor, except the oft-repeated statement that you must have low wages if you would have low costs. Until these two fallacies are absolutely discredited, we cannot expect a solution of our most serious problems.

Of these two fallacies, the second, namely, that you cannot have high wages and low costs, seems to be yielding gradually to the overwhelming mass of evidence against it. So many cases are now on record where the industrial engineer has increased output, raised wages, and at the same time lowered costs, that only those who are too conservative to investigate are still holding on to the old theory. Better still, many employers have shown the courage of their convictions by adopting a scheme of management for the increase of output and the reduction of costs, which they are perfectly well aware will make a decided increase in wages. With evidence of this kind at hand, it is safe to say that this fallacy will before long be entirely discredited. On the other hand it must be fully understood that something more than a simple increase in wages is necessary to increase output, and if nothing is done but to increase wages we are sure to get higher costs.

The other fallacy, that the ratio of "non-productive" to "productive" labor is a gauge of efficiency, is so firmly rooted, however, that it is hardly to be expected that it will yield in the near future.

In considering this subject I wish to call attention first to the terms "productive" and "non-productive" labor, which seem to me to be misleading. If any expense is "non-productive," namely, does not contribute to the end for which the factory was established, it should be eliminated. The salaries of the officers, foremen, janitors, truckmen, and laborers, as well as the money paid for taxes, insurance, or interest are necessary to the operation of the factory and therefore productive. They are, however, not chargeable usually to any specific order, but must be distributed over all the work done according to some definite rule. I prefer to call all such expenses that have to be distributed "indirect" expenses, and those that are chargeable to specific orders "direct" expenses. The ratio which we have in mind is thus more correctly described as that of "indirect" to "direct" labor. This, however, is a matter of names and does not affect the fact that to base any conclusions as to the efficiency with which factory is run on this ratio is misleading, and to attempt to use it as the gauge in operating a factory may be, and often is, productive of inefficiency rather than efficiency.

This fact can best be made clear by a series of examples. In a factory where this ratio was used as a guide the following incident occurred:

A foreman had ten men on a job, which he said could be done by eight if he could have a boy to supply them with work. He said, however, that if he made the change, the boy's wages would be called "non-productive" labor and his ratio would go up, with the result that he would be criticised, so he did not make it.

In the U. S. Navy an energetic officer studied the loading of ammunition and very much reduced the direct labor employed, but, being unable to reduce the indirect labor in the same proportion, the above ratio went up. He came in for very severe criticism, notwithstanding the fact that his total labor had been decidedly reduced.

I might give numerous examples of this kind, including one where two men took the place of sixteen, and a daily direct wage of $8 took the place of $48, with but little increase of the corresponding indirect expense. The result of this and other changes was that the ratio for that shop became over double its former value, with a marked reduction in the total cost. Needless to say, that the ratio theory in that plan is not regarded wih the same reverence that it once was. In plants where such results have been accomplished, those who have been accustomed to worshipping this ratio, at once demand another idol in place of the one that has been so badly discredited.

The Shattered Idol

Inasmuch, however, as the efficiency of the operation of a factory is made up of the efficiency of a great many independent operations, and is really indicated only by the cost of the various articles produced, there has not yet been found any easy way of indicating the efficiency without first getting the cost of the individual articles. Hence there is no readily available idol that can be substituted for the discredited one. Having been accustomed to an idol, however, both the accountant and the financier demand one, and are loath to give up the idol they have so long worshipped no matter how badly shattered it may be.

Detail Knowledge Essential

In speaking of the cost systems, we must discriminate between cost systems and expense systems. Before we can get correct costs we must have a correct knowledge in detail of all the expenses of a plant, and some idea of how to combine these to get costs.

In discussing this subject, I wish to avoid the controversy as to the proper method of distribution of indirect labor and indirect expense and to confine myself to the problem of how to get a true knowledge of the various items of labor and expense, both direct and indirect. This subject seems to have been given but scant consideration by the average accountant, who has usually assumed this to be easy and devoted his energies to working out elaborate theories as to what should be done with the various items of expense. Inasmuch as I find that the information which the office gets of what the shop has done is, as a rule, not very reliable, I feel that it is far more important to get this information correct than to get up elaborate schemes for using it.

Everybody is agreed that all expense of material or labor that can be readily charged to an order should be so charged, but whether the indirect labor and expense should be charged in proportion to direct labor or machine hours, and how other items of rent, taxes, insurance, etc., should be distributed, are questions which it seems to me should be largely determined in each case on its merits. I have never yet seen any general scheme that seemed to suit all cases.

A Reliable Cost System

We shall therefore confine ourselves to the consideration of what the essential elements of a reliable cost system are, and how to get an exact knowledge of them. These elements are a knowledge each day of

(a) What was done the day before.
(b) Who did it, and
(c) What was paid for it.

It is necessary to check these items daily, for it is impossible to check them accurately after the lapse of any appreciable time.

It is comparatively easy to get a set of returns purporting to give the above information, but the real difficulty comes in knowing whether these returns are correct or not. The only sure way of knowing whether these returns are correct or not is to know beforehand

(a) what should be done the next day
(b) who should do it, and
(c) what should be paid for it.

When we have arrived at a condition under which we can plan our work in advance on these lines, we have the basis of a real system of management, in which we can promptly check what has been done with what should have been done, and know with certainty each day how we stand.

When it is realized that the installation of such a system seldom results in an increase of output of less than 25 per cent., and often as much as 100 per cent., it is easy to see that the additional clerical work cuts but little figure. As a matter of fact *the clerical work needed to operate the best systems of this type is decidedly less than that needed to operate any of the standard cost systems put in by chartered accountants.*

It must be borne in mind, however, that during the process of installing the new system and training the employees to operate under it, the old system must be continued; and not until each function performed by the old has been taken over by the new can we drop the old entirely.

During the process of installation, therefore, we must to a large extent operate two systems. This necessarily runs up the ratio of "non-productive" to "productive" expenses, and the accountant lifts up his hands in horror at the expense the new system is running them into. If at the same time the new system is successful in reducing the "productive" labor, the ratio is still higher, and the "showing" is still worse, even though the total cost is less. I therefore repeat that the first step to be taken before introducing a modern system of management is to eliminate the ratio of "non-productive" to "productive" labor as a measure of efficiency.

The elimination of this ratio as a measure, and the establishment of the fact that total cost is the only reliable guide, will do much to pave the way for an improved system of management.

Its Functions

The first step is to revise our ideas as to the functions of a cost system. In the past the principal function of a cost system, besides indicating a limiting selling price, has been to enable those in financial control to criticise those operating the factory. These criticisms are usually from one to three months late, and are so general in their character as to afford, as a rule, no guide whatever by which the superintendent can be governed. Such a system is too often most highly prized for its worst defect, namely, that it enables those in financial authority to criticise without taking any responsibility whatever for showing how to do better.

If, instead of making the function just described the prime one, we raise to equality with it a function which requires the system to furnish promptly, day by day if necessary, exact information of what has been done and what the expenditure has been, we shall find that its most valuable function becomes, not finding costs, but furnishing the superintendent with information which helps him to reduce costs.

The Cost Accountant

In other words, before we can expect to get any great benefits from the newer managerial ideas, we must readjust our ideas of the functions of the cost accountant, *who must become the servant of the operating executive as well as of the financial executive.*

As long as the cost accountant is simply a critic, he may be called "non-productive," but when he furnishes the superintendent with prompt information which enables him to reduce costs he becomes "productive." Promptly detailed information of what is being done each day, furnished in such manner as to be readily compared with what has been done, and what can be done, is the best method of measuring efficiency.

Gray & Davis Variable-Speed Generator

New Method of Voltage Regulation—Change in Shape of Machines—Instruments Lighter—Refined in Detail—Two Motors and Two Generators in Line—All of 6-Volt Type

TWO starting motors and two lighting generators with many new features will constitute the Gray & Davis line for 1915. The most important change is that found in the lighting generators which are now of the variable speed type. Both generators and motors have been reduced in size, the accessibility improved and detail mechanical and electrical changes made in both systems.

The two types of lighting generators are the T rated to give a current output of 10 amperes at 6.5 volts and 1,000 revolutions per minute and the S which gives 10 amperes at 6.5 volts and 650 revolutions per minute.

The two starting motors are the Y and the H-1, the former being new.

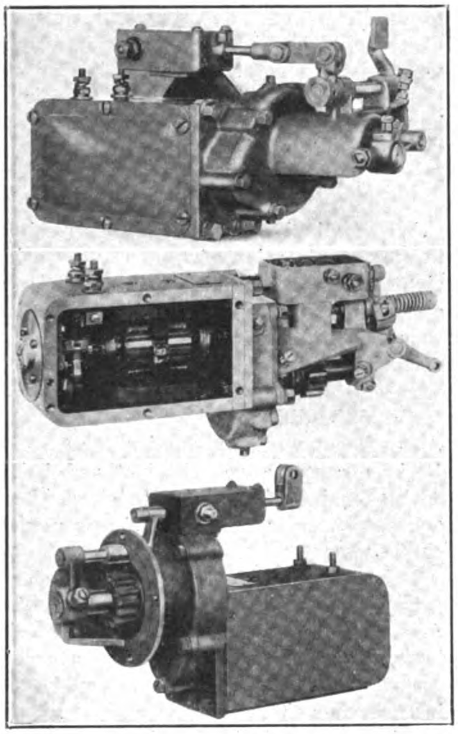
Most important of the changes in the generator is the method of voltage regulation. In the machines of this year voltage regulation was accomplished by maintaining the speed of the armature constant by the use of a centrifugal governor. In the new machine there is a combined regulator and cutout which rests on the top of the generator and which not only maintains the voltage constant regardless of speed variation but also breaks the circuit when the speed of the generator drops so low that the voltage it generates is less than that of the battery.

Rectangular Frame

The new machines have a rectangular or magnet-shaped frame which is constructed of one flat piece of low carbon steel formed into a U shape. This change in frame construction gives greater ruggedness, is more compact, allows more accurate alignment of the bearings and the number of parts is materially reduced. Magnetic leakage is also avoided.

The type T generator gives a 6.5-volt, 10-ampere current at 1,000 revolutions per minute, is intended for four-cylinder cars and is designed to run at approximately two and one-half times crankshaft speed, or in short, to be driven at its rated speed at a car speed of about 10 miles per hour car on high gear.

The type S generator is for six-cylinder machines and is to be driven directly from the magneto shaft, at one and one-half crankshaft speed. This gearing allows the generator to run at its rated speed of 650 revolutions per minute when the car is driven 10 to 12 miles per hour.



Upper—Y motor designed for open flywheel installation. The starting switch is on top. Middle—Y motor for open flywheel installation but with starting box at one side Lower—Y motor enclosed flywheel type

The generators for 1915 are similar in appearance to the type Y starting motor, being of the longitudinal yoke design. This construction has enabled the production of the same current at the same speed as heretofore but with a smaller and lighter machine.

The type T generator complete with regulator cutout weighs 20.5 pounds, a reduction of 6.5 pounds. It measures 4.13 by 5.34 by 8.62 inches, while the G-1 generator which it replaces measures 5.5 by 6 by 11.67 inches.

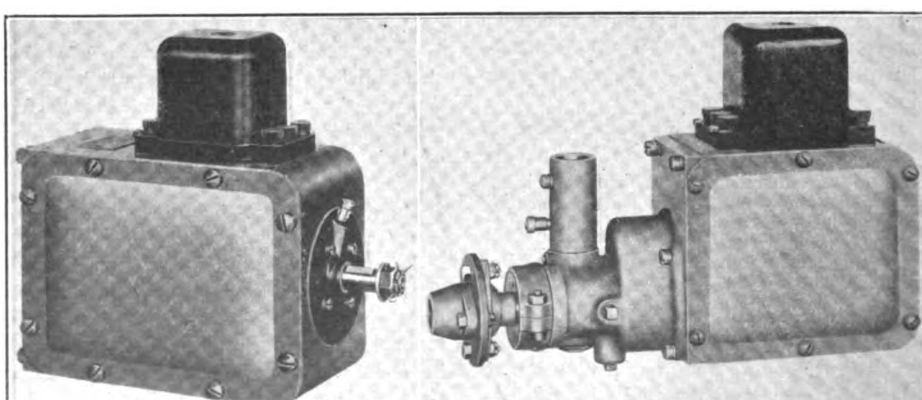
Likewise the new type S generator which takes the place of the type E has been reduced 1.25 pounds in weight and the dimensions reduced from 5.5 by 6 by 12.5, to 4.63 by 5.97 by 10.75 inches.

The type Y starting motor will be standard equipment for all except the largest cars. This motor is a new design and is rated at 6 volts, 100 amperes at 2,800 revolutions per minute. Cars with motors of extreme size will use the type H-1 motor, which was a standard model this year. It carries its full load when operating at 1,500 revolutions per minute, at which time it draws a current of 150 amperes. It operates only on the 6-volt circuit.

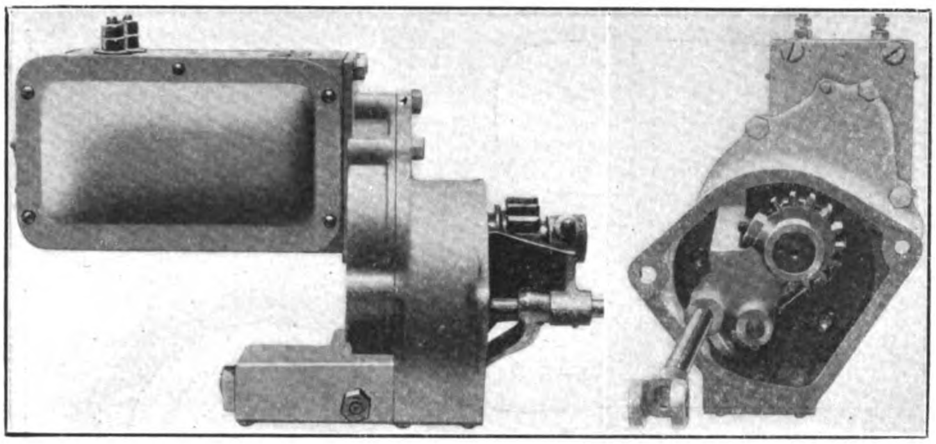
Accessibility Improved

Mechanical improvements in the starting motor have been directly chiefly towards accessibility and ease of inspection of parts and to the refinement of details to give greater strength. For accessibility, the new Y motor has the longitudinal type of field yokes which readily permits access to the interior of the motor by the removal of the cover plate from the side. The entire interior mechanism of the motor can be reached by removing these side cover plates by taking out six screws.

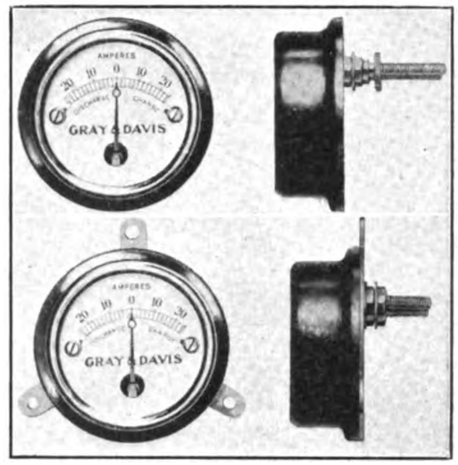
Electrical improvements in the Y motor have given it better torque than the type K motor of this year and it



Left—Model S generator with regulator cutout placed on the top. Right—Same dynamo with geared head and vertical ignition drive



Two views of Y motor enclosed flywheel type with side mounting of the switch. The driving gear construction is shown in the end view



Ammeters of the stud and case supported type

weighs only two-thirds as much, the new motor weighing 19.75 pounds and the old one 31 pounds. While the type K motor was rated to develop normal load at 3,600 revolutions per minute with a current draw of 100 amperes, the type Y develops the same torque with the same current consumption at 2,800 revolutions per minute. The type Y motor is 4.312 by 4.72 by 8.16 inches. These dimensions compare favorably with the K motor which was 5.75 inches in diameter and 8.875 inches long.

For 1915 the flywheel drive will be standard. The speed reducing gears and starting switches are integral with the motor casing and arranged so that a single movement of the starting pedal simultaneously meshes the sliding pinion with the flywheel gear and closes the starting switch.

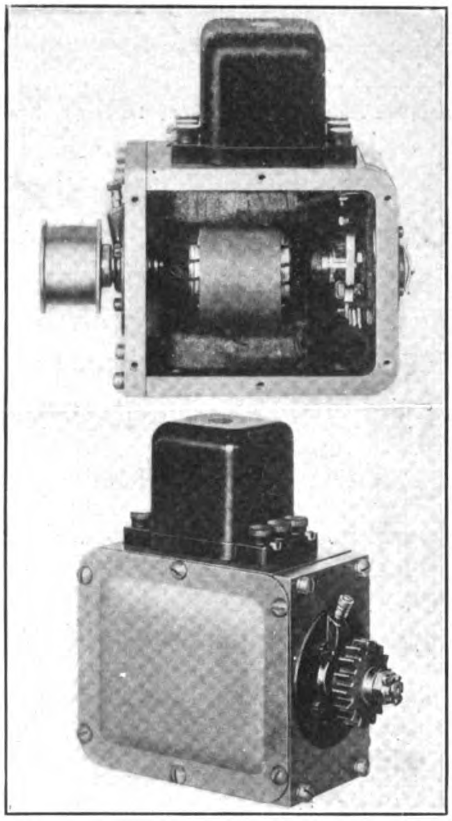
Cranking Speeds

Cranking speeds vary according to the motor but the following table showing the speeds of various sizes of motors will give an idea:

Number of Cylinders	Bore	Stroke	Cranking Speed
4	2.87	4	210
4	3.5	5	132
4	3.75	5	124
4	4.12	4.5	135
6	3.38	5	108
6	3.75	5.5	104

Under normal conditions the draw on the battery varies from 65 to 110 amperes. Under adverse conditions such as a cold motor and a chilled battery the initial kick may be as high as two and one-half times the normal running current but this maximum draft is only for a fraction of a second.

In all Gray & Davis systems the starting and lighting machines are separate units although in the special system recently brought out for Ford cars these two are mounted one above the other in a single case. Only 6-volt systems are built and the single wire is standard construction.



Upper—Type T generator with armature and fields exposed by removing the side cover
Lower—Gear-driven generator. Note oil hole just above gear and general accessible construction

Recent Court Decisions—No Garage in Park

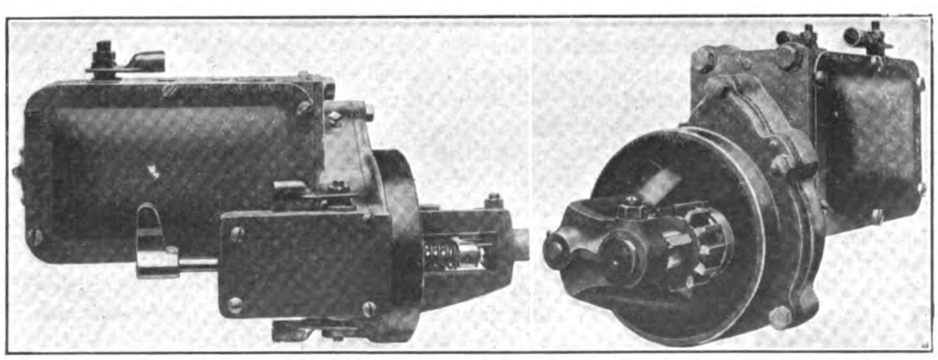
In an interesting case recently decided in Oregon, it was held that the park commissioners of Portland did not have the right to build a garage to house cars which were used by the park commissioners and park employees in a part of the park adjacent to the street.

Landowner Plaintiff

Suit was started by a landowner who owned property across the street from the park to procure an injunction against the commissioners on the claim that they were diverting part of the pleasure grounds for unauthorized purposes. The City of Portland has secured the park's site in the year 1871 and in the year 1909 the ground opposite it had been purchased by the party bringing the suit.

Court Ruling

The Court held that the park commissioners did not have the right to make excavations preparatory to building a garage for the storage of automobiles and motor trucks to be used by members of the park board and other employees, as the park was to be used exclusively for pleasure purposes and accordingly issued an injunction against the board.—*Messinger vs. Mische*, 142 *Pacific* (*Oregon*) 612.



Enclosed flywheel type of Y motor with side mounting of the switch. The driving gear is clearly shown at the right

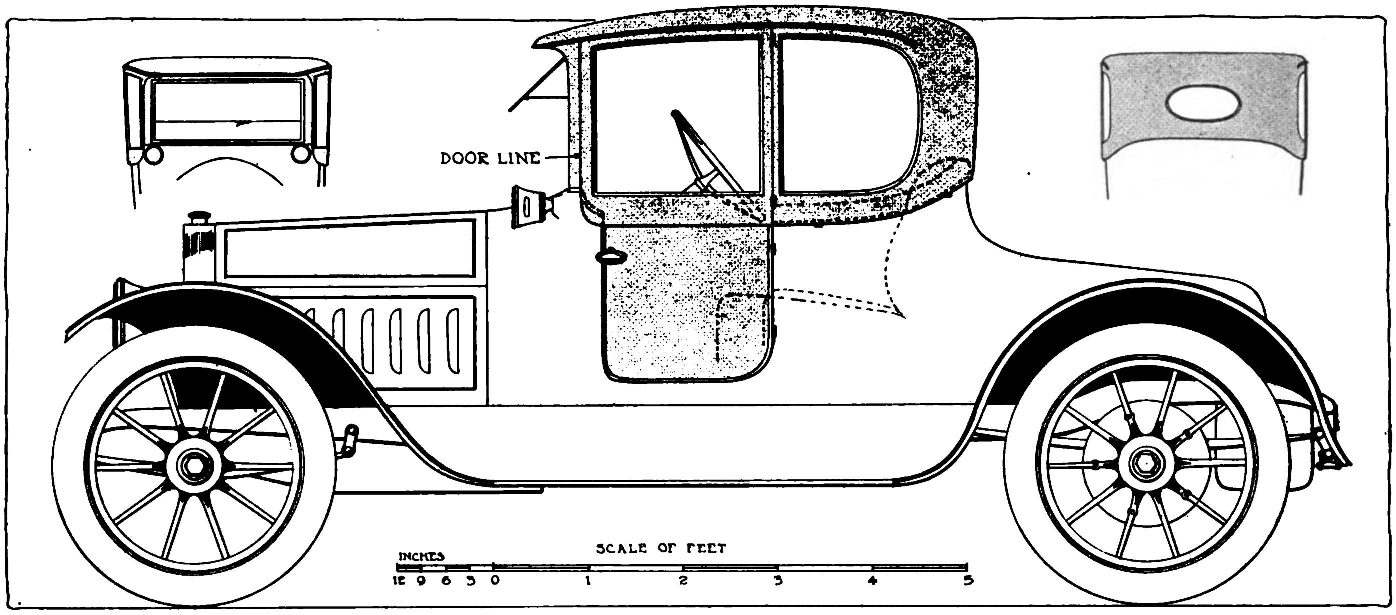


Fig. 1—Special coupé fitted to 1914 Cadillac runabout. This may be removed without leaving any disfiguring marks

Coupé Bodies for Runabout Use

Suggested Designs for Tops Which May Be Applied Directly to Runabout Without Necessitating Material Changes—Ordinary Top Irons Are Utilized

By George J. Mercer

THERE is considerable activity in the body shops converting runabouts and touring cars into closed bodies by the addition of an upper structure that can be easily removed when the warm weather returns. At present nearly all the changes made are by the addition of tops that make the body into a coupé or limousine. The falling type of top, like the landaulet, is not in fashion for this quick change. Some body builders are equipped with parts already made up for certain makes of cars, and are prepared to assemble same and get the car out at short notice. This will make the price to the buyer an interesting figure, because the parts are made in quantities. Nevertheless individual designs will be required to a large extent, and to illustrate this, two makes of popular cars are shown with tops for changing the runabout into a coupé.

Ordinary Top Irons Used

A 1914 Cadillac factory model is shown in Fig. 1; it must be taken into consideration, that, when this top is made that it is founded on the essential that the parts added can be removed when warm weather returns and the original features restored without showing any defacement of the painted surface. Hence in assembling the top on the car, the regular top iron sockets on the body are utilized for attaching the top at the sides and rear corners. The framework of the top is made to fit over and come flush with the under side of the socket, completely covering it, and a stud is let into the framework and fastened with a nut at the bottom. These sockets provide four fastenings and take care of the sides and back. At the front, the sockets for the windshield are used in similar manner to receive studs set into the front posts.

New doors are made, the hinge line on the old doors preventing their use, as it will not line up with the hinges on the upper part. The lock handle must run through to the outside, and as before mentioned it is the intention to leave the door of the runabout without changes so that it can be reassembled.

The upper structure is made to offset outside the body line so as to cover the socket irons, and the miniature front and back views show this offset line continued across the doors. Looking at the side view again, it will be noted that the offset belt line is continued forward and rounded up until it forms the door line at the front post. This will make the upper part of the door wider than the lower part, the reason for this being that the door line is established in the body and the front post is established by the bearing for the windshield. In order to have the door meet the post without having wide framing that will obstruct the vision, the door is made in this manner. The original shape of the cowl is indicated by dotted lines and where the door overlaps the cowl it is free from contact with the painted surface and the trimming inside the door will serve as a windbreak. The lower part of the door will fit into the regular door opening and special hinges are made to allow of their use at the old hinge plates without cutting the pillar.

Regular Windshield Utilized

Doors made in this way will not permit of the glass being lowered, or at most not over 2 inches. The side and rear glasses are also stationary but the front is made with the regular windshield, the upper part a visor and the lower to swing for ventilation.

A rounded top for this design will add to the cost of manufacture. Aluminum panels are used throughout, on the sides, back and roof, the metal being joined as far up on the roof as the width of the sheets will permit. The ends are well fastened with wood screws and then soldered, while the metal is also turned under on the lower edge and into the window openings. The absence of moldings and the extreme rounded effect is decided by the intention to make the upper part conform to the original body lines. The framing is of wood, and this is made as light as possible, not only to save weight but to diminish the offset of the top from the body lines as much as the conditions will permit.

Frameless Glass Windows

The size of the body will govern the size of the top framing, because it fits over and outside the body, the height being determined by proper headroom over the seat cushion. The windows are frameless glass with natural wood garnish inside and the most suitable trimming is a dark cord cloth that will look well with the leather finish of the seat and cushion. This trimming will be finished smooth and will cover the sides, back and roof and one dome light is placed in the center of the top.

Fig. 2 is a design of top fitted to an Overland runabout, the lines are different from Fig. 1, but they are more suitable for the straight lines of this body. It is fastened in the same manner as the previous design and the front framework rests on the bearing previously occupied by the windshield. In this design a bent corner glass is used to piece out the space between the door and the front post and this bent glass corner is equally applicable to the design in Fig. 1.

The construction of this top is less expensive than Fig. 1. The top is covered with canvas over wood bows, the cloth ends being fastened under the drip moulding that runs all round the top. The back and rear side panels are one piece of aluminum which is fastened at the top under the drip molding and under the molding around the window openings and at the bottom it is turned under and fastened with screws to the bottom edge of the framework, the door panels and the narrow belt panels are also aluminum and the posts of wood. The door window is made to drop about 12 inches, the rest of the windows being stationary except the front windshield; all the windows are frameless glass and the door glass is supported with a lift strap. Wood with natural finish is used inside on the window edges and the same applies for the trimming and the dome light as for the design in Fig. 1. The miniature end views complete the illustrations sufficiently to convey the appearance of the design from the several veiwpoints, and the same rules for proportions apply as before mentioned. The accompanying scale in feet and inches will permit any desired measurement being obtained on the larger illustrations and the miniature views are made just one half the size of the large drawings.

The cost of a top like either of these designs will be governed by the workmanship, material used and the reputation of the maker. Such tops are often made at a middle figure of $200.

Hints for Closed Car Trimmings

On the doors there should be large pockets covered with a flap and the tufted trimming line can be carried across the door above the pocket. At the bottom of the door the carpet will run up to the pocket and will match the material in shade and the silk curtains on the doors, rear side windows and the back will also harmonize. If possible, the door curtain should not be fastened to the door itself but on the toprail above the door, thus avoiding possible staining of the curtains by the rain when the door is opened.

The doors should have inside handles and sensible hinges and locks. There is a toilet case on each side of the car just back of the door and additional appointments may be added to suit the tastes of the customer, but there is not space to place much more than here specified.

The trimming designs of closed bodies at present aim to give as soft a cushion and back as possible. Fewer buttons are used and the small biscuit and the pipe-and-point are seldom found on the new cars. The superseded designs no doubt kept the trimming in good order much longer, but the present effort is to secure the same soft effect in a new job as was formerly found only in a body that had seen service.

Harmonious Color Schemes

Color designs seem to be definitely settled to the rich sober hues that are modest and show refined taste. It is a rare thing now to see a closed body painted other than the conventional dark colors. This tends to make the cars look alike and it allows a design of real worth to stand on its merit. A conspicuous color will often attract the attention of the customer and bias the judgment, but where a sober, harmonious color scheme prevails on the several body styles, a customer's attention is not diverted from those essential features that they have predetermined are necessary.

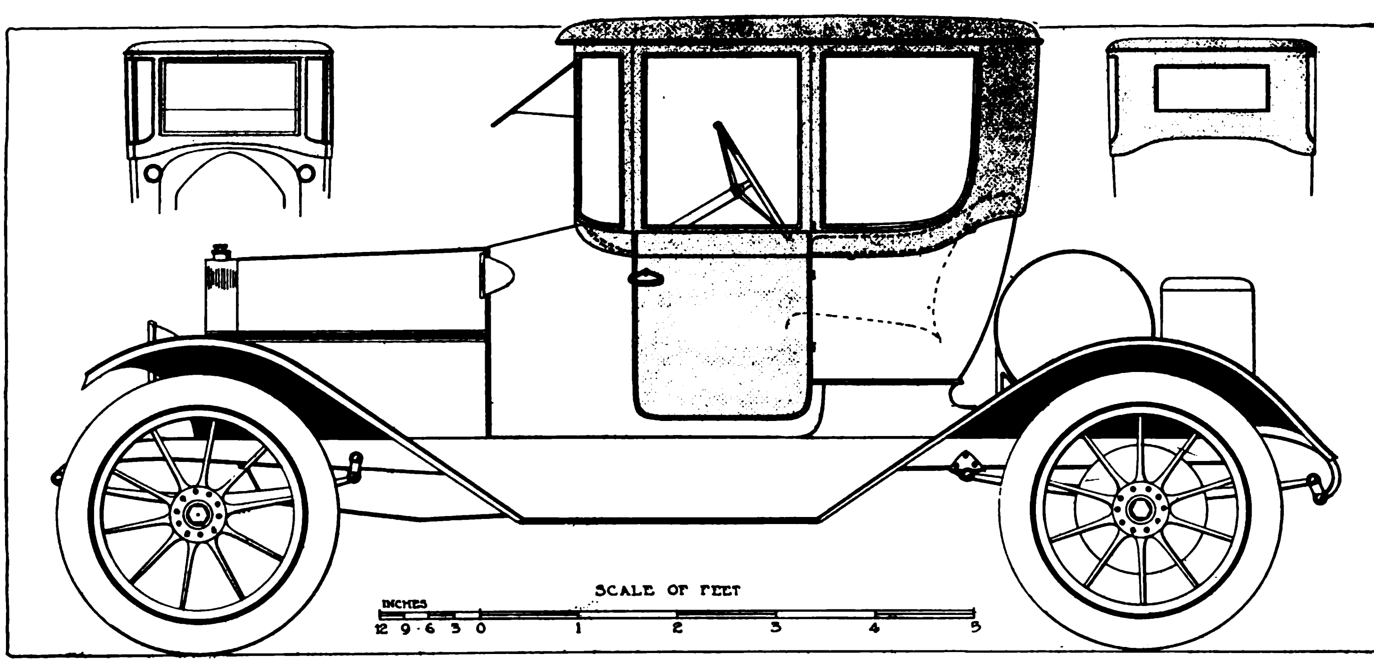
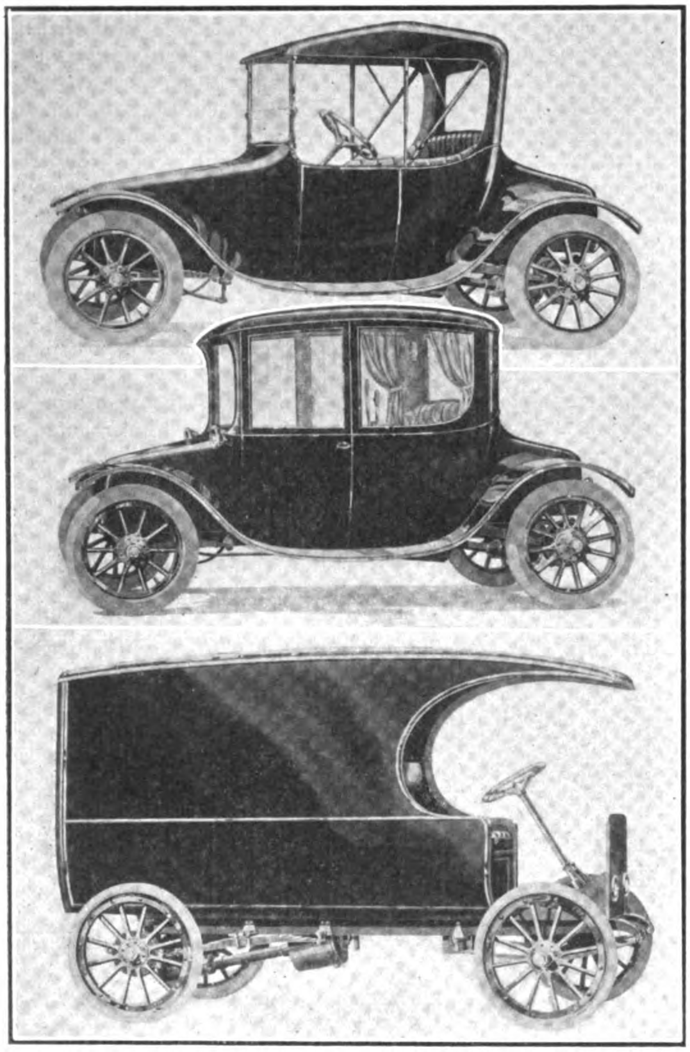


Fig. 2—Overland runabout body with special coupé top mounted. Note different design from Fig. 1 to conform with body lines

Milburn Electrics in Three Models

Line Consists of Coupé, Roadster and Delivery Wagon —Light But Strong Construction a Feature—Worm Gear Drive—Mileage Obtained 50 to 75 Per Charge



Upper—Milburn electric roadster which, fitted with seventeen-plate twenty-cell batteries and capable of about 70 miles per charge, sells for $1,285

Middle—Coupé type, which has twenty-cell, fifteen-plate batteries and travels 60 to 70 miles on a charge. It lists at $1,485

Lower—750-pound delivery wagon, the chassis of which is priced at $985. Bodies of all types are $100 and upward

THE Milburn Wagon Co., Toledo, O., long established in the vehicle-making business and a large producer of bodies for the automobile trade in general, has placed upon the market the electric vehicle with which it has been experimenting for the past 2 years. The car appears in three models—a coupé at $1,485, a roadster at $1,285 and a delivery wagon at $985. Not only does the concern bring the electric down into the comparatively low-priced field, but the construction is lighter than that generally applied to the design of electrics.

All three models have practically the same specifications, although the wheelbase of the delivery is 90 inches, whereas that of the passenger types is 100 inches. Motors and controllers are of General Electric make and batteries of Philadelphia, twenty-cell type. Cantilever springs suspend the passenger chassis, while the delivery uses semi-elliptics in front with cantilever rears. There are four forward speeds provided, and tires on the roadster and coupé are 30 by 3 1-2 pneumatics. The roadster has the greatest mileage per charge, it being capable of 60 to 75 miles, it is said. The coupé will run as far as 70, and the delivery as much as 50 miles on a charge. Worm gear axle drive is employed.

The coupé body is very graceful, with long stream lines, and although it is somewhat smaller than the conventional heavier one found on most electrics, it provides ample accommodations for four persons. Large doors, 28 inches wide, and sashless glass windows add to the attractive exterior, which is painted a dark blue. The interior is commendably well appointed, containing the complete equipment found in inclosed bodies of the highest type. The upholstery is of French fabric specially made for the car. Mechanical window lifters are fitted to both doors and to front and rear windows.

Low Center of Gravity

The body is hung low on the cantilever springs. This low center of gravity provides a factor of safety against the possibility of upsetting or skidding. The manufacturer states that preliminary tests have shown the reduced weight of the Milburn makes it very easy to control in crowded traffic.

The coupé weighs approximately a ton, and with its battery of twenty cells, it attains a normal speed of 17 miles per hour and a maximum of 20. It has a mileage ranging from 60 to 75 on a charge, the rated amount of which is 180 ampere-hours.

The motor is of high speed special design, and the controller is a continuous-torque, non-arcing, drum type which gives four forward speeds and two reverse. Both speed control and steering are by horizontal levers.

The front axle is fitted with Bower roller bearings, while the rear axle, which is of three-quarter floating type, employs Hyatt heavy-duty roller bearings. Its shafts are of chrome-vanadium steel. The drive is direct worm type with no universal joints, and is carried on Hess Bright ball bearings.

The full cantilever spring units are of chrome-vanadium steel, self-lubricating. Twelve-inch, Thermoid-lined brakes are on each rear hub, and the construction is such that none of the braking strains is taken through the worm drive of the motor.

Alarm Prevents Power Waste

A feature which is calculated to eliminate unnecessary waste of power is an automatic alarm which rings if the brakes happen to be applied while the power is on.

The roadster has the same specifications as the coupé, only it is about 100 pounds lighter. This less weight together with its 25 ampere-hours more battery capacity due to the cells being of seventeen plates instead of fifteen as in the coupé, give the roadster a mileage of approximately 70 under normal driving conditions. The normal speed is 19 miles an hour with a maximum of 24.

Instead of having lever steering, the roadster is fitted with a 16-inch steering wheel connecting with a worm-and-nut type of steering gear. Distinctive appearance is given it by the use of a rain-vision windshield and a special one-support top.

Delivery Car Capacity 750 Pounds

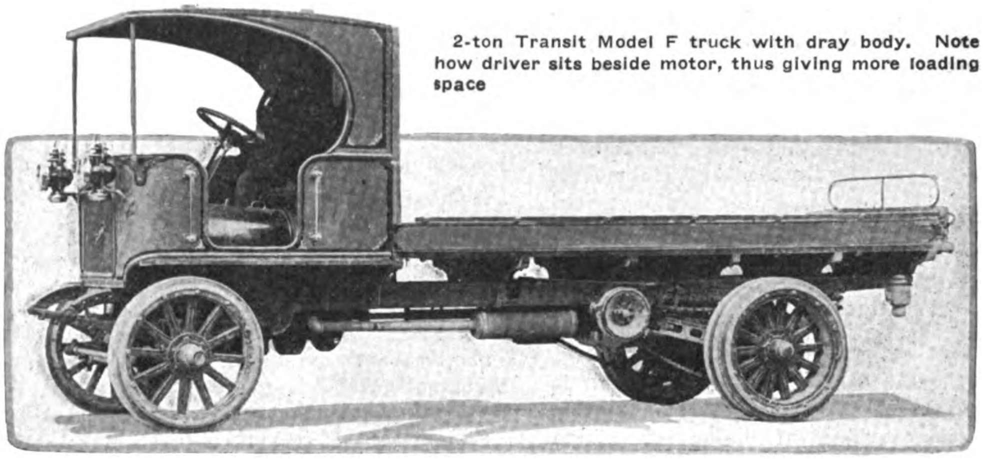
The delivery machine, with a 90-inch wheelbase, has a carrying capacity of 750 pounds in addition to the operator and one passenger. The price of $985 covers the chassis only, due to the wide variety of body types required for various conditions of service. Bodies of all forms are furnished at prices ranging from $100 upward, the styles being determined by the use for which the vehicles are intended.

This commercial car has a battery capacity of 180 ampere-hours also, and a normal speed of 14 miles an hour with a limit of 17. It will run from 40 to 50 miles on a fully charged battery.

The equipment of all the models is complete, consisting of two 6-inch front lamps, tail lamp, two inside corner lamps in the coupé, bell voltmeter, speedometer, 8-day clock, tire pump, hydrometer, jack, tools, and so on. Although the 30 by 3 1-2 tires included in the standard equipment are Goodyear special electric pneumatics, Motz cushion tires may be had optionally at an extra charge, these being of 32 by 3 1-2-inch size. The delivery car is equipped with 32 by 3-inch solids, made specially for electrics.

Four Chassis for Transit Trucks

Models Vary from 1 to 5-Ton Types—Two-Thirds of Payload Is Carried on Rear Wheels



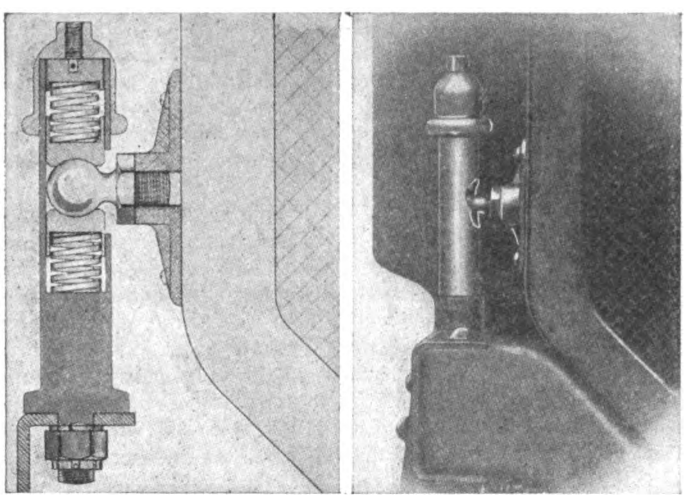
2-ton Transit Model F truck with dray body. Note how driver sits beside motor, thus giving more loading space

THE Transit Motor Truck Co., of Louisville, Ky., which is entering upon its fourth year of active manufacture, offers Transit trucks for 1915 in four models, of the following capacities:

Model E, 1-ton, $2,000; Model F, 2-ton, $2,850; Model T, 3.5-ton, $3,500; Model V, 5-ton, $4,500. The prices are for the chassis only, and bodies of any style desired are furnished at additional prices depending upon style and size.

Driver's Cab a Feature

A new feature of the Transit truck is the design of the driver's cab which not only renders the motor more accessible but affords greater loading space and better load distribution than is found with trucks having a hood over the motor and the driver's seat placed back of the motor. In this design the driver's cab is built the width of the body and arranged so that the driver sits on one side of the motor while the helper sits on the other, the motor being covered by a sheet metal hood between the seats. By this construction a loading space of 3 to 4 feet is gained which means that for a given length of loading space the wheelbase may be made proportionately shorter and the amount of overhang of the body back of the rear axle is reduced. The proportion of all Transit trucks is such that two-thirds of the payload is carried on the rear wheels.



Left—Detail of radiator mounting used on Transit trucks. Right—External view. This ball-and-socket spring suspension provides a universal action protecting the radiator from torsional strains

All models are built on the same general design and the following equipment and specifications apply to all models alike: The Continental motor equipped with Mea magneto and Rayfield carbureters is used in all models. The clutch is the Hele-Shaw universal type. Timken front and rear axles and jackshaft are used, the latter carrying a selective type gearset with Timken roller bearings throughout and having three speeds forward. All models are chain driven. The frames are of pressed steel of the fish-belly type.

Three-Point Suspension

The motor is mounted on a sub-frame having three-point suspension and the drive from the motor to the jackshaft is through a straight shaft fitted with two universal joints.

The Ross steering gear is mounted on the right side as are also the control levers. Semi-elliptic springs are used all around and in addition to these a coil bumper spring is used with the front and a cross supplementary spring in combination with the rear springs, this cross spring coming into action only when the truck is loaded.

The 1-ton is offered with a wheelbase of 120 inches to 144 inches; 2-ton, 132 inches to 144 inches; 3.5-ton, 144 inches; 5-ton, 144 inches to 156 inches.

Business Gain in Western Canada

Trade Is in Best Condition for 3 Years, Despite European War—Farmers Buying Cars—Agencies in Demand—Sales Plentiful—Truck Field Developing

By A. C. Emmett

WINNIPEG, MAN., Dec. 10—In spite of the European war, the automobile trade in western Canada is in a better condition at the present time than it has been for the past 3 years.

A general review of the trade reveals the fact that the dealers are all doing a good business and in some cases such as the Ford, Studebaker, Hupmobile, Overland and cars of the medium-priced class their sales records show that business for the month of November was from 35 to 50 per cent. in advance of the record for the same period in 1913.

Horses to War

A great deal of this improvement is due to the heavy buying by farmers, who, in the provinces of Saskatchewan and Manitoba, have exhibited a tendency to replace their teams with a light car and sell their horses to the British war department for remount purposes. The trade in the cities is, however, still of a good class and quite a number of high grade cars have been sold in the cities of Winnipeg, Brandon, Regina and Edmonton.

Traveling representatives of the firms who act as factory distributors for American manufacturers, send in optimistic reports from every part of the three provinces and accompany the reports with signed contracts covering 1915 business and orders for the immediate shipments of demonstrating cars.

The phenomenal fall weather, which has been enjoyed throughout October and November, has had the effect of keeping cars in use for a much longer period than is generally the case and it has been interesting to note the number of country buyers who have come into the city and taken delivery of their new cars and started for home by road. One day in particular, November 18, no fewer than seventeen new owners started from various hotels in this city driving new cars to points widely apart in the province of Manitoba.

Good for 1915

Manufacturers' representatives who have visited Winnipeg with a view to looking over the territory for agency purposes have been surprised at the demand which they have found existing and have advised their factories to send forward shipments promptly and take care of the needs of agents in the future as in their opinion Western Canada will be a good market for cars throughout the whole of 1915.

Developing Truck Business

Another phase of the situation which is receiving the serious attention of the trade are the possibilities that exist for the opening up of good business in the motor truck field with trucks of 1 and 2 ton capacity for use by farmers. An educative campaign in this respect was discussed at the last meeting of the Winnipeg Motor Trades Association and a committee was appointed to go thoroughly into the matter and report for the benefit of members at the next general meeting.

That dealers are making no sales that are not founded on the best business policy under existing war conditions is proved by the fact that no second-hand cars are taken in part payment of a new car until such time as a buyer is found for the second-hand car at a price mutually agreed upon between the dealer and the purchaser of the new car. This arrangement has led to a little extra effort on the part of the dealer to locate buyers and secure business in a new car and territory which was considered unpromising for the sale of new cars at the present time has been found a good market for the second-hand car and over 100 of these cars have been sold.

Farmers Buy

As THE AUTOMOBILE representative I have traveled a great deal in Manitoba and on every hand has been found evidence of the desire to purchase a car either for the sake of its utility in the life of the farm or simply for the added opportunities it provides for social intercourse. This desire coupled with the fact that farmers were able to sell quite a number of horses to the British government has been responsible for the sale of a number of cars sooner than otherwise would have been the case and the dealers are consequently in a better condition as far as winter trade is concerned than they have ever been before.

At the commencement of the war it was anticipated by the pessimistic brigade that the business of the automobile dealers would come to an absolute standstill and this opinion was shared to a very great extent by a number of influential business men but those who were in actual touch with the motor industry saw the signs of good business and with commendable foresight closed out big contracts with the manufacturers for immediate delivery so that when the combination of good weather and high prices for wheat placed the farmer in a good position and brought him into the market for a car they were ready to give him immediate delivery and close sales which might not have been secured at a later date.

Medium Cars Sell

Ford sales are of course not to be wondered at but take as a basis for demand the sales made by the Winnipeg distributing branch of the Ford company during the month of November are nothing short of phenomenal and would lead one to the conclusion that all the buyers were out to get a car that would be low in cost and cheap to operate. That this was not the case was soon evident by reports from the Overland, Studebaker, McLaughlin-Buick and Hupmobile agents. All these reports were of the most optimistic character and backed up their statements by the addition of the names of those to whom the cars were sold and the names of those who had applied and signed agency contracts for sub agencies during 1915.

As all these contracts are based on the sale of three cars before an agency contract is given it will be readily seen that the outlook for business in western Canada as far as the three provinces of Manitoba, Saskatchewan and Alberta are concerned is extremely good and when the total sales are figured at the end of the 1915 season it will be found that the business has been equal to the best year that the dealers of Western Canada have ever had.

Latest statistics issued by the municipal commissioner for the province of

Manitoba show the total of cars owned in this province as 7,340 at the end of September, 1914, an increase of over 1,200 cars during the past year.

Turning from the car sales to the accessory and tire trade, which form a barometer for conditions in the use of cars already owned, it would seem that there is no falling off in business on this side of the trade as in the case of the tire concerns the reply to a query as to conditions that are likely to obtain during 1915 brings the answer that conditions were never better. Orders on hand are in excess of business at the same time last year and judging by the consignments of tires ordered forward for spring delivery there is none of the owners of cars in the province who will not be making use of them next year.

The accessory dealers are finding business also equal to other years and are sending forward good supplies of material to country garages who are overhauling cars and getting them in shape for next year's work.

"Business as Usual"

Fancy stories of conditions in Canada since the outbreak of the war have been circulated in some irresponsible papers in the United States, such as: "Automobile owners in Winnipeg and Manitoba are using their automobiles with ropes on the wheels in place of tires as the war has made them so hard up they cannot buy tires." One factory representative actually arrived in Winnipeg from the headquarters of a big tire factory with the idea in his head that this was true and was more than surprised to find, "Business as Usual," the slogan of everybody with whom he came in contact. The gospel of hard times cannot be preached very successfully in western Canada just now and if there is anyone suffering from the war there are others who are ready and willing to tide them over the hard spot and keep the family together whilst they help the Motherland to fight her battles by sending forward men and supplies as fast as they are called for.

With this condition of things the automobile manufacturer need not be scared away from the Canadian market but should rather lay his plans to secure a share of the ever increasing business that will come with the development of western Canada when the war ends.

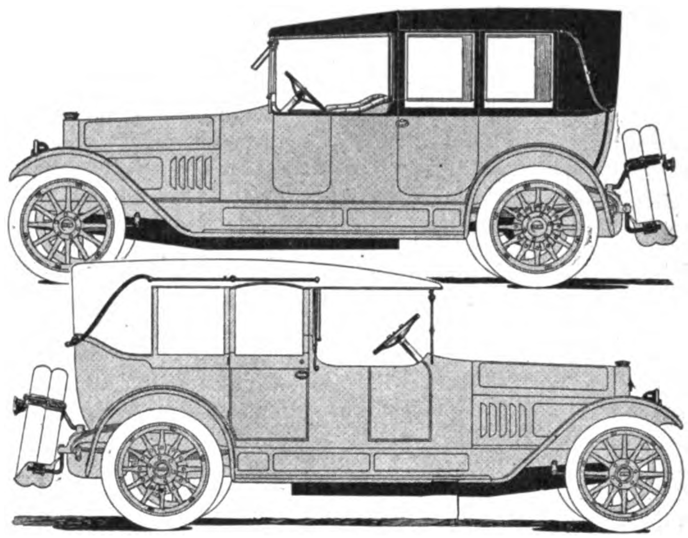
Some New Locomobile Special Bodies

SEVERAL bodies of more than usual elegance are on view at the New York City sales room of the Locomobile Co. of America. This private exhibition held there marks the inauguration of a special department for the planning and ordering of specially designed bodies.

Two of these new models are imported and three are made in this country. A handsome example of the French body worker's art is shown in the coupé built by Henry Binder, Paris, and mounted on a 38 chassis. It sells for $6,600. The other French design is a phaeton-landaulet by Bail Jeune Frères, Paris, and placed on a 48 chassis. This model lists at $7,500. The top and sides fold down so that the car can quickly be converted into an open model.

The American bodies are of Holbrook make, a landaulet-limousine on a 38 chassis selling for $6,150 a coupé-landaulet at the same price and a semi-touring car placed on a 48 chassis and listing at $6,800. The latter equals in utility the phaeton-landaulet mentioned above, as it can be used as a closed or open car as desired.

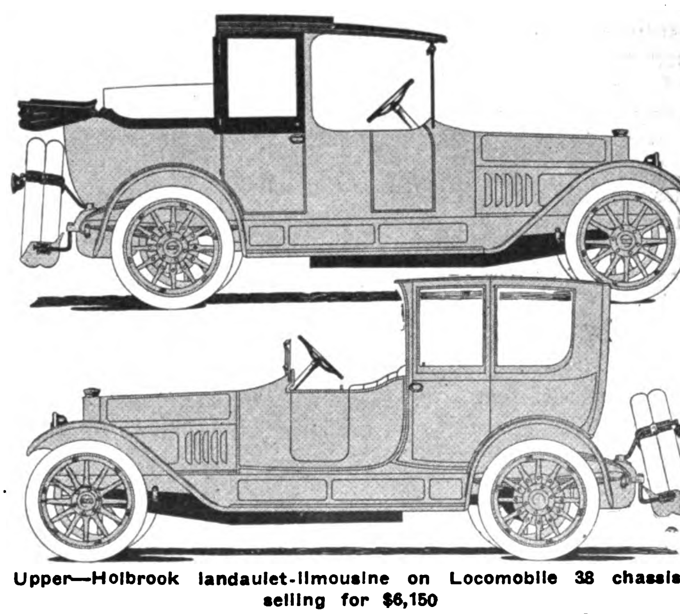
This new department, as announced in THE AUTOMOBILE for October 8, is managed by J. Frank de Causse, who has been connected, as assistant manager, with Kellner & ses Fils, and it is planned to furnish patrons with bodies to their own specifications as regards general design, equipment and finish.



Upper—Phaeton-landaulet by Bail Jeune Frères, Paris, on Locomobile 48 chassis, $7,500
Lower—Holbrook semi-touring car on Locomobile 48 chassis listed at $6,800

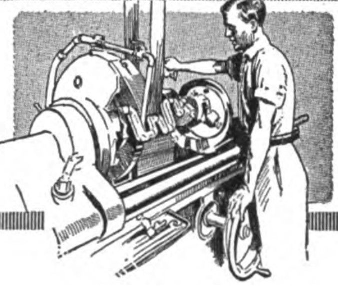
16-Year Contract for Motor Mail Man

SILVER CITY, N. M., Dec. 5—What is said to be the roughest and longest star route in the United States is that which runs from Silver City to Mogollon, 90 miles. The postoffice department has just let the contract for carrying the mail over this route by means of automobiles to C. A. Bennett of Silver City for $10,000 per annum. The contract runs for a period of 16 years. It requires that the first-class mail shall be carried six times a week and fourth-class mail three times a week. Besides using a light motor vehicle, Mr. Bennett will place a motor truck in service to transport the heavier packages, such as come by parcel post. The mountain road runs via Gila, Cliff, Buckhorn and Jackson, each of which towns are also served under the contract. The treacherous nature of the Gila river, which often goes on a big rampage, has caused an aerial tram to be constructed by which means the stream is crossed in a large cable car that runs high in the air. This aerial car is large enough to carry the motor truck, load and all.



Upper—Holbrook landaulet-limousine on Locomobile 38 chassis, selling for $6,150
Lower—Coupé by Henry Binder, Paris, on Locomobile 38 chassis, selling for $6,600

The Rostrum



This department is for the instruction of the readers and all are at liberty to ask questions. Be sure to give full name and address that we may send you a reply by letter if there is no space in the Rostrum. If you wish to sign a fictitious name, also sign your own.

Directions for Adjusting Main and Connecting-Rod Bearings

EDITOR, THE AUTOMOBILE:—I would like to have you explain clearly how to fit babbitt bearings on crankshaft and connecting-rods, either when putting in new ones or when taking up slack in old ones?

Cape Girardeau, Mo. P. J. LOUGHLIN.

—The treatment depends on the condition of the bearings. If only slightly worn, the bearings may be adjusted by removing shims or filing the bearing caps, depending on which method has been adopted. If the bearings are scored or worn out of round, or if new bearings are put in, the surfaces must be scraped.

If the bearing surfaces are in good condition and not worn out of shape, a slight amount of adjustment should be sufficient to make them tight. Generally there are several shims under the bearing cap and by removing these one by one, the looseness will disappear. A typical connecting-rod bearing with shims is shown in Fig. 2. Be careful not to remove too many shims so that the bearing cap will bind when drawn up. Remove only enough of the shims to make the bearing a snug, but not a tight fit. When shims are not used, the lost motion may be removed by filing the surface of the bearing cap as shown in Fig. 1. In case too much material is removed a copper or paper shim or shims should be inserted to make the cap fit. Care should be exercised in filing to preserve the flat surface of the bearing cap. This requires that the file not only be held flat against the surface but also that the movement of the file be carefully executed.

If the bearing is scored, worn out of round or if the bearing is new, it will need scraping. If possible this work should be done by an experienced man. Scraping of the connecting-rod bearings may be done without tearing the motor down but if the main bearings require scraping, the motor must be dis-assembled, the crankcase placed upside down on a suitable support with the crankshaft and flywheel still in place. We will describe the method of scraping the main bearings as this is more difficult than scraping the connecting-rod bearings. The main bearing caps are removed, and the crankshaft bearing surfaces are painted with a solution of Prussian blue. Then the crankshaft is rotated a few times and removed. The high spots of the bearings will be coated with the blue. These spots are carefully removed with a special scraping tool, care being taken not to cut too deep. Then the crankshaft is repainted, replaced in the bearings and rotated. In this way the high spots are once more determined. The crankshaft is removed and these spots cut off. By successive treatments, the few large high spots which there were at the outset have gradually given place to smaller and more evenly distributed ones until finally when the operation is completed these spots will be very small and uniformly distributed over the entire surface showing that the bearing makes contact with the crankshaft surface at practically every point. In a similar manner, the surface of the main bearing caps and the connecting-rod bearings should be put in condition.

Six Gives Smoother Torque

Editor, THE AUTOMOBILE:—1—Kindly tell me whether in general, six-cylinder motors are considered better than four-cylinder and why?

2—Give me a simple rule to compute horsepower.

3—Which is best, cone clutch or multiple disk?

Delmont, Pa. H. N. SMITH.

—1—The advantage of the six is that it has a smoother torque, that is, since it has two more cylinders there are three impulses instead of two, during each revolution. The result is that the six pulls better at very low speeds, and will accelerate more rapidly on hills. It runs smoother, especially at low speeds, because it is in better balance and the reciprocating parts are smaller per cylinder.

2—You may use the S. A. E. formula, in which horsepower $= \dfrac{D^2N}{2.5}$ where D = the bore in inches and N = the number of cylinders. This formula assumes that the piston speed is 1,000 feet per minute and that the mean effective pressure is 90 pounds per square inch.

Since a piston speed of 1,000 feet per minute is a low maximum for modern motors a more accurate result can be obtained from the modified S. A. E. formula in which the horsepower $= \dfrac{D^2NSR}{15{,}000}$, where D = bore in inches, S = stroke in inches, R = revolutions per minute, and N = number of cylinders. In this formula piston speed is taken account of by the stroke and speed in revolutions per minute.

3—Both seem to be equally good. Both may be found on the highest-priced and the cheapest cars.

Information on Welding and Brazing

Editor THE AUTOMOBILE:—I would be very pleased if you would furnish me with some information regarding welding and brazing processes or refer me to the proper

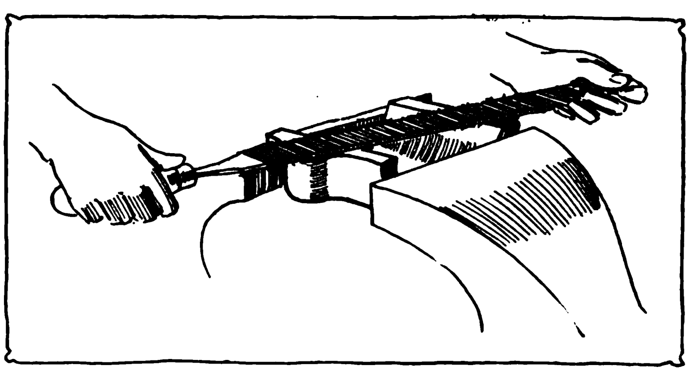


Fig. 1—Method of filing bearing. Care must be taken to put an even pressure on the file so that the same amount of material is removed on both sides

authorities for same. I do not see any advertisements or other information along these lines in your current issue.

Midville, Ga. J. R. NORTH.

Directions for oxy-acetylene welding were given in THE AUTOMOBILE for November 12 on page 885.

Brazing metals, which means that they are joined by a film of brass, requires a red heat and borax is generally used as a flux to protect the metal from oxidation and to dissolve the oxides formed. Heating must be done by means of a blow pipe torch, gas forge, coke or charcoal furnace and cannot be done by means of a soldering iron.

Before work is assembled for brazing it should be carefully cleaned. The parts are then fastened together, generally by pinning but sometimes wire bolts or clamps are used. If possible the pieces should be fastened in such a way that the work may be turned over during the process of brazing without changing the relation of the parts.

—The following are some books on welding and brazing: Hard Soldering, Welding and Brazing, \$1, J. N. Hobart, McGraw-Hill Book Co., 239 West Thirty-ninth street, New York City; Soldering and Brazing, J. N. Hobart, \$1, David L. Williams Co., 231 West Thirty-ninth street, New York City.

How to Solder Aluminum

Editor THE AUTOMOBILE:—Would you kindly give me any information you can on soldering aluminum?

Philadelphia, Pa. JOHN E. JAMES.

—Aluminum is soldered by the use of a blow torch. A solder which may be used without a flux is composed of 75.5 parts of tin, 18 parts of zinc and 2.5 parts of aluminum. The parts should be slightly heated before applying. The solder should be forced in place by means of a stiff metal brush. Another solder which requires a flux however, is made up of 80 per cent. tin and 20 per cent. zinc, stearic acid being used as a flux.

The objection to soldering aluminum is that the joint is not very strong. A solder which is claimed to overcome this difficulty is the German-American which was described in the September 17 issue of THE AUTOMOBILE on page 564.

This description is reprinted in part:

To dispense with the present oxy-acetylene method of repairing fractures in aluminum parts is the object of the German-American Aluminum Co. which has just established a sales office at 25 West Forty-second street, New York City.

The new solder is the invention of Karl R. Peters, a metallurgist of Berlin, Germany, and at the present time it is being manufactured in this city as well as in that country. The inventor claims that no breaks are too complicated to be repaired by the new method and that the work can be done at a saving of at least one-third the cost of the welding job. The strength of the solder, according to Mr. Peters, is about double that of aluminum as regards its resistance to tensile strains and even greater as regards its resistance to bending.

In performing the work on an aluminum casting that has been broken into a number of pieces, the various parts are matched as closely as possible and screwed down on a jig. The fractures are then chiselled in the form of a V-shape slot in the same manner as for a welding job. The solder, which melts at a temperature of 400 degrees Fahrenheit, is then run into the slot and finds its way down into crevises between the two pieces of metal. Upon solidifying the joint is made.

Mr. Peters states that he has had 8 years' successful experience with his solder both in this country and abroad. It is a secret composition, containing eight ingredients, five of which are metals and the other three salts of metals. The German-American company will either do the repair work itself at its factory at Port Jefferson, Long Island, or will sell the solder, together with territorial rights and instructions for its use in garages and repair shops. A guarantee is made that regardless of the work to be performed the aluminum will break before the soldered joint under any ordinary strain.

Motor Speeds at 10 m.p.h.

Editor, THE AUTOMOBILE:—1—How many revolutions per minute will the motors on the following cars turn running at 10 miles per hour: Studebaker, Model S.D.; Buick, C-24; C-25; Maxwell, 25; Overland, 81; Regal, D; Oakland, 37?

2—What is considered the most efficient ratio of stroke to bore?

New York City. M. CASSIDY.

—1—Knowing the gear ratios and the tire diameters of

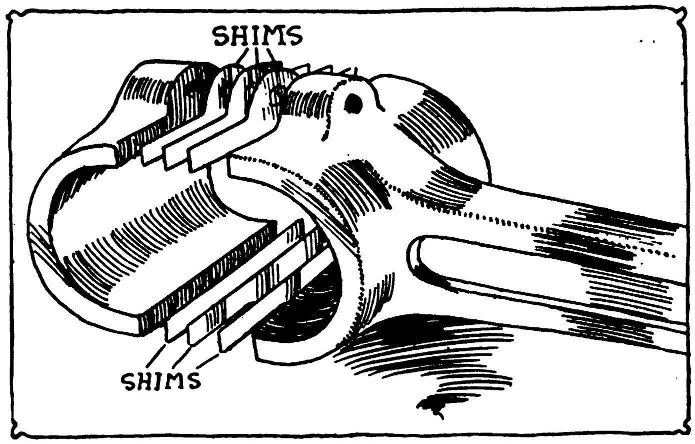


Fig. 2—Connecting-rod bearing end with cap removed to show shims

these cars, the motor revolutions at 10 miles per hour may be easily figured. Ten miles per hour corresponds to a certain number of feet per minute and this divided by the circumference of the tire equals the number of revolutions per minute that the rear wheel makes, in each case. Multiplying this quantity by the gear ratio, the revolutions per minute of the motor is found. Using symbols for the different quantities involved, the formula

$$M = \frac{S \times R}{D} \times 336$$

is found. M = motor revolutions per minute, W = revolutions of wheels per minute, C = circumference of wheel in feet, S = speed in miles per hour, R = gear ratio, and D = wheel diameter in inches. $\frac{S}{60}$ = speed in miles per minute and $\frac{S}{60} \times 5{,}280$ = feet per minute, then this quantity divided by the circumference of the wheel C gives the wheel revolutions per minute, $\dfrac{\frac{S}{60} \times 5{,}280}{C}$, then this multiplied by the gear ratio R will give the motor revolutions per minute, or revolutions per minute of the motor =

$$\frac{\frac{S}{60} \times 5{,}280}{C} \times R \text{ or } = \frac{S \times R \times 5{,}280}{C \times 60}$$

The circumference of the wheel C in inches is 3.14 multiplied by the diameter D in inches; divided by 12 this expression is reduced to feet. Therefore the circumference

$$C = \frac{D \times 3.14}{12}$$

Substituting this in the above formula

$$\text{r. p. m. of motor} = \frac{S \times R \times 5{,}280 \times 12}{D \times 3.14 \times 60}$$

$$= \frac{S \times R}{D} \times 336 = M$$

Using this formula, the motor speeds, since the tire sizes and gear ratios are given, are as follows:

	Gear Ratio	Tire diameter	Motor r. p. m. at 10 m. p. h.
Studebaker, S.D.	4 to 1	33	408
Buick, C 24, C 25	4 to 1	32	420
Maxwell, 25	3.58 to 1	30	400
Overland, 81	3.75 to 1	33	381
Regal, D	3.75 to 1	32	393
Oakland, 37	4 to 1	33	408

2—This is a matter of opinion but the average of the principal American motors for 1915 gives a ratio of 1.3.

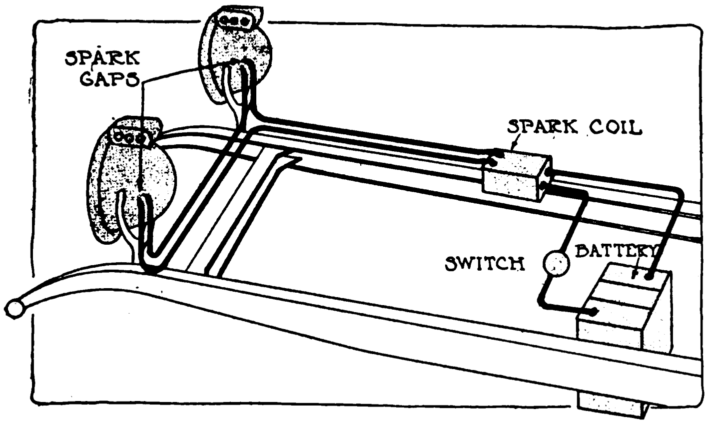


Fig. 3—Wiring to enable the lighting of the acetylene headlights by electricity

This may not be the most efficient ratio but it is probably close to it. It must be remembered, however, that the ratio must vary to a certain extent according to the size of the motor, being less for a large one and greater for a small one. The average bore and stroke of these motors is 3.82 by 5.1

Horsepower of Two and Four-Cycle

Editor, THE AUTOMOBILE:—1—What is the difference in horsepower between a two and a four-cycle motor having the same piston displacement?

2—Would the two-cycle have twice the power of the four?

3—What is meant by the word Baumé?

4—Who makes the Marsh one-cylinder air-cooled motor?

5—What is the right pronunciation of Mercedes?

Jamestown, N. Y. M. K. PALMQUIST.

—1 and 2—In motors of average design there is little difference in horsepower between the two. Although the two-cycle has twice as many strokes per revolution the mean effective pressure is generally not so high.

3—Baumé is a measure of the specific gravity of the gasoline with reference to a solution of salt and water, and the method was invented by a French chemist, Antoine Beaumé. The measuring is done with a Beaumé hydrometer which is merely an ordinary hydrometer with a special scale on it. Certain fixed points were first determined upon the stem of the instrument. The first of these was found by immersing the hydrometer in pure water and marking the stem at the surface of the water. This point formed the zero of the scale. Fifteen standard solutions were then prepared with 1, 2, 3, up to 15 per cent. by weight of dry salt and the hydrometer was immersed in these different solutions and corresponding marks made on its stem. Thus an arbitrary scale was formed for determining the densities of liquids heavier than water.

The hydrometer intended for densities less than water and which would be used for gasoline was marked in a similar way. A solution of 10 per cent. pure salt was used for the zero of the scale and the points at which the instrument floats in distilled water at 10 degrees Reamer or 54.5 degrees Fahrenheit is numbered 10. Equal divisions are then marked off up the scale as far as 50.

4—The concern that made the Marsh has been reorganized and is known as the Sterling Motor Co., Brockton, Mass.

5—This is a Spanish name for a girl. It is impossible to indicate the exact pronounciation but it can be approximated in English by giving the first e the same sound as the e in berry, the second e the sound of i in still but emphasized, and the last syllable should be pronounced as des in destroy. The accent is on the second syllable.

Questions on Ford Magneto

Editor, THE AUTOMOBILE:—Kindly explain the following questions concerning a Model T Ford magneto:

—1—What is the voltage, amperage and field resistance at 1,000 and 2,000 revolutions per minute and how can these speeds be determined?

2—What are the causes of a drop in voltage and amperage?

3—Explain how the magnets can be recharged by use of direct current through the magneto plug.

4—Does low resistance between the field terminals (caused by shunting in lights, electric horns, etc.) injure the magneto?

Newburyport, Mass. NORRIS C. INGALLS.

—1—There is no field resistance since the Ford magneto employs permanent magnets. The amperage depends entirely on the voltage generated and the resistance of the circuit. The voltage at 1,000 and 2,000 revolutions per minute is not obtainable but at 980 revolutions per minute the voltage varies from 16 to 24 depending on the condition of the magnets, it is stated.

2—In the Ford magneto drop in voltage causes missing at low speeds but in general is a drop in pressure, the same as when water flows in a pipe there is a certain drop in pressure between any two points. The drop in voltage, Fig. 4, is explained by studying the flow of water, which is opposed by a frictional resistance and if we have a pipe 2 inches in diameter and 100 feet long and have a pump which supplies water at 100 pounds pressure at one end, then the flow of water will be quite rapid so that a great many gallons will be discharged. The only force opposing the flow of the water will be the friction between the water and the walls of the pipe. If the interior of the pipe is rough more resistance will be offered than if it is smooth. If the pipe is made larger the resistance will be reduced and more water will flow. If it is smaller the resistance will be increased and less water will flow. Likewise if the pipe is lengthened to 200 feet the total resistance will be twice as great and only half as much water will pass through it.

The same may be said of the electrical wire. The volt is the unit of pressure and if 100 volts is applied to 100 feet of wire of a certain diameter a current flow of a certain number of amperes will result. It has a certain electrical resistance which opposes the flow of the current the resistance varying with the material of which the conductor is made instead of according to the roughness of the surface as is the case with the pipe. This resistance also varies with the area of the wire, the larger the wire the less the resistance. Also the resistance depends on the length of the wire.

If the resistance of the conductor is reduced by shortening it, by increasing its diameter or replacing it with a material which has a smaller resistance then the current flow in amperes will be greater and likewise if the resistance is increased in any way the flow will be reduced. If the voltage or electrical pressure is increased and the resistance remains constant then the flow of current must increase and if the pressure is lessened it must decrease.

In a wire of uniform size and material the drop in voltage is uniform from end to end because the resistance of any small unit of length is constant.

3—Six fully charged, 6-volt, 60-ampere storage batteries, a compass and some wire are required for charging the magnets. The storage batteries are connected in series and the negative wire is grounded on the car. The positive wire should have a rod attached to its end and then the magneto plug should be removed and the rod thrust in to make contact with the magneto inside the cover. Place the compass a small distance behind and to the left of the hole for the magneto plug, and have someone turn the motor over until the needle points to the front of the car. Then open and close the circuit by removing the negative wire from the car. The circuit should be held closed for 6 seconds at a time and then broken, twenty-five times.

4—The low resistance is not of itself injurious but if the resistance is low enough to allow a heavy current to flow, there may not be enough current for ignition or possibly the current will be so strong that it will heat the coils and hurt the insulation.

Questions on High-Speed Motors

Editor THE AUTOMOBILE:—I noticed in one of your recent issues a short article by Charles Duryea on How Rotary Valves Are Timed. I have not had the opportunity of reading the previous discussion therein referred to and would like to be enlightened more particularly on this subject.

1—In timing the intake valve is not the only essential that said timing be so arranged that the gas will have been started through the manifold by a sufficiently early opening as to be ready to supply the greatest volume of gas during the instant of greatest opening of valve and that such maximum opening be sustained during the period of greatest suction or piston speed?

Mr. Duryea contends that gas having started through the manifold while suction existed will continue to ram in after the compression stroke has started. In the Deltal motor described in your columns some time ago, the intake closed 48 degrees past dead center. In your opinion through how many of the 48 degrees of the compression stroke would gas continue to ram in?

2—Was any gas backed out?

3—Is it not a fact that during most of this 48 degree period, the poppet valve remains open only because it is not deemed advisable to shape the cam so as to allow the valve an immediate drop and close?

4—In that same Deltal motor the exhaust opened 68 degrees before dead center and closed 8 degrees after. Is this extremely long opening of exhaust the secret of the high speed attained by this motor?

5—Did not considerable power waste through the valve between the time of its opening and say 20 degrees before lower dead center? Did not the valve at such early opening lift against greater pressure than would exist at 20 degrees before dead center?

6—Is it not a fact that early opening of an exhaust valve of the poppet type is deemed advisable solely for the reason that such an opening affords means of reaching and sustaining the maximum opening throughout the scavenging stroke?

7—If an exhaust valve of the rotary type was supplied that opened 20 degrees before dead center and closed 8 degrees after, but which provided an extra quick and very large opening such that would permit a free and easier exhaust to even a greater volume of exhaust gas than the Deltal motor handled, and if such valve were easier of actuation than the Deltal type, would not such a valve make for more power and more speed?

8—In producing a special high-speed motor the reciprocating parts are made as light as possible. Am I right in assuming that these reductions are made in order to offset the power absorption of the larger valve gearing used, and thus register a greater power than can be obtained from stock motors?

9—Should not the opening of the exhaust valve be governed largely by the length of the stroke?

10—In a rotary valve motor of 4-inch bore and 6.5-inch stroke, equipped with extra large straight passage valve ports and with easily actuated valves and gearing, etc., in which the intake opens 8 degrees after dead center and closes 20 degrees after next dead center, and in which the exhaust opens 20 degrees before dead center and closes 8 degrees after next dead center, in your opinion would a change of such timing to that of the average of 60 engines mentioned by Mr. Duryea, be a change for the better? or worse?

Pittsburgh, Pa. B. D. GAMBLE.

—1 and 2—The object in delaying the closing of the intake valve is to allow the intake to ram in, as Mr. Duryea terms it, after the compression stroke has started. This effect only occurs at high speed. At ordinary rates of revolution a small amount of gas might be pushed back out of the intake valve. At high speed the gas, due to its inertia, will continue to flow in all the time the valve is open, that is through the 48 degrees of opening. However the piston movement represented by 48 degrees on a motor with 5-inch stroke is only .4 inch and therefore only a small amount of gas will be forced out.

3—Yes. Whether the cam allows a quick closing or not is a question of whether silence or maximum power is the more important.

4—Partly. The high speed is due mainly to two things: The amount of combustible mixture taken into the cylinders and the rapidity with which the exhaust gas is disposed of, thus reducing the back pressure. In order to obtain the former, at high speeds, the closing of the intake valve must be delayed. To accomplish the latter, the valve is opened before the piston reaches the end of the expansion stroke. A small amount of the expansive force is lost by so doing but this is more than offset by the gain which results from having a reduced pressure on the piston at the first part of the exhaust stroke.

5—A small amount of power is wasted at low speeds only with this early opening. Regardless of the speed the energy in the gas is largely spent before the exhaust opens at 68 degrees before lower dead center, its expansive force is nearly gone, and its pressure is very low compared with what it was at the beginning of the stroke. When the motor is running slowly some power is wasted but as already explained when it is operating at high speed this loss is more than made up for by the reduction of back pressure.

6—Yes.

7—This rotary-valve motor might develop more power than the ordinary touring car type at touring car speeds but it would not be apt to show the power at high speeds.

8—The reciprocating parts are made light to reduce vibration.

9—The time of opening of the valves, if this is what you mean, depends on the maximum speed of the motor and whether it is to be used for touring or racing, but the size of opening is governed by the piston displacement and maximum speed desired.

10—Mr. Duryea's timing is preferable. He states that the exhaust should open 45 degrees before bottom center and close 8 degrees after top dead center.

How to Wire Gas Lighter

Editor THE AUTOMOBILE:—Will you kindly advise me what is the proper way to wire an electric lighting system for gas head light? Shall I have one coil vibrator for each lamp or just one coil for both?

Houston, Texas. JOE TESORO.

—One coil for both lights should be sufficient. Make the gaps spark small, say not over 1-32 inch, putting the two in series. The wiring is shown in Fig. 3. You might wire the ignition coil to produce the required sparks but without knowing the type of coil you have, details can not be given.

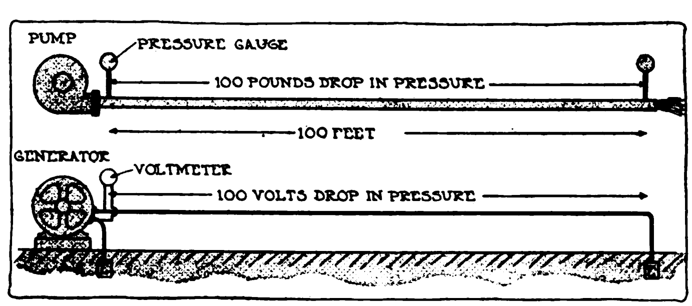


Fig. 4—Diagram showing the relation between the flow of water and electricity

The Engineering Digest

Recent Progress with Alloys—Theory Explaining Self-Hardening Metals Including the Special Steels

SIMPLIFIED HEAT TREATMENT GAINED BY SKILFUL STEEL MAKING

EVERY day, almost, sees new alloys of metals which are placed in the market with a view to the attainment of definite industrial purposes. They have usually been developed at research laboratories, and the improvements which they represent relate to their manufacture, their composition and properties or to their heat treatment. While not entering upon an account of the progress made in smelting, casting, forging and rolling, Leon Guillet, the well-known metallurgist, presents in eleven recent issues of *Génie Civil* a somewhat detailed report of the improvements made in the past few years in the properties of alloys as due to modifications in their composition or the manner of working them. As complicated heat treatment has not been found industrially practicable, by reason of the uncertainty of the labor element and the cost, the improvements in working methods go in the direction of simplification and the reduction of machine work. The self-hardening steels now much used for automobile gears and other parts in France furnish an example of the combination of great strength and durability with simple heat treatment and small correction for distortion.

A few passages from Professor Guillet's account are here rendered with omission of most of the technical explanations and reasonings, as these could scarcely be made intelligible in abbreviated form.

General Principles

Alloys show sudden variations, in their solid state, of some of their properties, such as their specific heat, their expansion or volume, their electric resistance, magnetism, etc., and these variations can be due to a transformation which the whole mass of metal undergoes as a unit, or to reactions among its components or to transformation of one of these. The changes brought about by heating and quenching are of the greatest industrial importance, being intended to increase strength and hardness or resilience. The effect of quenching is to preserve in part the condition which is stable in the metal at the temperature at which the quenching takes place, this effect being obtained by the suppression of the transformation which would take place during slow cooling.

The first condition for being able to harden an alloy by quenching is thus that it naturally undergoes a transformation at a certain temperature, and this fact indicates the importance of metallurgical diagrams for the metal industries. The second condition is that the temperature of transformation is at least reached before quenching takes place. As changes are not instantaneous, it follows also that the heating must last long enough to make them complete, if the full effect of quenching shall be obtained. Finally, as the speed of reactions generally grows with the temperatures, it is pertinent to inquire if it is not advisable to heat to a temperature above that of transformation.

Only in the case of certain nickel and manganese steels is it found that the condition existing before the cooling is completely maintained after it. In all other cases there is after the hardening process always a partial return toward the normal state of the metal. It can therefore be said that while industrial hardening imparts to an alloy a different structure from the normal one it is not the same which exists above the temperature of transformation. In the case of steels, for example, the malleability and high resilience existing above the point of transformation are much reduced in the cooling, and magnetism is restored, but the structure which is characterized by fine martensitic needles at the high temperature is maintained.

In this connection it is observed that if an alloy is heated too far above the point of transformation before quenching, the martensite becomes more and more visible under the microscope, coarser and thicker, and this structure, which detracts from the desired mechanical properties of the metal, is more stable for the high temperature than the finer martensitic structure and is therefore preserved more fully by quenching, as is also shown by experience to be the case. The quenching temperature should therefore never be more than 50 to 75 degrees centigrade higher than the highest transformation point of the alloy.

The Critical Points

That there can be question of a higher and a lower transformation point is due to the phenomenon of hysteresis, which causes the transformation to come at a higher temperature during heating than during cooling. Usually this difference is small, but for some compositions it is pronounced, and recently this phenomenon have been turned to important industrial account. Another factor, besides the composition of the alloy, influences the hysteresis, as for certain alloys it is stronger the higher the temperature is carried, at least within certain limits.

The principle of the influence of composition is shown most strikingly in nickel steels, where a nickel content of up to 25 per cent. lowers the critical or transformation point in the manner shown in the classical Osmond curve reproduced in Fig. 1, which may also serve to illustrate the industrial importance of hysteresis. Consider an alloy whose critical point during heating is at the temperature T while during cooling it is at t. To make such a metal take a temper it must be heated to above T to bring about the required molecular change, but to obtain the maximum effect from the quenching the latter should take place in the neighborhood of t. One should heat to T + 50 degrees and quench at t + 50 degrees. In practice, unless the hysteresis is pronounced, the differences in properties is not very great.

But suppose that t lies below ordinary temperature. In that case no retransformation will take place if the metal is left alone, and the alloy will be self-hardened and will have at ordinary temper-

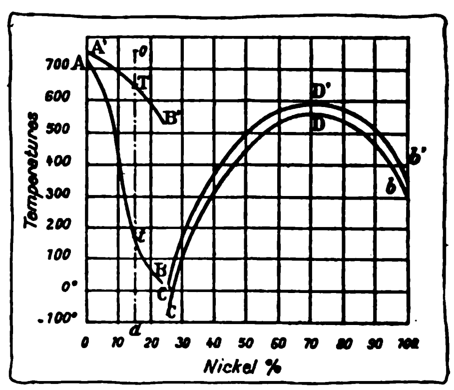


Fig. 1—Curves of critical points in nickel steels; for heating A' B' C' D'; for cooling A B C D

atures the structure which is stable for ordinary steels at high temperatures. This is the situation with steels high in nickel and manganese.

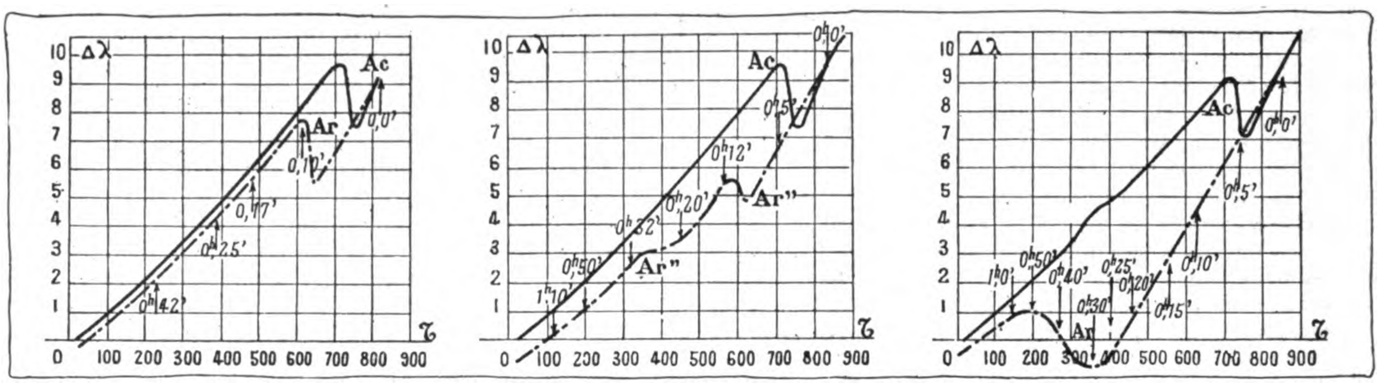
If, however, *t* lies somewhat higher, as at 200 or 300 degrees, and the metal has been heated to above T and is left to itself, it should change back to normal from the high-temperature structure upon reaching *t*, but at this relatively low temperature the molecules have small mobility and the components remain very much divided in their colloidal state; the structure is then that of ordinary hardened metal, combining properties of both the heated and the cold conditions and characterized structurally by fine martensitic needles; or by osmondite flakes which color easily.

In other words, alloys so composed that T comes high but *t* at a temperature at which the metal stiffens considerably can be hardened by heating them to above T and then leaving them alone. It is an obvious objection that such metals must have been heated above T in their manufacturing processes —the smelting, forging or rolling—and therefore must be pears and Ar" alone remains, and the metal becomes irreversible or almost so. [This seems to mean that reheating to just above Ac does not restore Ar readily to its previous place.] According to statements from the steel works at Imphy, where these diagrams were produced, certain chrome-nickel steels can be made semi-reversible or altogether irreversible according to peculiarities in the heating. The same phenomenon has been turned to practical account in the case of certain copper-zinc brasses.

Some aluminum alloys, when cooled suddenly at certain temperatures, show no immediate changes in their properties, but after some time has elapsed their hardness increases, and for this peculiarity no explanation has yet been vouchsafed.

Self-Hardening Chrome-Nickel Alloys

The industrial steels which are self-hardening by reason of a large hysteresis depending upon their composition contain nickel, but if this alloy metal is used alone to produce the self-hardening property, the strength and the hardness



Figs. 2, 3 and 4—Variations in the critical transformation points of certain chrome-nickel steels, as determined by the temperatures reached in heating the metal

too hard to be worked. But it has been found, empirically, that alloys of this nature can be softened by reheating them as closely to T as practicable without danger of reaching this temperature—in practice to T minus 25 degrees centigrade—by which operation they lose some of the mechanical effects of hardening while retaining the structural peculiarities and the ability to return to the hardened state when the temperature is again reduced.

Metals of this description, in which *t* lies at about 300 degrees and T usually 400 to 500 degrees higher, are thus of great industrial value in all cases where their physical properties in the hardened state are those desired, the heat treatment being much simplified. They should not be confounded with high-speed steels which follow different laws. In certain chrome-nickel steels the self-hardening principle finds important applications subsequently referred to.

Irreversible by Overheating

The influence upon the hysteresis of the temperature to which the heating is carried has been known for some years, especially so far as chrome-nickel steels are concerned, and is illustrated in Figs. 2, 3 and 4. [These diagrams are based on measurements of the expansion of the steel; Mr. Guillet shows also others based on heat measurements and thermomagnetic recordings]. It is noticed that the heat reached is about 800 degrees in Fig. 2, 870 in Fig. 3 and 900 in Fig. 4. The rate of cooling is indicated in minutes elapsed. By noting the locations of the points of transformation it is observed that this point, Ac, for the heating curve remains approximately constant but that, for a constant rate of cooling, the critical point Ar of the cooling curve drops considerably lower where the temperature has been higher. Moreover, this point, Ar, repeats itself in two places still lower, Ar' and Ar", if the heating has been such as to produce this result, as in Fig. 3. By increasing the heat still further, Ar' disappears

after tempering [which, it is noticed, is a process similar to annealing of ordinary steels] are not sufficient for such industrial purposes as would economically justify the use of a special and high-priced steel. When chromium is also added, however, the result becomes quite different, and it is for this reason that self-hardening chrome-nickel steels lately have entered widely among those used for automobile construction.

The physical properties shown by the best known brands of these steels are of interest.

One of them claims separate attention, being among those developed most recently and combining the qualities of the best steels in the two classes mentioned afterwards. It contains: C = 0.28, Mn = 0.32, Si = 0.19, Ni = 5.67 and Cr. = 1.05. Its critical point lies at 725 degrees on the heating curve and at 390 degrees for cooling. Annealed at 650 degrees this steel gives an ultimate tensile strength R = 94.1 kilograms per square millimeter, an elongation A = 14.7 per cent., a reduction of area S = 53.5 per cent. Shocks lengthwise of fiber with the ramming machine registers 10.9, crosswise shock 6.9, the hardness 264 Brinell.

Heated to 850 degrees and self-hardened it gives the following properties: R = 186.3, A = 7.5, S = 29.3, lengthwise shock 5.6, crosswise shock 2.7, hardness 482.

The shock tests were made on test pieces of 10-millimeter square section with notches 2 x 2 millimeters, and the figures refer to the resilience, giving the number of kilogram-meters absorbed in the test piece per square centimeter of working section. The Brinell figures refer to 300 kilogram pressures.

The other self-hardening steels in actual use come in two classes. In the first one the carbon ranges from 0.20 to 0.30 per cent., the nickel from 3 to 5 per cent. and the chromium from 1 to 2 per cent. In the second class the carbon ranges from 0.10 to 0.20 per cent., the nickel from 6 to 7 per cent. and the chromium from traces to 2 per cent. [Guillet here gives tables with the test figures in full for 5 steels in the first class and 3 in the second, but the general remarks on the showing made in these tables may here be sufficient.] In both classes the high critical point averages about 820 degrees and the low one about 410. The first class shows the higher tensile strengths, elastic limits and hardness, and the second class the higher resilience, especially for lengthwise shocks. High manganese and little chromium in one of the steels in the second class, with the nickel 6.45, produces brittleness however, as it takes this brand into the manganese steel class.

Practical Uses

In accordance with this showing the steels of the first class are indicated for gears and those of the second for rods, steering knuckles and parts similarly subject to brutal shocks. In practice it has been found that none of these steels fail by reason of brittleness, as their high elastic limits —reaching up toward 185 kilograms per square millimeter— are supplemented by a resilience of 4 to 5 kilogram-meters in their hardened condition. It might rather be said that they suffer from a certain lack of superficial hardness when used for gears. They have not always borne out the test figures, but this has been ascribed to faulty gear cutting or mounting of the gears, while it has also been maintained that gears properly machined from the start polish and harden themselves on the wearing surfaces by use, acquiring properties superior to those possessed by them when new.

However this may be, these steels have one important shortcoming in their high price, and this is due not so much to the nickel and chromium contents as to the great care which must be taken in their manufacture, or, more correctly, in their selection. Every melt, every ingot must be studiously investigated and must go to the discard whenever it shows even minor variations in its composition from the standard required in each case.

With regard to the relative effects of chromium and nickel in producing the self-hardening properties, the greater or lesser responsiveness of the alloy under the variations of temperature and the shadings of the final properties of interest to the steel worker or the buyer of the industrial products, Mr. Guillet sets forth a series of conclusions, apparently of great interest to steel makers, and also the chemical industries. It is brought out, for example, that the second class, above mentioned, of self-hardening nickel-chrome steels blends into a third class, in which a portion of the chromium fails to go into metallic solution and forms into carbide, with the peculiar result that the steel becomes highly refractory to ammonia and nitric acid.

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Example of Four-Wheel Drive Truck Used for War Purposes—Rules Governing the Requirements

At the military trials of subsidized French motor trucks, which had almost come to a close when the European war began, the vehicles in which all four wheels are driven played a conspicuous part, as it had become realized that they would be found almost indispensable for heavy transportation work that could not take place on hard macadamized roads. Three hundred four-wheel drive trucks are now said to have been taken into use in the actual warfare and to have justified the expectations entertained with regard to them, so far as their ability to overcome all sorts of traction difficulties is concerned, while little has become known with regard to the amount of maintenance work required for keeping their special transmission mechanisms in working order under the unusually severe conditions, the very hardest work, across soft fields and ditches and over the steepest grades, being their constant lot.

Some details of the design of the Blum-Latil trucks, which came through the preceding trials with flying colors, are under these circumstances of interest. They are taken, together with the illustrations, from an ante-bellum issue of *Omnia*.

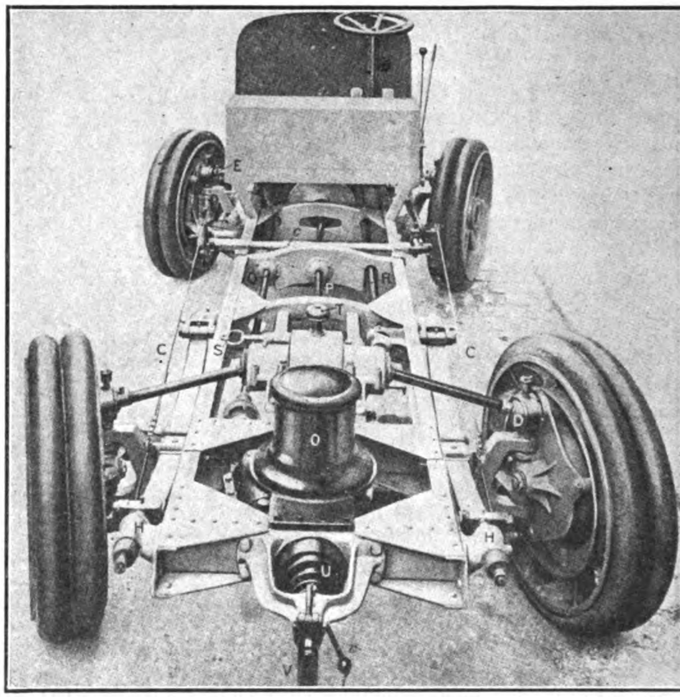


Fig. 5—View from rear of Blum-Latil tractor-truck

An advantage in the all-wheel drive system which has rarely been mentioned is here at once noted—see Fig. 6. As the front wheels are driven they can be loaded more heavily than in ordinary trucks without endangering the steering, and the motor can therefore be placed entirely ahead of the front axle, leaving more loading space for a given length of wheelbase.

The actuating of the front driving axle is much simplified by the same disposition, as it becomes possible to accomplish it, as is here done, by means of a short transverse shaft directly from the gearbox, the latter being mounted, by the way, as a unit with the motor. The rear axle is driven by a shaft from the gearbox in the customary manner.

Each axle has its differential, but that of the front axle is located inside of the gearbox. All of the wheels have speed-reducing gears driven through transverse wheelshaft with universals, and as the vehicle is broad-gauge the wear of the universals is considerably reduced, as compared with a similar driving system for pleasure cars. Both differentials can be locked, to help in overcoming traction difficulties on slippery ground.

All four wheels are steered, and it may be noted in the illustrations that the shaft which transmits the steering effort to the rear wheel pivots are of very large dimensions to secure the rigidity and freedom from torsion which are necessary to make the four wheels turn in perfect unison. There are also brakes on all four wheels and they are actuated simultaneously from the same hand lever by means of two cables, one to each pair of wheels and each with a compensating lever. Like the wheelshafts, the brakeshafts connect with universals mounted in vertical alignment with the axes of the steering pivots.

A special feature in the spring suspension is the lengthwise journaling of the spring shackle housings—or the pins, as the case may be—in the spring brackets, with additional resistance springs in the latter; this provision obviating the torsion of springs when only one of a pair of wheels is raised over an obstacle. Other construction details, such as those relating to the winch and the hooks for the attachment of a trailer, will be noticed in the illustrations.

The rules under which four-wheel-drive trucks are built for military uses in France express of course the opinions

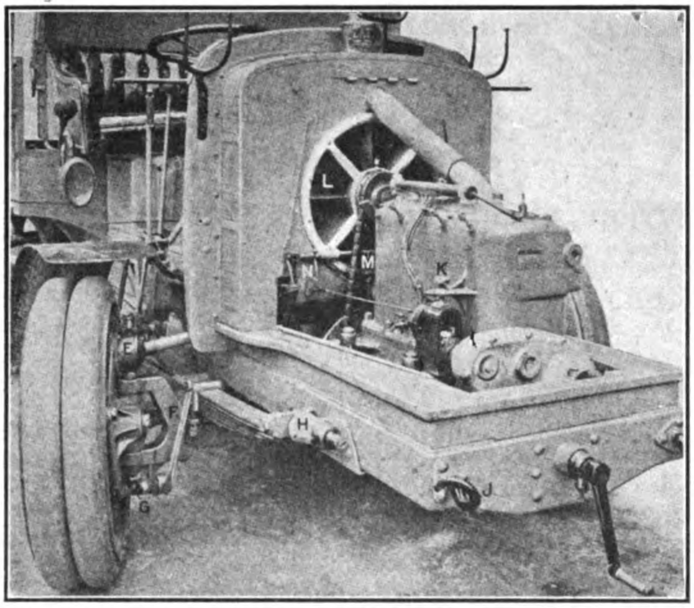


Fig. 6—Over-reaching front end of Blum-Latil truck. F, brake levers; H, pivotal spring brackets; K, set-screw for mounting magneto

which prevailed before the present war enlarged all previously gained experience on such subjects, and these opinions may have been modified on more than one point, but they still have a general value, and the more important ones among them are given in the following.

For emergency transportation work, of a civilian character, such as that which is required in connection with excavating and mining, they might be found even more useful than for the military work for which they were drafted, provided it is considered that the four-wheel-drive system, as applied to business purposes, can justify its constructive complications in other vehicles than those of the electric or gas-electric types.

Regulations for Four-Wheel-Drive Trucks

Weight Limit.—Must carry a payload of at least 1,500 kilograms, and the payload must be at least one-half of the weight of the empty vehicle. No axle must be loaded with more than 60 per cent. of the total, whether vehicle is loaded or empty, and under no circumstances with more than 4,750 kilograms. Maximum weight of vehicle and load 8,000 kilograms.

Traction Efficiency.—Empty the vehicle must be able to haul a trailer weighing twice as much, with its load.

Body.—Driver's seat must be sheltered and there must be seats for two beside it. Body at least 3 meters long, 1 1-2 meter broad with sideboards at least 60 centimeters high.

Turning Radius.—Diameter of smallest turning circle, measured to outside tracks, not to exceed 15 meters.

Wheels.—Front and rear wheels alike, with twin solid and continuous rubber tires (or equivalent substance) on smooth turned metallic rims either 850.6 millimeters or 1 meter in diameter.

Brakes.—Two sets required, one acting on transmission, the other on wheels; one operated by hand, the other by pedal.

Gear Speeds.—At least four and reverse. Low speed must develop at least two-fifths of the total loaded weight in pull at the hauling hooks, on good and level roads.

Devices Required.—It must be possible to lock the differentials. There must be two hooks at the front as well as at the rear of the frame, so that vehicle can both haul and be hauled. They must endure a pull of 2,000 kilograms and be suited to have cordage 40 millimeters thick looped into them. At the rear there must also be a spring hook, artillery model. A sand box to be operated by the driver from seat. A winch or similar device actuated from motor by irreversible gear and admitting of ready removal of cable, whether latter is under pull or not. Arrangements for pulling forward as well as rearward.

Cooling Capacity.—Sufficient to permit stationary operation for 30 minutes with power needed for hauling loaded trailers.

Hill-Climbing.—With maximum own load 18 per cent. grades; with trailer load in addition 12 per cent. grades on hard roads. By winch the trailer load on 15 per cent. grades.

Brake Capacity.—Sufficient to stop with trailer on 10 per cent. grade without recourse to brakes of trailer. Sufficient to anchor vehicle on 15 per cent. grade and haul trailer load by winch.

Rules for All Trucks

A number of the regulations are the same as for ordinary motor trucks with the ordinary driving system, while there are also many rules for the ordinary trucks which do not apply to the special class. All rules are of course at present somewhat relaxed. The rules in common are:

Anti-Skidding.—Means for easy attachment of traction chains or equivalent devices; they must not project beyond the rim of wheel and must keep coils of chain separate and evenly spaced.

Total Width.—Of vehicle, must not exceed 2.20 meters.

Road Clearance.—All organs must be at least 30 centimeters above the ground when vehicle is loaded. The wheels and organs thereon form exceptions.

Screwthreads.—Bolts, nuts and threaded pins must follow international system, if the parts serve for the assembling of two pieces, but not if they serve for adjustments.

Radiator Protection.—Radiators must be effectively armored by strong screens against accidental collisions.

Sprags or equivalent devices are compulsory. The construction and manner of mounting *magnetos* are hedged with many detailed provisions looking to interchangeability.

A *mirror* for looking backward must be provided, or an equivalent device. Also suitable tool *boxes* or *drawers* and one or more boxes to receive the baggage of three men, totaling an interior volume of at least 100 cubic centimeters. No box must have any dimension less than 0.20 meter.

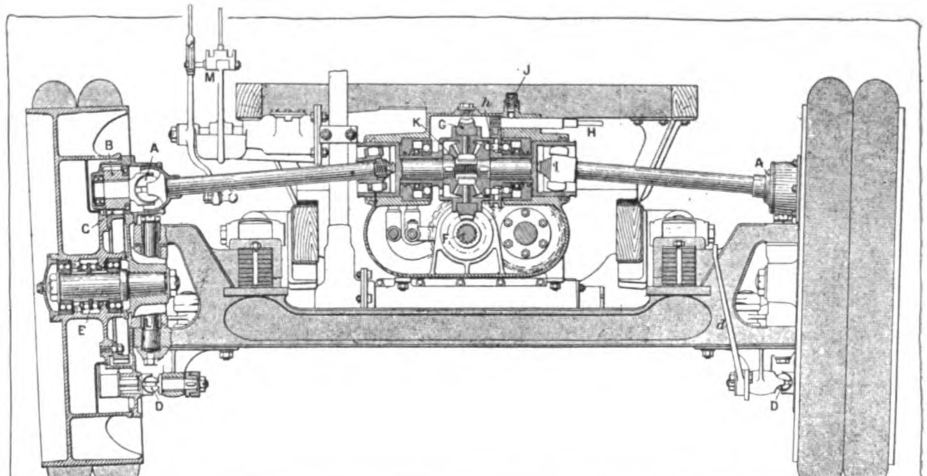


Fig. 7—Section of transmission; similar in front and rear. A, universal; BC, reduction gear; D, universal for brake; F, longitudinal drive shaft; G, worm gear for winch drive; H, lever for locking differentials with lugs *h*; K, differential; M, gear lever and quadrant

Care of Truck Springs

Overloading and Overspeeding Injurious to Suspension—Loading Problems—Resetting Worn-Out Springs Not Economical—Clips Must Be Kept Tight and Inspected Each Week

By John G. Utz,
Perfection Spring Co.

SPRINGS are probably called upon to stand more grief and punishment than any other part of a heavy-duty truck. The variation from no load to full load is so much greater than on a pleasure vehicle that it is worthy of attention.

Assume a 3-ton truck to weigh 8,000 pounds, or 4 tons, above the springs. When loaded a strain of 7 tons is upon the springs against 4 tons empty, a gain of 75 per cent.

A pleasure vehicle weighing 2 tons is only asked to take an additional passenger weight of 1,200 pounds, or a gain of 30 per cent. These figures indicate that the truck springs must handle close to two and one-half times the variation of a seven-passenger pleasure vehicle.

Use Rating Plate

This comparison of weight increase, due to carried load, refers to normal rated load only. In cases where overloading is practised it is evident that the gain is greater and, consequently, the springs are called upon to handle even greater variations. In most cases truck makers are attaching the rating plate in a prominent place, cautioning against loading beyond rated capacity, but we all know how these rating plates are disregarded.

Again, some truck makers allow for an overload capacity in their design beyond the advertised rated capacity, and when the spring maker is advised of such conditions, he is able to accommodate the same in the spring design.

Misleading Capacity

There is danger in letting it become generally known that a given truck is capable of handling a certain over-load, as many truck salesmen, in order to clinch a sale, will tell the prospective customer that, while the normal rating is, say 3 tons, "the truck is really designed to carry 5 tons." This is unfair to all concerned, as the customer immediately considers the vehicle as having a 5-ton capacity, and will load up accordingly, occasionally even exceeding this limit. The result is self-evident; all margin of safety disappears and the

EDITOR'S NOTE—*A paper read by John G. Utz of the Perfection Spring Co., Cleveland, O., before the convention held in Detroit, Mich., under the auspices of the Motor Truck Club of America, October 7-10.*

ultimate life of all parts is shortened accordingly.

The next item is the solid tire of the truck that throws additional vibration upon the springs. The frame of a truck is far more rigid than that of a passenger vehicle, which throws the distortion, due to road variations, upon the springs of the trucks.

Distribution of Load

Next, and of great importance, is the determination of load. In a pleasure vehicle the position of the carried load is predetermined, but on a truck the placing of the load is entirely up to the discretion of the driver.

The relation between bulk and weight of goods transported is widely variable, sometimes even in the same load. The necessity of evenly distributing such a load in proportion to weight instead of volume is a point that must be observed.

Quite often there is a temptation to place a heavy casting or piece of machinery on the very rear of the platform. A little thought and analysis will show that such loading throws a complex set of strains upon the springs that cannot but be harmful. Such a load should be placed in the middle of the platform right and left and as well as possible fore and aft.

The front end of a conventional truck has more or less constant load. At all events 80 per cent. of the load falls on the rear springs. It follows that the variable loading at the front end cannot be greater than the ratio of the load, reduced to pounds, to the weight of the motor equipment, cab, driver and helper.

Driver's Judgment Needed

Referring to the rear springs, since they carry 80 per cent. of the total load and, remembering that the load varies from nothing to as much as 50 per cent. overload, nothing but the intelligence of the driver stands between good and bad spring service.

Where Load Shifts

Another point of considerable importance in heavy duty trucks is the possibility of loads shifting, due to crowned roads. Many commodities, such as brick, small heavy castings, stone, etc., are given to shifting to the right side of the loading platform when driving on the right side of a crowned pavement. It is apparent that when a truck hauls nothing, for instance, but brick, and is continually driven on the right side of the road, the shifting of the load to the right side of the platform throws a more severe strain on the right spring than on the left, and it is quite apparent that the right spring will consequently fatigue long before the left spring. This may seem like a fine drawn theory, but there is definite knowledge of quite a number of cases where this very thing has occurred. Attention has also been called to certain vehicles, which, under full load, were standing lower on the right side than on the left. In these cases it was found that the load had shifted to the right and the truck was also standing on the right side of a crowned road, and difference as much as 2 inches or 3 inches between the two springs have been noted in such cases.

The Injury of Speeding

Speeding is probably the greatest crime that can be perpetrated upon an innocent truck. If a truck is moved along the road at 10 miles per hour under full load, it is more than likely that it will continue to do so for a very long time without exhibiting undue weakness at any point. But, if a truck is driven without any load at 20 miles per hour, remembering that the truck weighs more or less than 60 per cent. of the gross rated load, it is a certainty that the truck will wear out long before it pays for itself in service. It is not believed that the average driver fully understands how detrimental it is to the life of a truck to drive it at high speed when it is empty. The energy stored in a moving mass responds to the rule, which may for convenience be expressed as follows:

The energy stored in a moving mass is proportional to the weight in pounds multiplied by the square of the speed. In other words, if the speed is doubled, the strain is multiplied by four, and the life of all parts materially diminished.

Buy by Weight

In the economical production of commercial vehicles, in view of the present day competition, truck makers are reducing costs wherever possible, and since springs are sold by the pound, they are quite anxious to reduce the weight of the springs.

Springs Dissipate Energy

There is a point here worthy of attention. In the first place, the springs are called upon to absorb and dissipate energy, and there are only two ways in which this energy can be absorbed and dissipated, and both ways are in the form of friction. The two kinds of friction involved are internal and external, the internal being work done upon the molecular structure of the steel and the external in friction between the plates. The external friction is small, and with the present unwarranted demand for lubrication between spring plates, little reliance can be placed upon this form of absorption. This leaves the internal friction of the molecules as the only means of absorbing the desired energy. The more energy the molecular structure of steel is called upon to absorb, the sooner its power of absorption will be overcome. Therefore, it is quite evident that the larger volume of steel employed to absorb this energy, the greater will be the life of the springs. It is surely true that a certain amount of energy must be absorbed in the springs, and the more steel the more life. Hence, a reduction of steel means a reduction of life.

The Safety Factor

It also follows, where the springs are designed with sufficient steel to absorb the energy brought about by the normal rated load with a liberal factor of safety for overload; that, when the normal load is exceeded up to the overload, the factor of safety disappears; and when the carried load exceeds the overload capacity, the life of the springs will be reduced at an alarming rate.

Springs Wear Out

It should be borne in mind at this time that springs and tires are the two things on any motor vehicle which must wear out, since they are the only two items on a vehicle that are deliberately distorted in normal service. Fortunately for the truck maker (and unfortunately for the spring maker) springs do not wear out in as short a time as tires, but they ultimately must wear out. And when springs that have stood up to the mark for a considerable time begin to weaken and settle, it is time to replace the entire spring instead of having them reset.

Opposes Resetting

Resetting of springs is something like retreading a pneumatic tire, or putting a pair of half soles on an old pair of shoes. It is not economy to put a pair of half soles on an old pair of shoes where the uppers are practically worn out. We all know that retreading an old pneumatic tire is of little value as the carcass is near the end of its life; and for the same reason it is not good policy to reset an old pair of springs, as the molecular tension of the steel indicates that it is near exhaustion when the springs begin to settle, assuming the steel to be of corbitic micro-structure after heat treatment.

Keep Clips Tight

Spring clips should be inspected at least once a week and tightened as much as possible. If the clips become loose, the spring will break between the clips. If there is undue stretching of the clips, the difficulty might be overcome by having new clips made of better material, as it is always cheaper to replace clips which are too light than to have broken springs as a result.

The bearing place upon which the spring rests on the axle should absolutely conform to the curvature of the spring at that point, as sufficient bearing surface is just as important as tight spring clips.

Hints on Repairs

If a spring plate should break, it is important to have it repaired or replaced immediately by a skilled spring maker. Quite often a break in a plate occurs at a place where it does not immediately cripple the entire spring, but it is simple to understand that the breaking of one plate throws extra work upon the other plates which will break in turn. If one of the intermediate plates should break at the center bolt, the spring clips should be tightened down until it is possible to have the break repaired. Very often rebound clips are loose and broken. Missing rebound clips very often result in broken main plates.

On chain drive trucks there is always an ample allowance for adjustment to offset the stretch and wear of the chains. As the chains become stretched to a great extent, it is wise to remove an entire link and then shorten the adjustment so as to keep the spring shackles (at each end of the spring) standing at about the same angle.

A spring is a complete unit as produced by the spring maker. The removal or addition of a plate entirely disarranges the grading of the original plates, and should never be practised under any circumstances. It is also very bad policy to replace a broken plate by any plate that happens to be of the same width as the spring. It is far more desirable to let a competent spring maker attend to the repair or replacement.

In view of the preceding, there follows a list of things to be observed in the operation and care of the truck, if there is a desire to give the springs a fair chance to offer their longest life.

Rules of Reason

A—Evenly distribute load. Prevent shifting of load.

B—Do not overload beyond rated capacity. The factor of safety allowed by the maker is for the owner's protection as well as the maker's.

C—A wheel out of round due to flat spots on a solid tire, imposes a severe and dangerous shock upon the springs. Keep the wheels round.

D—Keep excessive side play out of shackles and hangers to minimize the lateral shock on the springs when on rough roads.

E—Give careful attention to all parts subject to friction. Keep them amply lubricated, as an excess of grease keeps the dirt out.

F—Take corners slowly, without or with load.

G—Back into a curbstone or platform gently as your radius rods might buckle and throw the jolt upon the springs. In driving the front wheels against a curb or any obstructions, the shock must be taken by the springs alone.

H—When loaded, drive gently over rough road or obstruction, remembering your frame is rigid and the springs must take the distortion.

I—Drive at moderate speeds at all times. Remember your solid tires have little resiliency.

J—If you have to tow a car, or have your car towed, hitch the tow-rope to the frame, not to the axle.

K—If an accident occurs, and a spring hanger, or the frame near the hanger is bent, have it straightened at once. A spring distorted by a bent hanger is liable to break under load.

L—When adjusting chains, remove a link when the adjustment would throw the shackles to a bad angle.

M—Keep spring clips tight at all times. If a center bolt should break, due to loose clips, replace it at once.

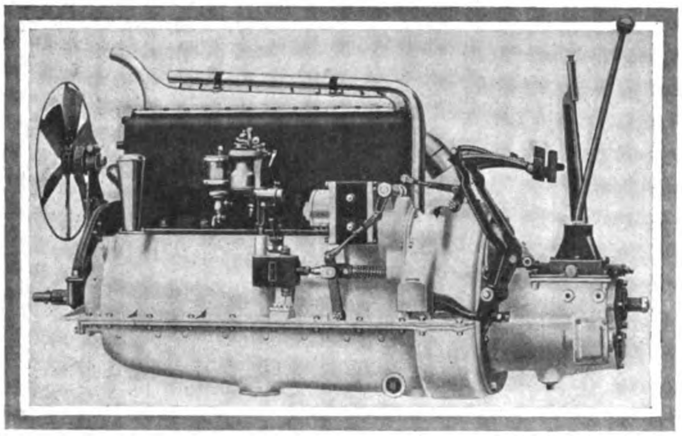
N—On a crowned road, drive as nearly in the center as possible, as driving to the right throws an extra load on the right-hand spring.

O—If a plate breaks, have it repaired by a competent spring maker at once, or the other plates will break in turn.

P—Tighten or replace loose or broken rebound clips.

Kissel Adds L-Head Block Six

New Model Has 3 5-8 by 5 1-2-Inch Motor—Electric Starting and Lighting and Vacuum Fuel Feed—Many Body Types

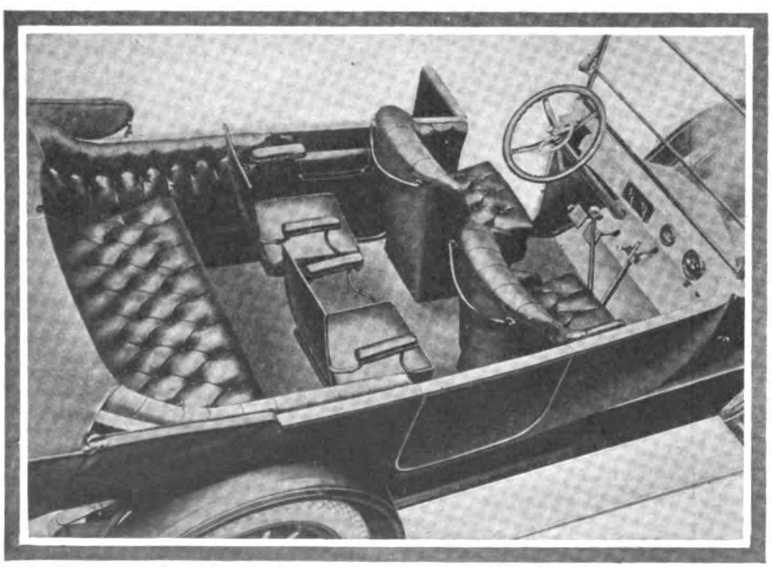


Left side of power plant used in new Kissel 42-six. The motor has a bore of 3 5-8 inches and a stroke of 5 1-2. Valves are 2 3-16 inches in diameter with heads of nickel steel

As the result of over a year's work in preparation and testing, the Kissel Motor Car Co., Hartford, Wis., has brought out a six-cylinder model embodying L-head block motor, three-speed gearset, 126-inch wheelbase, electric starting and lighting and complete equipment. This addition to the company's line lists at $1,650 fitted with five-passenger touring body with either two or four doors, or as a roadster. With seven-passenger body having three or four doors and oversize tires the car sells for $1,850, while with five-passenger touring body including detachable sedan top it is $2,000 and in coupelet form, $1,950.

The Motor

An L-head motor is used in the new model, which is called the 42-six, and the cylinders are cast in a block. The bore is 3 5-8 inches and the stroke is 5 1-2, giving an S. A. E. rating of 31.57 horsepower. The makers' rating, based on block performance, is 42 horsepower. Valves are 2 3-16 inches in diameter and are inclosed, together with the lifters. Valve heads are of nickel steel. The crankcase is an aluminum casting and, to insure maximum strength, the division is 2 inches below the crankshaft, which measures 38 1-4 inches over-all. The crankshaft is of special alloy steel and is carried on bearings 2 1-8 inches in diameter. The camshaft is of heat-treated alloy steel and is driven by wide-faced helical gears and is supported on white brass bearings.



New Kissel model 42-six fitted with special seven-passenger tonneau

The gray-iron engine cylinders are sand blasted and milled on a special machine, all holes being bored at the same time to insure accuracy and interchangeability. The heat treatment of the various metals used is all done in the Kissel plant, which is equipped with oil furnaces, dip tanks and electric pyrometers for this work. All chassis are tested by fan dynamometer.

Vacuum Fuel Feed

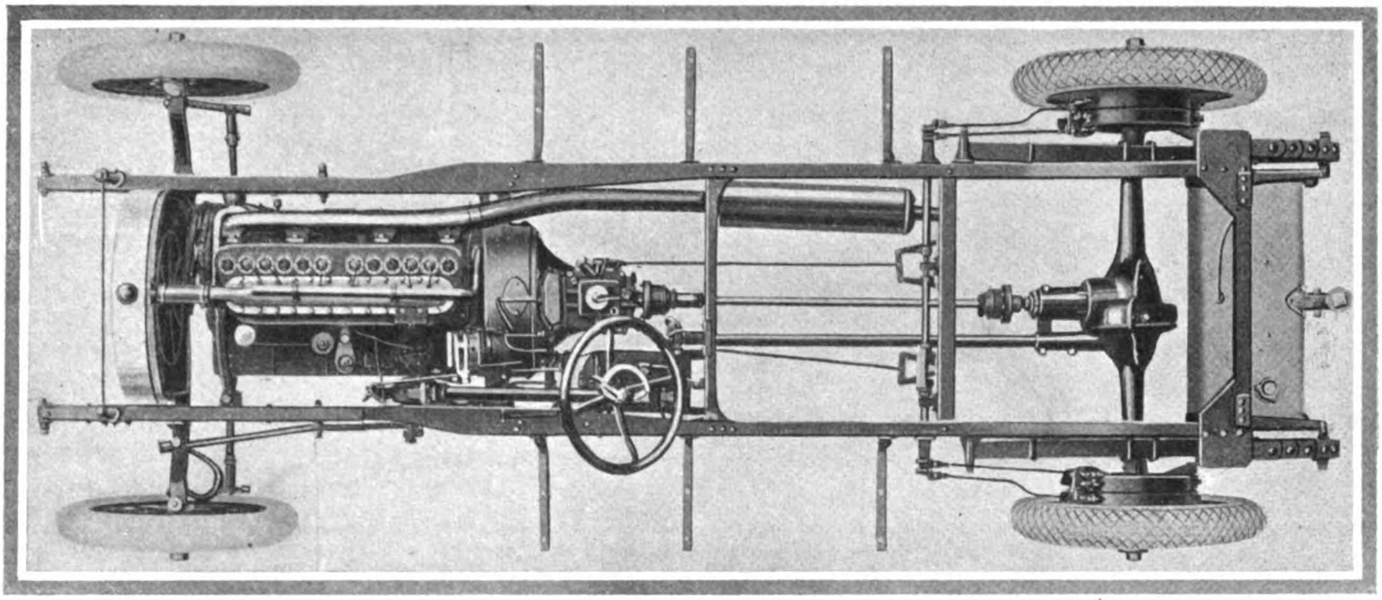
The lubrication system is by splash with a constant oil level maintained in troughs under the connecting-rods by a pump, whence it drains through a screen before being redistributed. The cooling water is circulated by pump through a Mayo honeycomb radiator through which a draft is induced by a 16-inch safety blade fan. The carbureter, which is a Stromberg of special design, is mounted horizontally and attached directly to the cylinders near the top, thus promoting accessibility. Fuel is fed from a 19-gallon main tank mounted at the rear of the chassis through a Stewart-Warner vacuum feed apparatus. The electric starter bears the Kissel nameplate and operates through gearing cut in the periphery of the flywheel, a foot plunger serving to engage the gears and connect the starter with the Willard battery, which is located amidships, under the floor. All wiring is centralized in a panel in front of the dash, thus facilitating the location of trouble and permitting the removal of the body without severing any wires in the electric system. The lighting generator is driven by gear from the engine. Headlights are provided with a dimming attachment.

Vanadium Steel Axles

From the motor, power is transmitted by a leather faced cone clutch, with adjustable spring inserts, to a three-speed selective gearset, the motor, clutch and gearset forming a unit supported on one bearing at either side and one bearing in front. Annular ball bearings are used throughout the gearset. The axle is of the floating type with vanadium steel driveshafts mounted, with the chrome-vanadium steel differential on Timken roller bearings. The differential gears are steel forgings, case hardened. The front axle is an I-beam section with vanadium steel steering knuckles and arms properly heat-treated.

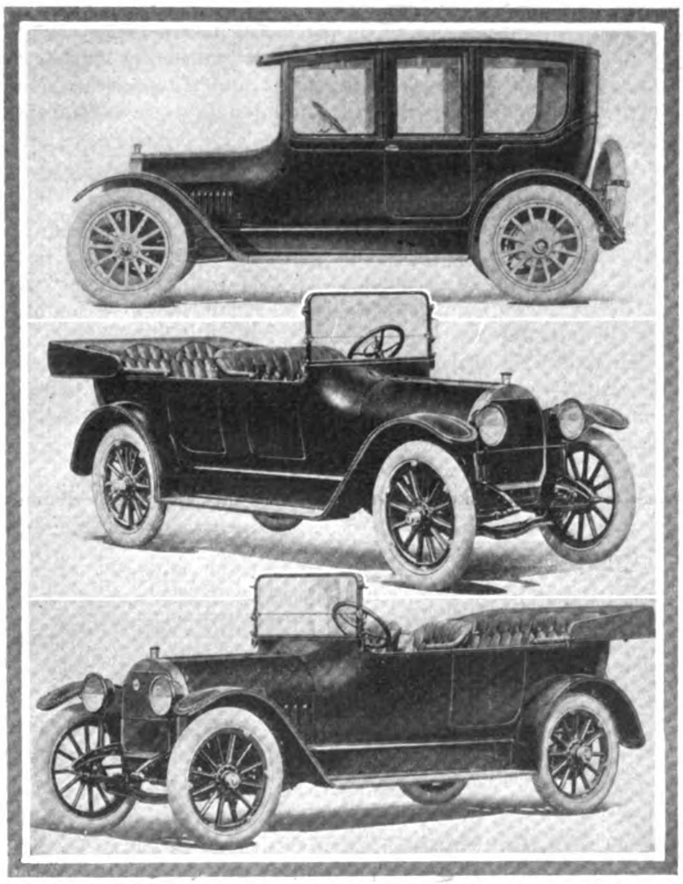
Easy Brake Adjustment

The pressed steel frame is arched at the front to give maximum clearance and permit of a short turning radius. It is mounted in front on semi-elliptic springs, 2 inches wide, and in the rear on three-quarter el-



Plan view of Kissel 42-six chassis, showing block motor, mounting of electric starting and lighting units and main fuel tank at rear. The speedometer is driven from the rear of the gearbox

liptics 2 1-4 inches wide. Both sets of brakes are external contracting on 14 by 2-inch drums mounted on the rear wheels. There is a hand nut arrangement for easy adjustment. With the exception of the seven-passenger model, which is mounted on 35 by 4 1-2-inch tires, all models are shod with 34 by 4 tires, the wheels being second growth hickory with heavy spokes.



Upper—Detachable sedan top fitted to regular touring body on Kissel 42-six chassis. This combination sells for $2,000 and furnishes an admirable all-weather car

Middle—The four-door five-passenger touring body which lists at $1,650 mounted on the new six-cylinder chassis

Lower—With one-compartment touring body having two doors and carrying five passengers, the 42-six sells at $1,650

As usual, the company has made a strong feature of body design, the new models, which are all products of the Kissel shops, being true adaptions of the streamline principle. Body walls are of special sheet steel, with aluminum backs, covered with the best grade of leather, the cushions which are 11 inches deep, incorporating mattress springs and fine curled hair. The storage facilities are unusually ample, the compartment under the rear seat measuring 43 by 15 1-2 inches. Tools are stored under the front seats, the space being almost equally ample. The standard color is Kissel blue with a gold hairline striping finished with English varnish. All control instruments are mounted in a straight line on the dash, where they are illuminated by concealed electric bulbs. Fenders are crowned.

Left Drive and Center Control

Steering is on the left, an 18-inch wheel with inserted spider operating a split nut and worm fitted with adjustable ball thrust bearings. This arrangement is semi-irreversible. Control levers are in the center on the driver's right.

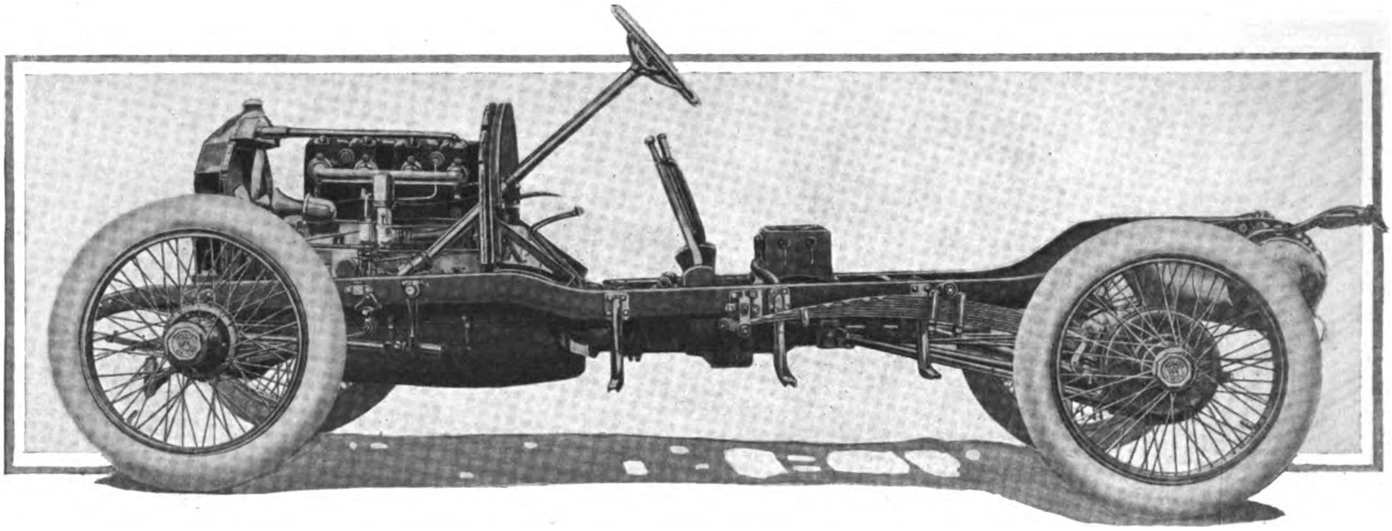
The equipment, which is included in the list price, includes a two-piece ventilating rain-vision windshield, one-person top with cover, demountable rims, Stewart speedometer driven by a gear from the rear of the gearbox, ignition lock, motor-driven warning signal, adjustable tire carriers and the usual jack, tools, foot and robe rails and tire repair outfit.

In addition to this new model, the Kissel company is continuing all its other models as follows: 60-Six, $3,150; 48-Six, $2,350; and 36-Four, $1,450.

B. S. A. Profits for Year $952,150

LONDON, ENG., Dec. 1—The annual statement of the Birmingham Small Arms Co., Ltd., also known as the B. S. A., the largest motor concern in England is always awaited by the British automobile trade with much interest, because, since the old Birmingham manufacturers have taken over the British Daimler works it has become one of the leading automobile manufacturing concerns not only on British soil but of Europe.

The fiscal year ending in 1914 shows a total profit of $952,150 equal to about 12.7 per cent. of the capital stock of the concern which is $7,500,000. A dividend of 15 per cent. has been declared, which with the exception of 3 years, is the same the concern has declared during the last 13 years. A quarter of a million dollars has been placed on reserve and $341,420 has been carried forward.



Side view of four-cylinder chassis of 1915 Willys-Knight, showing mounting of motor with its detachable cylinder heads, cantilever rear springs, left drive and center control, and also of horn and storage battery

Refinements Mark New Willys-Knight

Chassis Changes Include Addition of Tire Pump, New Carbureter and Use of Ball Bearings in Gearbox

THE most important change noted in the 1915 Willys-Knight made by the Garford Co., Elyria, O., is the reduction of the price from $2,750 to $2,475. The mechanical changes that distinguish the new model are in the details, the body lines have been improved, a four-cylinder, motor-driven pump has been installed, a Zenith carbureter added and ball bearings substituted for rollers in the gearset and rear axle.

Removable Cylinder Heads

Dimensions of the four-cylinder motor remain at 4 by 5.5 inches, giving a rating of 40-45 horsepower. The cylinder heads are removable and the return connections to the radiator are attached to the heads. The intake manifold is a simple T design. The carbureter is carried high on the left side of the motor so that the manifold is very short and the possibility of condensation negligible. A hot air pipe is fitted. Also on this side of the motor is the oil filler opening which is situated in the front arm of the crankcase and the oil gauge which is located in the rear motor arm.

On the right side of the motor are found the centrifugal water pump, tire pump and Simms magneto. The pump is placed at the front and the magneto to the rear, the latter being driven directly from the pump shaft. Between these two units is a gear which meshes with an idler driving the tire pump.

Force-Feed Oiling

The crankshaft is carried on five plain bearings and the eccentric shaft which drives the sleeves is mounted on three bearings. Oil is distributed to all the bearings by a force feed controlled by the throttle. A gauge on the cowl shows the pressure maintained in the system at all times.

The starting and lighting generator is a single unit U. S. L. system combined with the flywheel. Starting current is furnished by a 24-volt, 80-ampere hour storage battery mounted under the front seat. The generator is completely housed in a bell extension of the crankcase.

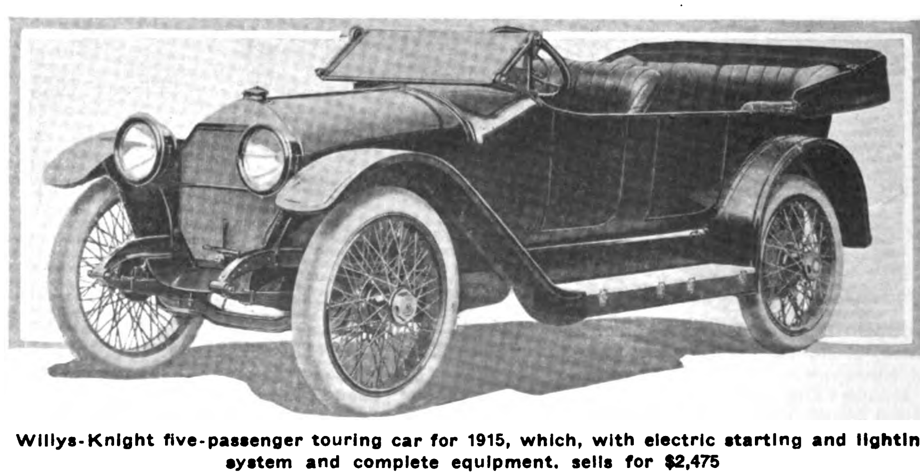
Power is transmitted from the motor to the gearset by a leather faced cone clutch with springs under the leather to insure easy and gradual engagement and a clutch brake to slow the clutch down when disengaged and thus facilitate gear changing.

Four-Speed Gearset

The gearset is a four-speed unit mounted amidships. Direct drive is on third. The gears have wide faces, it is stated, and are made from heat-treated vanadium steel. As previously noted, the gear shafts are now mounted on ball instead of roller bearings.

The rear axle is a floating type with worm driving gears. The worm is situated under the wheels so that it is continually submerged in oil thus affording maximum lubrication and minimum wear. This construction also gives straight line drive.

Two sets of brakes, both operating on the wheel drums, are provided. The service set are external contracting and the emergency internal expanding.



Willys-Knight five-passenger touring car for 1915, which, with electric starting and lighting system and complete equipment, sells for $2,475

The front axle is an I-beam drop-forging, being made in one heat without welding. Renewable bronze bushings are employed in the steering arms, ball thrust bearings in the steering knuckles and taper roller bearings in the hubs. It is stated that the steering knuckles are so designed that a very short turning radius is allowed.

Lanchester Rear Springs

In the rear, the Lanchester cantilever method of spring suspension is continued. This spring is an inverted semi-elliptic which is fulcrumed at its center to the frame and shackled at its forward end. The rear is carried under the axle where it rests upon a roller, permitting a free backward and forward movement and removing the dead weight of the spring from the rear axle, thus tending to improve the riding qualities of the car and to decrease the wear and tear on the tires.

Since the range of travel of the cantilever spring for a certain up and down movement of the axle is only about one-half the distance in the ordinary half-elliptic, the former moves up and down at a slower speed than the latter and the shocks to which the passengers are submitted are just that much less. The dimensions of the springs are 52 by 2.5 inches.

Semi-elliptic springs are used in front, these measuring 38.5 by 2.25 inches.

Left Drive and Center Control

Left drive with center control is standard. The steering wheel has a diameter of 18 inches and is a worm and full gear type. These parts are hardened steel and adjustable and are equipped with ball thrust bearings.

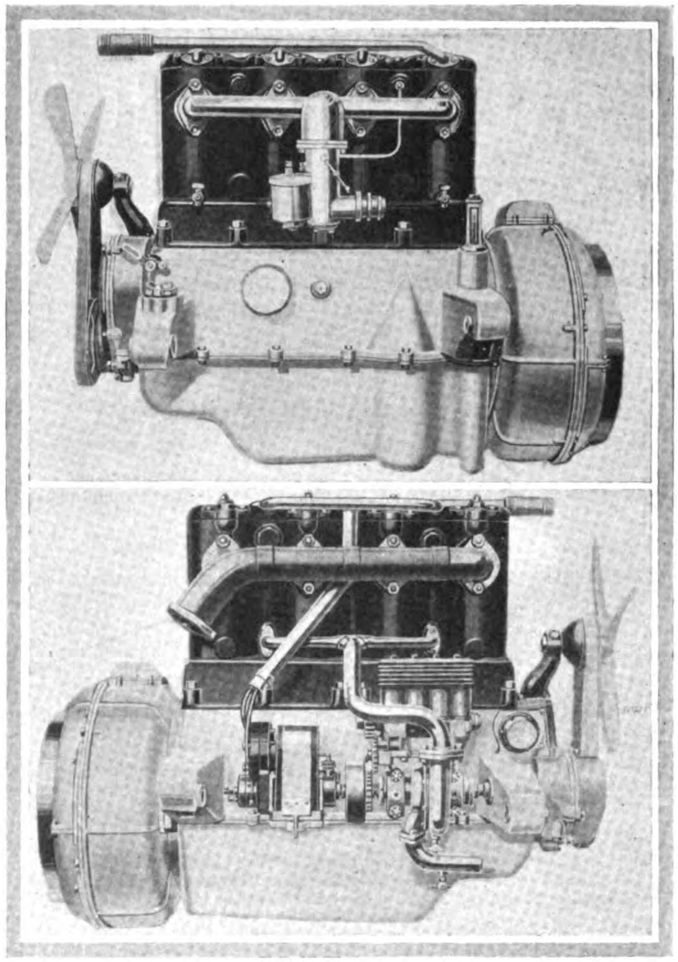
Turning to the body, it will be noted that the lines have been improved somewhat, giving the car a better streamline form. The body is composed of steel and wood, all hinges are concealed and the latches operate from the inside. The finish is dark blue with ivory striping, and the metal parts are nickel trimmed.

The new body furnishes an abundance of leg room for the tonneau passengers so that with three in the tonneau there is no crowding. The seats are extra wide. High seat backs and deep upholstery add to the comfort. Full Turkish roll cushions are used. The flexible springs in the upholstery are filled with selected curled hair and covered with long, straight-grained hand-buffed leather. The front seats are adjustable, permitting the position best suited to the driver.

New Instrument Board

An instrument board extending across the body under the upper edge of the cowl is a new feature on the Willys-Knight. This brings all of the indicating devices into a position just a trifle below the driver's ordinary line of vision. The electric light switches are also conveniently located and can be reached without effort. The electric horn button is placed at the top of the steering column.

The equipment includes complete electric starting and lighting equipment, one-hand extension mohair top with storm curtains and top boot, windshield of the folding type, inspection lamp, engine driven, four-cylinder power tire pump, speedometer driven from the gearset, electric horn, extra wire wheel and carrier, long tool boxes under the running boards, robe rail, foot rest, tire repair kit, jack and tools. Tires are 36 by 4.5 inches, fitted on quick detachable rims.



Upper—Intake side of four-cylinder motor used in Willys-Knight for 1915. Note high mounting of carbureter and housing for USL starting and lighting system

Lower—Exhaust side of motor, showing mounting of new four-cylinder tire pump, centrifugal water pump and Simms magneto. Also note neat method of wiring and strong fan attachment

200 Goodyear Family Homes Completed

AKRON, O., Dec. 14—After a year in the making, the plan of the Goodyear Tire & Rubber Co., of this city to provide modern homes for its workmen at actual cost, has made such progress that it is regarded as one of the interesting sights of the city.

Nearly 200 homes have already been completed and occupied and many more applications for homes will be acted upon as soon as the return of spring makes building operations possible.

President F. A. Seiberling, whose idea it was, bought several farms at the edge of town, not far from the works. A design for the community was arranged by an eastern landscape gardener. Streets were laid out in graceful curves, pavements and sidewalks, sewers and gas and water pipes, etc., put in, all on large contracts, and the total cost of the land plus the improvements was divided into actual lot prices, without profit. Then contracts for houses were let in large numbers insuring lowest costs, and the completed properties turned over to workmen and paid for as rent. No down deposits are required.

Individuality in Houses

One of the strongest features of the plan is that every house has individuality. It in no way resembles the usual "company house." Brick, brick and stucco and frame are included in the designs, of which there are dozens—and each has its proportions and style in harmony with the whole plan.

Men who have been prevented from owning homes because of inability to make "down payments," now become home owners. The community already has its church, school and stores.

It is expected that the community, built upon the hills just outside the eastern limits of the city of Akron, will finally contain about a thousand homes.

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New York's Delay

WHAT is wrong with old New York?

Indianapolis built its speedway years ago, thanks to the enterprise of four Hoosier citizens, and has made good. Minneapolis, in the face of a national depression, is building hers for the Northwest. Chicago, where there has been continuous hesitation for the past 3 or 4 years, has at last fallen into line. Sioux City, Iowa, started 2 years ago and has made good. The Pacific coast has corralled everything in the speed record field. Even the South in Texas has made good. But, why New York? Here within a short radius is a population approaching 9,000,000, ample patronage for a flock of speedways. Here in New York, the cradle of automobile racing in America, there is a most noticeable dearth. The coveted Vanderbilt that was conceived and nurtured on Long Island has wandered to the Pacific, where the energetic Californians have taken pity on it. Why New York?

Light Armored Cars

FRANCE, as well as other belligerents, has learned that weight and height are the two big handicaps on armored cars, truly a page taken from standard automobile experience. Too much weight or armor plate consumes the good in the car. The armored car, as with many other devices is largely a compromise, a middle course between the heaviest armor that would withstand bullets and the lighter armor that allows speed and a factor of protection. But in this war speed is often more desirable than over protection, and so France in its latest fleet of armored machines, described in other columns in this paper, has aimed at high possible speed at the expense of over armoring. The wheels are left entirely exposed, as they offer the poorest target—in fact the enemy will generally endeavor to disable the gun. Light weight and speed reduce this possible danger, in that a swiftly moving car offers a much poorer target than a slower moving vehicle.

Ethics of Attack

SINCE 1910 the use of block cast cylinders has increased from 8 to nearly 68 per cent. notwithstanding the usual arguments launched against the practice for years by those who saw to it that their method of casting singly, in pairs or in threes was infinitely superior to the block method. In spite of these continuous charges the block continues to gain, and unquestionably when the figures for 1916 are compiled the percentage will be still higher. How long before some makers will be content to watch new developments take their place in the industry without the usual muck-raking methods, worthy of some crossroad political campaign, being followed by those concerns that do not believe in the new or who for manufacturing or other reasons are compelled to use the older designs for some time. Manufacturing ethics would dictate at least a passive policy, yet the events of the last 5 years reveal several instances of where a maker openly attacked a type of design that he intended to use the following season, but which he thought he was required to attack because it did not coincide with his present methods. How long?

The Boomerang

LITTLE did some unsuspecting maker or salesman imagine when he first gloried in the overcapacity ability of a motor truck that the day would not be far distant when the makers would as a unit have to actively campaign against such destructive practices. It is not 3 years since a big metropolitan buyer made it a requisite of the demonstration that each truck should carry 100 per cent. overload at approximately 50 per cent. over the rated vehicle speed. The fastest performer was given the initial order. Today the tables are turning and our makers are finding it necessary to institute a campaign, one platform of which is to prevent spring makers supplying to owners stronger springs for a truck than those originally fitted, the ostensible object of the owner being to fit stronger springs to care for more overload. Brass-band salesmanship may appear attractive for a single order, but it proves very costly when adopted by the masses.

Exports for 10 Months Ending October Total $21,241,860

20,262 Passenger Cars Valued at $17,888,351 and 1,309 Trucks Worth $3,353,509 Sent to Foreign Countries—Great Britain Is Largest Buyer

WASHINGTON, D. C., Dec. 12—The detailed figures of the imports and exports of automobiles and trucks during October and the 10 months ended October, together with figures for the corresponding periods of last year, were made public today by the federal bureau of statistics. The general figures were published exclusively last week in THE AUTOMOBILE. The figures are of particular interest at this time as showing the influence of the European war on our import and export trade. The complete tabulation appears herewith.

In October 672 commercial cars, valued at $2,286,964, and 732 passenger cars, valued at $768,387, were exported, as against seventy-nine commercial cars, valued at $129,506, and 1,697 passenger cars, valued at $1,663,716, exported in the same month last year. The exports for the 10 months ended October last were 1,309 commercial cars, valued at $3,353,509, and 20,262 passenger cars, valued at $17,888,351. During the same period in 1913, 857 commercial cars, valued at $1,480,646, and 21,872 passenger cars, valued at $21,614,434, were exported.

The imports of passenger cars increased during October. Last year for that month, twenty-nine cars were imported while in October, 1914, thirty-two were brought from the other side. Ten of these were from the United Kingdom, which led all the other countries.

Exports to Non-Contiguous Countries

WASHINGTON, D. C., Dec. 12—Figures have been compiled showing the exports of motor cars and parts to the non-contiguous territories of the United States during October and the 10 months ended October, together with the figures for the corresponding periods of last year. The figures show that in October a year ago three cars, valued at $2,536, and parts, valued at $82, were shipped to Alaska. There were no cars shipped to Alaska in October last and the parts shipments were valued at $321. During the 10 months' period the shipments of cars increased from twenty-six, valued at $24,549, in 1913, to fifty-four cars, valued at $60,703, in 1914, while parts shipments increased from $3,176 to $8,100.

Hawaii Takes 139 Cars in October

Hawaii received 139 cars from this country in October last, the value of which was $120,247, while in October a year ago 29 cars were sent to the islands, the value being $49,083. During the 10 months' period the shipments increased from 496 cars, valued at $861,005, in 1913, to 753, valued at $764,029, in 1914. Parts shipments decreased from $8,172 in October, 1913, to $7,874, in October last, but increased from $76,435 to $79,535 during the 10 months' period.

Shipments of cars to Porto Rico increased from twenty-seven, valued at $31,972, in October, 1913, to thirty-six, valued at $33,275, while parts shipments fell from $5,792 to $5,241.

During the 10 months' period the car shipments increased from 232, valued at $295,703, to 284, valued at $268,632, while parts shipments decreased from $71,895 to $58,358.

During October last 5 cars were shipped to the Philippine Islands, the value of which was $10,790, while in October a year ago the number was 69 and the value $83,474. During the 10 months' period the shipments declined from 550, valued at $687,300, to 360, valued at $371,541. Shipments of parts increased from $7,776 in October, 1913, to $8,768, but decreased from $57,586 to $43,893, during the 10 months' period.

	October				10 months ending October			
	1913		1914		1913		1914	
	Number	Value	Number	Value	Number	Value	Number	Value
EXPORTS								
AUTOMOBILES:								
Commercial	79	$129,506	672	$2,286,964	857	$1,480,646	1,309	$3,353,509
Passenger	1,697	1,663,716	732	678,387	21,872	21,614,434	20,262	17,888,351
Total	1,776	$1,793,222	1,404	$2,965,351	22,729	$23,095,080	21,571	$21,241,860
BY COUNTRIES.								
AUTOMOBILES:								
France	59	$35,759	108	$171,049	714	$546,090	1,152	$796,685
Germany	32	27,923	......	....	890	775,466	1,063	799,552
Italy	18	19,172	2	1,450	277	241,180	233	151,698
United Kingdom	283	250,293	415	829,982	4,183	3,184,530	5,545	5,111,008
Other Europe	82	91,421	346	1,461,191	1,565	1,355,249	2,736	3.357.408
Canada	298	423,016	127	143,916	5.558	7,473,333	3,981	5,024.978
Mexico	24	41,354	5	8,200	199	362,733	73	87,384
West Indies and Bermuda	35	36,110	72	51,792	405	397,538	466	394,342
South America	182	181,230	48	33,242	2,271	2,554,210	963	775,504
British Oceania	356	310,163	190	169,582	2,774	2,585,389	3,075	2,619,212
Asia and other Oceania	231	226,694	63	71,956	2,001	1,974,777	1,295	1,240.336
Other countries	176	150,087	28	22,991	1,892	1,644,585	989	883,753
Total	1,776	$1,793,222	1,404	$2,965,351	22,729	$23,095,080	21,571	$21,241,860
TIRES:								
Belgium	....	$180	......	....	......	$98,949	......	$301
Germany	....	3,238	......	....	......	425,773	......	81,917
England	....	68,135	......	$103,894	......	1,198,419	......	1,174,955
Canada	....	79,606	......	37,093	......	1,057,285	......	833.065
Mexico	....	19,965	......	9,792	......	133,663	......	59,957
Philippine Islands	....	9,418	......	31,735	......	111,257	......	124,310
Other countries	....	56,574	......	65,045	......	455,785	......	529,407
Total	....	$237,116	......	$247,559	......	$3,481,131	......	$2,803,912

	October				10 months ending October			
	1913		1914		1913		1914	
IMPORTS	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles ....Dut.	29	$74,646	32	$79,476	417	$983,445	218	$373,086
Parts of (except tires).Dut.	....	50,595	......	85,564	......	242,031	......	784,188
BY COUNTRIES.								
AUTOMOBILES:								
France	15	$38,961	2	$1.837	158	$370,272	60	$118,204
Germany	1	3,000	1	3,852	78	205,931	11	20,408
Italy	6	11,455	1	2,526	74	137,373	67	76,906
United Kingdom	5	16,691	22	67,436	42	128,993	46	118,469
Other countries	2	4,539	6	3,825	65	140,876	34	39,099
Total	29	$74,646	32	$79,476	417	$983,445	218	$373,086

Spring Maker to Work with Truck Builder

Will Decline to Increase Spring Suspension for Dealers or Owners Without Consent of Truck Manufacturers—To Prevent Overloading Vehicles

NEW YORK CITY, Dec. 12—Manufacturers of leaf and supplementary springs have been asked by the Commercial Vehicle Committee of the N. A. C. C. to co-operate with the Chamber in its efforts to discourage the overloading of motor trucks.

Attention of the truck makers having been called to instances in which dealers and truck owners have asked spring makers to increase the capacity of the rear spring suspension of trucks so that loads greatly in excess of the rated capacity of the chassis could be carried, a circular letter was addressed to spring makers in general, stating that the truck manufacturing members of the Chamber of Commerce almost unanimously deprecated such practice, which leads to overloading and consequent injury of the vehicle.

It was pointed out that the springs as originally built into the chassis are carefully proportioned to the axle, wheels, tires, and driving mechanism, which are guaranteed only for the factory rated load capacity, and that the substitution of stronger springs and the carriage of heavier loads causes unexpected stresses in these parts, with probable consequent breakages.

A number of spring makers already heard from have agreed to notify the truck manufacturer of any orders received from dealers or owners to increase the spring capacity of his trucks and to decline to fill such orders without his consent, as suggested by the N. A. C. C.

Annual Banquet for January 5

In connection with the Fifteen Annual Automobile Show at Grand Central Palace in New York, the National Automobile Chamber of Commerce has decided to hold its annual banquet at the Waldorf-Astoria on Tuesday, January 5, 1915, which is during show week. The Banquet Committee, consisting of Messrs. Hugh Chalmers (Chalmers), chairman; Henry B. Joy (Packard); Benjamin Briscoe (Briscoe); Chas. T. Jeffery (Jeffery); and Fred W. Haines (Regal), has promised some interesting and novel features.

Plantation Rubber Shipments for United States

NEW YORK CITY, Dec. 14—The English embargo on the shipment of rubber from the Far East is still in effect; consequently only a relatively small amount of it is afloat. Negotiations are now in progress which may result in the shipment of some plantation rubber from London to this city for the United States Rubber Co. and its subsidiaries. Arrangements have been made for the sailing of two ships, carrying the Dutch flag, direct from Sumatra to New York City, loaded with plantation grades of rubber for the above company. They are to leave the Far East this month. The steamship Hawaiian, of the Hawaiian-American Line, arrived in this port last week from the west coast of Africa with a cargo of rubber consigned to the Continental Rubber Co., this city.

As a result of the English embargo and the interruption of transportation earlier by German cruisers, the price of both plantation and Brazilian grades has advanced sharply. It is pointed out, however, that the price now is governed almost wholly by the manner of transportation. If satisfactory shipping facilities could be arranged, it is stated, the prices for both plantation and Para rubber would decline. The falling off in consumption in Europe has been pronouncd because of the war, and this country has been at least 15 per cent. below last year. The output of rubber, both in the Far East and in Brazil, has been large. If it could only be placed safely in the hands of consumers the supply would be materially in excess of the demand, which, of course, would bring prices down, as already stated. At the present time the stocks of crude rubber in the United States are comparatively small. There is plenty of it in England, but it is being held there because of the fear that if it is released it would find its way into the hands of manufacturers in countries with which England is at war.

A number of the large Akron factories are busy supplying large war orders for rubber goods. As a result the rubber stock market has become materially strengthened. Stocks have leaped from $6 to $45 a share.

Cocoanut Water as Rubber Coagulant

NEW YORK CITY, Dec. 14—An article appearing in the Daily Consular and Trade Reports states that an important discovery, it is claimed, has been made in the use of cocoanut water as a rubber coagulant. Millions of gallons of cocoanut water, which now runs to waste, can be utilized as a profitable by-product.

Details of the process are not now available, but it is understood that the cocoanut water is allowed to ferment for 4 or 5 days, after which it can be used immediately for coagulating latex. One to 2 ounces of the fermented liquid will coagulate 1 pint of pure latex. It is said to produce a better rubber than that procured from the present method of using crude acetic acid, especially so far as color goes, and clearer than that obtained from the cocoa-fermentation acid treatment.

Automobile Safety Devices on Exhibition

NEW YORK CITY, Dec. 13—The second annual safety and sanitation exhibition in Grand Central Palace opened today. There are 200 booths devoted entirely to safety devices and inventions. Among the safety devices are several for automobiles, namely, the Auto Signalite, a rear signal manufactured by the Auto Signalite Co., this city; the McNutt non-explosive gasoline can, McNutt Can Co., this city; the Matisse no-glare spherical paraboloid lenses and electric dimming devices, C. & A. Matisse, this city, and the elastic safety buffer, Douglass Mfg. Co., this city. There are also a number of accessories such as the Shaw one-piece wrench, J. Edward Dunn Co., this city, and the Recordograf, a tape recorder, for use in commercial car work, American Taximeter Co., this city. This company also shows a taximeter and a hub odometer, called the Transimeter. The Bristol Co., Waterbury, Conn., is manufacturing the Bristo patent safety set screws.

In the Exposition of Inventions such recent inventions as the automobile automatic turning headlight, patented by Charles S. Parcells, No. 1,091,532, March 31, 1914, and an automatic locknut and axle for vehicles patented by G. Huettner, No. 846,349.

Design for Made-In U. S. A. spirit that is being widely suggested

Automobile Securities Quotations

NEW YORK CITY, Dec. 15—On Saturday the Stock Exchange was re-opened after the longest recess in its history. On Monday it was announced that the market was open for tradings in all securities, upon which the already bustling activity increased at once. Nearly all the stocks showed slight gains over the quotations for last week and some were substantially higher. General Motors common went up 8 1-2 points and the preferred 3 1-2, Willys-Overland common gained 3 1-2, Maxwell stocks went up slightly and Reo Truck added 1-2 point. Studebaker common dropped and preferred gained 1 point. Of the tire stocks, Swinehart showed the largest gain by climbing from the 69 of last week to 87, or an increase of 17. Goodrich preferred went up 6 points and the common lost 1-2. Goodyear common added 5 points and preferred 1. U. S. Rubber gained 5.

	1913		1914	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co. com	195	220	250	..
Ajax-Grieb Rubber Co. pfd	97	102	100	..
Aluminum Castings pfd	98	100	95	100
J. I. Case pfd	..	..	..	..
Chalmers Motor Co. com	..	94	..	90
Chalmers Motor Co. pfd	90	95	87½	92½
Electric Storage Battery Co	..	..	48½	49½
Firestone Tire & Rubber Co. com	235	242	340	..
Firestone Tire & Rubber Co. pfd	100	101	109	111
Garford Co. pfd	78	90	..	..
General Motors Co. com	35¾	37	84½	86½
General Motors Co. pfd	75	76	89½	91½
B. F. Goodrich Co. com	17	18	25	26
B. F. Goodrich Co. pfd	75½	76	94	96
Goodyear Tire & Rubber Co. com	185	192	185	191
Goodyear Tire & Rubber Co. pfd	90	92	101	102
Gray & Davis, Inc., pfd	94	101	..	..
International Motor Co. com	..	5	..	..
International Motor Co. pfd	..	14	..	..
Kelly-Springfield Tire Co. com	..	..	68	69
Kelly-Springfield Tire Co. 1st pfd	..	..	77½	78½
Kelly-Springfield Tire Co. 2d pfd	..	..	95	97
Maxwell Motor Co. com	2½	3	14¼	14½
Maxwell Motor Co. 1st pfd	18¼	18¾	43½	45
Maxwell Motor Co. 2d pfd	6½	7	17½	18½
Miller Rubber Co	115	121	160	..
New Departure Mfg. Co. com	140	150	..	..
New Departure Mfg. Co. pfd	100	102	..	..
Packard Motor Car Co. com	..	..	..	100
Packard Motor Car Co. pfd	90	95	90	..
Peerless Motor Car Co. com	15	25	15	20
Peerless Motor Car Co. pfd	75	80	..	55
Pope Manufacturing Co. com	1	3	..	..
Pope Manufacturing Co. pfd	10	15	..	..
Portage Rubber Co. com	..	30	25	30
Portage Rubber Co. pfd	..	85	80	85
*Reo Motor Truck Co	5	7	10½	11½
*Reo Motor Car Co	13½	14½	21½	22½
Splitdorf Electric Co. pfd	40	45	..	..
Stewart-Warner Speed. Corp. com	55	57	47	49
Stewart-Warner Speed. Corp. pfd	95½	97½	97	100
Studebaker Corp. com	17	18	32½	34
Studebaker Corp. pfd	65	67½	87	88
Swinehart Tire & Rubber Co	65	70	87	88
Texas Co.	..	..	130½	132½
U. S. Rubber Co. com	54	55	50	..
U. S. Rubber Co. pfd	100	100¼	100	102
Vacuum Oil Co	191	194	198	204
White Co. pfd	105	110	107	110
Willys-Overland Co. com	58	62	80	84
Willys-Overland Co. pfd	81	85	86	90

*Par value $10; all others $100 par value.

Market Reports of the Week

MARKET prices this week were mostly steady. A few of the metals, however, rose. Both copper and tin saw a steady rise from Wednesday. Both electrolytic and Lake coppers rose $0.00 3-8 a pound while tin rose $1.85 per 100 pounds. Lead remained steady but quiet. Antimony is in moderate demand and weaker at $0.12. Cyanide potash came down $0.02 a pound. Sulphuric acid is meeting with a seasonable demand, and the market retains a steady tone. Cottonseed oil dropped to $5.68 a barrel this week, a drop of $0.13. The market for plantation rubber and fine Up-River Para, was firmer, but aside from this, the situation lacked new features. Consumers manifested little interest in the situation, being disposed, apparently, to use up some of the supplies on hand before purchasing freely.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.13	.13	.13	.13	.13	.12	—.01
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	1.21	......
Bessemer Steel, ton	18.00	18.00	18.00	18.00	18.00	18.00	......
Copper, Elec., lb.	.12¼	.12¼	.12 9/10	.13	.13⅛	.13⅛	+.00⅞
Copper, Lake, lb.	.12⅞	.12⅞	.13	.13⅛	.13¼	.13¼	+.00⅜
Cottonseed Oil, bbl.	5.81	5.81	5.84	5.80	5.75	5.68	—.13
Cyanide Potash, lb	.23	.23	.21	.21	.21	.21	—.02
Fish Oil, Menhaden, Brown	.38	.38	.38	.38	.38	.38	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	.90	.90	......
Lead, 100 lbs.	3.80	3.80	3.80	3.80	3.80	3.80	......
Linsed Oil	.47	.47	.47	.47	.47	.47	......
Open-Hearth Steel, ton	18.00	18.00	18.00	18.00	18.00	18.00	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.71	.71	.71	.71	.71	.71	......
Rubber, Fine Up-River, Para	.71	.71	.71	.71	.71	.71	......
Silk, raw, Ital	..	3.90	..	..	3.90	3.90	......
Silk, raw, Japan	..	3.17½	..	..	3.17½	3.15	—.02½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	......
Tin, 100 lb.	32.75	32.75	33.50	33.75	34.25	34.60	+1.85
Tire Scrap	.05	.05	.05	.05	.05	.05	......

Hood Tire Co. Is Organized

WATERTOWN, MASS., Dec. 12—The Hood Tire Co. has been organized as a distinct corporation to manufacture automobile tires in Watertown, Mass., instead of having the work done as part of the general production of the Hood Rubber Co. The latter company does a big business in all kinds of rubber goods, including tires, but it was felt that there should be a separate company formed for the tires so that it could be better developed. Charles W. Daily is president and treasurer and Herbert E. Ross and Robert Muir are the other officers. The new company's capital is $20,000.

LANSING, MICH., Dec. 15—The Reo Motor Car Co. has declared its regular quarterly dividend of 2 1-2 per cent. payable January 1 to stock of record December 19.

Unisparker Wins Medal for Kent

PHILADELPHIA, PA., Dec. 11—Arthur Atwater Kent, of the Atwater Kent Mfg. Works, Philadelphia, Pa., has been awarded the John Scott Legacy and Premium by the City of Philadelphia for the Atwater Kent Unisparker and ignition system. This medal and premium were bequeathed by John Scott, chemist, of Edinburgh, who in 1816 created an endowment to the City of Philadelphia directing the interest and dividends to be divided annually among "ingenious men who make useful inventions." In 1834 the city vested the award of this medal in the Franklin Institute of the State of Pennsylvania. This is believed to be the first time that this medal has been awarded to a manufacturer of automobile parts.

Both sides of John Scott medal, presented to Arthur Atwater Kent

Walker Absorbs Chicago Electric

Truck Concern Buys Factory and Business—To Make Three Passenger Models

With the Property Practically Complete Organization Will Go with Walker Co.

CHICAGO, Dec. 14—The Walker Vehicle Co. of this city, maker of electric commercial cars, has purchased the factory and business of the Chicago Electric Motor Car Co. maker of Chicago electric passenger vehicles, which concern suspended business in October of this year. The manufacture and sale of Chicago electrics will be continued, the construction work to be done at the plant of the Walker company and the sales for Chicago on the site of the former sales agency for these cars. With the transfer of property practically the complete organization including the factory and service men will continue with the Walker company, Gail Reid formerly secretary and sales-manager of the Chicago Electric Motor Car Co., taking the office of general sales-manager.

Under the name of Chicago electrics the Walker company will market three models known as Models 151, 152 and 153. Models 151 and 153 are rear seat drive, four-passenger limousines, identical except that in Model 153 the right front seat is revolving, while in 151 the front seat extends across the car and is stationary. These models sell at $2,650. Model 152 is a front seat drive, five-passenger limousine and sells for $2,850.

The Chicago Electric Motor Car Co. was organized in 1912 by the late Frederick J. Newman. It was reorganized in November, 1913, for the purpose of expanding the business and invading the commercial-car field. In October, 1913, arrangements were made to liquidate the entire business.

Hoosier Automobile Men Are Optimistic

INDIANAPOLIS, IND., Dec. 14—The industrial and financial situation in Indiana has clarified to an encouraging extent and automobile interests regard the outlook for the coming year as very encouraging. Manufacturers of motor cars, parts and accessories have taken an increased activity within the last few days and still further improvement is promised.

The money market is much easier than it has been for several months which has permitted a resumption of activity in many lines. Orders for war equipment from European countries has caused thousands of men to be put back to work.

In the rural communities there has been little complaint, for farmers have had a prosperous year, due to large crops. The only complaint has been of losses suffered in certain parts of the state through the foot and mouth disease.

Kalamazoo Co. to Build 200 Trucks

KALAMAZOO, MICH., Dec. 12—According to President F. G. Clark, the Kalamazoo Motor Vehicle Co. will build 200 trucks in 1915. During the first year of the company, which ended in September, the output was twenty-five trucks. President Clark declares that during the second year of the existence of the company it is planned to build 200 thirty horsepower, 1 1-2 ton trucks, similar in design to the first model, although with several minor improvements which have been adopted. For those who desire to combine a light and heavy truck in one vehicle the company has devised the use of a trailer which will carry 3 tons, giving a capacity of 4 1-2 tons per haul.

Goodyear Officers and Directors Re-Elected

AKRON, O., Dec. 12—At the annual meeting of the Goodyear Tire and Rubber Co., last week, the stockholders reelected the directors, F. A. Seiberling, C. W. Seiberling, G. M. Stadelman, F. H. Adams, P. W. Litchfield, H. B. Manton and J. P. Loomis—and the officers of the company were also reelected, as follows: F. A. Seiberling, president and general manager; C. W. Seiberling, vice-president; G.. M. Stadelman, secretary; F. H. Adams, treasurer; W. E. Palmer, assistant treasurer, and P. W. Litchfield, factory manager.

DETROIT, MICH., Dec. 12—The stock, machinery and equipment of the bankrupt Benham Mfg. Co., which made the Benham six cars has been purchased by the Frank Bros. Iron & Metal Co., Orleans and Grand Boulevard, for $4,500. The assets of the defunct company were estimated by it to be worth about $40,000 but the appraisers reduced this figure to $15,000. The Union Trust Co., receiver, has not yet disposed of the real estate. The Puritan Mfg. Co. was the purchaser of the repair parts, tools, jigs, drawings, good will and name of the Benham company.

Form Company to Make Searle Tube

NEW YORK CITY, Dec. 12—The Searle Unburstable Inner Tube Co. has been incorporated in New York State with the ultimate object of manufacturing the Searle Unburstable inner tube; the tube is an English product which was demonstrated in New York City but a few months ago. The plans of the company are not fully developed. The incorporators are two attorneys and Orson Kilborn, son of Horace M. Kilborn, of the National City Bank, New York. The capitalization is $400,000.

Lyons-Atlas Capital Is $1,500,000

INDIANAPOLIS, IND., Dec. 12—An increase in capitalization from $1,000,000 to $1,500,000 has been made by the Lyons-Atlas Co., of this city, which is preparing to market a new, medium-priced car. Experiments on the new car have been under way for several months and are nearly completed.

Sparks Elected Mayor of Jackson

JACKSON, MICH., Dec. 8—William Sparks, secretary and treasurer of the Sparks-Withington Co., was today elected mayor of this city by a vote of almost 2 to 1 over his competitors. Mr. Sparks was a representative of the Charter Club, an organization for the maintenance of good government in Jackson.

DETROIT, MICH., Dec. 12—Frank J. Mooney, sales and advertising manager, and Charles E. Buck, his assistant, have resigned from the Hupp Motor Car Co. Their successors have not been chosen. Mooney had directed the Hupp advertising for several years and some time ago assumed charge of sales, Buck becoming his assistant at that time.

NEW YORK CITY, Dec. 12—J. C. Nichols, Inc., 1671 Broadway, at present New York City distributor for Wheeler & Schebler, Indianapolis, Ind., has been appointed exclusive Eastern representative of the Disco Co., Detroit, Mich. He will distribute the newly perfected Disco electric lighting and starting system for Ford cars.

Co-operative Plan for Federal Truck Dealers

NEW YORK CITY, Dec. 14—A new plan to get co-operation among truck dealers in small towns has been made by M. L. Pulcher, general manager of the Federal Motor Truck Co. His idea is for them to consider the truck needs of their community and recommend to prospective purchasers the particular size and model of truck which tests have proved to be the best for the purpose.

DETROIT, MICH., Dec. 14—Charles Denby will take charge of the export sales department of the Hupp Motor Car Co. He recently resigned from the United States Diplomatic Service to take the above position. He was Consul General to Vienna, having left his post there on a leave of absence November 18, and arriving in this city on December 12 with his family.

NEW YORK CITY, Dec. 14.—The Dimond-Apperson Motor Co., 2000 Broadway, has been appointed Apperson distributor for this city and adjacent territory.

Zenith Elected Member of M. & A. M.

NEW YORK CITY, Dec. 14—At a meeting of the board of directors of the Motor and Accessory Manufacturers, held Friday, the Zenith Carburetor Co., Detroit, Mich., was elected to membership.

Third Used-Car Report Issued

Prices on 128 Makes of Gasoline Cars and 14 Electrics—General Response Throughout Country

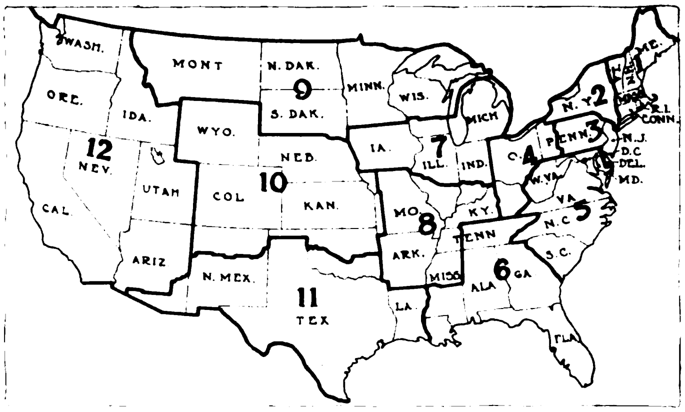
Improvements Planned for Next Issue —Trade Associations Promise Co-operation

CHICAGO, Dec. 14—The Chicago Automobile Trade Assn. has issued its third "Used-Car Central Market Report," which is the third edition since this work was taken up by the association. The prices in this issue are based on actual sales in the Chicago territory during July, August and September. Prices on 128 different makes of used gasoline cars and 14 makes of used electrics are included.

These reports on used cars have met with very general response throughout the country, the only objection thus far offered against the reports being a slight difference in market conditions in various sections of the United States, as compared with the Chicago zone. To correct this discrepancy the association has formulated a plan which is now being put into effect to collect sales data on used cars from different sections of the country with a view to compiling a national report. To collect these data the country has been divided into zones corresponding in area with those adopted by the Federal reserve banking system, and the trade associations within these zones are being asked for co-operation on the prices for used cars sold in the respective territories. A map showing the division of the country according to the Reserve Banking System is used as a basis of the work.

When this step from a local market report to a national one is taken the report pages will be altered, and will appear as in the illustration herewith which is a sample page inclosed in the current edition for the purpose of showing exactly how the national work will appear. The national report will be in the form of a booklet, 12 1-4 by 9. In the last column of each page on the national report will be published the "appraised as is value" for the Chicago zone only. This will be the only appraisement made, but a margin will be left in the book so that trade associations using the book can meet jointly and insert their local appraised value. The first issue containing the values as based on the zone system will appear in January and will be based on sales made during the months of October, November and December.

The work of collecting these sales data by trade associations in the different zones will not be a difficult matter and already several associations have notified the Chicago organization that they will co-operate in making this a national report.



Map of the United States, showing division into zones according to the Reserve banking system, used by Used-Car Central Market Report

Co-operative Garage for Electric Pleasure Cars

NEW YORK CITY, Dec. 12—The often-talked-of plan of a co-operative garage for electric pleasure vehicles has become a reality with the signing of a lease by the New York Electric Vehicle Assn., for a building on the southwest corner of Central Park West and Sixty-second street. A number of the leading manufacturers of electric pleasure vehicles are co-operating with the association in this undertaking. The Rauch & Lang, Detroit and Baker companies will have showrooms in the building, making it their headquarters. The various manufacturers will have their showrooms in the building and these are being rapidly fitted up for occupancy, while the garage itself is being equipped so as to make it in every way ideal for electric cars. It will start with accommodations for 150 cars, of which more than 100 have already been secured. It is planned there will be a fixed charge of $45 a month which will include battery charging, care of the car and taking the car to and from the owner's residence to the garage.

4-90 Five-Passenger Newest Chevrolet

NEW YORK CITY, Dec. 16—A new five-passenger touring car is announced by the Chevrolet Motor Co., New York City and Flint, Mich. It has a 20-horsepower, four-cylinder, valve-in-head type of motor, as conforms with standard Chevrolet practice. It is equipped with a magneto, 30- by 3-inch tires, 102-inch wheelbase and weighs 1,700 pounds, and lists at $490. It is called the 4-90.

It is stated that many special features will be found on this car which will be exhibited for the first time at the New York Show. These features include novelties in spring suspension, a steering gear mechanism, rear seat arrangement, clutch collar and hub cap. It is stated that double-acting, shock-absorbing springs, reinforced at the top and bottom of the center leaf are used and that the machine rides well and holds the road at all speeds. Patents have been applied for.

An unusually simple and light steering gear has been evolved. It is stated that it can be controlled with very little effort and that it will turn the car in a 20-foot circle.

A section of the back of the rear seat is removable, permitting the person occupying the center to relieve what is termed the hip-and-shoulder wedge. This permits a four-and-a-half-passenger car to be converted into a five-passenger car with a comfortable seating capacity. The car has an all-steel body with flush sides and concealed hinges with steel sills and door posts. A speed of 50 miles per hour is claimed.

USED CAR CENTRAL MARKET REPORT

CHALMERS—Mfd. by Chalmers Motor Co., Detroit, Mich.

Model	Year	Type	Pass. Capac.	Cyl.	H. P.	List Price		Chicago Market	Zones 1	2	3	4	5	6	7	8	9	10	11	12	"Chicago Appraised As Is Value."
F	1909	Rbt.-Tour.	2-5	4	24	$1500	As Is..	250	230	220	235	260	277	215	235	280	325	290	850	260	220
							P. O...	300	280	270	285	310	320	265	285	330	375	340	250	310	
							R. B...	350	330	320	335	360	377	315	335	380	425	390	300	360	
E	1909	Rbt. Tour.	2 5	4	40	2750	As Is..	400	380	360	385	410	427	365	385	430	475	440	350	410	300
							P. O...	450	430	410	435	460	477	415	435	480	525	490	400	460	
							R. B...	500	480	460	485	510	527	465	485	530	575	540	450	510	
30-K	1910	Pony Ton.	3-7	4	25	1600	As Is..	340	320	310	320	325	350	305	325	370	415	380	500	350	350
							P. O...	390	370	360	370	375	400	355	375	420	465	430	340	400	
							R. B...	440	420	410	420	425	450	405	425	470	515	480	390	450	
30-K	1910	Rd.-Tr.	3-7	4	25	1500	As Is..	400	370	380	385	410	427	365	385	430	475	440	440	410	350
							P. O...	450	420	430	435	460	477	415	435	480	525	490	400	460	

USED CAR CEN

Sample page from Used-Car Central Market Report inserted in third issue to show how pages will look in the national report which is now being prepared

To Continue Premier Cars

Business Good Under Receiver Smith, Who Is Elected Trustee —Creditors Are Optimistic

INDIANAPOLIS, IND., Dec. 15—Frank E. Smith, who has been receiver of the Premier Motor Mfg. Co., was elected trustee of this organization, at a meeting of the creditors before referee in bankruptcy Albert Rabb, here, and the manufacture of the Premier automobile will be continued.

The meeting developed the fact that the Premier is enjoying prosperity under the administration of Mr. Smith, more business having been done during the period of receivership, than in a similar period before the appointment of the receiver.

The Premier difficulties in the courts started on October 17, and since that time Mr. Smith had pruned down the organization, manufactured automobiles, sold them, and in various ways, profitably adjusted the financial affairs of the company, resulting in the successful building and distribution of the product.

That the Premier company will be allowed to exhibit at the Chicago show, carry on an advertising campaign, and bring out a new model car, in addition to the current models, were all brought up for discussion before the referee in bankruptcy and the assembled creditors.

Creditors stated that the plans, as outlined, would be carried out, as they would unquestionably show a profit, and might eventually bring the Premier back to its original, if not to a better position than it previously occupied.

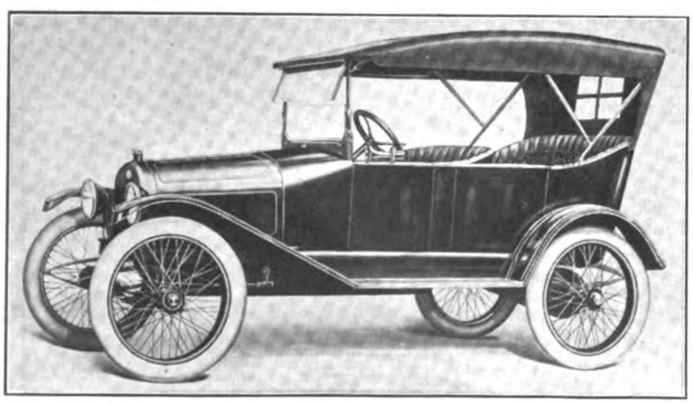
American Motors Discharged from Bankruptcy

INDIANAPOLIS, IND., Dec. 14—The American Motors Co. has been discharged from bankruptcy. The proceeding, a most unusual one, gives rise to what seems to be a well-founded report that V. A. Longaker and associates will soon announce plans for the return of the underslung type of motor cars to the market. Mr. Longaker when seen confirmed the court's discharge of the company from bankruptcy, but beyond saying he had no other announcement to make at the present time, he was quite reticent.

It is not unusual for individuals to receive discharges from the Federal Court in bankruptcy proceedings, but it is uncommon in the case of corporations and it was somewhat of a surprise when Judge Albert B. Anderson in the U. S. district court granted the discharge.

It has been known for a long time that someone would sooner or later revive the underslung type of motor car, such as was manufactured by the American Motors Co. During the company's embarrassment many overtures to revive the car have been made, but no one has been able to get inside plans. That at least 1,000 cars of the underslung type could have been moved from Indianapolis during the past year is believed to be a conservative estimate as a result of the many inquiries received.

The American Motors Co. was organized in Indianapolis in 1905. The plant was located in Indianapolis. It is estimated that between 3,000 and 5,000 cars of this type are now being run in the United States and Canada.



New Metz touring car selling for $600 with 105-inch wheelbase and Gray & Davis starting and lighting system

Stewart-Warner Denies Horn Patent Infringement

NEW YORK CITY, Dec. 15—Denying the charge that its hand-operated horn in any way infringes the Long hand horn patent No. 1,090,080, and claiming that the patent is invalid, the Stewart-Warner Speedometer Corp., of New York, filed its answer yesterday in the suit brought against it and the Stewart-Warner Speedometer Corp. of Virginia last month by Gottfried Piel and the G. Piel Co.

The Stewart-Warner interests claim that the Virginia corporation is not within the jurisdiction of the U. S. District Court for the Southern District of New York, in which the suit is brought, and their attorney will appear before the court Friday with a motion to dismiss the bill of complaint against it on that ground. On Friday the motion of the Piel company for a preliminary injunction will also come up.

In the answer filed by the New York corporation it is stated that its business is separate and distinct from that of the Virginia corporation and that its place of business at 233 W. Fifty-eighth street is not a regularly established place of business of the latter.

It asks for proof of the ownership of the Long patent and states that it is not true that the Stewart-Warner Speed-

Board of directors of Continental Motor Mfg. Co., Detroit, Mich. Left to right—B. F. Tobin, president and treasurer; R. W. Judson, vice-president; A. H. Zimmerman, secretary and assistant-treasurer; W. A. Fredericks, chief engineer; H. J. Warner, second vice-president; G. W. Yeoman, assistant to the president and director of sales

The Anderson Electric Car Co., Detroit, Mich., maker of Detroit electrics, has received orders from London for a number of buses similar to those already in use in that city. These buses, of the type illustrated above, are fitted with 60 A-8 Edison batteries capable of carrying the vehicle 50 miles on a charge. The capacity of each bus is thirty people ometer Corp. of New York has made or sold automobile horns embodying the alleged inventions of patent 1,090,080 and claimed in claims 4, 5, 7, 8, 9, 10, 11, 12, 13 and 14. The answer declares that the only automobile horn the corporation has been selling does not closely resemble the hand-operated horn made by the G. Piel company. It denies that the G. Piel Co. created the hand horn business and states that the Stewart-Warner corporation entered the business of selling hand horns in straightforward business competition and that it was aware of the constructions on the market, none of which, it states, closely resembles the Stewart-Warner warning signal.

The answer goes on to claim that the Long patent is invalid for lack of invention, lack of novelty, for excess and for aggregation, and avers that Long secured his patent with intent to defraud and deceive, the structure covered not being his own but that of A. Aufiero, who is now contesting Long's right to the patent in the Patent Office at Washington. In proof of its charge that the Long patent is invalid the answer cited seven men and firms beside Aufiero who, it states, knew and practiced the alleged invention prior to the alleged invention thereof by Long.

It also cites patents to the number of fifty-nine which, it alleges, embody the ideas of the alleged inventions in the Long patent, and which were granted prior to the latter.

The answer concludes by asking that the bill of complaint against the Stewart-Warner Speedometer Corp. of New York be dismissed with costs.

Metz Touring Car at $600

WALTHAM, MASS., Dec. 14—The Metz Co., this city, has placed on the market a touring car model selling at $600. It has a 105-inch wheelbase and elliptic springs. It is equipped with the Gray & Davis separate unit electric starting and lighting system. The streamline body has flush doors. The hood is tapering with a rounding top. Wire wheels, 32 by 3 1-2-inch, are used with Goodrich clincher tires.

The engine is water-cooled, with Bosch high-tension magneto and A. W. T. carbureter. The cylinders are 3 7-8 by 4, giving a rating of 24.2 horsepower and the valves, push rods and springs are completely inclosed. Other equipment includes a built-in gasoline gauge, speedometer, Hyatt roller bearings, signal horn, tire outfit, jack and tools complete. It has a fiber grip gearless transmission. According to the maker, the car is capable of 5 to 50 miles an hour on high.

More States Declare War Tax

NEW YORK CITY, Dec. 14—The States of Illinois and Ohio have ruled that all applications for registering automobiles and motor trucks, as well as applications for chauffeur's licenses, must bear the usual 10-cent Federal revenue stamp. This ruling will apply on all 1915 registrations.

The State of Maryland, through Collector of Internal Revenue Miles, who raised the point that state licenses are not taxable under the emergency war tax law, has received assurances from the department in Washington that that view is correct. Now that Federal authorities have ruled the collection of war taxes on New Jersey licenses invalid, automobilists don't know how to get their money back.

Refuses to Issue Kentucky Licenses

LOUISVILLE, KY., Dec. 12—Louisville automobile owners whose licenses are about to expire were thrown into a quandary yesterday when the Louisville Automobile Club was advised by the Commissioner of Motor Vehicles at Frankfort not to forward to Frankfort any applications for license renewals, owing to the refusal of Secretary of State Crecelius to accept the recent definition of his duties handed down by the Attorney General.

It was also made known that Secretary of State Crecelius had informed the automobile club that applications for automobile licenses sent to his office would be refused.

About 7,500 licenses, one-fourth of which are those of Louisville people, will expire January 1.

Car and Truck Registrations Steadily Increase

BOSTON, MASS., Dec. 5—The fiscal year for the Massachusetts Highway Commission, that controls the automobiles in the Bay State ended November 30 and the figures just compiled shows that motorists contributed a large amount of money to the state this year. The grand total reaches $965,669.59. That it did not go up closer to the million mark is due to the fact that the motorists showed greater respect for the law, and so while the total number of cars and drivers increased a great deal the fines this year were slightly more than in 1913. The fact that the increase in drivers was about 22 per cent. and the increase in cars 23 per cent. and the fines were nearly the same as a year ago is good evidence that motorists are getting away from the speed mania. The total amount for fees was $925,964.75 while in 1913 it was $803,196.51. The fines in 1913 totaled $39,043, and this year they reached $39,704.84. When the expenses of running the highway commission are deducted Massachusetts will have more than $800,000 for road maintenance of which $640,000 will be available for state roads and $160,000 for improving through routes that are under city or town control.

The registrations for the year totaled 77,246 motor vehicles. These figures include 8,236 commercial vehicles and thiry-nine cars owned by non-residents. A year ago there were 62,660 vehicles which included 5,948 trucks and 920 non-residents. The general increase was 23 per cent. for all vehicles and about 40 per cent. for commercial vehicles. The larger part of the cars registered were less than 30 horsepower and came under the $10 classification. As a matter of fact including the electrics and the trucks registered at $5 the number of vehicles paying $10 or less totaled 60,103 out of the 77,246. There was a gain of 180 in the manufacturers' and dealers' class. There are now 99,532 persons licensed to operate cars in Massachusetts, or about one in every 33. This is a gain of 18,488. The comparative figures for 1913 and 1914 appear herewith.

MADISON, WIS., Dec. 12—The state of Wisconsin's gross revenue from automobile and motorcycle registrations thus far in 1914 is $294,477, or nearly twice as much as was collected in 1913. On November 28 the total registrations by private owners at $5 each were 53,341; motorcycles, 7,876 at $2 each, and dealers, 1,202 at $10 each. It is expected that about 100 additional private owners' registrations will be made before December 31, when all licenses expire and must be renewed at the same price schedule. On January 1 the secretary of state predicted a registration of 45,000 private owners, but his estimate is already 8,341 wide of the mark. Applications for 1915 registrations will be received after December 15 and issued on January 1.

DENVER, COL., Dec. 12—Twenty thousand cars for Colorado in 1915 is the estimate made by Secretary of State James B. Pearce, who has just received his first consignment of license tags for the new year. The order calls for 19,000 regular tags and 1,000 dealers' tags. The total registration so far for 1914 is estimated at close to 19,000, but complete reports have not yet been received from the outside counties.

LANSING, MICH., Dec. 12—According to the figures given out by Secretary of State Martindale, there were 76,350 automobile licenses issued in Michigan so far this year.

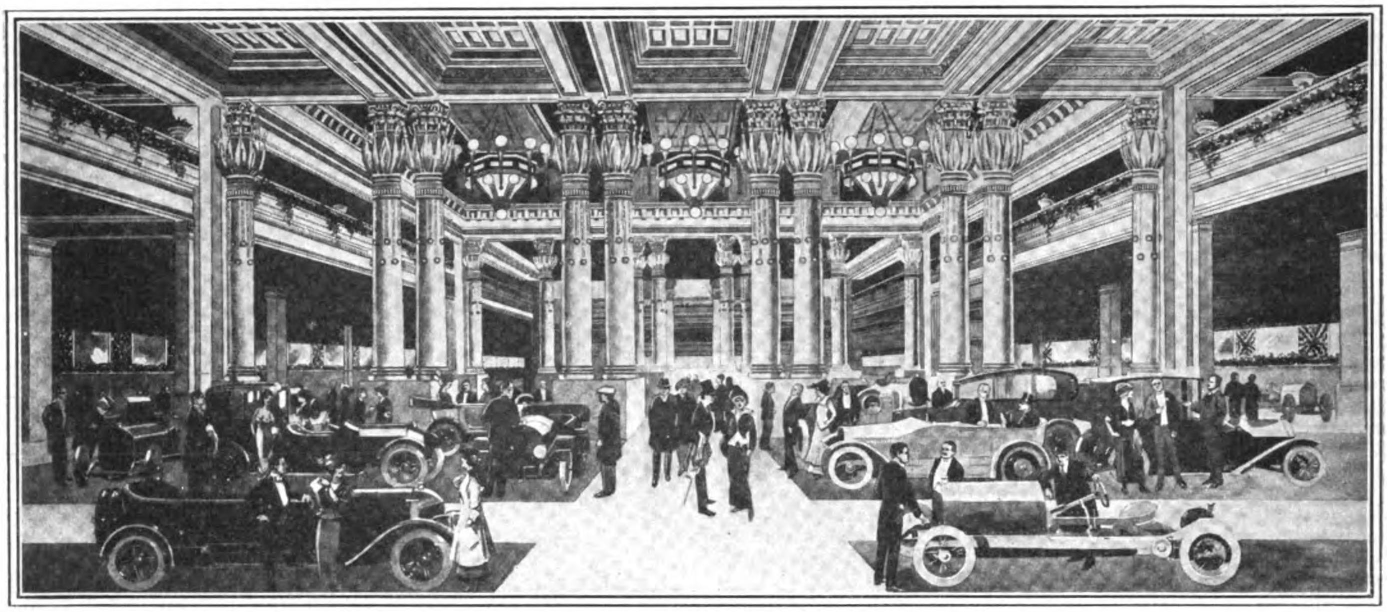
TORONTO, ONT., Dec. 7—Over 6,000 automobiles are registered as owned in Toronto which is more than are numbered in many of the principal countries of the world. It is interesting to note that 50 per cent. or half the cars sold in Toronto are Fords while 85 per cent. of all the cars owned by medical men and 90 per cent. of all the cars owned by commercial firms in Toronto are also Fords. Toronto's total figure according to a recent census is equal to the number of cars owned in the kingdom of Hungary and a greater number than are owned in British South Africa, Sweden, Switzerland, Holland or Bulgaria.

Massachusetts Car Registrations for 1913 and 1914

	1913	1914	Increase
Motor Veh. (Total)*	62,660	77,246	14,586
Commercial Veh.	5,948	8,236	2,288
Non-residents	920	39	†881
Motorcycles	7,127	8,161	1,034
Mfrs. and Dealers	1,330	1,518	180
Operators	17,009	21,257	4,148
Chauffeurs	5,233	5,601	368
Operator Renew.	40,858	51,090	10,232
Chauf. Renew.	17,934	21,584	3,650
Examinations	7,288	7,497	209
Fines	$39,043.00	$39,704.84	$661.84
Total receipts	$803,196.51	$965,669.59	$162,473.08

* Includes commercial vehicles and non-residents.

† Decrease due to new law making visitors register for all year.



Plan for the decoration of the main hall at the Grand Central Palace, where the New York Automobile Show will be held, January 2 to 9. The general scheme will be that of a Persian garden. Many mirrors will be used

Business Poor in Australia

War Affects Trade Conditions —Reduces Market for American Cars—English Small Cars Gain

Millions of Pounds of Wool Lying Idle —Crop Outlook Unfavorable

SYDNEY, AUSTRALIA, Nov. 20—Business throughout Australia has fallen off considerably owing to the extremely dry condition of the country, and this on top of the war has just about made trade in all lines as slow as possible and there seems little chance of improvement so far as Victoria and South Australia are concerned. New South Wales and Queensland have been more fortunate and they are experiencing an improvement, but the export of motor cars from America to Australia during the next 12 months will be on a very limited scale.

The English light car is making big strides throughout the whole of Australia, and in such cities as Melbourne and Adelaide the English light car is taking hold very rapidly, doctors and traveling salesmen purchasing them in quantities.

There are many factors which enter into trade conditions at present in Australia and in a recent compilation of opinions from leading bankers and financial men the following nine conditions are considered of varying importance in determining the present condition of affairs:

1. The government is the biggest employer in the state and it is putting its men on half time.
2. Extra taxation is foreshadowed by both the state and commonwealth and the spending power of the community is necessarily certain to be reduced.
3. Industrial corporations, although they have earned dividends during the past year, are not disposed to pay them due to bank restrictions, and also because of the future outlook.
4. Banks will no longer advance to store-keepers, but are throwing the burden upon wholesale houses. They will not advance to farmers as in normal times.
5. Wheat crops throughout the Commonwealth are bound to be of restricted character and it is quite possible that wheat will have to be imported to meet local requirements. Drought conditions are certain to prevail throughout Australia. The estimated loss of wheat on last year's values is 10,000,000 pounds.
6. The wool at present is commanding a good price for the very best quality which is scarce, and the cheaper grades have no value whatever. These were usually purchased by the Germans. Eleven million pounds of wool in New South Wales alone are lying without a market.
7. Building operations cannot be financed as the banks refuse to make advances.
8. Mines have closed down in many sections and cannot ship or sell concentrate.
9. The contribution of men and ships for the war will cost for the year $10,000,000 and the financing of this will have to be arranged for. The government proposes to place a local loan and this is leading banks to fear a depletion of their gold reserve. Paper money, it is thought, will be issued by the government and the sovereign will go to a premium.

Four Entries for Indianapolis Race

INDIANAPOLIS, IND., Dec. 12—With the contest yet 6 months away, four entries are already lined up for the next Indianapolis 500-mile race, the last to register being Ralph DePalma, America's road racing champion, with his Grand Prix Mercedes. Through his backer, E. C. Patterson, DePalma made entry this week, desiring to be as close to the head of the list as possible, because of the Hoosier elimination trials, which take place in the inverse order of nomination each year.

Though defeated at Corona, DePalma has great hopes of capturing the Indianapolis classic, since, out of all the machines that raced in the western contest, his was practically the only one conforming to the new 500-mile specifications, being well under 300 cubic inches, the limit prescribed by the speedway management, and tested in over 1,500 miles of actual racing.

A.A.A. Plan Annual Meeting May 17-18

NEW YORK CITY, Dec. 14—The American Automobile Assn. will hold a spring meeting at Boston, Mass., next year instead of a winter one. The Executive Board of the association decided at its December session in Washington, D. C., to postpone the meeting until May 17-18. At that time of the year the main highways in most of the states are in practical condition, and it has long been the opinion of many of the members that the annual gathering should be one to which one could tour over the roads.

At the conclusion of the Boston meeting it is quite probable that a party of transcontinental tourists will start for the Panama-Pacific Exposition.

Bull Tractor Sells for $395

MINNEAPOLIS, MINN., Dec. 14—It was stated in THE AUTOMOBILE for December 3 that the Bull tractor, which is manufactured by the Bull Tractor Co., this city, sells for $335. This was incorrect, as the price of the tractor is now $395, an improved design having been placed on the market.

A 2-Mile Board Speedway for Chicago

Contract Signed for Construction of Track for Speedway Park Assn.—315-Acre Site Secured—Contractor Gives $200,000 Bond to Complete Work June 1, 1915

CHICAGO, ILL., Dec. 12—After having built at least a half-dozen speedways on paper, it really begins to look as if Chicago is about to come into its own and that by the middle of next summer this city will have a track for automobile racing that will stand comparison with any in the country. This is the offering of the Speedway Park Assn., which announced today that it had placed the contract for the construction of a 2-mile board speedway to be completed by June 1 under the terms of the agreement.

The association was formed last June but purposely the organizers have refrained from publicity until all its plans had matured. The climax came last night with the signing of the contract for the actual construction of the track. The full title of the organization is the Speedway Park Assn., and the Speedway Park Club with headquarters in the Marquette building, Chicago. It has secured 315 acres of level ground situated on the west side of the city west of the Desplaines river between Maywood and Riverside, bounded on the north by Twelfth street, on the south by Twenty-second street, on the east and west by First and Ninth avenues and reached by nine transportation lines. Those who drive from the business section will have a fine 10-mile drive over boulevards.

The officers include: David F. Reid, a stock and bond broker, president; Charles McHugh and Harvey F. Harvey, vice-presidents, and Judson G. Hancock, secretary-treasurer. The directors are George W. McFatrich, Peter S. Thuerer, C. H. Stebbins, Jay F. Pitts, Joseph Hopp, John Irwin and John C. Roth, all prominent business men. Graham, Burnham & Co., are the architects.

The financing has been secured by means of a membership proposition. The full allotment of 1,000 members at $250 per has been secured, it is claimed, which put $250,000 into the treasury. In addition to that the directors have pledged $500,000, for which they will take stock if necessary. The lists having closed, it now is contemplated selling another 1,000 memberships at $50 a year which will not carry any stock.

The contract for the track calls for a minimum expenditure of $500,000 and with the maximum at $1,000,000. The contractor has given a bond of $200,000 to complete the work by June 1 and next week 500 men will be put to work on the property. Fortunately the land is vacant so no time will be lost in wrecking old buildings. Work will be continued all winter.

The track surface is to be 2 by 4's laid edgewise with 1-4-inch space between. The supports are to be of wood set at proper intervals upon concrete foundations or piers, the bottom of which will be below the frost line. The straightaway runs are to be pitched about 1 foot toward the inside. The north turn is to be figured for a maximum speed of 90 miles an hour. The south turn track level at the outer edge is to be the same level as the north turn, although the radii are not alike.

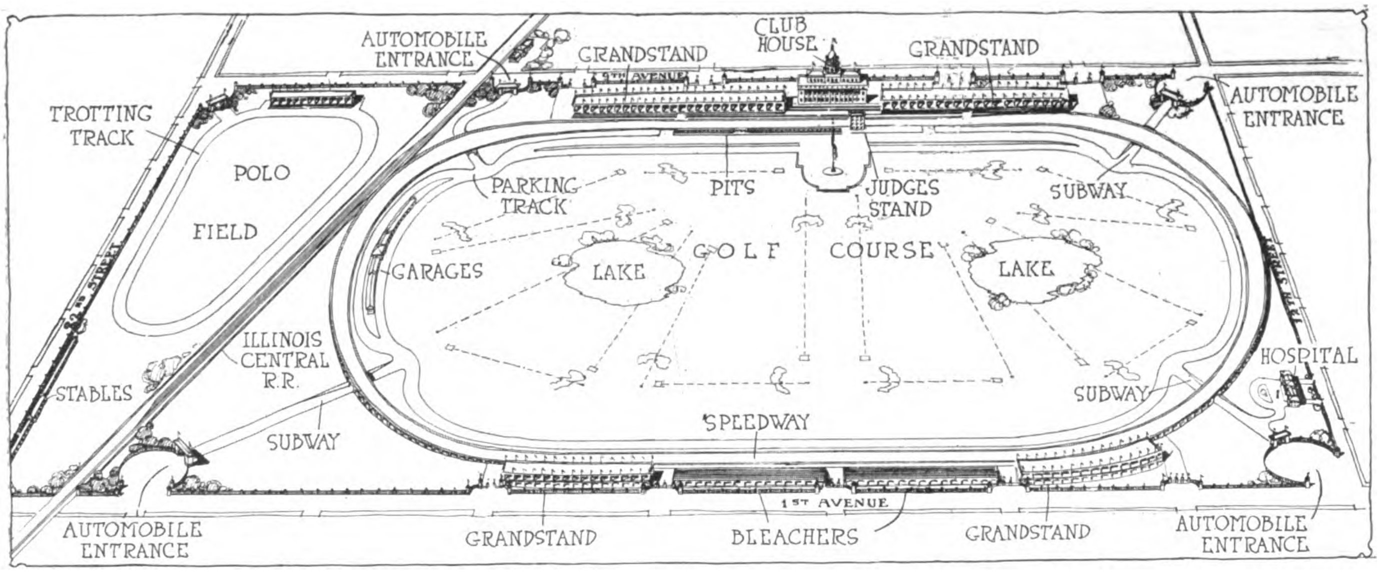
The track will be 60 feet wide on the homestretch and 70 feet on the turns. On the first turn there will be three different radii and the whole idea is to secure a speedway that will be safe and at the same time produce interesting competition. The backstretch will be 50 feet wide.

The race will be open to cars of a piston displacement of 300 cubic inches and under and will be for 500 miles. Qualifying trials will be for a speed of 85 miles per hour. The purse will be close to $50,000.

The speedway itself is not the whole issue in the proposition, for it also is planned to have golf links, polo field, aviation course and an equestrian course. The speedway itself will be built first.

Richard Kennerdell, chairman of the Contest Board of the A. A. A. spent today in this city in order to adjust the threatened conflict in dates between the new Chicago Speedway and the mile-track interests at Galesburg, Ill. Galesburg had been allowed June 16 as a sanction date for its $5,000 dirt track meet. The Chicago Speedway wanted this date. A compromise has been effected, Galesburg taking June 9, and leaving June 16 open for the new speedway. Chairman Kennerdell has insisted that the speedway authorities make reasonable progress in order to hold this date and has delegated Clifford Ireland, a member of the Contest Board, representing Illinois, to inspect the Chicago plant on February 1 to ascertain if sufficient progress has been made to warrant a possible meet on June 16. If such progress has not been made the sanction date will be cancelled. F. E. Edwards, technical representative of the A. A. A. contest board has signed with the speedway as contest manager.

At this date ten entries have been received for the Vanderbilt and Grand Prize races to be held in San Francisco, February 22, and March 1; the entries include three Maxwells, three Mercers, two Peugeots, and two Stutz. There is promise of an additional Stutz entry.



Plan of the 2-mile board speedway, polo field, golf course, etc., to be constructed by the Speedway Park Assn. and the Speedway Park Club at Chicago, Ill.

LANSING'S New Factories Cost $1,000,000—During the year 1914 more than $1,000,000 will have been spent in Lansing, Mich., in new buildings, and more than half is credited to the automobile industry. One company, the Reo Motor Car Co., figures on the list for over $400,000, and its total floor space is now 22½ acres. The new forge plant of the Atlas Drop Forge Co. is 675 feet long and 105 feet wide, and cost over $65,000. The new plant of the Capital Auto Body Co. cost over $40,000, and is one of the largest automobile body manufacturing factories in this state.

U. S. Tire Adds—The United States Tire Co., New London, Wis., will erect a four-story addition, 70 by 70.

Carbureter Plant for Dwight—Edward A. Atkins, Dwight, Ill., will establish a plant for the manufacture of a patented carbureter.

Peerless Starter Adds—The Peerless Air Motor Co., Stanfield, Ore., will erect a windmill factory at Stanfield, 50 by 100, of concrete.

Parker Purchases Trenton Bldg.—The Parker Motor Co., Trenton, Mich., has purchased the building and equipment of the Trenton Engine Co.

Shaw Adds $35,000 Bldg.—The Shaw Motor Co., Chicago, will erect a brick and concrete shop building, 60 by 108, to cost $35,000, at Prairie du Sac, Wis.

Bartlett to Build—The Bartlett Automobile Co., Stratford, Ont., of which C. Bartlett is manager, has had plans drawn for a factory to cost, equipped, about $50,000.

Full Force at Buick Factory—The Buick Motor Co., Flint, Mich., which several weeks ago reduced its working force, is now again working with its full force, or over 5,000 men. It is expected that the average daily shipments in December will be 140 to 150 cars.

Jeffery-Dewitt in New Field—The Jeffery-Dewitt Co., Detroit, Mich., manufacturer of spark plugs, has entered a new field, that of manufacturing high-grade small porcelain ware for the use of the plumbing trade. They expect to turn out 35,000,000 pieces within a year. European porcelain ware is no longer available.

Edison Battery Works Saved—Of the thirty-four buildings composing the plant of Thomas A. Edison, Inc., West Orange, N. J., three brick buildings and five or six of the new concrete buildings were destroyed by fire which started in the evening of December 9. The estimated loss is placed at less than $1,000,000. The laboratory and three other buildings, among them the one in which the storage batteries are manufactured, were saved. The primary battery building and all the structures in which the new phonographs, picture films and numbering machines are made were burned down.

Eureka Spring Wheel Establishes Plant—The Eureka Spring Wheel Co., Brockton, Mass., has been organized to put that device on the market, and the men backing it comprise Henry G. Martis, George S. Bent, John W. Barlow and James A. Case, of Brockton; Harvey D. Lincoln, of Attleboro, and Clinton Gowdy, of Springfield. The company has established a plant at 124 Court street there, and it is being equipped with machinery. The officials are displaying samples of the wheels in some of the larger Massachusetts cities. They state that by means of a series of springs taking the place of the ordinary spokes it is possible to use solid tires and get as good resiliency as from pneumatics at a great saving of expense.

Manufactures Automobile Upholstering—The National Car Equipment Co. has been incorporated at South Bend, Ind., to manufacture automobile top covers and upholstering of automobiles. The capitalization is $20,000. F. J. Cosgrove, of Chicago, is president, and Norman Roos, of South Bend, is vice-president. According to Mr. Cosgrove, the National Car Equipment Co. has taken over the Topeka (Kan.) Auto Trimming Co., and has moved the equipment to South Bend on account of better shipping facilities offered. The concern will start operations this week with a force of twenty-five men.

Metz's New $250,000 Plant—The Metz Co., Waltham, Mass., has just had finished for it a new plant covering 4 acres of ground which cost the company, with the land, a total of $250,000. It is now fully equipped with the latest machinery and the mechanical departments are now housed together so that there is no time lost in putting the cars together. All parts of the car are made here. The old plant is still in use and it will not be given up because the demand for the cars calls for all the space the company can secure. The new buildings are one story, with saw-tooth construction of roof, giving maximum lighting efficiency. Spur railroad tracks run to the factory, and during the past month the company has been making shipments in carload lots.

The Automobile Calendar

Dec. 12-19.......Akron, O., Show, Akron Auto Show Co., O'Neill Bldg.
Dec. 14-18.......Chicago, Ill., American Good Roads Congress.
Jan. 2-9.........New York City, Annual Automobile Show, Grand Central Palace.
Jan. 2-9.........New York City, Automobile Salon, Grand Ball Room of Astor Hotel, Automobile Importers' Alliance, E. Lascaris, Pres.
Jan. 3-10........Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 5-7.........New York City, Engineering Societies' Bldg., Winter Meeting Society of Automobile Engineers.
Jan. 8-14........Milwaukee, Wis., Show-Auditorium, Milwaukee Auto. Dealers' Assn.
Jan. 8-14........Kansas City, Mo., Show.
Jan. 9...........San Diego, Cal., Road Race.
Jan. 9-16........Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.
Jan. 16..........Detroit, Mich., Show.
Jan. 16-23.......Cleveland, O., Show, Cleveland Automobile Show Co., F. H. Caley, Mgr.
Jan. 20-28.......Lancaster, Pa., Hiemenz Auditorium.
Jan. 23-30.......Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 23-30.......Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 25-30.......Fall River, Mass., Show.
Jan. 25-30.......Buffalo, N. Y., Show, Broadway Auditorium, Buffalo Automobile Dealers' Assn.
Jan. 30-Feb. 6....Columbus, O., Show, Memorial Hall, Columbus Auto. Club and Columbus Auto. Trades Assn.
Jan. 30-Feb. 6....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb.............Portland, Ore., Show, Portland Auto. Trade Assn.
Feb.............Toledo, O., Show, Toledo Auto Show Co.
Feb. 2-7.........Kalamazoo, Mich., Show, Armory.
Feb. 15-20.......Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids *Herald*; C. L. Merriman.
Feb. 15-20.......Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 15-20.......Bridgeport, Conn., Show, State Armory; B. B. Sterber.
Feb. 22..........San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27.......Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.
Feb. 23-27.......Syracuse, N. Y., Show, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.
Feb. 27..........San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13........Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 9-15........Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14..........San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
April............Calumet, Mich., Show, Coliseum.
May 17-18.......Boston, Mass., A. A. A. Annual Meeting.
May 29..........Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 9...........Galesburg, Ill., Two-mile Track Meet.
June 16..........Chicago, Ill., Speedway, 500-Mile Race, Speedway Park Assn.
June 25..........Sioux City, Ia., Track Meet.
July 4...........Tacoma, Wash., Road Race.
Aug. 20-21.......Elgin, Ill., Road Race.

The Week in  the Industry

Motor Men in New Roles

STRAUSS Elected Chairman — M. B. Strauss, of St. Louis, was elected chairman of the St. Louis (Mo.) section of the Electric Vehicle Assn. of America, C. A. Michel having resigned.

Madden Overland's Assistant Treasurer—E. S. Madden, credit manager of the M. Rumely Co., Laporte, Ind., will become assistant treasurer of the Willys-Overland Automobile Co., Toledo, O., January 1.

Now with the Stutz—S. Hardy Mitchell, formerly with the Cadillac agency in Boston, has bought an interest in the Stutz Motor Car Co., Boston, Mass., and he has joined the salesforce as assistant manager.

James Hood Tire Sales Mgr.—The Hood Tire Co., of Watertown, Mass., has opened a St. Louis (Mo.) office. L. S. James, formerly of the James Tire Co., of St. Louis, has been appointed local sales manager and agent.

Pardee Chicago Studebaker Manager—F. J. Pardee has become manager of the commercial vehicle department of the Chicago, Ill., branch of the Studebaker Corp. He was formerly a Pacific Coast representative of the F. B. Stearns Co.

Campbell Elected Mayor—Chester I. Campbell, secretary of the Boston automobile organizations, and the manager of all the big automobile shows in the Hub, was elected Mayor of Quincy, Mass., at the election held in that city last week.

Lempe Heads Albany Club—Dr. George G. Lempe was re-elected president of the Albany Automobile Club, Albany, N. Y., at the annual meeting. The other officers are: Vice-president, Peter G. Ten Eyck; secretary-treasurer, Roland Ford; counsel, Melvin Bender.

Portland Assn. Elects Officers—At the annual meeting of the Portland Automobile Dealers' Assn. in Portland, Me., the following officers were elected: M. B. Mank, president; W. B. Thombs, vice-president; E. E. Brewer, treasurer, and H. B. Chandler, clerk.

McGuinness's New Appointment—F. V. McGuinness, sales engineer of the Edison Storage Battery Co., Orange, N. J., has been appointed assistant manager of the railway dept., taking the position of W. F. Bauer, who was recently made manager of the company's Chicago office.

Langtry Heads Ogden Agency—The Cadillac Sales & Service Co., Ogden, Utah, has been organized to take care of the Cadillac interests in Box Elder, Cache, Rich and Weber counties. Headquarters have been opened at Washington avenue and Twenty-sixth street. E. M. Langtry is in charge of the company.

Greenwald Rumor Incorrect—In THE AUTOMOBILE for November 26 it was stated in these columns that Lemon Greenwald, Ashland, O., had been made manager of a branch of the Firestone Tire & Rubber Co., Santiago, P. R. This statement was an error on the part of our correspondent, as Mr. Greenwald is manager of the service department of the Firestone company, a position he has held for a number of years.

Barnes Promoted—W. H. Barnes, Seattle, Wash., distributor for G. M. C. trucks, has been promoted to Pacific Coast district manager for the commercial vehicles of the General Motors Co. He will spend 6 months of each year in Seattle and an equal length of time in San Francisco. He also will have supervision of the G. M. C. wholesale branch in California. With the promotion of Mr. Barnes the factory has decided to open a Northwest distributing branch in Seattle. Mr. Barnes has represented the General Motors Co.'s product in Seattle since 1909.

Recent Klaxon Changes—W. H. Bendfelt, formerly of the Detroit office of the Western Electric Co., and P. C. Little, of Boston, late of the Bi-Motor Equipment Co., of that city, have been added to the Klaxon selling organization. W. G. Packard, of the Klaxon service department, and until recently in charge of Klaxon service in Detroit, has been transferred to the sales department. He will work in conjunction with R. G. Coghlan in the Eastern territory. F. M. Hayes, who, for the past 2 years, has represented the Klaxon sales department in New England, will henceforward use his experience and knowledge of this territory in perfecting and extending the Klaxon service system there.

Garage and Dealers' Field

Plant Destroyed by Fire—Fire, November 12, destroyed the plant of the United Auto Co., Springfield, Mass. Loss, $20,000.

Lamp Branch Opened in Brooklyn—A Brooklyn, N. Y., branch of the Hudson Auto Lamp Works has been opened at 1054 Bedford avenue.

Detroit Gould Office Moved—The Gould Storage Battery Co., Detroit, Mich., has moved its office there in the Kerr Bldg., 100 Beaubien street.

Auto Surplus Moves—The Auto Surplus Stock Syndicate, 875 Eighth avenue, New York City, will be located after December 31 at Broadway and Fifty-second street.

Muskegon Vulcanizing Moves—The Muskegon Vulcanizing Co., Muskegon, Mich., has taken new quarters on Terrace street, and the latest in equipment will be installed in the plant.

Transforms Ambulances into Taxicabs—All the undertakers have disposed of their ambulances to the Ann Arbor Taxicab Co., Ann Arbor, Mich., which will transform them into automobile apparatus and operate them. They will be placed in service as soon as possible.

D'Arcy Spring in New Plant—The D'Arcy Spring Co., Kalamazoo, Mich., which manufactures springs for automobile seats, is occupying its new two-story, 200 by 300 feet, factory, and the finishing touches will be put on the plant before spring. The new factory of the company cost $50,000.

Ford Makes Improvements in Memphis—A permit for the construction of elevator inclosures in the new building of the Ford Motor Car Co., Memphis, Tenn., has been granted. The cost is given at $3,000, and, it is said, will bring the total amount of recent improvements to the building to more than $10,000.

Sparks-Withington's Display Board—The Sparks-Withington Co., Jackson, Mich., is supplying its dealers with a new demonstrating display board, which carries three hand-operated Spartan horns. The board is constructed of quartered oak, finished in the early English style, and carries the names and prices in plain view of the three models displayed. These are the Model EB, finished in black with nickel-plated front section of bell; Model F, in black satin finish, and Model M, with black satin body and interior of the bell nickel-plated.

Detroit Agent Builds Garage—A two-story showroom, office and garage will be erected at 694 Woodward avenue, Detroit, Mich., for the McKenney-Devlin Co., distributor for the Detroiter, Haynes and Grant cars. The showroom will be 50 feet square and two stories high, and fitted interiorly like a Dutch house. It will have a red tile floor and a large brick fireplace in the rear wall. Heavy oak beaming extending from the floor to the ceiling the full two stories in height and across the ceiling will be a feature. The garage will be 50 by 100 feet in dimensions. The service station at 22 Alexandrian street will be continued.

New Scheme for Automobile Sales—A new departure in the automobile world, which is interesting alike to dealers and buyers, has been inaugurated by C. E. Herrick, Inc., San Francisco. This firm will specialize in making cash purchases of medium-priced machines for buyers who desire to pay down a smaller sum than the ordinary dealer would be able to accept and to complete their purchase in reasonable monthly instalments. "Our plan will enable the dealer to make cash sales of cars that he would otherwise be obliged to sell on the instalment plan," said C. E. Herrick, "and it will enable many prospective buyers to obtain cars on terms which the dealer would be unable to offer them."

New Indianapolis Agencies—Several new agencies have been opened in Indianapolis. The Alter Motor Sales Co., distributor for the Alter, has moved its headquarters from Marion, Ind., to Indianapolis. A branch will be maintained at Marion. An agency for tubes and tires manufactured by the Hood Rubber Co., Watertown, Mass., has been opened at 514 North Capitol avenue by Clem T. Strauss. The Hampton Mfg. Co., manufacturer of Kant-Blo interliners, has established a sales agency at 429 North Meridian street, with W. F. Winslow as manager. The company will vulcanize free all tires and tubes blown out or punctured that are equipped with the interliners.

Accessories for the Automobilist

NO-SHAMMY Utility Box—A box for storing substances which need protection from air and dirt is made by the No-Shammy Products Co., Cleveland, O. The interior is divided into four parts, Fig. 1, three of which are round and one of which is rectangular. One compartment is intended for white lead, one for graphite and one for shellac. The large rectangular compartment is for grease.

In most garages these various articles are kept in the original containers and, although they may be used frequently, they are not always in good condition. The lead may be dry, the shellac thick and dirty and the graphite dry and flaky. The Utility box avoids all this. The box is made of heavy black japanned tin. The grease compartment is fitted with a self-closing cover, and the covers to the other compartments are furnished with hangers, so that they will not become lost.

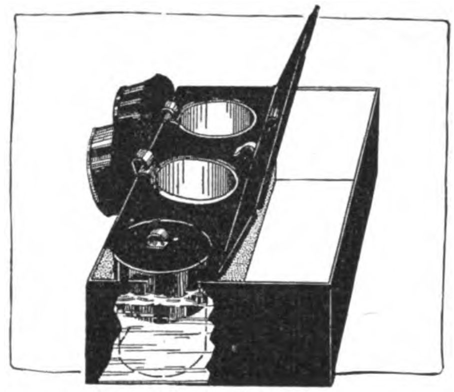


Fig 1—No-Shammy utility box

St. Louis Magnetizer—To recharge magneto magnets, the St. Louis Electric Works, 5409 Easton avenue, St. Louis, Mo., has put out the device shown in Fig. 2. It consists of a powerful electro magnet mounted on a neat wooden base, on which is a switch and two binding posts. A well-charged, 6-volt storage battery is connected to the binding posts, and the ends of the magneto are placed on the tops of the coils. The magnetizer weighs 8 pounds, measures 7 by 4.5 by 5.25 inches and sells for $7.50.

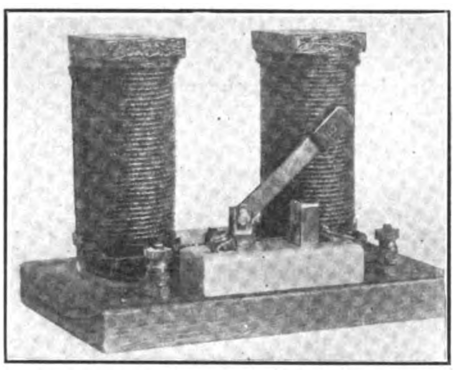


Fig 2—St. Louis Magnetizer

Ideal Electric Vaporizer—To provide easy starting in cold weather is the object of the new primer, Fig. 3, made by the Ideal Brass Works, Tenth and Canal streets, Indianapolis, Ind. There is an electrically-heated plug which is placed in the manifold and through which gasoline is discharged. Since the end of the plug is warm the fuel is heated and vaporizes easily, thus giving a good mixture and insuring a quick start. Current is supplied by four dry cells and the gasoline is supplied from a small gravity primer mounted on the dashboard. The device retails for $5 ready for installation, less batteries.

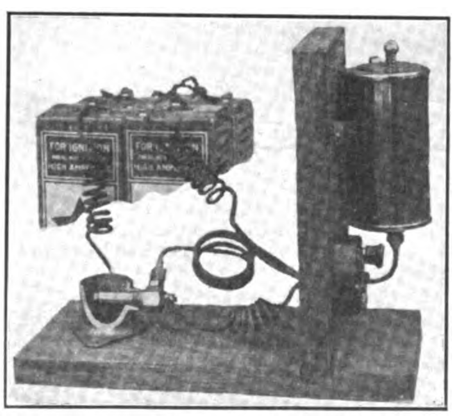


Fig. 3—Ideal Electric vaporizer

Jaeger Nitro Electric Lamps—Nitrogen-filled electric light bulbs which, it is said, give a white, intense light with a consumption of .5 watt per candlepower are made by H. J. Jaeger Co., Hoboken, N. J. A bulb is shown in Fig. 4.

The filament is made of drawn tungsten wire coiled into a helix and mounted within a very small space, thus concentrating the light and permitting close focal adjustment. Instead of operating this filament within a vacuum as is the case with the ordinary tungsten bulb it is surrounded by nitrogen and other inert gases under pressure, the presence of which permits a higher incandescence of the filament without disintegrating it, thus producing higher candle power and twice the efficiency of the ordinary type, it is stated.

There are two standard types, the G 16, 24 and 32 candlepower and the G 12, 15 to 21 candlepower. Both these lamps are for focusing and are made for voltages ranging from 6 to 14.

Davis Gas Lighter—An acetylene gas lighter has been put on the market by Hermann Dinkelaker, 7 N. Alabama street, Indianapolis, Ind. All that is required to light the lights is to turn a handle and press a button. In the city the lights may be dimmed by operating the same handle. The price is $5.

Presto Electric Hand Lamp—A simple lamp attachment which bolts to the top of a dry cell and which sells for $1.25 with battery has been brought out by the Metal Specialties Mfg. Co., 736 Monroe street, Chicago, Ill. As illustrated in Fig. 5, it consists of a bracket which may be attached to either the flush or extended carbon type of dry cell. The bracket is bolted to the carbon binding post and a wire runs to the zinc. There is a suitable handle for carrying the lamp by. The lamp itself is pivoted so that it may be set at any angle, thus providing most effective illumination.

Fisher Rim Grip Sub-Casing—The Western Auto Sub-Casing Co. Inc. of 1044 So. Los Angeles St., Los Angeles, Cal., is making the Fisher Rim Grip Sub-Casing, which is a casing used under the regular tire. The Sub-Casing is made of the same rubber impregnated fabric or friction as is used in all pneumatic tire construction. Varying numbers of layers of fabric depending on the size of the tire are built up and vulcanized together without any loose ends or overlapping splices.

Then two flexible flat steel bands are vulcanized into the Sub-Casing, one on each edge. These bands form the anchor or security for the reinforcement. Inflation of the inner tube forces these bands against the tire beads effectually preventing any slipping of the Sub-Casing which would be injurious to both tire and inner tube. These bands might be compared to the hoops on a barrel and the manner in which they hold the staves in place.

The Fisher Sub-Casing, it is claimed, is so strong and the basic principle is so practical that it holds all the inflation pressure strains put on it by the inner tube.

When used in tires that have unbroken fabric walls the makers guarantee against blow-outs, rim-cuts and other tire expense.

Pillsbury Wautopail—The Pillsbury Mfg. Co., Minneapolis, Minn., is manufacturing a water pail made of canvas and which can be folded and placed under one of the car seats. The fact that it can be flattened out makes this accessory valuable for those who do considerable touring. The Wautopail weighs but 8 ounces.

Fisk Red Top Ford Tire—The Fisk

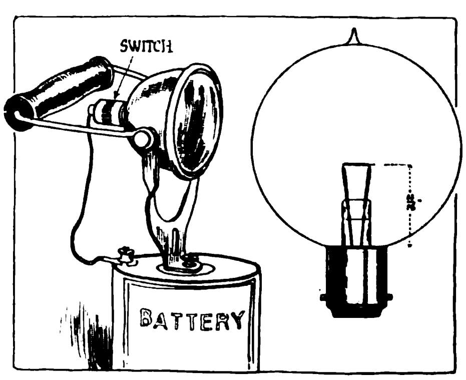
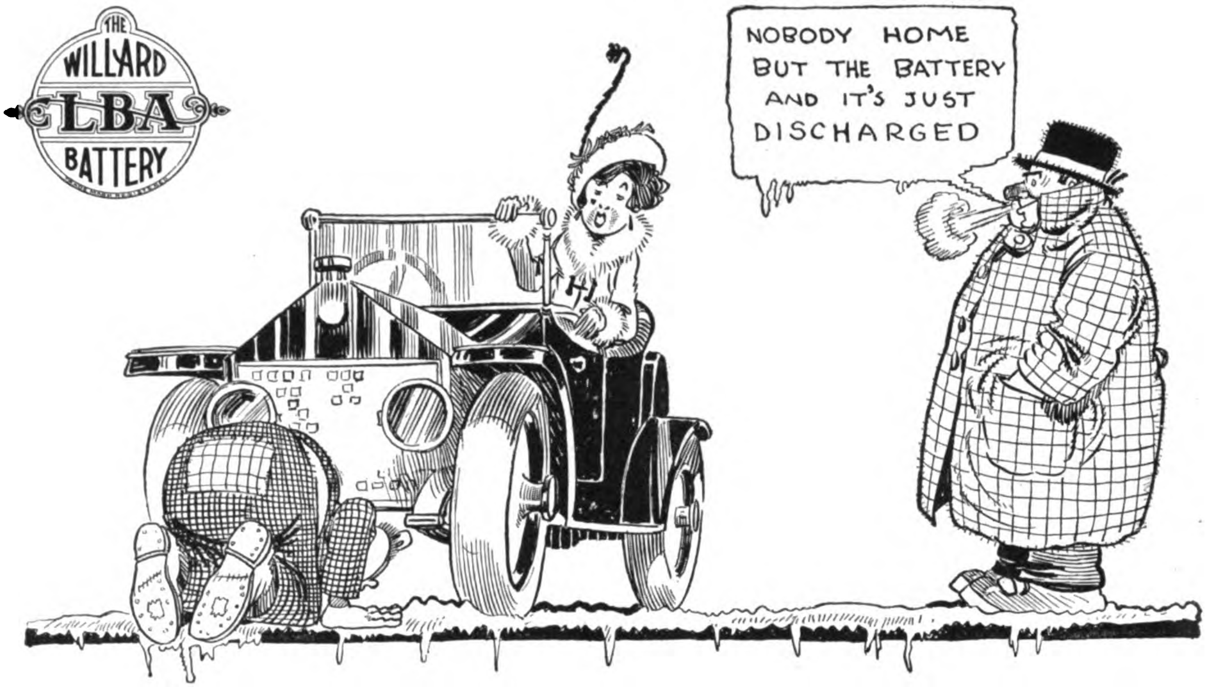


Fig. 4—Right—Jaeger Nitro Electric head lamps
Fig. 5—Left—Presto electric hand lamp



Nobody Home

What's the matter with the starter anyhow?

Nothing, your battery is frozen to death, that's all. Take it out, give it a decent burial and put in a Willard.

Then you can stay in the front seat, push the button and let her buzz! She'll turn that old engine over so fast it will make your head swim.

Somebody Home

There's always somebody home in the Willard Shops. Somebody inspecting every grid; somebody rejecting those "good-enough-for-some-folks" oxides that fall below Willard standard; somebody watching every man, machine and operation. It's all these little things put together that mean good hot service in cold weather.

ANSWER—Willard on the job in 85% of all electrically equipped cars.

Willard STORAGE BATTERY

Willard Storage Battery Company

CLEVELAND, OHIO

New York Branch: 228-230 W. 58th St. Detroit Branch: 736-740 Woodward Ave.
Chicago Branch: 2524-30 S. Wabash Ave. San Francisco Branch: 821 Monadnock Bldg.
Indianapolis Branch: 318 North Illinois St.

Service Stations in All Principal Cities in the United States, Canada and Mexico

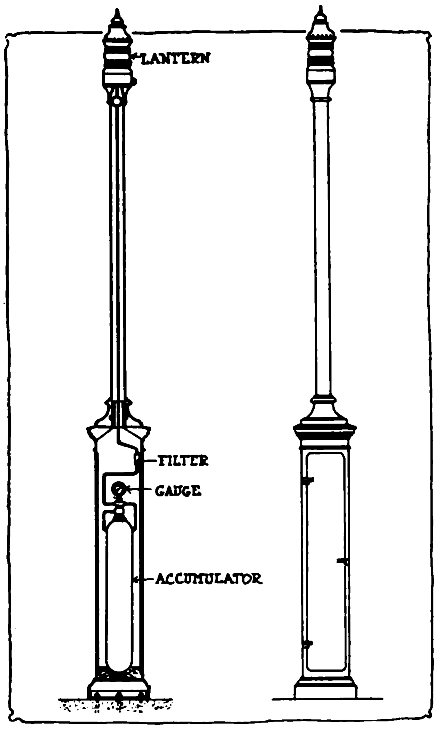


Fig. 6—A. G. A. highway beacon

Rubber Co., Chicopee Falls, Mass., is making a non-skid tire with a red top and white side walls for Ford cars. The tread has additional thickness and will therefore give greater life, it is stated.

A. G. A. Highway Beacon—A safety device, Fig. 6, to prevent accidents at night at dangerous turns, cross roads or railroad crossings, has been brought out by the American Gas Accumulative Co., Penn Building, Philadelphia, Pa., which has recently placed on the market a safety device known as the A. G. A. Highway Beacon, which is equipped with an automatic flash light giving from 30 to 90 flashes per minute, as desired.

It is evident that by using a flash light this danger signal cannot possibly be mistaken for an ordinary street light.

The illuminant used is dissolved acetylene, the brilliant white light of which makes it eminently suitable for a night signal. The acetylene is stored under pressure in seamless steel containers known as gas accumulators, which are made in various sizes from 2 1-2 to 1000 cubic feet capacity. These accumulators are filled with a mass of about 80 per cent. porosity. This mass is saturated with acetone, a liquid possessing the property of dissolving 250 times its own volume of acetylene at a pressure of 10 atmospheres.

As the accumulators are filled with a quantity of acetone equal to 40 per cent. of their own volume it follows that these containers will store 100 times their own volume of acetylene when charged to a pressure of 10 atmospheres.

The gas consumption is very small, approximately 0.8 cubic feet per 24 hours, and the light will burn for a period of from 60 to 200 days on one charging, depending on the size of tank.

Fig. 7 illustrates a highway beacon, recently installed in Potomac Park, Washington, D. C., which is equipped with a tank that will keep the light burning for 100 days at a total cost of $1.35.

Westinghouse Motor-Generator Battery Charger—The small motor-generator set, Fig. 8, forms a convenient, economical and reliable means for charging automobile starting, lighting and ignition storage batteries.

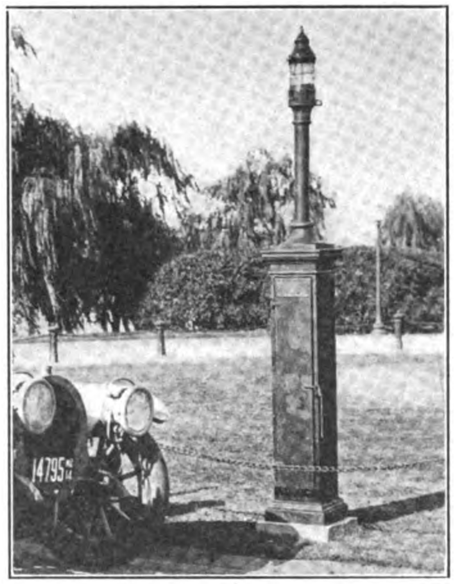


Fig. 7—A. G. A. highway beacon

It consists of an alternating-current motor and a direct-current generator compactly mounted in the same frame. The motor operates from the 60 cycle, 110 volt alternating current lighting circuit and drives the generator which furnishes the current for battery charging.

The generator is rated at 10 amperes and it can charge one or two 6-volt batteries or one 12-volt battery. Its voltage can be regulated from 6.3 volts to 12.6 volts by means of a field rheostat.

The operation is very simple. Merely connect the motor lead to the electric light socket and turn the snap switch. Adjust the generator to the desired voltage and connect with the battery. No attention or voltage regulation is required during charging. The generator is so wound that its voltage rises automatically at the end of the charge so that each cell receives 25 volts.

The length is 19 inches, width 7.75 inches, height 8.375 inches. Shipping weight 140 lbs.

The set is manufactured by the Westinghouse Electric Mfg. Co., East Pittsburgh, Pa.

Detroit Universal Coupling—The ball bearing universal which was briefly described in the October 29 issue of The Automobile is now being manufactured. The universal Products Co., 518 Woodbridge street, East Detroit, Mich., is the maker. The universal is shown in Fig. 9.

The features claimed for this universal are its frictionless action, perfect lubrication, capacity for frictionless longitudinal movement and its adaptability to tubular shaft drive construction which is now becoming so common.

It is stated that it is not only lighter than the usual type of universal but much smaller in diameter, contains less than half the amount of parts and is much stronger in proportion to its weight on account of its pressed steel body construction which eliminates the need for an outer housing.

The operation of the joint is clearly shown in the figure where it and it will be noted that the stress is taken by two hardened steel balls ground to very close limits and traveling in longitudinal races of circular section. These races are also hardened and ground to the proper limits of clearance to allow perfect rolling of the balls. The balls themselves are mounted on a hardened and ground nickel-steel trunnion pin which in turn is mounted through a third ball attached to the end of the drive shaft.

The universal action is obtained by the rotation and sliding of the ball members on the trunnion pin about the center of the spherical drive shaft head as a pivot. Moving the drive shaft up and down will cause the balls to roll in the races in opposite directions about the center while moving the drive shaft at right angles to this former movement the pivotal action is that of pivoting the trunnion pin through the balls themselves. The movement is limited by the conical, flat compensating spring at each end of the shaft, the shaft floating between these two springs.

Peerless Radiator—Hot water heaters which may be placed in the car floor in both the front and rear and which take their water supply from the radiator are made by the Peerless Radiator Co., Gibbs, Ida. Six tube heaters sell for $35, eight tube ones for $40. The connections to the water system are made near the radiator and do not interfere with cooling.

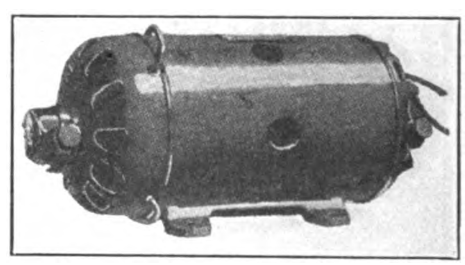


Fig. 8—Westinghouse motor-generator

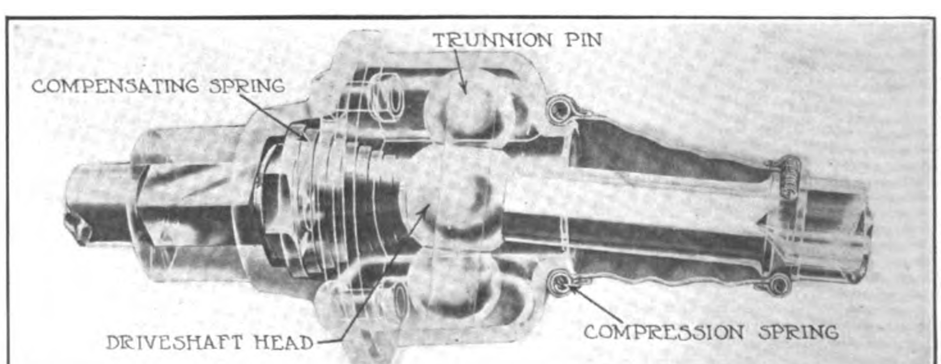


Fig. 9—Detroit universal coupling

VOL. XXXI NEW YORK—THURSDAY, DECEMBER 24, 1914—CHICAGO No. 26

The AUTOMOBILE

Forces at Work During 1914 —The Year Review

Industry Grows In Spite of Financial and Industrial Depression —Epoch-Making Forces Launched—Conservative Activities a Characteristic—Factory Additions

DURING the year just closing the automobile industry has made most material progress, notwithstanding the financial and industrial depression which has settled more or less uniformly over the entire country. This continued prosperity, in the midst of general retrenchment, can only be attributed to the part the automobile is playing in business and private life, testifying to the fact that no longer can the automobile be considered a vehicle of luxury for the classes, but it must be interpreted as a vehicle of necessity for the masses.

Healthy Condition Country-Wide

THIS premise is based on the fact that the healthy condition has been generally country-wide, with the sole exception of those cities or localities where local conditions have been dominating factors.

Industrial and financial prophets told how on the outbreak of the war the automobile industry would suffer more than older established industries, industries that played a more useful rôle in carrying our great nation along on the highway of destiny, but the records since that memorable Saturday, July 30, show that the automobile industry is not a youngster, not a luxury, not a sunny-day industry, but that already this dominating industry of the twentieth century has taken a high place in the gamut of national importance, a position so necessary that even the restrictions brought about by the great war have not laid it low, as was anticipated; rather the automobile industry bids well to once more demonstrate that since its inception each succeeding year has been a bigger one than its predecessors, and that this is at least one industry that has grown from year to year, notwithstanding adversaries in the shape of industrial and financial misfortunes.

Industry Unequally Affected

ALL branches of the industry have not prospered to the same extent, those divisions that have appealed to the masses with special fascination having suffered least by war and financial and industrial stringency. The passenger car industry suffered less than the motor truck department, business houses from the opening of January evidencing more or less distrust, due unquestionably to the general state of national unrest and expectancy, based on how the varied governmental changes were going to work out. The passenger car market opened and continued active until the war cloud gathered, after which date trade in the higher-priced vehicles fell off most perceptibly, but business in the lower-priced types continued with amazing steadiness. The abundant cotton crop in the South with the poor market developed a condition local to cotton-producing states, which has prolonged itself to the present, when there are symptoms of general invigoration throughout that territory.

The accessory market has kept pace with car and truck production, but since August 1 general buying has been below par, a condition explained in many cities by the conservative money atmosphere, and in our larger cities because many automobiles were placed in winter storage months earlier than in previous years.

For several months the attitude of banks in many cities of nearly every state in the Union has not been conducive to business optimism, particularly with the dealers. Not a few banks have been slow to advance funds to dealers in payment for automobiles shipped on bills of lading, these banks apparently considering it a poor risk to make advances of this nature with automobiles as collateral. In some sections there appeared to be a concerted movement among certain banks to discourage dealers' business. Many banks consider advancing money in payment for unsold cars a poor risk, but modify their decision in nearly every case, namely, that the financial and business career of the dealer is invariably a factor to be considered. At the other end of this banking attitude are those factories desiring to raise funds from banks to pay for raw materials to be used in the manufacture of automobiles on which deposits have already been placed by the dealer. Refusing to assist the dealer in his purchase of cars and further refusing to aid in financing the maker has worked not a few hardships, but, thanks to a general movement intended to improve these conditions, it is anticipated that few serious damages will result.

Patent Litigation Continues

IT has become historic with the automobile industry to link with it an almost endless trail of patent litigation, a trait of character bestowed on the industry through Selden litigation before it was out of its swaddling garments. Three years ago when the Selden case was settled it was anticipated that this demoralizing dissension had passed, but nearly every month of the present year has witnessed new activities in the courts. Throughout the season litigation on electric motor horns and hand-operated horns has been fought with the keenest edge, and only recently has it appeared that the end was in sight and that both makers and dealers would have this nightmare eliminated. These fights have been carried through the local courts, through the courts of appeal and through the various divisions of the patent office, and the end is not yet.

Kardo Patent Situation

MORE industry-wide litigation was launched in March with the organization of the Kardo company controlling patents on floating axle, front axle and other constructions. So broad has this conflict become that the national organization, the National Automobile Chamber of Commerce, Inc., has not only conducted a comprehensive investigation in this country but also in Europe on the patent situation as affecting these lines, and at its last meeting decided to fight suits against any of its members on these patents, the validity of which has yet to be established in the courts. There have been some other important decisions handed down during the year, one in favor of the Hess-Bright company on bearings, another declaring the Knobby tire patent invalid, a decree forbidding the refilling of Prest-O-Lite tanks, and one in favor of the Motometer.

S. A. E. Activities Broaden

OUR national engineering society, the Society of Automobile Engineers, has prospered. Its activities have been considerably broadened since January 1. The present administration opened its régime auspiciously by improved financing of its standards committee work by obtaining from the National Automobile Chamber of Commerce, Inc., a substantial donation, which has enabled the society to pay railway mileage to the members of its standards committee attending quarterly standards meetings in New York. The result is a greatly increased attendance at these meetings and higher efficiency from those attending. This was the first year in which these standards meetings have been conducted quarterly, and the progress made in arriving at new standards, eliminating others that have proved useless, or writing specifications of metals off the data book, indicates the broad grasp of the problem by the present administration.

Approximately one-third of the specifications of steel have been removed from the data book. The work of adding new standards has gone perhaps more slowly than formerly, the standards committee as well as the various sub-standard committees preferring to make progress very slowly to that less conservative policy of doing only to undo a year or so hence.

Besides the iron and steel specifications the society's standards committee has made important strides toward the standardization of many of the parts for commercial and passenger vehicles. Twelve new standards have been adopted during the year. The introduction of the Cleveland section to the society is also a step in advance, as it is through the monthly section meetings in various cities that the work of the society is materially advanced.

Eight-Cylinder Cars

THE year of 1914 has been one prolific in engineering upheaval, and whether some of the developments that have taken place in the industry can be designated as progress only the passage of years will determine. The eight-cylinder motor has made its début, has been adopted by two makers and gives promise of adoption by several more before 1915 is many months old, widespread activities pointing in this direction havng been well known for several weeks. The eight-cylinder is not new; France has built it in a limited quantity for many years; it has been sold in considerable numbers in America, and against its success nothing can be said; but the American maker is catering to a fastidious buying clientèle, and it will only be after the eight has been tried against the six and the four that the final trend can be deciphered. The return to the smaller four is a characteristic, not spectacular but yet present.

Many other engineering movements have taken shape during the year, the cord tire, new systems of gasoline feed, etc., but these are reserved for the engineering review of the year to appear in THE AUTOMOBILE for December 31.

Factory Financing Conservative

THE year has not been spectacular with big financing schemes, with the gathering together of many small units or factories into large organizations, such as was the order a few years ago; rather factory financing has been comparatively conservative, money not being over abundant for manufacturing enterprises. Yet the year has not been dormant, no fewer than twelve out of sixty-six of our leading automobile companies having increased their capital during the year to the extent of $8,762,000, or an average of $13,275.75 per concern. With some this new capital has been needed to take care of building operations; with others it has been required for expansion and increased production.

In the truck field, four out of twenty-nine companies increased their capital over $2,800,000.

In the accessory field this program of enlargement has been carried on and, although it is impossible to give reliable figures, our compilations show, of about 150 leading makers, fourteen have increased capital to the grand total of $2,318,000.

Substantially Increased Profits

A RÉSUMÉ of annual statements published during the year discloses in general favorable financial conditions, nearly all of our concerns showing substantially increased profits. The Ford statement showing its accumulated profits of $48,000,000 is abnormal and is far in advance of the general condition. It should not be accepted as even indicating the average condition. On the other hand, the General Motors issued a most creditable statement, revealing profits of $7,947,413; the Willys-Overland statement was particularly good, with profits of $5,864,858, as compared with $5,705,537 for the previous year. The Packard statement showed a surplus of $1,797,820.42 for the year; Goodyear handed down a report showing $3,091,165 over previous years, and a general résumé brings to the surface many very favorable financial records.

Nineteen hundred and fourteen can be recorded as a year approaching the average in the amount of factory building activity embracing the occupancy of new factories and the erection of additions. Several new factories have been occupied, these including Gray & Davis, Paige-Detroit, New Departure, Stutz, Ever-Ready and others. Those included in the list of additions to present facilities are Overland, Reo, Hudson, Kissel, Stutz, Vulcan, Hupp, Dodge Bros. Among the truck concerns making additions are: Lippard-Stewart, Kelly-Springfield, Four-Wheel Drive, Nelson & LeMoon and Motokart.

Very general activity in increasing factory facilities marks the accessory industries, such increases being too numerous to mention here. They are to be found elsewhere in this issue.

A brief enumeration of what some of these individual concerns have done and the money expended will serve as a conservative criterion of building progress, the detailed program of the different concerns appearing on other pages of this issue, where many of the new factories or additions are illustrated.

Increased Car Production

WITH increased factory facilities we look to increased production, and it would be disappointing if we did not meet with many evidences of increased production for the year as compared with 1913. Briefly analyzing state registration figures for the year substantial increases are found. Total registrations for the country up to October 1 are 1,735,369 as compared with 1,253,875 for the 12 months of 1913, this showing a gain of 481,494, not taking into consideration the last 3 months of the present year. The 1914 registrations for the twelve leading states up to October of the present year all exceed the total registration for the 12 months of last year. For New York State the total on December 17 was 155,000, as compared with a total of 122,411 for all of 1913, this allowing for duplicate registrations. Some of the increases in other states for 9 months this year against all of last year are: Pennsylvania, 46,595; Ohio, 32,896; Illinois, 32,025; Iowa, 29,889; Texas (estimated), 20,638; California, 58,061 (partly due to new registration law); Michigan, 20,411; Indiana, 21,962; Nebraska, 14,955; Missouri, 12,472, and Massachusetts, 12,140.

Profit-Sharing Shows Results

FROM a financing viewpoint, Henry Ford's co-operative profit-sharing plan with his employees announced in January immediately became a matter of international interest, and since then the announcement of the price reduction of $60 per car and of his additional plan to rebate $40 to $60 to every buyer of a Ford car upon the condition that 300,000 are sold in the period from August 1, 1914, to August 1, 1915, has done much to demonstrate the magnitude of the organization and the efficiency with which it is conducted. The announcement of a surplus of $48,827,032.07 in the annual statement, with $27,441,468.79 cash in the banks, have substantiated previous convictions.

Up to the present approximately 87 per cent. of the employees have qualified as eligible to participate in the profit-sharing plans, and an analysis of the factory force shows that Ford's plan was based on broad ethical plans, foundation stones mutually profitable to employer and employees. The movement must be considered a revolutionizing one in the industrial field.

War Affects Export Business

THE year 1914 opened auspiciously for automobile exports, but unfortunately this desirable program was cut short by the war. Not only was our foreign business increasing with Europe, particularly in the low-priced car field, but statistics from Australia showed that the United States exported the most automobiles to the Antipodes, but that the total value of British car exports exceeded those from America by $455,100, amounting to $1,491,525, while the American cars were valued at $1,036,425. Comparing this year with previous years, America's trade with Australia has been developing very rapidly.

Our South American business has not shown the improvement that was anticipated, partly due to the handicap our makers are under in not having American banks with branches in the leading South American cities. Fortunately one of our leading banks has already opened a branch in Rio de Janeiro and expects to have another branch opened in Buenos Aires before many weeks, so that this enterprise, together with the credit reports already being compiled, should greatly facilitate our business in many of these Latin-American countries. The most of South America has been under a moratorium since the opening of the war, and naturally business opportunities are not the most inviting, particularly as Europe was the banker for South America. Now with this banker engrossed in war the new program is that of our having to develop sales in a land not naturally favorably disposed to us and of having to finance the deals as well. No mean program, and one that calls for the best genius of our industry. But in spite of depression, not a few of our car and accessory concerns have dispatched special trade emissaries to these Latin-American countries with the grim determination of building up a trade along the same lines as the European experts in export fields have done, namely, locating in these lands, studying the characteristics of the people, analyzing the business methods, and preparing plans accordingly.

Passing of the Cyclecar

INDUSTRIALLY the wane of the cyclecar movement, in fact, you might almost say the elimination of the movement for the present at least, must take its place as one of the industrial cycles. The opening weeks of the year saw a perfect tidal wave of cyclecar enthusiasm. Concerns were being incorporated nearly every day, a national organization was formed of the manufacturers, a national sport-governing organization was launched, but today little is heard of the typical cyclecar. A score, perhaps two score, of the concerns have discontinued, and now the movement is to the conventional miniature car, a vehicle with a four-cylinder motor, a two or three-speed gearset, shaft drive, steering and general running gear details in conformity with standard practice. This trend of the cyclecar movement is a page from the history of the industry in England, where the cyclecar was conceived.

Why the sudden eclipse in America is difficult to answer, many factories combining. There was much stock-jobbing indulged in, selling stock on vehicles that were on paper but which had never reached the practical stages. There were many cyclecars launched without being backed up by sufficient engineering talent, and these had to go the certain path of the weak. There were many concerns not sufficiently backed financially to carry on production. But the public was not ready for the cyclecar. Tandem seating was an innovation; the narrow tread was not liked; you sat too much in the dust zone and too near the poles of horse wagons. There unquestionably will be a revival of the movement, perhaps more along the miniature car lines, with standard treads, until such times as our highways over all the states resemble our city boulevards.

A Good Contest Year

THE year has been an active one in contests, the official report of the American Automobile Assn., the official sport-governing body of the automobile industry, showing a total of 120 sanctions issued for the year, as against 101 in 1913, 132 in 1912, 117 in 1911 and 166 in 1910. Speedway and road racing enjoyed the major share of the sporting season, hill-climbs and reliability or endurance contests having a very scant following. The last few months have been considerably enlivened by the many certified trials held by different makers and conducted under official sanction by accredited technical representatives. These trials can only be interpreted as a striving for more accurate engineering information, and whether their mission is to determine fuel economy, tire efficiency, low-gear ability, etc., there is but one comment, namely, that they have stimulated critical interest in their line and should be emulated by many other makers.

The Tire Industry

THE tire industry has had a relatively peaceful existence since January 1 and the new year will witness approximately the same tire prices as ruled a year ago. The war caused a brief flurry, the price of crude bounding in a few days from 55 cents per pound to $1.10. There was an upshot in prices and something in the nature of a stampede among dealers to move the goods on hand. Owners bought very generally, and big stocks were moved, the feeling being that the importation of plantation rubber from the East Indies through London might be endangered by the war, particularly if Great Britain, who handled the rubber situation, should not maintain strict control of the high seas. Within a few weeks after the declaration of war the situation cleared and crude fell to normal, but the last month has brought renewed anxiety, due to the embargo placed on crude by Great Britain. It is not known when this embargo will be lifted and whether it was enforced due to the feeling that much of the crude brought from the east in British bottoms was eventually reaching her enemies, or whether the possibilities of interruption in the Suez Canal trade because of the Turkish hostilities was the dominating factor. As it is, the embargo remains and crude is about 80 cents per pound, with little hope of much East Indian production arriving in the immediate future.

Crude from the East Indies plays a very material part in the tire industry, in spite of the much-heralded Para gum from South America. The quantity of Para gum used in our tires is small as compared with that of plantation rubber from the East.

1914—A Good Contest Year

High-Speed, Small Bore Motors the Engineering Feature in Racing—102 Sanctions Granted—Speedways Popular—Many Individual Tests of Stock Cars for Speed and Economy

CONTESTS in 1914 attracted slightly more attention than a year ago, although few additional factories lent their support. Not more than one large concern, Maxwell, entered the field with specially-built racing machines and a comprehensive corps of drivers. Speedway races showed increased popularity, Indianapolis, Sioux City, Ia., and Tacoma, Wash., staging very satisfactory meets. Road racing was scarcely up to the mark of 1913, Elgin, Santa Monica, Corona and the desert duel between Los Angeles and Phoenix, being the major events. A very perceptible improvement took place in events on circular mile horse tracks. A series of 100-mile races with purses of $1,000 for winning, with good second and third money, drew the best racing talent and proved very popular.

Many Certified Trials

A most satisfactory development in contests during the year was the certified trials movement, in which individual car and accessory organizations took out sanctions and had trials made on fuel consumption, for low-gear traveling, for speed for 1 hour or longer, etc. These certified trials created a great deal of interest, and did much to stimulate sentiment.

More makers than ever before availed themselves of the Indianapolis speedway for private speed and other tests and concerns which have long been out of racing held several official speed tests.

The hill-climb movement was at the lowest ebb for several years, only two climbs of importance being staged, one at Atlanta, Ga., and the other at Uniontown, Pa. Wisconsin had the only large reliability contest and there were fewer sociability and short outing trips than formerly. The inter-club contests promoted for years in Chicago were continued with old-time success. Only one large competitive fuel economy test was held, it being conducted in Harrisburg, Pa.

Small High-Speed Motors

From racing results the dominating conclusion was the great performance of the small, high-speed motors, cars of 300 cubic inches or under showing higher maintained speeds than large 450- or 600-cubic-inch motors of previous years. The years of work that Europe has been expending in the development of the small high-speed, high-efficiency motor were well demonstrated at Indianapolis' 500-mile race, where an especially small car finished second. It can be accepted that 1914 definitely proved the fallacy of the large motor and heavy chassis for long-distance speedway or road races. The small motors with four valves per cylinder gave a wonderful account of themselves, both in America and abroad. More valve-in-the-head motors were used than ever before, though while these won the majority of races, the records of the year were established at Corona with a Mercer T-head design.

Cord tires came before the public more than ever before, and contests of 1914 proved as conclusively as previous years that car weight, car balance, and the resulting tire wear are still the controlling factors in racing.

Few Stock Car Contests

Unfortunately practically all contests were for non-stock cars, and it was exceedingly interesting when at certain times certified speed trials of stock cars demonstrated that we have stock cars that can maintain high speeds for 1 hour or longer, and that the public would still be greatly interested in more stock car performances.

In 1914 the Contest Board of the American Automobile Assn. issued 120 sanctions as compared with 101 last year, 132 in 1912, 117 in 1911 and 166 in 1910. A further analysis of the 120 sanctions issued in 1914 shows that fifty-two were on 1-2-mile dirt tracks, thirty-six on 1-mile dirt tracks, ten were road races, eight reliability tests, two hill-climbs, four certified trials, and one each of beach races, commercial vehicle tests. The Indianapolis, Tacoma and Sioux City speedways were the only ones to receive sanctions during the year.

This segregation indicates a falling off in the number of road races, which is explained by the fact that 1914 saw few class races, there being really only six events of major calibre, the Grand Prix and Vanderbilt at Santa Monica, the Chicago Automobile Club cup and the Elgin National trophy at Elgin, Ill., the Los Angeles-Phoenix desert race and the Corona races. In 1913 San Diego had three road races, Corona had two and Tacoma had three. This year San Diego was not in the running, Corona had only one, and Tacoma was put into the speedway category. Both the Los Angeles-Sacramento and Albuquerque-to-Santa Fé road races were abandoned this year.

Although road races in 1914 were fewer than ever before, yet the number of starters was 105 per cent. greater than in 1913 and the largest since 1911. There were 170 starting in the ten races whereas, in 1911, 202 started in twenty-seven events.

An Increase in Speed

This year showed an increase in speed. In each of the five classics the previous record for that particular race was beaten: De Palma's record of 75.49 m.p.h. for the Vanderbilt beat Mulford's mark of 74.07 at Savannah; Pullen raised Bruce-Brown's mark of 74.45 for the Grand Prix at Savannah to 77.2 at Santa Monica; De Palma raised the Elgin course mark from 66.8 to 73.9 and the Elgin National, formerly held by Gil Anderson at 71.5, to 73.53 and Pullen raised his old mark of 75.03 at Corona to 87.7.

This year saw about the same number of makers supporting racing teams, there being forty-seven makes represented as against forty-six in 1913, forty-four in 1912, forty-four in 1911, fifty-five in 1910 and sixty-three in 1909.

New speedway records were made at Indianapolis in the 500-mile race. These ranged from 20 miles up to 500. Oldfield in the Stutz gets the 20 and 25-mile marks and all the others go to the foreign cars. Speedway racing seems to have come into its own, for this year there were five races in this category, each won by a different driver and car. The Indianapolis 500-mile race was won by René Thomas in a Delage; Sioux City's 300-mile event went to Rickenbacher in a Duesenberg, and at Tacoma, the winners were Cooper, in a Stutz; Hughes in a Maxwell, and Parsons in a Frantz.

The year of 1910 was the next largest for speedway events, there being then three speedways in operation, Indianapolis, Atlanta and Los Angeles. In 1915, Indianapolis, Sioux City and Tacoma, it now appears, will be augmented by big tracks at Minneapolis, New York City, Omaha, and Chicago.

Races Longer Than Before

Referring back to road racing it is shown that another tendency noted this year was to make the races longer and the ten road races totaled to within 130 miles of the distance covered in the sixteen races in 1913. This gives 1914 the record average mileage with 354 miles as against 207 in 1913, 243 in 1912, 206 in 1911, 211 in 1910 and 211 in 1909.

The average time of all the finishers, too, was better, the figures giving 54.91 miles per hour, as against 54.68 in 1913, 54.49 in 1912, 59.51 in 1911, 51.58 in 1910 and 50.62 in 1909.

The average time of each winner was slower than those of 1911 and 1912 and faster than 1913. The following gives the average time made each year: 1914, 58.69; 1913, 57.7; 1912, 60.25; 1911, 63.22; 1910, 53.8 and 1909, 49.2.

Racing on 1-mile circular dirt tracks was more popular this year. A series of 100-mile races with keen competition between such drivers as Burman, Mulford, De Palma, Tetzlaff and Alley, brought large attendances. It is remarkable that in each of these races the 100-mile dirt track record was broken. First De Palma broke it at Brighton Beach, by making it in 1:40:15, then Burman at Kalamazoo, lowered that mark to 1:34:29 to 1:32:54 at Galesburg, and to 1:31:30 by Alley in a Duesenberg at Hamline.

(Continued on page 1183)

S. A. E. Advances Along Three Broad Lines

Standardization, Research and Social Activities Advanced—Over Sixty Papers Read—Twelve Sets of Standards Adopted—Cleveland Section Added

WHEN President H. M. Leland of the Society of Automobile Engineers spoke at the last Summer session of making two blades of grass grow where but one grew before, he struck the keynote of progress for the society. The organization has three broad lines of endeavor which may be laid down as the promotion of standardization in manufacture, research and the promotion of good fellowship and acquaintance among the men who make up the automobile industry. Along all these three lines Mr. Leland can truthfully state that the close of his administration sees many more blades of grass than the beginning. Progress has been made.

Twelve New Standards

In standards work, the addition of twelve new sets of adopted specifications and the modification and simplification of several others are milestones along the march of the committees in charge of this work towards the goal of maximum efficiency and economy in the manufacture of automobiles. The adoption of S. A. E. standards by other recognized engineering bodies is another important step. The Electric Vehicle Assn. has adopted the standards of the society as regards the electric vehicle in toto. The American Society for Testing Materials is considering the adoption of the entire list of S. A. E. steels. The recognition and confidence of other engineering bodies is a big factor in the success and growth of the society.

Over Sixty Papers

The fruits of research are the papers which are brought before the society for discussion and which then enter the transactions as a part of the permanent records. These papers not only represent private research but are also the reports of committees which have been definitely assigned to the work. In this committee investigation work the sections of the society have been a great factor and the work of committees on such subjects as gasoline-electrics, kerosene carbureters, etc., is bearing fruit in the shape of valuable data for use as reference in future developments. During the year more than thirty papers have been presented before the sections for discussion and at the two semi-annual conventions there were thirty-one others, fourteen in January and seventeen in June. Thus a total of more than sixty papers on selected subjects and the discussions which resulted from these have become part of the records of the society during 1914.

Cleveland Section Added

On the promotion of acquaintanceship it is impossible to set an accurate gauge. The social end of the society's work is aided to an immeasurable extent by the monthly gatherings of the four sections in New York, Detroit, Indianapolis and Cleveland. The last named section is another of the steps forward during the year as it has come into existence but recently. Probably the biggest opportunities for the formation of friendships are the semi-annual conventions. This year, as in the past, the winter session was held in January in New York City. The summer session was held on the sands of Cape May, N. J.

A step forward in the work of the standards committee has been made in the practice of holding a standards committee convention previous to that of the regular semi-annual conventions. This affords the members of the committee a chance to organize their work and establishes a firm stepping stone on which to base their reports to the society as a whole. In order to promote the best possible attendance at these important meetings the mileage of the members of the committee is now paid by the society. At the last convention of the standards committee held in October, seventy-five members registered during the progress of the meeting which occupied 3 days.

During this time the reports of twelve divisions which are actively engaged in the formulation of standards were heard. This offered the opportunity of telling the manner in which the specialized work was being conducted and enabled the committee as a whole to offer suggestions and discuss the manner in which the reports will be made to the entire society at the January 1915 session.

Fewer S. A. E. Steels

At the meeting in January 1914 eight new standards were adopted. At the summer session there were four others, making twelve new sets of standards for the year. These covered broaches, truck tire sizes, insulation tests, storage battery dimensions, battery rating, air pump dimensions, spark plugs, cotter pins for yoke ends and sets of specifications for S. A. E. alloy and carbon steels. In the iron and steel standards the adopted reports were in the line of simplifications of existing standards through the elimination from the list of steels, several that were not used to a sufficient extent to justify their retention.

Twenty-nine subjects are now engaging the attention of the society in regard to their standardization. These are noted in the accompanying table.

Many of these subjects are so broad that they are naturally subdivided and have certain portions of the work in the hands of sub-committees.

In the internal management of the society there have been several important milestones passed. The adoption of a new constitution which incorporates many features which broaden the work is one of the most important. The question of student enrollment is of great importance in the work of the society in developing men for the automobile industry. At the June meeting it was suggested that a paragraph be added to the constitution of the society putting it within the power of the council to enroll bona-fide students of automobile engineering under 30 years of age and for the sum of $3 annually allow them to receive the Monthly Bulletin of the society. To enter as a student, the endorsement of a member of the society and the approval of the council is necessary. Three student enrollments were approved during November.

Nine Tire Sizes

There are many steps in the standards work, which, although not adopted by the society this year, really belong to the year's work. One of the most important of these, both to the manufacturer and the user of cars, is the standardization of pneumatic tire sizes. There are now fifty sizes manufactured. If the proposed standard becomes a part of the policy of the tire makers there will be but nine, exclusive of the oversizes. The tire makers are heartily endorsing this stand because it will not only be a source of economy to themselves but will also work a benefit to the dealer, who will be able to keep himself stocked more readily and to the user because he will have less difficulty in securing the size tire he wants.

The sizes of tires which the division in charge of this work recommends for adoption as standard are the 30 by 3; 30 by 3 1-2; 32 by 3 1-2; 32 by 4; 34 by 4; 34 by 4 1-2; 36 by 4 1-2; 38 by 5 1-2, and 36 by 5. The feasibility of reducing the fify odd sizes of tires to the above nine will be realized when it is understood that 85 per cent. of the tires on cars now in use are among the sizes mentioned. The society expects that tire makers will manufacture oversizes for these tires but that the makers of cars will adopt one of these standard sizes, allowing the user to fit the oversize should he deem it necessary, owing to the carrying of more than the weight for which the cars are designed or for roads of more than ordinary capacity for tire wear.

Cars Undertired

The question of tire equipment has been dealt with more extensively this year than any other. It is stated in the reports of those who have investigated conditions for the pleasure car wheels division that more than 90 per cent. of our cars leave the factories with a greater load on the tires than the average prescribed by the tire making concerns. For this reason a special committee is considering the economics of using larger tires with less inflation. While this matter will fall into next year, its initiation is one of the features of accomplishment during the 1914 season.

Many of the fittings under the jurisdiction of the miscellaneous division are of importance. A new spark plug, not to replace, but to supplement the present S. A. E. standard plug is suggested. This will take a larger porcelain than the old standard plug and the dimensions will be such that it can be screwed into place by hand, the final tightening only being made with a wrench.

A work of great importance to the society is the maintenance of the data sheets which are issued in loose leaf form. Under chairman B. D. Gray of the data sheet division the work of keeping these sheets up to date has taken on a new life. The result has been the entire revamping of the data sheets. They now keep pace with the work of the standards committee and as a result are to be found on the desks of draughtsmen and engineers as instruments of active use. The standards so far adopted are printed on these sheets together with a large amount of valuable data in the shape of tables and engineering facts and formulæ.

A new division of the standards committee which will doubtless prove of value in keeping the S. A. E. in touch with the outside world is the standard exchange division. The function of this body is to keep abreast of the standards and engineering practices adopted by the society and by written communications and conferences arrange that the established standards of other organizations harmonize with those of the S. A. E. insofar as it is practicable. In addition to the E. V. A. and the American Society for Testing Materials the division is working in conjunction with the Automobile Engine Manufacturers Assn. A definite aim in conjunction with the work of this organization is the adoption of a standardized set of dimensions for bell housings for unit power plants. This would lessen to a large extent the troubles of the parts manufacturers in designing clutch housings and gearboxes and would tend towards reducing the prices on these units.

Throughout the year a question which has been a source of considerable debate in the society and which now seems to be solving itself is that of the single vs. two-wire scheme in installing electric lighting and starting outfits. At the summer session of the society the standards committee brought to the society as a whole the resolution that the single-wire system be adopted as recommended practice. A warm debate ensued on this in which it was brought out that many of the members did not think that the single-wire system was safe. The objection urged against it was the risk of fire and the complications necessitated by the installation of fuses. No decision could be reached. Since that time the division to which the matter was referred back states that of the 1915 cars 220,000 will be equipped with single wiring and 98,000 with double wiring. It is felt that in view of the remarkable trend towards the single wire system a recommendation by the society would be superfluous. The information upon which the facts are based comes from a declaration of the intentions of thirty-eight makers. Twenty-seven of these favored the single wire and eleven the double wire.

Owing to the agitation against glaring headlights which was inaugurated early in 1914 in many of the largest municipalities, resulting in legislation which had different requirements for lights in different cities, it was thought that the matter should be investigated by the standards committee of the society. In this connection a sub-committee was appointed by the electric equipment division. It will be the work of this committee to determine a standard method of measuring the quantity of glare in order that some basis will be had upon which to base a uniform legislation. This work is well under way and must be included in any review of the progress of the year.

Standards Are Used

All the work of the standards committee as reviewed in these pages is the product of work which stands out owing to its timely importance. In addition to this, however, there is a large amount of technical data which has been evolved as the result of patient and painstaking effort on the part of the committee in gathering data from the makers.

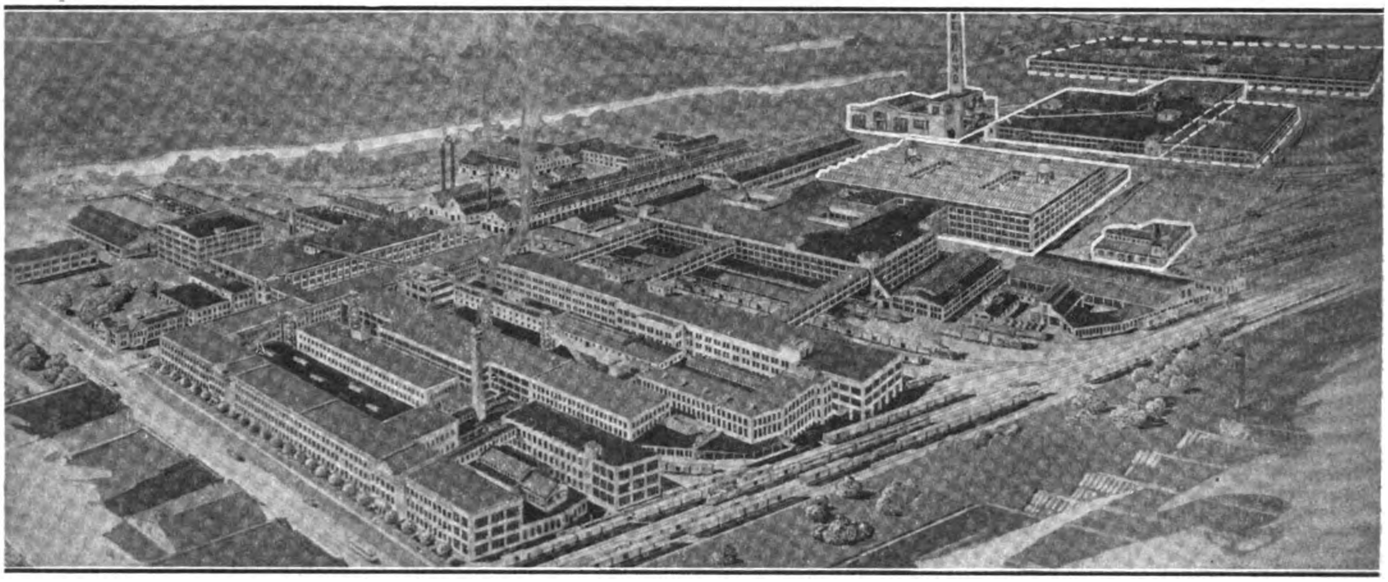
The proof of the pie is in the eating and in the standards work the eating of the pie is paralleled by the using of the standards in the actual work of designing the cars. The year of 1914 can truthfully be said to have seen a considerable advance in this respect. Car manufacturers who are turning out products which are to a large extent assembled are learning to specify S. A. E. standards foı their parts. The axle and gearbox manufacturers bring ample testimony as to this and none are more active participants in the actual work of the standards committee as well as in the discussions on the standards than are these makers. The contributions of the tire makers towards the adoption of a series of standard tests on demountable rims is one of the bright spots in the technical history of the standards committee work, showing that manufacturers whose industries are affected by the standards investigations are willing to lend time, men and money to the efforts to produce standards that will cut manufacturing costs.

It is to be regretted that the European war cut short the negotiations for the foreign visit this year. Many had expressed their intention of participating.

Subjects Now Engaging Attention of S. A. E. Standards Committee

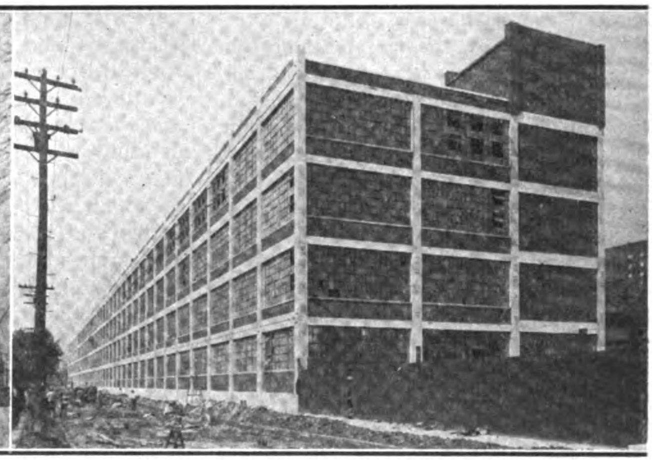
1—Truck wheel felloe bands
2—Truck wheel tire clamps
3—Anti-glare devices
4—Single wire fittings
5—Lamp nomenclature
6—Lamp fittings
7—Lamp bracket dimensions
8—Junction boxes
9—Frame sections
10—Lock washer material
11—Vertical carbureter flanges
12—Carbureter fittings
13—Air pump dimensions
14—Yoke end pins
15—Hex spark plug shell
16—Cotter pin sizes
17—Physical properties S. A. E. steels
18—Steel casting specifications
19—Pneumatic tire sizes
20—Tire inflation pressures
21—Demountable rims
22—Roller bearing sizes
23—Thrust bearing sizes
24—Tap drill sizes
25—Vehicle horsepower formula
26—Electric motor voltages
27—Electric vehicle ratings
28—Battery appliances
29—Industrial trucks

Some Building Activities During 1914—

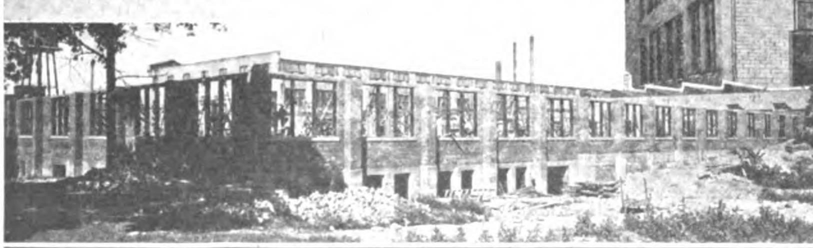


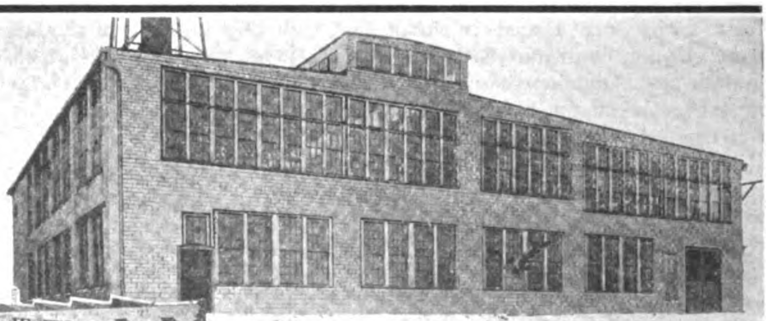
Bird's-eye view of Willys-Overland factory at Toledo, O., showing at right new buildings erected during the year at cost of $1,000,000. Completed structures are indicated by white lines surrounding the buildings. Other improvements under way are shown by dotted lines. The additions represent an increase in floor space of 1,985,000 square feet

New factory occupied by the Paige-Detroit Motor Car Co. in February of this year. New machinery to the value of $65,000 has been added for this new plant



Dodge Bros., Detroit, have increased their facilities during the year by a four-story assembly building, 876 by 70 feet, which, in addition to the other plants, gives a total area of 18.75 acres



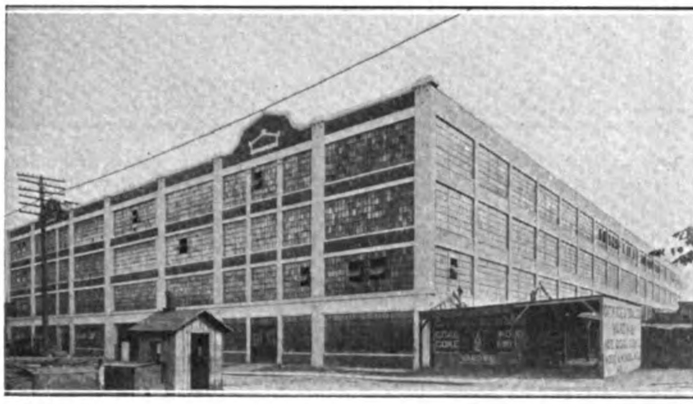


The Reo Motor Car Co., Lansing, Mich., has added 196,000 square feet. One of the new buildings (lower left) is a three-story one for various assembly departments and another is for heat-treating work. Cost of the additions was $110,000

The Hudson Motor Car Co., Detroit, has increased its floor area by adding a third story to the main building (upper left) and also to three of the wings, the additions being shown in dark in the illustration

The Kissel Motor Car Co., Hartford, Wis., has added 60,000 square feet for foundry and body-building work (upper right) at a cost of $60,000

Car, Truck and Accessory Plants Expand



The Cole Motor Car Co., Indianapolis, Ind., early in the year completed its new four-story factory measuring 400 by 100 feet, this new building incorporating the executive offices of the company

The Stutz Motor Car Co., Indianapolis, Ind., has occupied an entirely new factory building which increases its floor area 60,000 square feet at a cost of $100,000

THAT business conditions are really not as bad as some people would have us believe is the only conclusion possible after a close survey of the automobile, motor truck and accessory industries, particularly in regard to the progress in increasing manufacturing facilities.

In spite of the alleged general depression, out of seventy of our leading car makers, twenty-two added to their factory area, while twenty-three increased their machinery and other equipment. The total floorspace added is over 1,125,000 square feet, the expense incurred amounting to over $1,526,000. Machinery purchased represented an even greater expense totaling $1,720,000.

Among thirty of the leading truck makers, seven added to their floorspace, the increase amounting to 307,320 square feet at a cost of $72,000 and twelve bought new machinery and equipment, the total outlay being $156,200. Two entirely new factories are reported.

Of the 150 accessory manufacturers who reported, forty-seven increased their space by a total of approximately 2,000,000 square feet at a cost of $2,900,000. Seventy-eight of them added to their machinery and equipment, the amount invested in this direction totaling $2,400,000. Eleven entirely new factories and one partially new one are reported.

What the Car Builders Have Done

The Auburn Automobile Co., Auburn, Ind., has expended $10,000 in new machinery.

Consolidation of the Allen Motor Car Co., Fostoria, O., with the Sommer Motor Co., Bucyrus, O., gave an added floorspace of 40,000 square feet while test and first assembly buildings added during the year gave 35,000 square feet. New machinery, $25,000. New buildings, $20,000.

The Buffalo Electric Vehicle Co., Buffalo, N. Y., occupies an entirely new factory, five floors in height and 155 by 100 feet.

Cadillac Motor Car Co., Detroit, has increased its factory by 100,000 square feet. New machinery and equipment, $600,000.

New machinery to the extent of $42,000 has been purchased by the Chandler Motor Car Co., Cleveland, O.

The Cole Motor Car, Indianapolis, Ind., has added a four-story factory building 100 by 400 feet, which is illustrated on this page. The new building incorporates the executive offices of the company.

The quarters of the Dile Motor Car Co., Reading, Pa., has been enlarged 4000 square feet by the occupation of the new two-floor factory 60 by 150 feet. New machinery, $5,000.

Dodge Bros., Detroit, Mich., increased facilities by a four-story assembly plant 876 by 70 feet. The total floorspace of the factory is now about 18¾ acres.

Dorris Motor Car Co., St. Louis, Mo., has spent $5,000 in new machine equipment.

Fargo Motor Car Co., Chicago, Ill., has occupied an entirely new factory, two stories in height and 200 by 50 feet. New machinery, $1,900.

Grant Motor Car Co., Findlay, O., is established in new quarters, giving it a floorspace of 75,000 square feet.

A third story is being added to the factory of the Hudson Motor Car Co., Detroit, increasing the space from 8 to almost 11 acres. The third story is being added to the main building and three of the wings, making a total length of 2,200 by 62 feet.

The Hupp Motor Car Co., Detroit, has added an office, a dynamo-

Bird's-eye view of the combined plants of the New Departure Mfg. Co. at Bristol and Hartford, Conn. The six-story building at the left is a new $250,000 structure occupied during the year and is one of the models in its line

New eight-story factory of the American Ever Ready Co., Long Island City, N. Y., 200 by 300 feet and representing an expenditure of $1,000,000

The Auto Parts Co.. Providence, R. I., by erecting a new assembly shop at a cost of $25,000 has added 12,000 square feet of floor space

meter building and a garage, 8,336 square feet, obtained at an expenditure of 6,600. New machinery, $53,188.

Two buildings, costing $35,000, have been added to the plant of the Kissel Motor Car Co., Hartford, Wis., giving an increase of 60,000 square feet for foundry and body building departments. About $60,000 worth of new machinery.

Krit Motor Car Co., Detroit, Mich., has remodeled and enlarged its enameling department at an outlay of $1,500. New machinery, $6,000.

New machinery worth $500 has been purchased by the Lenox Motor Car Co., Boston, Mass., during the past year.

The L. P. C. Motor Co., Racine, Wis., has added 108,000 square feet. New machinery, $60,000.

The Lyons Atlas Co., Indianapolis, Ind., has altered a great many buildings covering an area of several hundred thousand square feet at an expense of several thousand dollars.

McFarlan Motor Co., Connorsville, Ind., has remodeled its factory and added a body-building department increasing its floorspace 18,000 square feet at an expense of $10,000.

Additions to the plant of the Metz Co., Waltham, Mass., consist of assembling, enameling, grinding, foundry and wood working departments, giving an increase of 160,000 square feet at an outlay of $250,000. The new additions are 400 by 400 feet. New machinery, $275.

The Milburn Wagon Co., Toledo, O., has rearranged its factory to take care of the new electric car departments, having added new offices with a floor space of 10,000 square feet.

Four buildings have been added to the plant of the Willys-Overland Co., Toledo, O., giving an increase of 1,985,000 square feet at a cost of $1,000,000. The buildings are as follows: four stories and basement, 410 by 500 feet; two stories and basement, 400 by 200; two stories and basement, 1,000 by 200; two stories and basement, 200 by 200.

Land comprising a tract 160 by 500 feet has been purchased by the National Motor Vehicle Co., Indianapolis, Ind., for a plant site.

The new plant of the Paige-Detroit Motor Car Co., Detroit, Mich., gives the company additional floorspace of 95,000 square feet and additional quarters rented in November give 49,000 square feet for the service department. New machinery, $65,000.

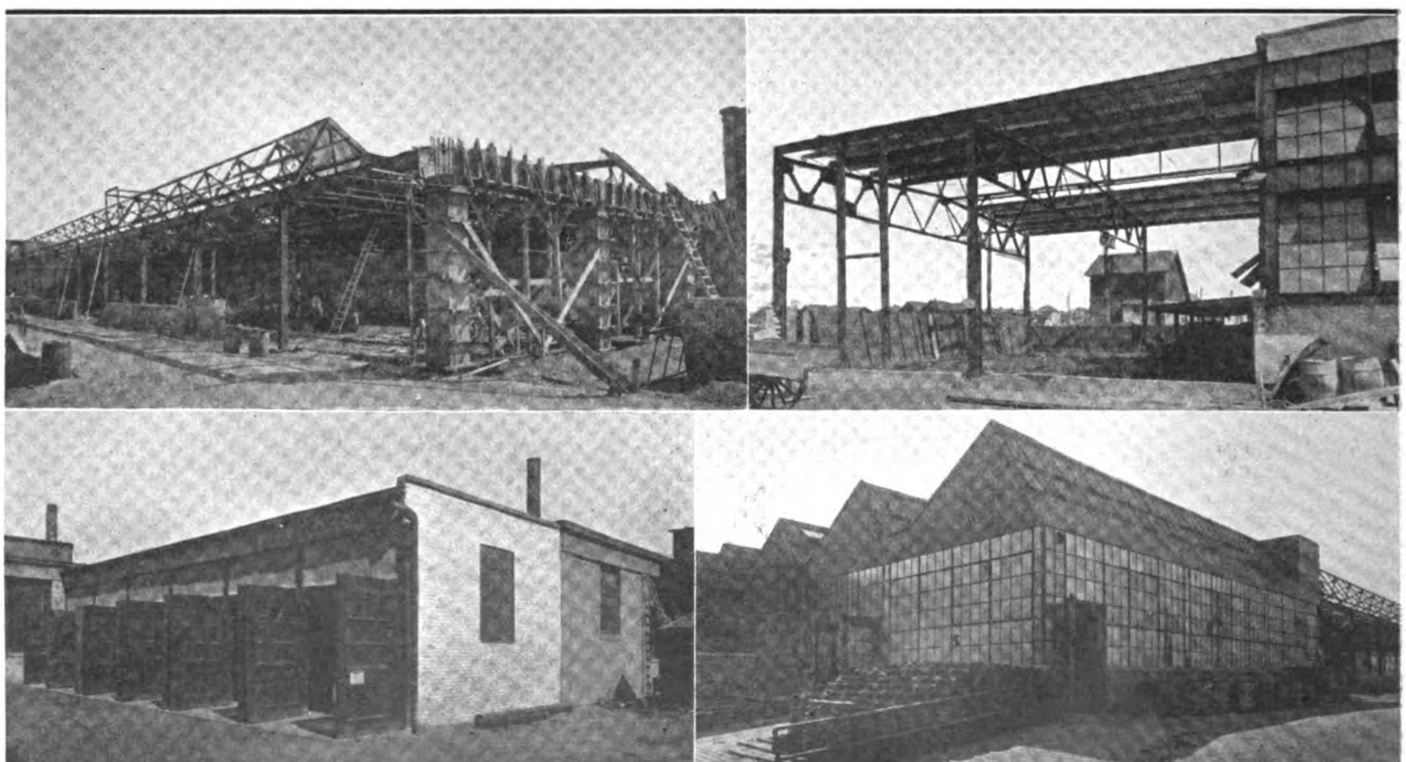
The Partin Mfg. Co., Chicago, Ill., purchased and occupied the factory formerly used by the Staver Automobile Co. in that city.

The Motor Car Mfg. Co., Indianapolis, Ind., has added 7,500 square feet.

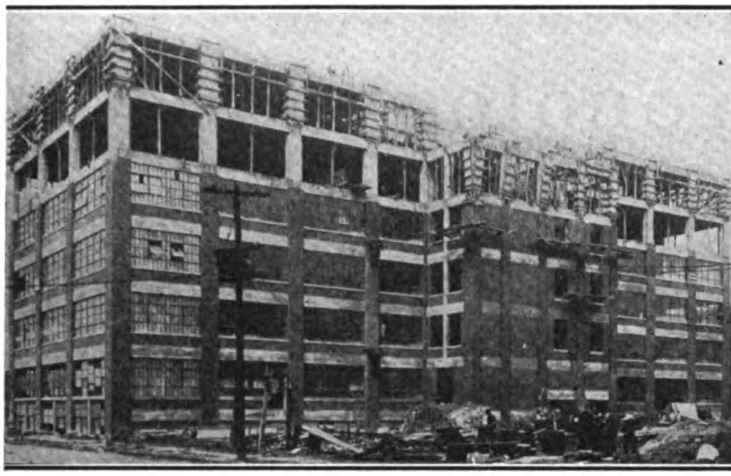
Machine tools to the extent of $42,000 and electrical and hoisting machinery worth $5,000 were added by the Pierce-Arrow Motor Car Co., Buffalo, New York, in 1914.

The Regal Motor Car Co., Detroit, Mich., invested $35,000 in new machinery and equipment.

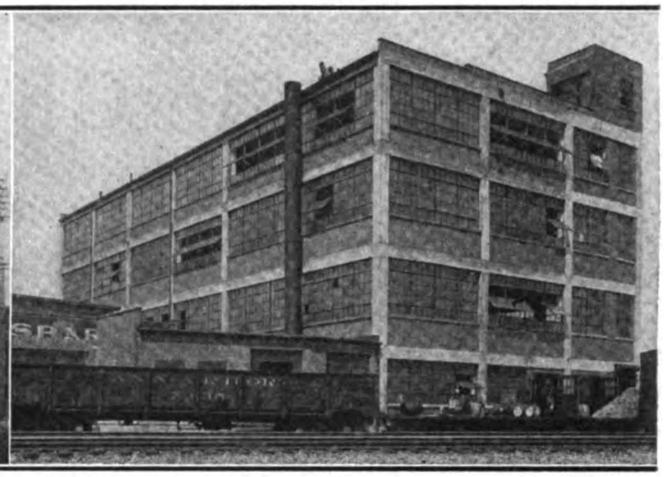
Reo Motor Car Co., Lansing, Mich., increased its floorspace 196,000 square feet. The additions represent an expenditure of $110,000, while machinery worth $240,000 and equipment worth $90,000 have been purchased. One of the three new buildings is a three-story structure to house the trim, top, gear paint and various assembly departments. A general machine shop 95 by 600 feet and another structure used for heat treating complete the list.



The Continental Motor Mfg. Co., Detroit, has added 75,000 square feet of factory area at a cost of $50,000 and has added new machinery to the value of $150,000. The additions include a machine shop, upper left in the illustration; addition to heat-treating department, upper right; a new garage, lower left, and a new steel stamping department, lower right



The Hyatt Roller Bearing Co., Newark, N. J., has added a six-story and basement structure, 200 by 75 feet and giving an increase in floorspace of 150,000 square feet



The Champion Spark Plug Co., Toledo, O., has completed a four-story addition giving an increase of 45,000 feet at a cost of $60,000. New machinery to the value of $100,000 has been added

The Saxon Motor Co., Detroit, Mich., has arranged to move into the factory formerly occupied by the Abbott Motor Car Co., which, with its 135,000 square feet of floorspace will increase the space of the company 85,000 feet.

The Sphinx Motor Car Co., York, Pa., purchased the four-story factory of the Hart-Kraft Motor Car Co., dimensions being 115 by 265 feet.

The Stutz Motor Car Co., Indianapolis, Ind., has added a new building, increasing its floor space 64,000 square feet at a cost of $100,000. The new structure is four stories, 80 by 204 feet, and will be used for assembly work. New machinery, $1,000.

New quarters are occupied by the Twombly Car Corp., New York City. The plant comprises six buildings, the largest of which is 450 by 100 feet. New machinery, $12,000.

An entirely new factory has been occupied by the Trumbull Motor Car Co., Bridgeport, Conn., giving the company 32,000 square feet of floorspace.

The Vulcan Car Co., Painesville, O., has added a final assembly room of 35,000 square feet at a cost of $10,000.

The Walker Vehicle Co., Chicago, Ill., has spent $10,000 on new machinery.

New machinery worth $2,000 has been added by the Waverley Co., Indianapolis, Ind.

The Woods Motor Vehicle Co., Chicago, expended $25,000 on new machinery.

In the Truck Field

The Atterbury Motor Car Co., Buffalo, N. Y., spent $2,000 for new machinery.

New machinery worth $3,000 has been added by the Blair Mfg. Co., Newark, O.

The Bowling Green Motor Truck Co., Bowling Green, O., expended $1,500 on new machinery.

The Couple-Gear Freight-Wheel Co., Grand Rapids, Mich., has bought $1,000 worth of new machinery.

The factory occupied by the new Denby Motor Truck Co., Detroit, Mich., has 20,000 square feet of floorspace.

New machinery worth $5,000 has been added to the equipment of the Duplex Motor Car Co., Charlotte, Mich.

Factory additions totaling 6,320 square feet and respectively 40 by 40 and 59 by 80, have been made by the Four-Wheel-Drive Auto Co., Clintonville, Wis., at a cost of $15,000. The additions will be used for power and painting departments. New machinery worth $25,000 has been added.

At the close of 1913 the General Vehicle Co., Inc., Long Island City, N. Y., moved into its new six-story main building. Machinery, $50,000.

The Kelly-Springfield Motor Truck Co., Springfield, O., has added two buildings, with a floor space of 26,000 square feet at a cost of $25,000. The additions are used for assembling and machine shop work. Machinery, $10,000.

The Knox Motors Co., Springfield, Mass., has purchased $3,000 worth of new machinery.

One addition has been made by the H. J. Koehler S. G. Co., Newark, N. J., at an expenditure of $20,000. It gives 4000 feet of floorspace for increasing production. Machinery, $30,000.

The Lippard-Stewart Motor Car Co., Buffalo, N. Y., occupied an entirely new factory with a floorspace of 50,000 square feet.

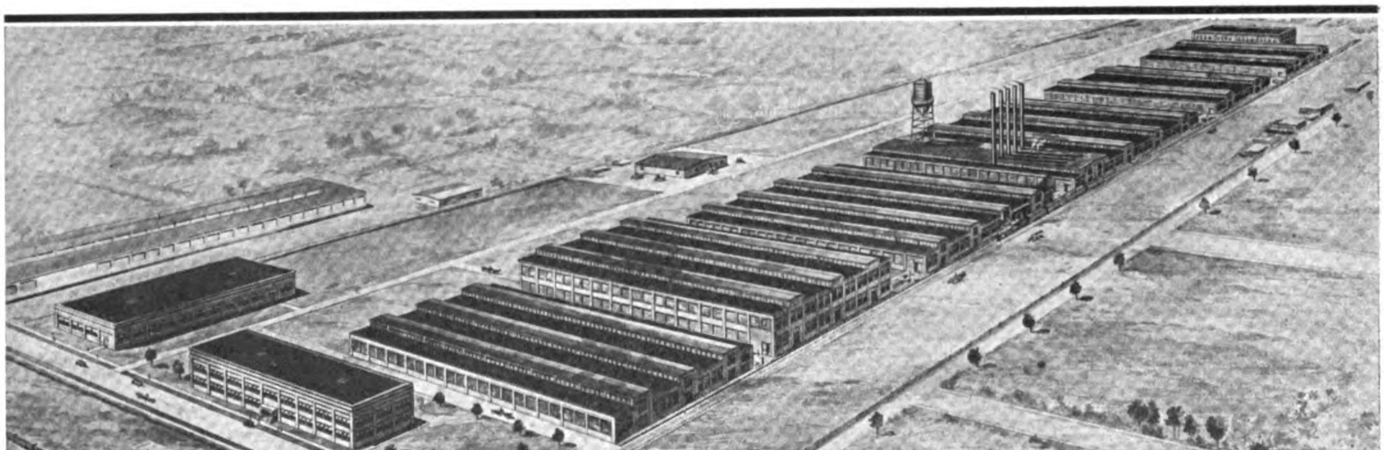
The MotoKart Co., New York City, is now erecting a plant at Scranton, Pa., which when completed will have a floor area of 195,000 square feet, comprising three manufacturing buildings, two 60 by 300 and one 60 by 250, a power building 50 by 100 and an administration building 50 by 250. Buildings will be two stories.

A one story building, 50 by 120, 6,000 square feet has been added by Nelson & Le Moon, Chicago, Ill., at an expenditure of $12,000.

Among the Accessory Makers

With the consolidation of the Splitdorf Electrical Co., Newark, N. J., and the Apple Electric Co., Dayton, O., the Apple company arranged for the removal of its plants to Newark by the purchase of buildings giving 70,000 square feet of floorspace, 5 acres of land and an office building.

(*Continued on page* 1174)



Bird's-eye view of the new plant of the Willard Storage Battery Co., Cleveland, O., which, when completed, will comprise ten buildings and contain 6 acres of floor space

Automobile Chronology for 1914

Engineering

January

1—145 American automobile manufacturers market 1914 cars at average price of $2,508.

2—American Voiturette Co. takes over manufacture of Keeton car.

2-10—Importers' Automobile salon, New York. Fifteen exhibitors.

3-10—Automobile Show, New York; 83 cars and 266 accessory exhibitors.

6—Moline-Knight ends 336-hour test at A. C. A., averaging 38.3 H.P.

6—H. M. Leland elected president S. A. E. at annual meeting.

6—Ford to distribute $10,000,000 among employees on profit-sharing basis.

15—Benz makes 122 m.p.h. at Brooklands. Hornsted's driving beats Demogeot's record at Ormond, by making 2 miles in 0:57.99, Demogeot's record being 0:58 2-5.

15—Buick six goes 20.1 m.p.g. at Chicago. Large and small four-cylinder models make 22.5 and 17.9 m.p.g. respectively.

20—Safety First Society organized.

21—American Electric Car Co., $1,500,000 capital, organized in Chicago to take over Argo, Brock and Borland-Grannis companies.

22—85,000 commercial vehicles in use in U. S. with 274 makers.

24-31—Chicago Automobile Show; 87 cars and 266 accessory exhibitors.

26—National Automobile Chamber of Commerce, Inc., christened.

27—Nobby Tread patent declared void. Court decides that knobby tread does not infringe Stafford.

27—Cyclecar Manufacturers' National Assn. formed at Chicago.

February

10—Exports for 1913, $27,029,451; 25,880 passenger cars and 1,009 trucks; $3,325,462 over 1912.

10—Russell-Knight motor averages 35.6 H.P. in 300-hour test at Toronto.

13—Paige-Detroit M. C. Co. moves into new factory.

16—Mitchell sells wagon business. Adds $2,700,000 to automobile capital.

21—Splitdorf Electrical Co. takes over control of Apple Electric Co.

28—Pullen wins Grand Prix in Mercer, 77.2 m.p.h., 403 miles.

29—De Palma wins Vanderbilt in Mercedes, 75.5 m.p.h., 295 miles.

29—Detroit builds 35,900 cars in February. A new record.

March

2—Supreme Court decides that makers cannot fix retail prices.

3—Argo Motor Co., Inc., to build $295 car.

8—Palmer & Singer Mfg. Co. files petition in bankruptcy.

7-14—Boston automobile show opens with 90 car exhibitors.

9—Kardo Co. organized for patent purposes, $1,000,000 capital.

10—U. S. has 1,253,875 registered cars, an increase of 243,392 over 1912.

18—F. P. Porter leaves Mercer to build own car.

18—Singer Motor Co. organized with $175,-000 capital.

19—George Westinghouse dead.

28—E. Y. Knight patents double-sleeve motor.

April

9—J. Ellwood Lee, of Lee Tire & Rubber Co., dead.

13—Entz Corp., $3,000,000, to build cars with electric transmission.

15—Prest-O-Lite wins against Searchlight at Chicago.

22—Ford production nears 600,000 cars since inception.

Industrial

May

1—Ninety-four Franklin cars average 32.8 m.p.g. in nation-wide competition. High mileage is 51.2 m.p.g.

2—Chandler Six does 24.4 m.p.g. at Chicago.

5—Ten patents assigned to Universal Rim Co., Chicago.

5—E. P. Batzell, Hudson engineer, dead.

9—Charter for new Knox company given Mayo heirs. Knox Motors Co., Springfield, Mass., incorporated for $2,500,000.

12—42.4 m.p.g. on French car trials; 18 light cars show economy in 2,000-mile test.

13—Chandler Six makes 23.7 m.p.g. in New York City.

16—180 Saxons average 34.75 m.p.g. in fuel test.

18—Stewart-Warner enjoined on Motometer patent.

19—G. A. Matthews, president Jackson Co., dead.

19—Ford declares $2,000,000 dividend.

25—Bailey electric averages 22.8 m.p.h. in Boston-New York run.

26—American Electric Starter Co., Detroit, absorbs Disco.

30—Thomas in Delage wins 500-mile race, Indianapolis, 82.47 m.p.h.

June

4—Col Charles Clifton re-elected president N. A. C. C., Inc.

5—Steinmetz declares 1,000,000 light battery-driven vehicles costing under $500 will swarm streets.

11—Sunbeam wins Isle of Man race, 56.44 m.p.h. in 600-mile 2-day race.

15—Cyclecar taxicabs planned by $500,000 Twombly Co., fixing 25-cent cost for first mile.

19—Carnation 24-hour non-stop run 29 m.p.g. in New York City.

20—Packard touring car averages 75 m.p.h. at Indianapolis Speedway for 1 hour.

20—1913 tire exports total $3,943,220.

23-26—S. A. E. opens eighth summer session at Cape May, N. J.

24—Michigan has 89,413 men employed in automobile industry.

23—Thomas H. White, founder White Co., dead.

27—Master Carbureter Corp. formed, capital $250,000.

29—Chevrolet Co. buys old Maxwell-Briscoe factory, Tarrytown, N. Y.

30—Moline Automobile Co. to build Knight motors for trade.

July

3—150,000 more cars registered in first 6 months of 1914 than same period in 1913; 1,203,770 cars, 33 states.

4—Stutz wins 250-mile race, Tacoma, 73.44 m.p.h. Maxwell wins 200-mile event, 74.28 m.p.h.

4—Lautenschlager in Mercedes wins French Grand Prix, 65.55 m.p.h. Mercedes cars take next two places. Distance, 467.5 miles.

4—Rickenbacher in Duesenberg wins 300-mile race, Sioux City speedway, 78.6 m.p.h.

5—Studebaker six averages 15.15 m.p.g. in series of five 200-mile events.

6—3,732,585 sq. ft. in Ford plant after expansion of 10 years.

7—Transcontinental Saxon reaches San Francisco. Averages 30 m.p.g. for 3,389 miles.

8—Dodge Bros., Inc., $5,000,000, Detroit, Mich.

8—Franklin shows 84.4 per cent. efficiency in test at Worcester Polytechnic Institute.

8—E. C. Patterson in Packard six makes Chicago-New York run in 41 hours.

11—Denby Motor Truck Co., Detroit, Mich., organized.

General

18—Detroit's car and truck exports in 6 months $3,154,875.

18—Stearns company adds 500,000 square feet to factory.

25—Grand Prix Peugeot with 274.6 cu. in. piston displacement makes 107 m.p.h. over 4.3-mile straightaway at Boulogne.

30—United States has 1,548,350 cars registered in first 6 months of 1914. A gain of 294,485 over same period for 1913.

30—239,902 cars from 25 Detroit plants in 6 months. Ford production 162,000.

August

1—Ford profit sharing plan lowers car prices $60.

10—Winton Motor Car Co. new name for Winton Motor Carriage Co.

11—New York Division of Electric Vehicle Assn. formed.

12—Disbrow in Simplex lowers 2-mile track record at St. Louis, 1:32 3-5.

12—Tetzlaff's Benz goes 1-2 mile in 12 3-5 seconds at Salt Lake City salt beds.

13—Michigan motor industry supports 22 per cent. of state's population.

13—Tire companies increase prices from 12 1-2 to 20 per cent.

13—Crude rubber raises from $0.70 to $1.15 in 1 week.

15—Record exports last fiscal year; 30,136 valued at $27,797,642 and $4,159,454 in tires.

17—Apple Electric Company moved to Newark, N. J.

22—Wood-wire wheel test by Automobile Club of America finished.

24—De Palma in Mercedes wins both Elgin races; 73.53 m.p.h. for 301 miles in Elgin National Trophy and 73.91 m.p.h., 301 miles, in Chicago Automobile Club cup.

30—One hundred and twenty-seven Detroit companies incorporated in 7 months.

September

1—Europe orders 1,000 motor trucks.

1—Used-car markets—Chicago Auto Trade Assn. publishes first market report.

1—Receiver for American Voiturette Co., Detroit.

3—Chevrolet Royal Mail roadster makes 27.9 m.p.g. in New York City.

8—Tire prices down to normal.

11—Buick wins Wisconsin 500-mile reliability.

12—Burman sets world's 15-mile record in 12:47, Peoria, Ill., in Peugeot.

12—Sphinx M. C. Co. buys Hart-Kraft factory.

15—Remington Motor Co. announces $495 car.

17—Cadillac announces eight-cylinder motor.

19—General Motors annual report shows $85,-373,303 gross sales.

25—Champion and Jeffery-Dewitt spark plug consolidate.

26—One hundred and sixteen Franklin sixes average 11 m.p.h. on low gear for 100 miles.

28—Chandler company declares extra 10 per cent. dividend.

29—Ford lists chassis at $410.

October

1—Stearns-Knight four for $1,750.

6—New York separator repeal law defeated.

7—Horsepower and gasoline war tax defeated by Senate caucus.

7—Hess-Bright wins bearing suit.

7, 8, 9—Motor Truck Club of America holds 4-day convention at Detroit.

9—Cole four averages over 22 m.p.g. in Indianapolis speedway tests.

12—W. H. Van Devoort nominated S. A. E. president.

12—Five hundred and forty-eight companies allotted space for National shows.
12—Maxwell earns 12 per cent. on first preferred stock. Net earnings $1,430.444.52.
15—Packard production passes 25,000 mark; 3,612 vehicles built in company's fiscal year.
19—Receiver for Premier Motor Mfg. Co.
19-20-21—Electric vehicle annual convention at Philadelphia.
23—Burman in Peugeot breaks 75-mile dirt track record, 1:08:56, Galesburg, Ill.
24—Alley in Duesenberg breaks 100-mile dirt track record, at Hamline, Minn., 1:31:30, over 65 m.p.h.
26—King has eight-cylinder car at $1,350.
27—Ray Harroun appointed chief engineer Maxwell company.
27—Owen to develop Weidely motor. Weidely Motor Co. organized.
27—Stromberg-equipped Jeffery makes 28.7 m.p.g. at Chicago.
29—United States has 1,735,369 cars registered to October 1. Gain of 203,503 over statistics July 1.

November

2—Canadian-American firms to make 36,000 cars in 1915.
5—Handley buys Marion; to reorganize company. Assets bring $120,000.
7—Two-mile speedway for Minneapolis and St. Paul. Twin City Speedway Assn. builder.
9—Pope-Hartford, with Hugh Miller and Ed. Orr driving, breaks El Paso-Phoenix record; 533 miles in 14:37, at 50 m.p.h.
9—Overland, Stromberg-equipped, makes 29 m.p.g.
9-14—Fourth American Road Congress, Atlanta, Ga.
10—Finley R. Porter announces F. R. P. chassis at $5,000.
10—Dodge $785 car out.
11—Grant six with electric system, $795.
11—Oldfield in Stutz wins Los Angeles-Phoenix desert race, 696 miles.
12—Marmon 41 averages 62.89 m.p.h. for 1 hour with five passengers and top up, Indianapolis speedway.
13—Ford increases surplus by $20,702,859.39. Total surplus, $48,827,032.07.
20—English government places embargo on rubber shipments from Far East to U. S. in English boats.
20—Up-river Para down to 64c. a pound.
23—Monroe two-passenger car, $460.
23—Chicago Stock Exchange resumes trading. Closed since July 30.
23—France buys 900 motor trucks.
26—Pullen wins Corona race at 87.7 m.p.h., 302 miles, world's record.
29—Saxon Motor Co., Detroit, leases Abbott Motor Co.'s factory.

December

1—England orders 250 Peerless trucks.
1—Saxon six, $785.
4—War tax of 10 cents for car owners in several states.
5—N. A. C. C. starts interchange of patent licenses by makers.
8—Overman Cushion Tire Co., New York City, with $150,000 capital, organized to succeed bankrupt Overman Tire Co.
8—Cincinnati court rules against Ford to maintain fixed retail prices.
9—Lozier Motor Co. declared bankrupt.
10—October exports, $3,055,351; trucks exports, 672. Gain, 593.
10—Five-passenger Reo six for $1,385.
12—New York Stock Exchange opens. Closed July 30.
12—N. A. C. C. co-operates with spring makers to stop truck overloading.
14—Metz touring car at $600.
14—American Motors Co., Indianapolis, discharged from bankruptcy.
14—Walker Vehicle Co. absorbs Chicago electric.
15—Frank E. Smith, receiver, Premier Motor Mfg. Co., to continue manufacture.
15—Chicago to have 2-mile board speedway.

Recent Court Decisions—Guest Sues Owner

By George F. Kaiser

A MOTORIST must use care to prevent a guest whom he has invited out riding from being injured, and if a guest is injured he may bring suit against the motor car owner.

A motor car owner invited a friend to go riding with him. While they were on the trip the owner drove negligently and the car hit a telephone pole and was over turned. The guest had an arm broken, his shoulder, elbow and left ankle sprained and his head cut, and also suffered severe bruises all over his body. He sued his friend the car owner for his injuries and the Court decided that the suit was proper, even though the owner was insured by a liability company and judgment was rendered in favor of the injured party for $1,750.—*Fitzgerald vs. Boyd*, 91 *Atlantic* (*Maryland*) 547.

Watch Your Policy

Texas Court decides that, even though a man broke the warranties in an automobile fire insurance policy, he may still recover, when the company's general agent waived the breach.

A motorist had a $4,000 fire insurance policy on his car, which was destroyed by fire. He brought suit against the insurance company to recover that amount. The company claimed that he had broken his policy so that at the time of the fire it was null and void. The policy provided that "It is warranted by the insured that the automobile hereby insured, during the term of this policy, shall not be used for carrying passengers for a compensation, and that it shall not be rented or leased." . . ."In the event of violation of any warranty hereunder, this policy shall immediately become null and void."

During a fair at Dallas, Tex., the motorist's son took the car, without his knowledge or consent, and used it for carrying passengers to and from the fair grounds for hire.

Although the company contended that this made the policy null and void, the Court said that it did not believe that the use of the car that way for a limited time breached the policy, as the working evidently meant that it should not be used that way continuously.

The company further contended that, as the policy contained the clause that "in consideration of the reduced rate at which this policy is written, it is understood that the property insured hereunder shall, at all times, be kept or stored in the private garage or private stable situate at 1000 South Harwood street, Dallas, Tex.; privileged, however, to operate the car and to house in any other building or buildings for a period of not exceeding 15 days at any one location, at any one time, provided the car is en route, visiting or being cleaned or repaired. All other terms and conditions of the policy remaining unchanged," and the motorist had used the car for several trips lasting more than 15 days, the policy was also null and void under this warranty.

The Court decided that, notwithstanding the fact that the policy was broken, the motorist was entitled to his insurance, because he had gone to the general agent of the company and had asked permission to go to his farm and such permission had been given him.—*Commercial Union Assurance Co. of London vs. Hill*, 167 *S. W.* (*Texas*) 1095.

Motorist Loses in Damage Suit

The fact that a motorist failed to give proof of his competency as a driver, and to show within what distance his car could be stopped, together with his failure to produce the bicyclist, who was an eye witness to the accident, caused the Minnesota Court to hold that judgment against him was proper, in a late case where a horse owner sued for injuries to the horse.

A horse was tied to a hitching post on a curb of a street in St. Paul. A few feet away, and on the other side of the street, was a covered automobile. The owner of the horse was absent 15 minutes and, on returning, found that the horse was so badly injured that he had to be killed. The owner of the horse thereupon sued the owner of the automobile for the value of the horse. The motorist showed that he had driven near the center of the street at about 10 to 12 miles an hour, and that when he was about 7 or 8 feet from the horse, a bicycle suddenly came from behind the carriage and, to avoid running down the bicyclist, he turned his machine at right angles and applied his brakes and that the pavement being wet, the machine skidded, hit the horse and injured it.

The court decided that he should have gone further and showed how competent he was to operate the machine, within what distance it could be stopped and should have either had the bicyclist in court as a witness or explained his absence.—*Whitewell vs. Wolf*, 149 *N. W.* (*Minnesota*) 299.

Balanced Intake in Rotary Motor

Bournonville Single Rotary Sleeve Performs Functions of Exhaust and Inlet Valve—Operated for 4,000 Miles

EUGENE M. BOURNONVILLE, who was one of the pioneers in oxy-acetylene welding in America, has invented a rotary valve engine and placed it in a chassis and after having submitted it to a 4,000 mile test is now making negotiations for its sale. As in other rotary valve motors which have recently been placed on the market, there is no difference from ordinary engine construction. In making up the experimental job a Fiat power plant was used, the only alteration being in the top of the cylinder head. Here a rotary cylinder extends horizontally the length of the motor and performs the functions of the inlet and exhaust valves.

A housing above the cylinder head contains the rotating cylindrical valve, and it is in the arrangement of the gas passages in the housing and in the valve itself that Mr. Bournonville claims to have overcome the difficulties which have heretofore been found in rotary valve motors.

Referring to Fig. 1 the top of the cylinder is seen at *A* and a passage or port leads from it vertically upward at *B*. This port serves as the means of communication between the valve above it and the cylinder below and hence offers a common passage for the exhaust and inlet gases. The valve itself is denoted by *C*. It rotates in the housing *D*. The intake manifold is a unit with the housing at *E* and the exhaust port is at *F* leads into the manifold *G*. This entire assembly is surrounded by the waterjacket *H*.

Referring to the transverse section of the motor at Fig. 1. the inlet manifold *E* runs the entire length of the motor and communicates through the ports *L* to the corresponding openings in the valve over each cylinder. In the position shown the cylinder is receiving its charge under suction stroke, the gas entering at *L* passing through *M* and thence through the opening *B* into the cylinder. As the valve turns on its axis the port is closed by the solid portion *N* covering the opening *B*. This holds the compression and after the firing stroke covers the inlet port *L* while the next opening portion of the valve *O* affords a passage from the cylinder through *B* to the exhaust manifold *G*. The positions of the valve for inlet, compression, firing and exhaust are given in Fig. 5.

Thus far the action of the valve is similar to other rotary valves. The big difference is in the means of distributing the

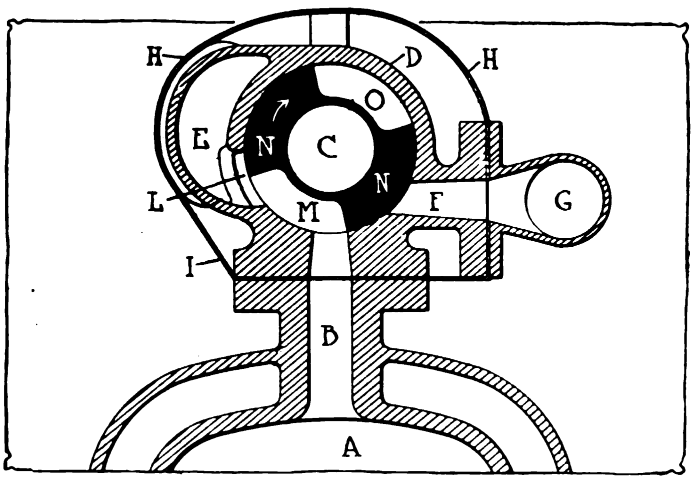


Fig. 1—Transverse section through Bournonville rotary valve motor

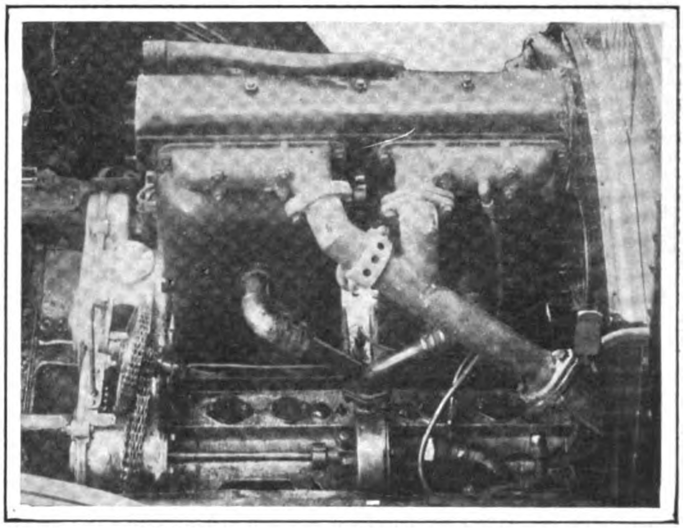


Fig. 2—Exhaust side of engine, showing mounting of valve housing

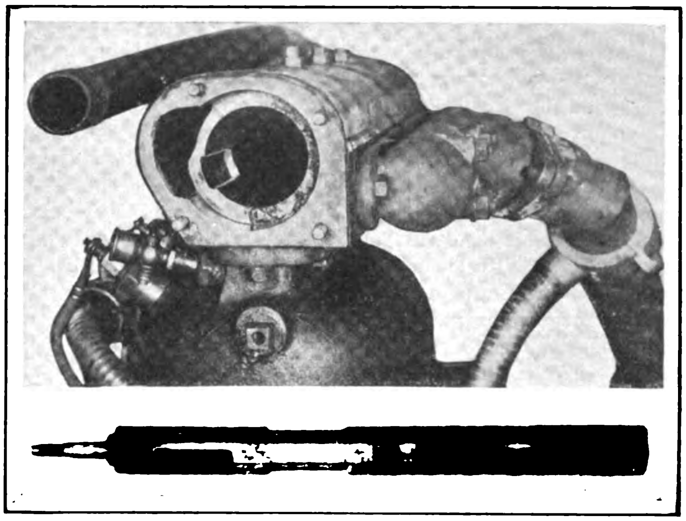


Fig. 3—Mounting of the valve housing and, below, the valve withdrawn

intake charge. The arrangement is such as to provide a heat balance and a friction balance at each cylinder, thus securing uniformity in the performance. The inlet manifold *E* extends the entire length of the valve housing passage. It communicates with the port *L*, which also extends the entire length of the housing, at each end. This offers, in effect, a long tube open at either end with gases entering from both sides. At four points in the length of this pipe there are openings corresponding to the passages to each of the four cylinders. Since the gases enter from the two sides simultaneously the average temperature of the gas will be the same at each cylinder because, if the gas gained one heat unit for each unit of length traveled and it had to travel two units from one side and eight units from the other it would have gained ten units; or, if it had to travel five units from each end it would still have gained ten heat units. This holds true for any point from which the gas is taken, in the length of the pipe. A friction balance is maintained in the same way. The distance that the gas has to travel is always the same no matter for what cylinder and hence the amount of frictional resistance to be overcome is constant.

Another effect secured by having the intake passage *L* open at both ends is that the gas is continually see-sawing backward and forward, giving a wiping action of the gases on the exposed surface of the rotary valve. This action is what the inventor claims to be the agent which keeps the valve free from carbon and hence eliminates cutting. On the engine which has now run 4,000 miles there is no sign of cutting visible. There is no carbon deposit on the exterior surface of the valve although in the ports *M* and *O*, there is the same kind of carbon caking that would be noted in the ports of a poppet valve motor. These ports, which are dark on account of the carbon deposit, can be seen in the accompanying illustration Fig. 3 and it will be also noted that the bearing surface of the valve retains its polish. A method of driving this valve is shown in Fig. 6. It is by silent chain from the crankshaft through the reduction gear as shown. The timing gear case in the illustration is not required in the rotary valve motor but remains in its position through the fact that this is a rebuilt job. In the tests that were carried out the old camshaft was left in place although turning idly.

With the two ports *M* and *O* the rotary valve is driven at one-fourth crankshaft speed. If it is desired the number of these could be increased to three or four with consequent reductions in the speed of the drive. This would not be feasible on smaller motors. The dimensions of the test motor illustrated are 4 15-16 by 5 15-16.

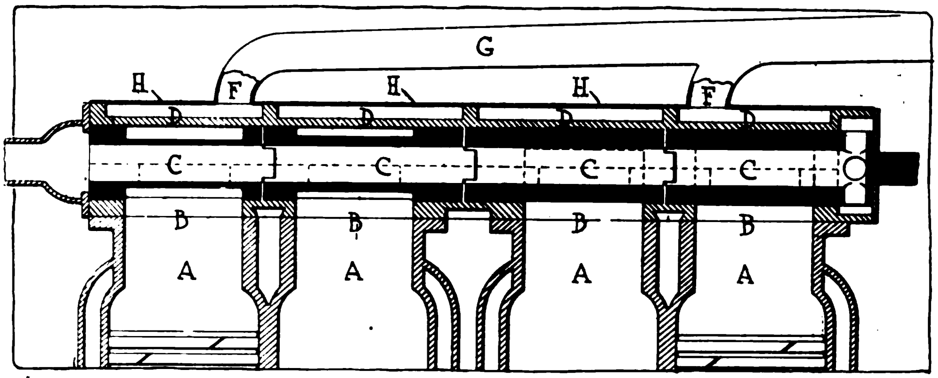


Fig. 4—Longitudinal section through Bournonville motor, showing valve in four parts

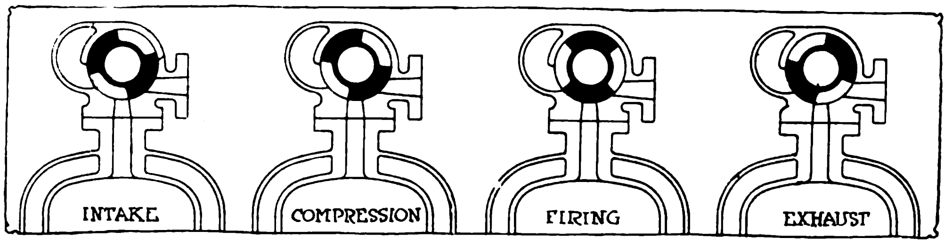


Fig. 5—Positions of the rotary valve for intake, compression, firing and exhaust

Valve Timing Orthodox

The timing of the rotary valve does not differ materially from that of ordinary poppet practice. The intake opens 15 degrees after upper dead center and closes 20 degrees after lower dead center. The exhaust valve opens at 45 degrees before lower dead center and closes 5 degrees past upper dead center. This gives a 10 degree pause between the exhaust closing and the intake opening with which a vacuum is created in the cylinder to promote a rapid inflow of gas on opening. The area of the ports is the same for intake and exhaust being 2.25 square inches with a length of 4.5 inches and width of .5 inches. Compression is 72 pounds per square inch.

In manufacture the cylindrical valve is made with .002 inch clearance in its housing. The housing itself being of large diameter can be ground with a cylinder grinder and the sealing of the valve is accomplished by the oil film in the small amount of clearance. The oil itself is the thinnest possible to avoid the loss of power required through shearing a heavy oil film. In taking down the engine after a difficult 100-mile run during which the car was driven by a representative of THE AUTOMOBILE a liberal coating of oil was found along the entire surface of the valve. Oiling on the experimental engine insofar as the cylindrical valve is concerned is taken care of by the suction of the cylinder. It is purposed on the permanent job to install a mechanical oiler. Another important feature which will be changed in the permanent manufacturing job is in the making of the valve housing and waterjacketing integral with the cylinder casting. This will reduce height and permit of more advantageous jacketing.

The elimination of moving parts is the chief advantage claimed. The valve timing once set remains constant and the valve itself can be taken out for examination in 10 minutes. As the valve is made in four parts as shown in Fig. 2 the amount of warping for each part should not be of any effect.

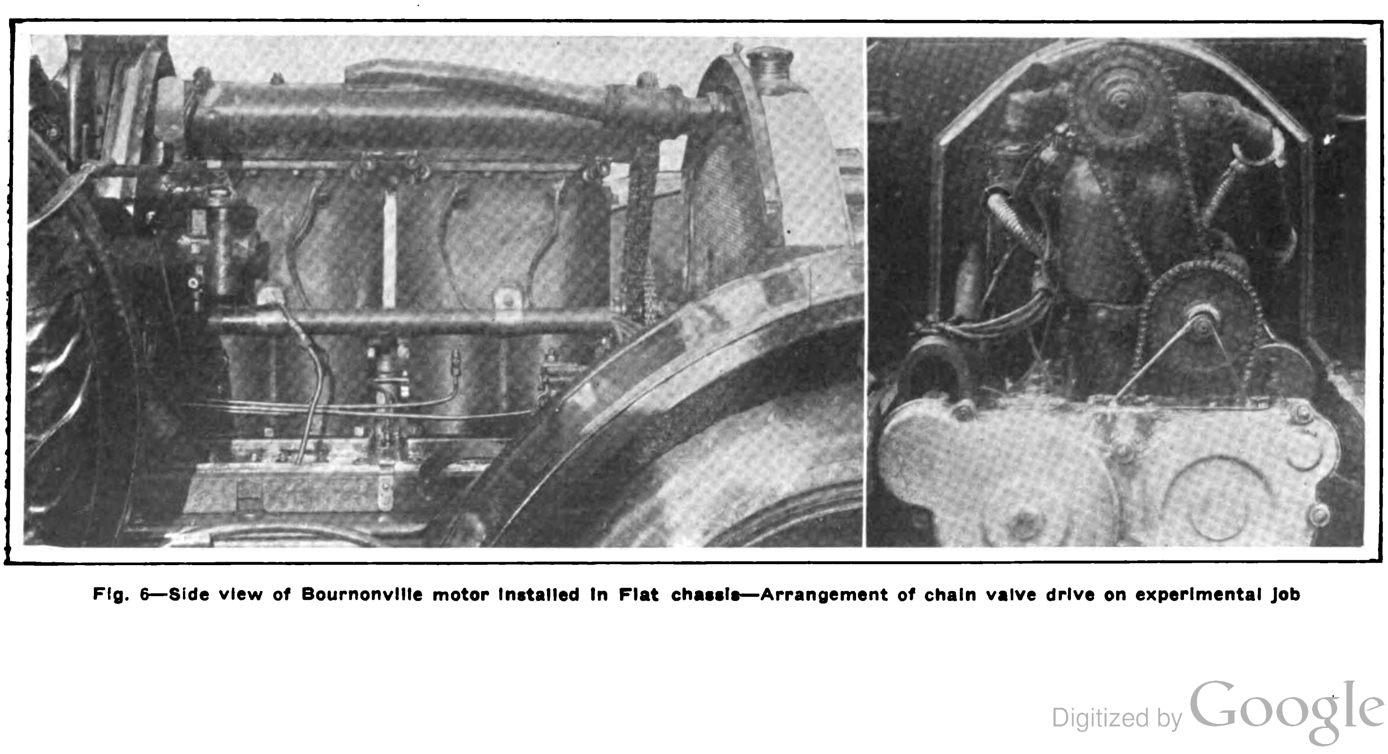


Fig. 6—Side view of Bournonville motor installed in Fiat chassis—Arrangement of chain valve drive on experimental job

Newcombe's Law Applied to Motors

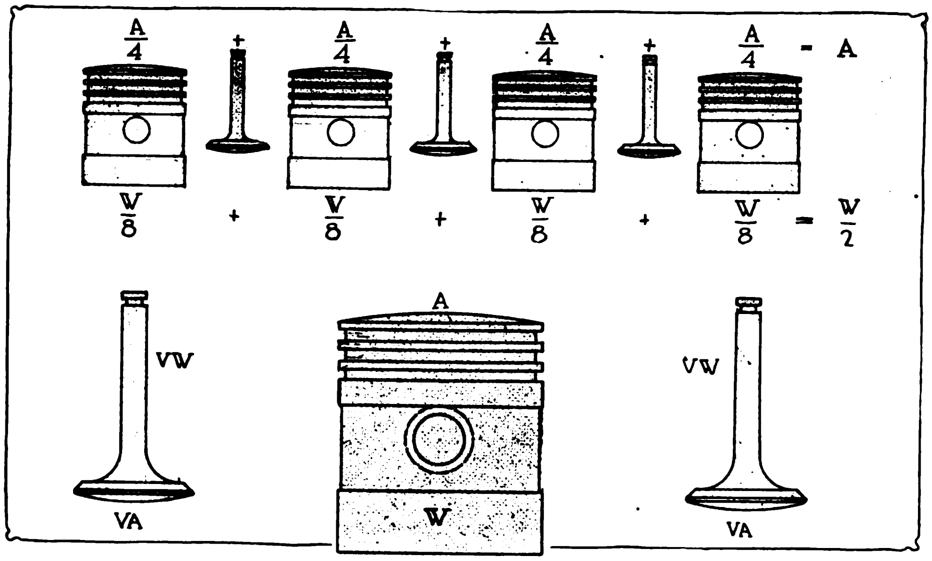


Fig. 1—Illustrating Newcombe's law. Above—Four pistons each half the size of the large piston shown below or 3 inches in diameter. This shows how by decreasing size an equal piston area is obtained while the reciprocating weight is thereby cut exactly in half. Below 3 inches mechanical difficulties limit carrying the law to the extreme

Piston Friction in Multiple-Cylinder Types Compared—Rigidity a Factor in Longevity

By William B. Stout
Chief Engineer, The Scripps-Booth Co.

DETROIT, MICH—Editor THE AUTOMOBILE:—The high-speed motor is a coming proposition. Slow-speed motors have proved grossly inefficient compared with the small-bore, high-speed types of Europe.

A high-speed motor may be as long lived as a slow speed. The four-cylinder motor in racing has proved the best high-speed automobile motor to date. The new eight-cylinder type of motor is acclaimed with reason as a better high-speed possibility than are six-cylinder constructions.

Rigidity a Necessity

Rigidity is the basis of engineering construction in high-speed motor design. Balance is the secret of power and r. p. m., and the chief reason for the long life of high-speed motors. Small bore and light pistons are, in turn, a chief secret of balance and form the primary basis for the very high degree of efficiency which is obtained in motors of high-speed type.

It is no longer good engineering, or good sense to judge the power of a motor by its bore and stroke. A 2 1-2 by 4-inch motor may give 6 horsepower actual or it may give 18 horsepower. R. p. m. with bore and stroke is not an entire basis of judgment. A motor may be able to turn up to 3,200 r. p. m. on the block and yet its power curve may show a decided drop in power at 1,000 r. p. m.

Efficiency the Aim

The chief aim of the high-speed motor is efficiency. If one takes a 12-horsepower motor and runs it at twice the speed with the same efficiency he will get 25 horsepower from the same bore and stroke. The aim of the up-to-date, high-speed motor designer, then, is to obtain the same efficiency, long life and freedom from vibration at 2,500 r. p. m. that present motors show at 1,200.

Every indication points toward the high-speed motor as the real innovation of 1915, public interest toward this type of motor having begun with the success of the Peugeot in the Indianapolis race in 1913.

With the coming of the eight-cylinder motor as a large probability for 1915, interest in high speed types has been doubled, as the eight-cylinder has possibilities as a high-speed, long-life motor.

Six Speed Limited

The six cannot attain to real high speed, due to crankshaft limitations.

A high-speed motor can be made as long lived as a slow-speed motor and can be run with as little overhauling and expense. The matters of long life and small wear are almost entirely questions of the rigidity of parts rather than their mere capability of transmitting the amount of power which goes out of the motor. Shaft diameter, for example, is figured largely, not from its power-transmitting capabilities, but its stability and freedom from whipping at the r. p. m. for which it is intended. Motors whose power could be transmitted by a 1-inch shaft are fitted with crankshafts over 2 inches in diameter and of the highest grade steels. Crankcases are stiffened. Castings throughout are watched to prevent internal vibration in the motor, which will tend to misalignment of bearings or distortion-friction in any of the moving parts. These conclusions point toward the eight V-type

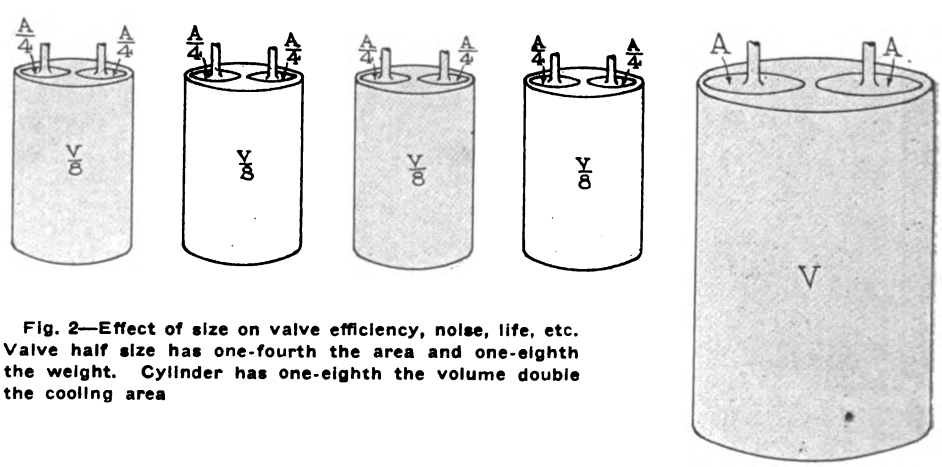
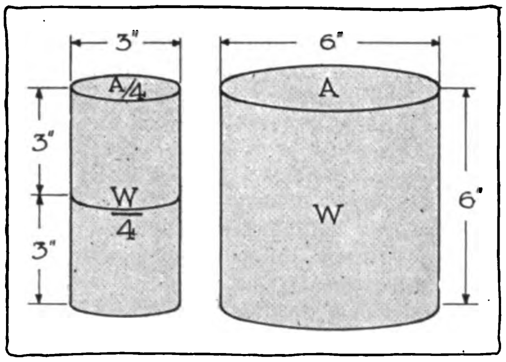


Fig. 2—Effect of size on valve efficiency, noise, life, etc. Valve half size has one-fourth the area and one-eighth the weight. Cylinder has one-eighth the volume double the cooling area



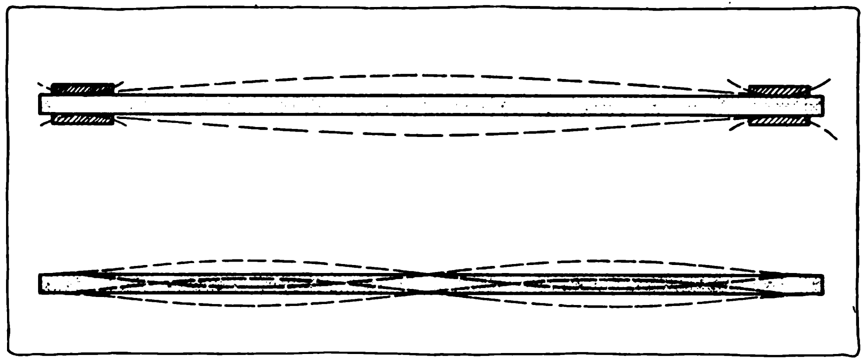


Fig. 3—Left—Theory of 2 to 1 stroke ratio. Fig. 4—Right—Above—Critical speed in shafts, the limitation of most American cars, the basis of metal fatigue. Below—Second critical speed with center node

motor as the eventual motor for cars requiring above 3-inch bore.

It would be practically impossible to build a high-speed six, in the writer's opinion, of greater than 3-inch bore, and even then the question would be one of the length of life of crankshaft bearings. A two-bearing crankshaft is preferable for high-speed work, from the standpoint of manufacturing cheapness, for a three-bearing shaft needs to have each web counterbalanced, and again because this type of motor is shorter and lighter in weight. The large size of the crankshaft insures the rigidity.

If a crankshaft of certain size is rigid on a four-cylinder it is doubly rigid if applied to an eight of equal cylinder capacity, for each explosion is of smaller moment, and the reciprocating parts are very much lighter in the eight. This statement holds good for all motors above a bore in the neighborhood of 3 1-2 inches. In smaller sizes, mechanical limitations do not allow the same laws to hold.

The smaller the bore, the more feasible, commercially, becomes the overhead valve. For really high-speed work where greatest amount of efficiency from bore and stroke is aimed at, overhead valves are a necessity. These valves as constructed in modern small bore motors, are even quieter than L head motors of the larger type and are especially accessible.

The following discussion covers points governing the main constructional ideas of high-speed motor construction:

Thinks 3-Inch Ideal

There is a basic engineering law which points toward the small-bore motor as an eventual type for all internal combustion engines where weight is a factor. Maximum and minimum formulas show that the most efficient motors, all things considered, probably will have a bore of around 3 inches.

All arguments to date in favor of six and eight-cylinder constructions have been based on purely theoretical assumptions, but few have taken into consideration the mechanical difficulties and limitations which hedge any theory in its application to automobile motor practice. There are certain things which are as basic in their application and as inevitable in their result as the fact that two plus two make four. The law governing motor size and pointing toward future development is as basic as this and was seriously brought to public notice by Simon Newcombe in his now famous mathematical proof that aeroplanes would never fly. The law which he stated exists, but the aeroplane designer, approaching the flying machine from a different angle than what Newcombe had in mind, overcame the law by mechanical construction which made it an assistance instead of a detriment.

Newcombe's Law

Briefly stated and explained, the law is this: IF YOU MAKE A THING HALF THE SIZE IT HAS ONE-FOURTH THE SURFACE, BUT ONE-EIGHTH OF THE WEIGHT.

ALL SURFACES ARE MEASURED BY TWO DIMENSIONS, LENGTH AND BREADTH; VOLUMES ARE MEASURED BY THREE DIMENSIONS, LENGTH, BREADTH, AND THICKNESS. IF YOU DECREASE AREA ONE-HALF YOU DECREASE TWO DIMENSIONS AND THE SIZE IS ONE-FOURTH. IF YOU DECREASE VOLUME ONE-HALF YOU DECREASE THREE DIMENSIONS AND THE MASS OR WEIGHT IS ONE-EIGHTH. THIS BRIEFLY EXPLAINS WHY HIGH-SPEED MOTORS ARE DOING SUCH REMARKABLE WORK AND AT THE SAME TIME SHOWING SUCH SURPRISINGLY LONG LIFE.

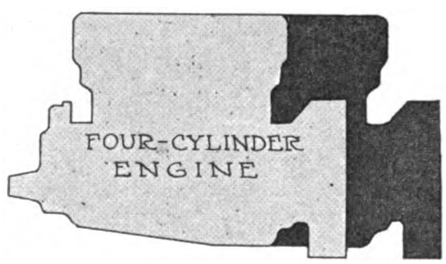


Fig. 5—Diagram showing the added weight in six-cylinder motor construction

Fig. 1 shows this law as applied to piston size, for example.

Below is shown the piston of a large bore motor—say 6 inches. This has an area on top of A, it has a weight together represented by W. The power of the motor is determined by three factors: the area A, length of the stroke L, and the r. p. m., R. It will be shown that the size of the piston has a great influence on all three of these factors and that the smaller the piston—within mechanical limitations—the more efficient.

Applying the Law

Above are shown four pistons, each half the size of the big piston, or 3 inches in diameter. The area of the piston on top in each case is $\frac{A}{4}$ since the area of each piston is 1-4, the area of the original. The weight in each case is $\frac{W}{8}$. The four pistons together have the same top area as the big piston or A, but the sum of their weights is one-half the weight of the original piston or $\frac{W}{2}$. Thus, by decreasing size we have obtained an equal piston area and have cut the reciprocating weight exactly in half. Since the same law applies to connecting rods it can be followed all the way through, it being acknowledged of course that below 3 inches, mechanical difficulties of construction come in which limit carrying this law to the extreme.

The internal friction on the four pistons would be the same as in a single big piston, as the side area of all four is equal to the side area of the original big one. The angularity of the connecting-rod would presumably be less with the small piston than with the large, as the light weight would not make the matter of keeping the angle small of so great moment. This law as explained in regard to pistons will at once explain the advantage of the long-stroke motor for high-speed work and an advantage which I think has not yet been explained

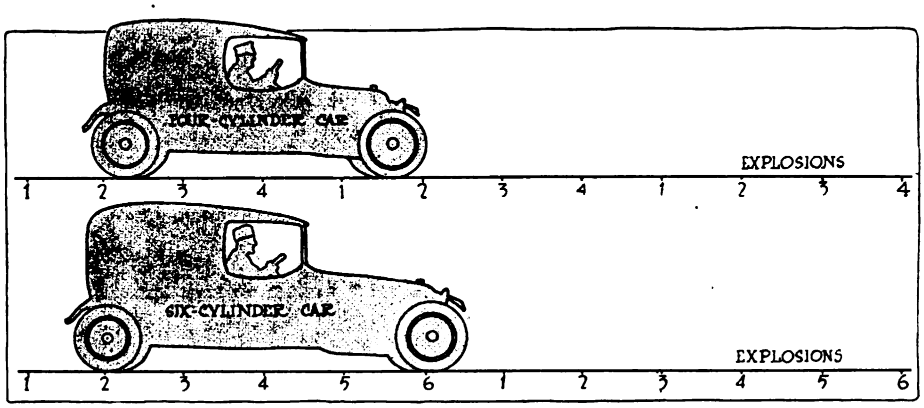


Fig. 6—Flexibility is shown by the number of explosions per mile whether the motor is four or six and is the result of gear ratio, not the number of cylinders. A high-speed four approximates a medium-speed six in performance

satisfactorily by any line of engineering argument heretofore published.

Having found the advantage of small piston size and presuming that the 6-inch bore piston in the first place was fitted to a 6-inch stroke engine—according to old-time practice—there will immediately be seen a reason for the long stroke in connection with the small piston, that the volume ratios may be kept as nearly as possible the same. In actual practice few motors are built in this country with two ratio stroke, but just what ratio is best has been ably handled in former articles. By shortening the bore-stroke ratio, however, little is lost for with pistons of half the weight the r. p. m. can be run up to a point where the piston's speed rate is very much higher than it was in the first case with the large piston. This ability to make higher speeds with the reciprocating parts very much more than compensates even should the stroke be decreased almost in proportion.

It will be noticed in Fig. 2 that our cylinder volume has decreased in proportion to surface enormously. Whereas the large cylinder has a volume W and a certain outer surface or cooling area, A the small cylinder has one-fourth the cooling area A, but only one-eighth the volume V of gas to cool, providing the cylinder length has decreased in proportion.

Fig. 3, however, shows the motor with the long stroke; this has one-fourth the piston area but the same stroke as in the first case, so that the volume of the small cylinder is one-fourth of the original. In this case, four-cylinders would show the same cubical capacity as the original one-cylinder at the right. The four-cylinder motor, however, as explained, shows but one-half the reciprocating weight of the single-cylinder, large-bore motor of the same piston area and the same volume.

It does not require any argument further to show that the maximum efficiency motor from this law alone must be a motor of high r. p. m. and small bore.

There are other reasons in the mechanism which allow the motor to make this r. p. m. beside that of weight of reciprocating parts. Fig. 2 illustrates Newcombe's law of sizes as applied to the complete cylinder, showing cylinders of 3 and 6-inch bore fitted with valves of one-half the cylinder diameter and in the head.

The smaller cylinders have one-eighth the volume of the big cylinder but the valves are one-fourth the area so that the valves in the smaller motor have just one-half the gas to handle per square inch of valve area that the big motor has, so that the smaller the cylinder the greater carrying capacity the valves will have.

While the small cylinder holds one-eighth of the gas in its volume it has one-fourth the cooling surface, so that theoretically at least twice the number of heat units can pass through the cylinder per minute.

Overhead-Valve Type

Engineers agree that the theoretically ideal valve construction is the overhead type. They admit from 12 to 15 per cent. more power from the same bore and stroke as with an L-head. The overhead valve in the large-bore motor is too noisy, however, for commercial use.

Valves in a small-bore motor can be built in the head and still be wonderfully quiet, as the valves in the smaller cylinder shown weigh one-eighth as much in the big cylinder. This less weight added to the lesser area enables the designer to fit valve springs much lighter in tension per square inch of valve area than in the big motor—less than half in practice. The possibility of overhead valves in a small-bore motor, however, adds greatly to its efficiency value. The same discussion of valve sizes applies also to L-head, block motors where the close proximity of the cylinders limits the size of the side-by-side valve. The use of small bore increases the valve carrying capacity with the same diameter.

In calculating the horsepower of a motor one cannot judge by the bore and stroke. A motor from which we obtain 12 horsepower the foreigners increase to 30 or 40 by the application of high speed principles, and one must consider r. p. m. as a basic factor in judging any motor.

Long life in a motor depends very largely upon the rigidity of its parts. This term rigidity should not be confused with the term strength, for by strength one thinks of immediate breakage whereas rigidity is a factor toward decreasing vibration and stress on bearings and working parts. There are many motors today which can turn over at 3,000 r. p. m. but whose practical working road speed is not over 900 r. p. m. The parts sustaining the moving factors of the mechanism are not of sufficient rigidity to allow bearings, oiling systems, couplings, etc., to stand the continued vibration or distortion.

Crankshaft's Critical Speed

Practically every motor of limited commercial r. p. m. can figure its limit of r. p. m. from the *critical speed* of the crankshaft. Every shaft, no matter what its size, has a critical speed, as shown in Fig. 4. The diagram is of a support on two bearings a considerable distance apart. One can rotate the shaft between these bearings slowly and it will work perfectly and last forever. As the speed increases, however, centrifugal force develops a whip at the center of the shaft, induced by the natural deflection of the shaft under its own weight between centers. This starts the center of the shaft whirling like a child's skipping rope, as shown by the dotted lines, and the speed point at which this whipping develops is known as the critical speed. If one gets above this speed a shaft will again find its center until at another point of higher r. p. m. it finds a second critical speed, and here it will be found that there is a node at the center of the shaft and a whipping in two directions from it, as shown in the lower sketch of Fig. 4. This indicates that a center bearing on a shaft may double possible motor speed with the same diameter crankshaft.

Crankshaft critical speed is the answer to the failure to date of the high-speed, six-cylinder motor of commercial type. For high-speed work a short crankshaft is necessary.

Every discussion which the writer has seen favoring the six and eight-cylinder types over the four has been taken largely from the standpoint of even-power torque. This is not the basic reason for the eight-cylinder motor or the four and not its chief advantage over the six. The writer prefers the four or the eight for reasons of mechanical limitations which no one has been able to overcome in the six.

The first deficiency of the six is its extra length and its extra weight, so that while one adds power in building a six he does not add equivalent power per pound, for the r. p. m. possibilities of the six are far below that of the four as a commercial-design proposition.

Two-Bearing Four

A four-cylinder motor can be built with two bearings on a very short crankshaft of large diameter. The extra diameter of this crankshaft makes little difference, as it is largely flywheel weight. This motor is a well-balanced motor for without the center bearing the crankshaft itself is in rotating balance and hence does not throw side stress on the bearings through its centrifugal deficiencies. In the six there cannot help but be a certain amount of distortion at high speeds which throws the engine out of balance. It is almost impossible to build a six cylinder motor which will not show critical speed in its crankshaft.

Supposing that in Fig. 4 one end of the long shaft shown were held in a vise. Supposing a wrench or crank were put on the other end and a 1,000-pound load was suddenly dropped on the end of this crank. There would be a certain amount of twist in the length of this shaft no matter how rigid, this twist depending on the leverage, the length of the shaft and diameter. A shaft one-third shorter would show far less twist effect with the same load and hence the shorter the shaft fitted to a high-speed motor the less will be this twist of the shaft. *This torque twist is not to be confused with critical speed and shaft whipping as this is another condition.*

In a six of fairly large size to throw one piston out of line for 100th of an inch at high speed is enough to create very great internal stress in the motor, and at high speeds this is felt in all six-cylinder motors. The six in large sizes through its mechanical crankshaft limitations must be a slow-speed motor.

Answering the argument of even-power torque in favor of the six-cylinder motor, there is no difference between the power torque of a six or four in its effect on the car *provided the number of explosions per mile be the same.*

A high-speed four, that is a four on a comparatively low gear ratio giving, say, 6,000 explosions per mile, will show the same flexibility and low speed running as a six, and in far less weight, provided the six is higher geared to give the same 6,000 explosions per mile. The extra two cylinders of the six are to give greater motor flexibility and the six is more flexible at slow speeds, but by making the four with a gear ratio giving the same number of explosions per mile as the six the four does not have to run so slowly to drive the car equally slow with the six.

The deficiency would seem to be therefore at the higher speeds, for ordinarily a low gear means a hindrance of maximum speed possibilities. With the new fours this is not the case. A small-bore motor can turn over so much faster maximum than a six of large bore that it more than makes up for the deficiencies of the low gear ratio. Small-bore, well balanced fours with big crankshafts and rigid construction, with pressure feed oiling, as in European motors, can keep up from 2,500 to 3,500 r. p. m. for long periods without undue strain. There are more periods of stress, it is true, as there are more revolutions and more explosions, but each one is far less than in the slower speed types.

Eight Outlook Bright

Since it is hard to make a high-speed six, and since there is advantage in the modern high-speed motor, the outlook for the eight is very promising. With large cars where a bore of 3 inches or thereabouts is not large enough it is very probable that the eight-cylinder will come into prominence. This motor can be built shorter than the four of equal power and lighter. Through the law explained at the beginning of this article THE PISTONS OF THE EIGHT WEIGH MUCH LESS THAN THE PISTONS OF THE FOUR OF EQUAL CYLINDER CAPACITY. The thrust per explosion will be less and the centrifugal force of the moving parts less so that THE SAME SIZED CRANK WILL GET LESS WEAR THAN IN THE ORIGINAL FOUR. The flywheel weight can be less on account of more even torque and because THE PISTONS AND RODS FORM PART OF THE ROTATING WEIGHT.

With the lighter moving parts the r. p. m. possibilities of the eight should lead to wonderful speed performance, making a low gear ratio possible and quick acceleration. For small cars the high speed four motor is wonderfully efficient and reliable. For big cars the eight has a great possibility. For slow speed motors the six will continue to be popular.—WILLIAM B. STOUT, Chief Engineer, Scripps-Booth Co.

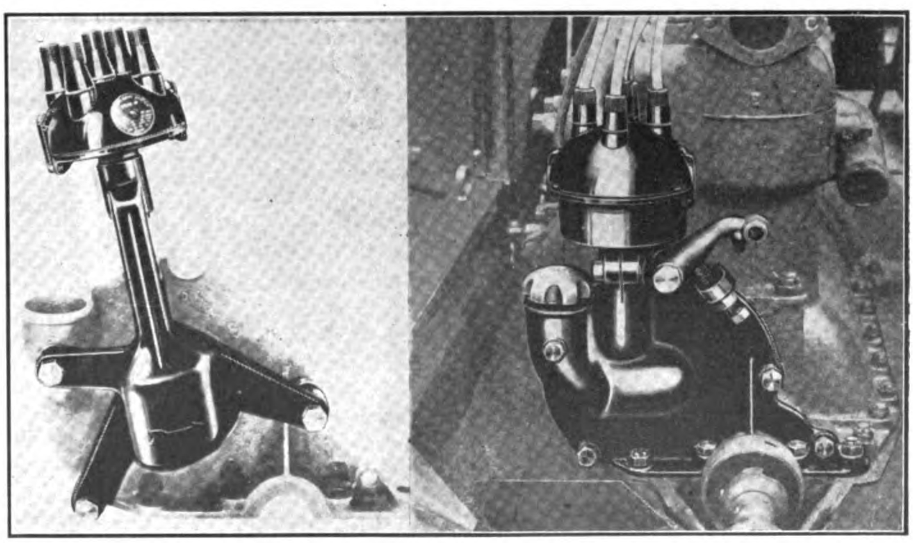
Ford Unisparker Has Automatic Advance

TO drive without thinking about the spark advance, to crank the motor without danger of a back kick and without spinning are the features offered by the adaptation to the Ford car, of the model K-2 Unisparker made by the Atwater Kent Mfg. Works, Philadelphia, Pa.

The device is mounted in a special gearcase cover which replaces the regular one and which can be attached without any fitting. Retard of the spark when cranking the motor is automatic and when the speed of the motor increases the spark advances, thus eliminating the hand control. The spark lever is removed as it is not needed. Spark advance is maintained up to 2,400 revolutions per minute and this range is ample for Ford requirements.

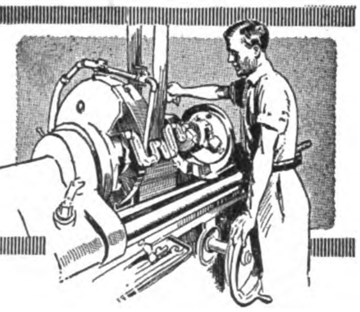
The price of the new instrument is $28, which was formerly the figure at which the type H instrument for Ford cars sold at. Recently the price of the type H was reduced to $22. Either of these models costs $2 more when a kick switch is furnished.

Current is supplied by a 6-volt storage battery or a six-cell dry battery, and it is stated that a set of dry cells will last 2,000 miles. The Ford magneto may be used for lighting.



At the right is illustrated the new Ford Unisparker with automatic advance. At the left is the instrument as made without automatic advance

The Rostrum



This department is for the instruction of the readers and all are at liberty to ask questions. Give full name and address so that we may send you a reply by letter if there is no space in the Rostrum. If you wish to sign a fictitious name, also sign your own.

Reasons for Advancing Spark Lever

EDITOR THE AUTOMOBILE:—In answering a question in the issue for December 10 you say:

"The necessity for advancing the spark is brought about by the fact that it takes a definite time to produce the spark, that is, from the instant the breaker points separate on the magneto until the spark occurs in the cylinder a small amount of time is consumed."

Now I know that this is the popular explanation for the necessity for advancing the spark, yet when we remember that the electric current travels several thousand miles in a second and that the distance from the breaker points to the spark plug is at the most only 3 or 4 feet it seems to me that this reasoning does not satisfy. Although I am a motorist of 10 years' standing I have never yet heard or read of a good explanation of this matter of spark retard and advance and the fact that the question of automatic or hand control is far from settled shows that this matter is not understood.

2—Any information regarding this question of spark advance will be appreciated. For instance, can you explain why advancing the spark so that the ignition occurs before the highest point of piston travel increases the power when the motor is speeded up?

East Canaan, Conn. D. C. CANFIELD.

—1—It takes time to produce a spark because of certain secondary effects that occur when a circuit is closed or opened. Suppose we have a spark coil and close the circuit. It is natural to believe that immediately the flow of current would rise to its full value, but it does not, for the reason that the flow of this current is opposed by a counter electromotive force which the current itself generates. This counter electromotive force, or voltage, however, gradually dies down so that the current eventually rises to its full value.

Magnetic Field Set Up

It is common knowledge that when a current flows in a wire that the space surrounding the wire is magnetized, or to use the technical term there is a magnetic field around the wire, the greater the current flowing the more intense this field. It is also well known that whenever there is a relative movement between such a magnetic field and *any wire within the influence of the field* a voltage is induced in this wire and a current flows. This principle is used in generators by moving the wires on the armature with respect to the field magnets, and in an induction coil this relative movement between secondary coil and primary magnetic field is produced by suddenly increasing or decreasing the strength of the field. The increase or decrease, as the case may be, induces a current in the secondary.

Since the primary magnetic field when it increases or decreases in strength causes a current to be generated in the secondary, it is only natural that this change in field strength will also produce a voltage in the primary winding itself, self-induction is what it is called. This voltage is in the opposite direction to the line voltage which is causing the current to flow. Therefore, when a current starts to flow it cannot rise to its full value immediately. It starts out with a rush when the circuit is closed but this causes a large back voltage to be generated; little by little the *rate* of current increase falls until the current reaches full value.

There is also some delay when the spark is produced by breaking the circuit due to self-induction in the secondary circuit and mutual induction in primary and secondary, but the delay is not so great because the flow of current due to the back voltage in the primary circuit is in the same direction as the flow due to the line voltage.

2—Since it does take an appreciable amount of time to produce the spark after the circuit has been closed or contact broken according to the system employed, it is necessary to advance the spark lever as the speed of the motor increases in order that the spark may be produced at exactly the same instant.

Why Advance Is Required

When the motor is running slowly, say 300 revolutions per minute, it takes a comparatively long time for the piston to complete its cycle and therefore if the spark is to occur just as the piston reaches top dead center the circuit breaker does not have to open much sooner. If it takes .01 second for the production of the spark after the breaker points separate, then the spark lever must be so set that the breaker points will open .01 second before upper dead center is reached.

Suppose now that we increase the motor speed to 3,000 revolutions per minute, the piston now is moving ten times as fast as formerly yet it takes just as long for the spark to be produced. Therefore if the spark is to occur at the instant the piston reaches top dead center, the spark lever must be advanced so that the breaker points separate long before dead center is reached.

So much for the spark lag; but it also takes a small amount of time for the charge to burn, and although this interval may not be appreciable when the motor is running slow it must be taken into account when the motor is running at full speed; therefore the spark must be advanced still further if the charge is to be completely ignited when the piston reaches top dead center, and since maximum pressure rise occurs somewhere near the point at which the burning of the charge is completed and since it is advisable to have the point of maximum pressure attained at about the time the piston reaches top dead center if best power and economy are to be obtained, it is best to have the combustion of the charge about completed when the piston reaches top dead center.

Reason for Vibrators on Ford

Editor THE AUTOMOBILE:—1—What is the address of the Simms Magneto Co.?

2—Since the Ford magneto produces an alternating current, why is it not possible to discard the coil vibrator in its electrical system?

3—Again, why will not the four-point timer, of the conventional type, in a system with four non-vibrating coils produce results like a circuit breaker, a non-vibrating coil and a distributer system?

Rices Landing, Pa. J. A. SHARPNACK.

—1—Simms Magneto Co., Bloomfield, N. J.

2—It would be possible to discard the vibrator but if this were done only one spark would be produced each time the circuit was closed instead of several.

3—For the sake of clearness the two systems are illustrated in Figs. 1 and 2. The main reason that the four-unit coil non-vibrating system, you suggest, will not work satisfactorily is that a weak spark is produced when the primary circuit of any coil is closed, a much stronger spark being produced when the circuit is broken—which is the method employed in the breaker system. Also with the breaker the sparks are much more accurately timed.

With the four-unit, non-vibrating coil system the spark is produced as follows: The timer closes the circuit, and the current builds up to full strength in the primary circuit. While the current is increasing in strength the magnetic lines of force around the coil (due to the current) are also increasing in number. The increasing strength induces a current in the secondary, the exact amount of which is dependent on the rate of current increase in the primary. As previously stated, the current in the primary rises to its maximum value comparatively slowly, due to various electrical effects.* It is seen that the voltage generated in the secondary must be greater when the speed at which the lines of force multiply is greater, but this rate of increase when the circuit is closed is limited by a phenomena known as induction.

Now when the magnetic field of the primary coil is decreasing in strength, a voltage is also induced in the secondary. In other words, either an increase or decrease of magnetic field strength will produce a voltage in the secondary. By breaking the circuit the reduction of field strength is exceedingly rapid. The rate of decrease is much more rapid than the rate of increase under the most favorable circumstances. The result is that this increased rate produces a higher voltage in the secondary, and due to the higher voltage a greater current flows, and the larger the quantity of current the hotter the spark.

In the breaker system, you mention, the circuit is broken to produce the spark and therefore this is superior to the four-unit coil, with timer system.

You have failed to recognize, apparently, that the number of coils really has nothing to do with the proposition. You might have a single coil with a single contact timer and then place a distributer in the secondary circuit to deliver the sparks to the right cylinders in turn.

Hydrometer for Anti-Freezing Solutions

Editor THE AUTOMOBILE:—I have a 1913 Cadillac car. When the cold weather first started I put two quarts of alcohol and one pint of glycerine in the radiator and whenever the car is filled, I mix 25 per cent. of alcohol with 75 per cent. water. We have had many warm days since the mixture was put in the radiator and undoubtedly the alcohol evaporates more quickly than the water. Therefore I do not know at present how much alcohol there is in the radiator.

Is there any way of ascertaining this from time to time so as to know whether to put more alcohol in or not?

Buffalo, N. Y. CHARLES HINES.

—If there has been no leakage in the cooling system, it will be sufficient to add alcohol because the amount of water that has been evaporated is negligible, for the reason that alcohol has a much lower boiling point than water—and of course, there is no danger of the glycerine evaporating.

But if some of the solution has leaked out and you know the specific gravity of the original mixture you may easily determine whether to add alcohol or water or both by means of a hydrometer. Take the specific gravity of the radiator compound and then add water or alcohol to bring the gravity to its original value. In case you do not know the specific gravity of the original mixture you might calculate it as follows:

Specific gravity of mixture = percentage of water by weight + the percentage of alcohol by weight $\times$ .83 + the percentage of glycerine by weight $\times$ 1.27.

*See answer to D. C. Canfield's letter on preceding page.

Ford Jerks—Bands Worn

Editor THE AUTOMOBILE:—1—I have a 1914 Ford model T which always starts with a jerk, either forward or reverse. I have tried tightening up and also slacking the bands but the trouble is still present.

2—Also this motor is very difficult to start even when warm. I have ground the valves. When running it has plenty of power.

Hawthorne, Mass. H. J. PIRIE.

—1—Probably the lining on the hands is worn out. These should be relined or new bands substituted, whichever is more convenient—the cost in either case is small.

First remove the cover plate on the top of the gearbox, Fig. 4, turn the reverse adjustment and brake adjustment nut to the extreme end of the pedal shafts, and then remove the slow speed adjusting screw. Take off the upper half of the gear box. Slip the band nearest the flywheel over the first of the triple gears and turn it around so that the opening is downward. The band can now be removed without any difficulty. The operation is more easily accomplished if the three sets of triple gears are so placed that one set is about 10 degrees to the right of the center of the top.

In putting the bands back in place pass a cord around the ears of the three bands to hold them in place so that when the gearbox cover is put back no trouble will be experienced in getting the pedal shafts to rest in the notches in the band ears.

2—Adjust the carbureter to give a richer starting mixture and then if the trouble persists look for it in the ignition system.

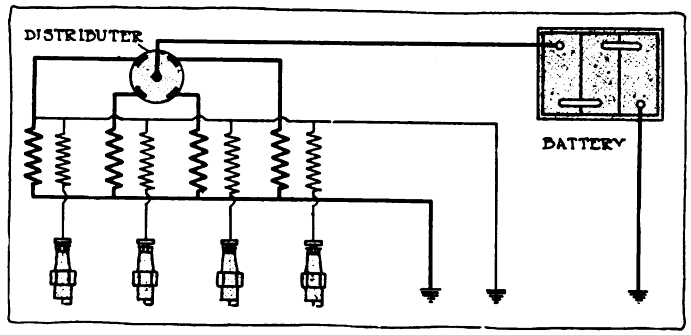


Fig. 1—Diagram showing four-unit coil system with timer, but without vibrators

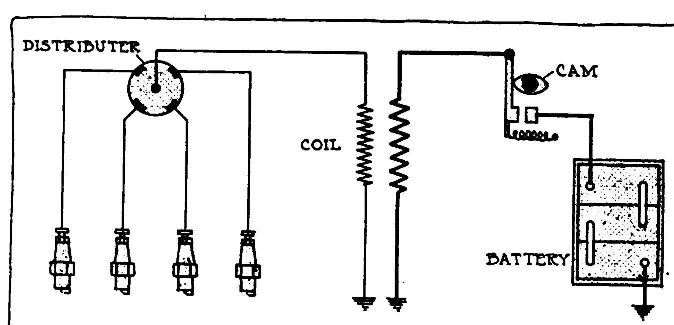


Fig. 2—System with single coil distributer and cam-actuated breaker

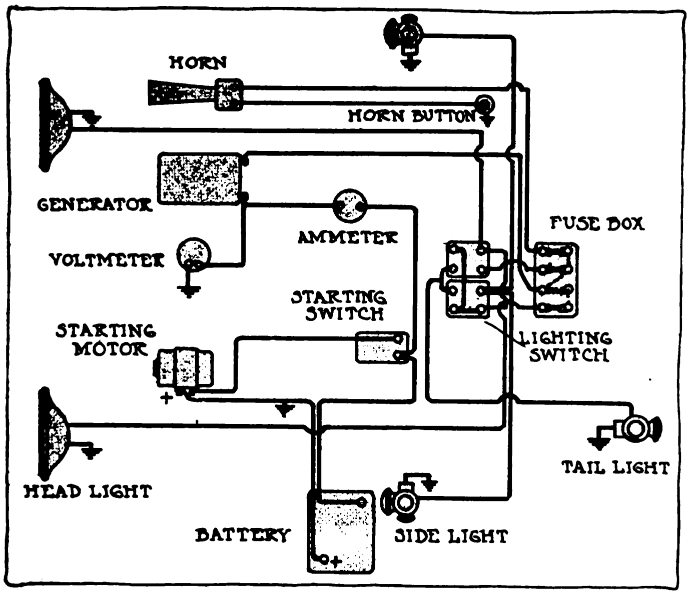


Fig. 3—Hupmobile starting and lighting wiring diagram for 1914, showing installation of ammeter and voltmeter

If the contact points are worn, dirty or out of alignment the vibrator will not work properly. The usual method of adjustment is to turn the adjusting screw up until the vibrator stops buzzing, then screw down slowly until the two points just come together and the explosion in that cylinder becomes regular. In adjusting K-W coils it is important to see that the little flat cushion spring underneath the vibrator bridge works back and forth every time the points make and break contact. This action can be determined by taking the unit out of the box and holding it up to the light; then press down the vibrator and observe the operation of the cushion spring. It is important to have all the units arcing adjusted alike. Too close contact between the adjusting screw and the vibrator will cause arcing, thus hindering the flow of the current, burning away the contact points and often putting the coil out of action. If the points become pitted or worn so that imperfect contact is made, they should be filed with a flat thin double-faced file so that the surfaces meet each other squarely.

How to Attach Electric Meters to Hupp

Editor THE AUTOMOBILE:—I have a 1914 Hupmobile with Westinghouse starting, lighting and ignition system. Would you kindly explain how a voltmeter and ammeter could be best wired from the dash to the generator?

Woodstock, Vt. E. H. REED.

—The wiring diagram is shown in Fig. 3. The voltmeter should be connected between the terminal on the generator and a ground on the motor or frame. The ammeter is connected into one of the main wires leading from the generator.

Garage for Twenty Cars

Editor THE AUTOMOBILE:—Fig. 5 shows a plan of a proposed garage on which we would like your advice.

1—How many cars do you estimate this garage would hold, considering that there will be a machine shop with a planer, lathe, drill press and gas engine?

2—Is there room to store cars lengthwise along the narrow wing of the building, and yet have room to drive by?

3—Where would be the best place for the office and accessory sales room. We do not expect to have a separate room for showing our new model cars. Both streets are main ones and have about an equal amount of motor travel.

4—In the Winter we do not have any cars running so we have the entire space for car storage. How many cars do you think it should hold in Winter?

Crestline, O. F. H. R.

—1—You can store about twenty cars according to the design shown in the figure. The exact number depends largely on the average size of the cars because different arrangements may be made according to whether the cars are large or small.

2—There should be room to store cars along this passage way, although there will be no room to spare. Two cars may be placed in the driveway as shown in the figure without causing any great amount of inconvenience. One of these cars gains entrance from the street side of the small wing and the other comes through the main garage.

3—The position of sales office and accessory store are shown in the illustration.

4—In Winter you might be able to store as many as thirty cars of medium size.

We believe that this is a very poor shape to make a garage. It is very difficult to use the space to full advantage. A more regular plot of ground would be found more satisfactory.

Medium Temperature Best for Varnish

Editor THE AUTOMOBILE:—Regarding the storing of a machine for the winter, I would like to have the following questions answered:

1—Which is the better for the paint and varnish of the machine, a cold or warm storeroom?

2—Should the tires be empty or inflated?

3—Should the tires be kept in a cold or warm place?

4—If it is advisable to put something in the cylinders (to keep the engine parts from rusting, etc), what should be put in?

5—Should anything be done with the storage battery?

Cleveland, Ohio. HENRY L. HOSSLER.

—1—A room of medium temperature is best, around 50 degrees. Temperatures above or below this figure are not particularly detrimental, however.

2—The tires should be removed from the rims, wrapped to keep out the light and laid flat. When they are stood up they deflect out of shape due to their own weight. The best atmosphere for tires is a dry one with the temperature around 50 degrees.

3—Answered above.

4—There should be enough lubricating oil from the last time the motor was operated to protect the surfaces and keep them from rusting. You need not worry about this.

5—Before storing a battery for the winter it should be put in the best possible condition, for the effects of deterioration are more or less cumulative. If it is known that a battery is in a very inefficient condition, that one or more cells are below par, that plates are sulphated, terminals corroded or jars cracked, the obvious thing is to have the conditions corrected before storage. Otherwise the battery, or at least part of it, will show considerably more than normal deterioration when again placed in active service.

Assuming that the battery is in good condition, the cells should be examined to see if they contain sufficient electrolyte to cover the plates well; if the liquid is below the depth recommended by the manufacturer the deficiency should be made up by adding distilled water or filtered rain water. Under no ordinary circumstances should acid be put in. There should be at least .25-inch of electrolyte above the plates; the depth varies slightly in different batteries.

A full charge should be given at normal charging rate, which varies according to the make and size of the battery; the charging rate almost invariably appears on the nameplate. Hydrometer tests of fully charged cells will vary a few points.

In the absence of specific instructions as to the proper density of the electrolyte, as indicated by the hydrometer at the end of a charge, it will be perfectly safe to assume that if the figures are anywhere between 1.275 and 1.300 the battery is in fairly good condition. The battery should be charged in the usual way, with slow finishing rate maintained until the hydrometer tests show no variation at half-hour intervals. If some cells read lower than others it is probable that they will continue to raise their test readings after the others have stopped rising. In such a case, continue the charge until the gravity ceases to rise in all the cells; the overcharging will not injure the cells if it is not carried beyond a few hours at a very slow rate.

Moderate Temperature Best

Batteries are best stored where there is a moderate temperature, and usually the makers recommend that they be kept where they will not be exposed to frost. At intervals a freshening charge should be given. As to whether the batteries should be removed from the car or not, the question is one for individuals to decide. If the cells can be kept clean, at moderate temperature and occasionally charged and inspected while in the car there is no objection to leaving them there. Otherwise they should be removed.

Change Every Two Weeks

As to how often freshening charges should be given, different makers give different instructions. The Willard company states "After being fully charged when put away, the battery should have a freshening charge by gravity test at least once, and preferably twice each month at the finishing rate given on the battery nameplate." The recommendations of other makers are given here.

Before the freshening charge is given, the cells should be inspected to make sure the electrolyte is above the tops of the plates. If the plates are exposed, the dry parts are liable to sulphate, while the electrolyte, made stronger by the fact that the water evaporates out while the acid does not, will have too sharp an action, and if charged and tested in this condition the hydrometer readings will be too high.

Dry Storage

Storage battery plates can in some cases be stored dry, if the trouble of charging and inspection is considered too great or if the idle period is to be very protracted—say 8 months or a year. The Gould company instructs that the battery for dry storage should first be fully charged, the cells disconnected, elements removed and positive and negative groups separated. Positive groups are allowed to dry without washing and with the acid on them. Negative groups are rinsed in water, set on a clean bench until they begin to steam, when they are sprinkled or dipped in water and again allowed to stand. They will heat and steam again, and the cooling process must be repeated, alternating with steaming, till the plates will stand without getting warm. They are then soaked for 3 or 4 hours in electrolyte of 1.275 specific gravity, dried without washing and stored. The electrolyte from the cells and the wood separators are thrown away, as they cannot again be used.

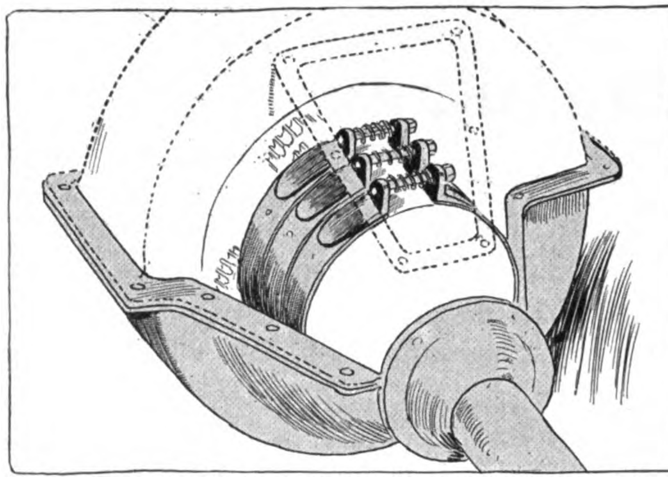


Fig. 4—Ford gearset, showing bands to be relined

The makers of the U-S-L battery state: "If the battery is drained thoroughly, washed with water and again drained carefully and then hermetically sealed, it can be stored dry for two months with every assurance of safety. The factor which would determine the length of time before the battery would commence to be injured is the drying out of the wood separators. As long as the wood separators remain moist the battery will be safe."

—One of the most important things to do, and one which you apparently have overlooked, is cleaning the car properly. If you store it the way it is, it will be very difficult to properly clean the car in the spring after the dirt has been left on the body and in the top for several months. Put the top up and brush it thoroughly, then wash it with lukewarm water and castile soap. Next clean the upholstery carefully. After this is done wash the body, first softening all mud with a gentle stream from a hose. Do not rub the mud loose by means of a sponge, if you care to perfectly preserve the body finish. After all mud and dirt have been removed, dry the surface with a soft shammy. Finally polish all metal parts and rub lubricating oil over these parts to keep them from tarnishing. The oil may be removed with warm soap and water in the spring.

Drain the water from the radiator and flush it to remove sediment.

How to Patch Celluloid

Editor THE AUTOMOBILE:—To patch a celluloid window, moisten the surfaces with acetone and press together. It holds securely and will be just as transparent as before.

Port Clinton, O. W. BUZZELL.

From Chicago to Florida

Editor THE AUTOMOBILE:—I am contemplating a trip to Florida in the next few weeks, and would like to have information as to the best route from Chicago to Jacksonville, Fla., by way of the Mammoth Cave of Kentucky.

Minooka, Ill.

GEO. O. JACOBS.

—Probably the best way according to the *Automobile Blue Book* will be through South Bend and Indianapolis. Starting from Chicago the route runs through Lafayette and Indianapolis to Louisville. From thence to the Mammoth Cave to Nashville, Chattanooga, Atlanta, Macon, Valdosta, Jacksonville, your destination.

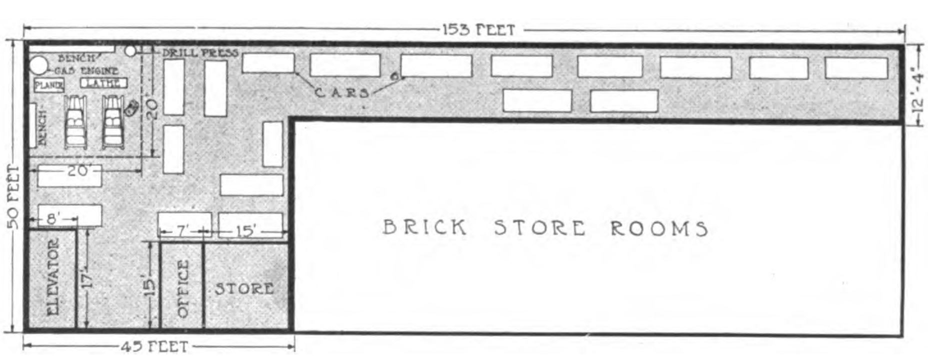
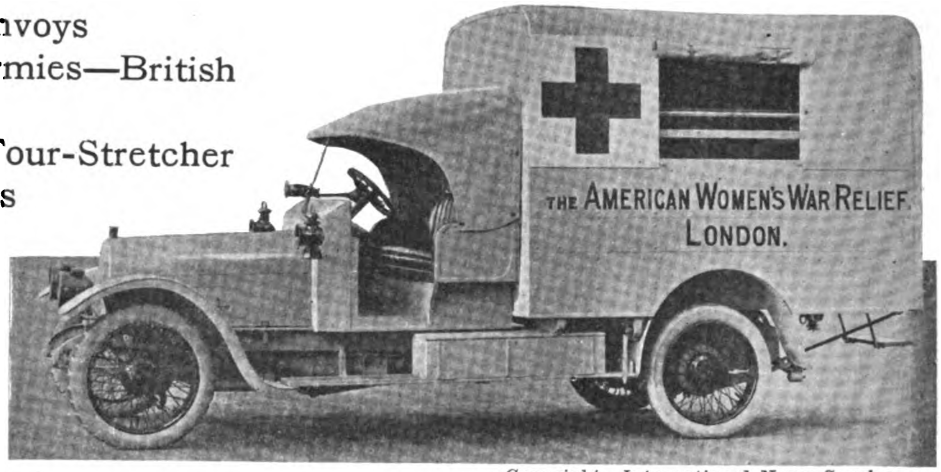


Fig. 5—Plan for garage, accessory store and machine shop

Ambulance Corps Dispatched to Front

Many Motor Convoys for Aid of Embattled Armies—British Red Cross Standardizes Two- and Four-Stretcher Body Designs



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One of the automobile ambulances furnished by the American Women's War Relief of London. The body, a rear view of which is given on the opposite page, is a four-stretcher design built in conformity with the specifications of the British Red Cross Society

LONDON, ENG., Dec. 1—The motor ambulance convoy for the British army in France has been dispatched to the front. It consists of forty-one ambulances, two traveling workshops, three trucks of stores, three officers' cars and ten motorcycles, and it now forms a permanent unit of the Army Service Corps. The personnel comprises five officers, eight non-commissioned officers and 136 men, all the non-commissioned officers and men being expert mechanics and good drivers. It is understood that the general design and equipment of the ambulances have been approved by Lord Kitchener. This convoy was organized by Col. Arthur du Cros, who is organizing similar corps for the Indian and Colonial Expeditionary forces. The colonel and his friends have promised to supply at least ten of the motor ambulances required.

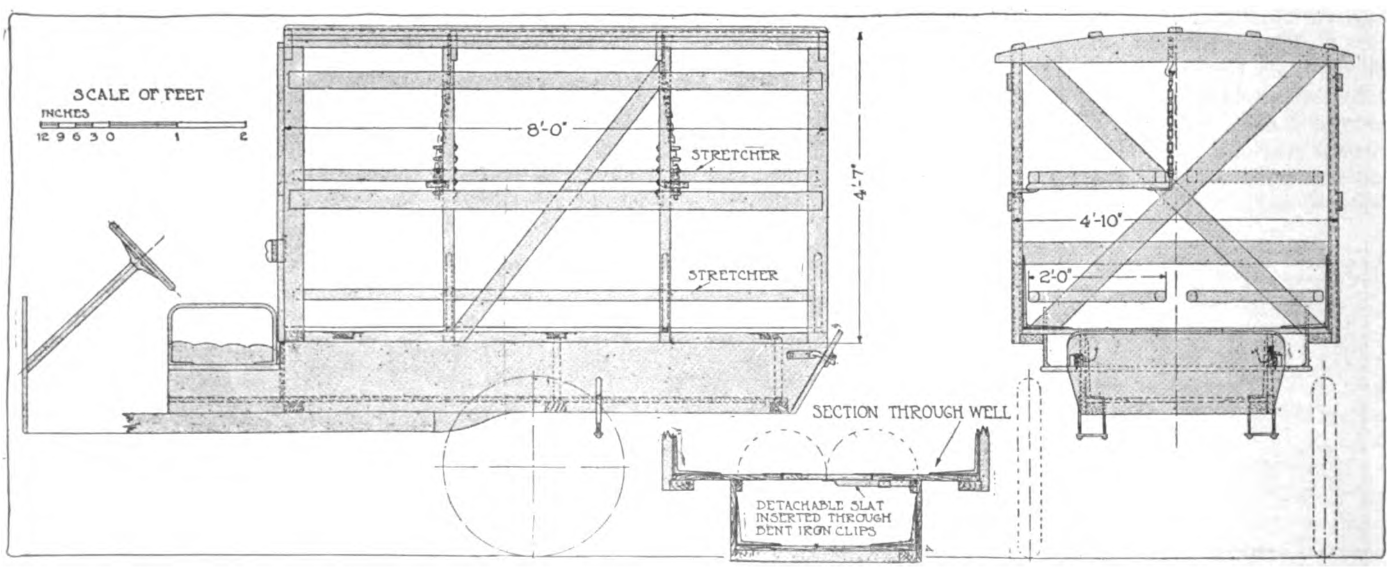
Red Cross Requirements

In this connection it is interesting to note how the British Red Cross Society is co-operating with the government and the war department in standardizing and obtaining a supply of motor ambulances.

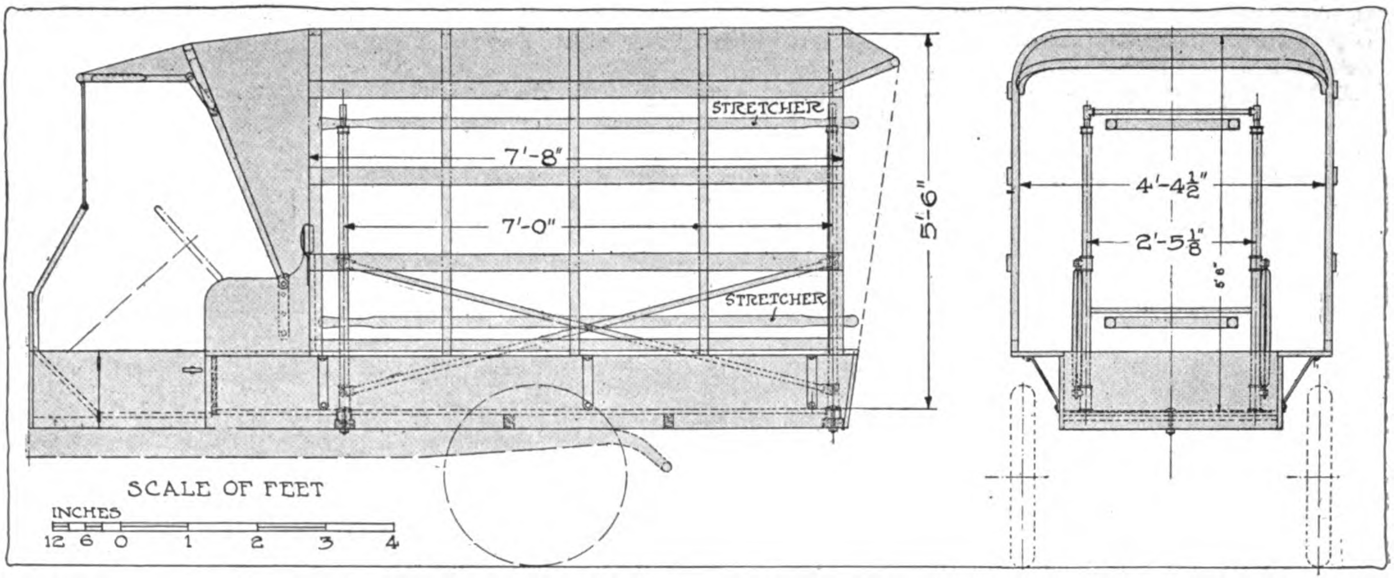
The work of the society in this is to act as a supplementary organization supporting the war department and ready at any time to meet emergency requirements which could not be anticipated, and cannot conveniently be filled by the motor ambulances owned by the government. This being the case, the problem from the point of view of the society divides itself broadly under two heads, namely, the provision of chassis and the provision of temporary ambulance bodies. The former requirement is the more numerous, because good use can be made not only of ambulances, but also of comfortably equipped touring cars for the carriage of wounded men. A very large percentage of these are able to travel in an ordinary vehicle not fitted with stretchers, and consequently, the society has expressed itself anxious to hear from car owners who would be willing to make their cars, particularly if fitted with spacious inclosed bodies, available at short notice for this sort of work.

Emergency Ambulances Needed

At the same time, a considerable number of emergency ambulances certainly ought to be provided. At ordinary times, the design of a motor ambulance, so far as the chassis is concerned, is a matter rather for the manufacturer of industrial motor vehicles than for the maker of touring cars. The speed not being particularly high, solid tires are in some cases fitted, though it is more usual to equip these machines with strong pneumatic tires of heavy section. In some instances the body is suspended on elliptical springs from the chassis, so that two distinct systems of springing are interposed between the



Working drawings of British Red Cross Society standard body for automobile ambulances of four-stretcher type with dimensions, etc.



Sketches of British Red Cross Society standard two-stretcher ambulance together with rear elevation, dimensions, etc.

patient and the road. In forming an organization hurriedly to meet requirements not exactly defined, refinements of this kind are out of the question, and probably the best course is to get the loan of well-sprung touring car chassis and to fit light and simple ambulance bodies of a type that can be constructed in a very few days. The main difficulty is in connection with the length of the chassis frame. The great majority of touring cars are not really of the right length for the work. A certain amount of space may be saved by giving the driver a somewhat narrow seat as close to the wheel as is consistent with reasonable comfort. The body itself has to be slightly over 8 feet in length to accommodate government stretchers of standard dimensions. The carriers of these stretchers are 7 feet 9 inches long, and the width of each stretcher when extended is 23 inches.

Roads a Factor

In fitting up a temporary ambulance it is necessary to take into account the fact that no one knows the nature or quality of the roads over which the vehicle may have to travel. The *pavé* roads of the Continent of Europe are calculated to cause considerable vibration in the interior even of a well-sprung pneumatic-tired vehicle, and from this vibration the patient must be protected so far as possible. Then again, very severe gradients may have to be negotiated, and consequently it would not do to overload the car.

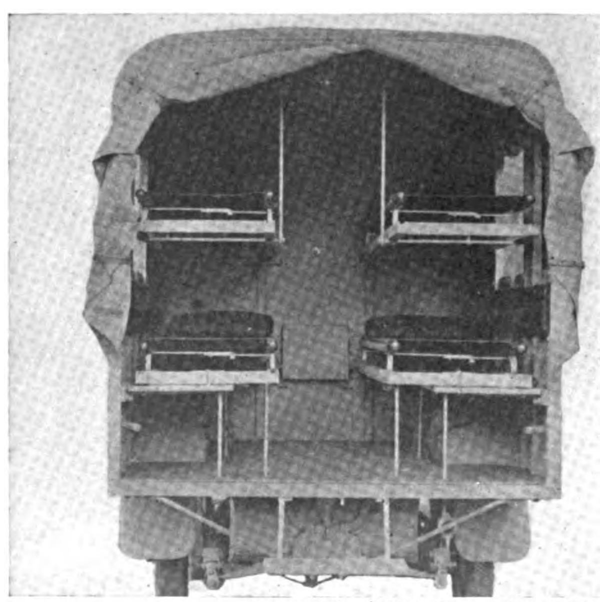
The Standard Body

In view of these and other considerations, the Red Cross Society has standardized a body of very simple construction, and consisting of a light framework covered with waterproof canvas, and having canvas curtains at the front and back. The floor of the body has to be fairly substantial, and provided with two transverse grooves to take the base of a suitable equipment designed to carry stretchers. The equipment selected is of the type known as the L.X.R. It consists essentially of a braced framework of steel tubes. The four upright corner tubes are slotted to take the ball ends of steel cross bars from which the stretchers are suspended. The cross bars when slipped into position do not bear upon rigid metal, but upon the tops of strong coiled springs contained in the corner tubes of the structure. Each equipment takes two standard stretchers with ample head and air room between and above them.

It will be noted that the whole arrangement provides what is tantamount to a second system of spring suspension between the patient and the road surface, and this without suspending the stretchers loosely or in any such way as to allow of any rolling or pitching relative to the movement of the vehicle itself. It has been found that if stretchers are loosely slung from above so as to be free to move to some extent, a periodic rolling motion is set up while the vehicle is traveling, and this not only gives to the patient a sense of insecurity and danger, but has a physical effect akin to that of the rolling of a ship at sea. It is, consequently, very necessary for the stretchers to be carried from the cross bars by short ropes, making them for the time being into one rigid structure with the bars from which they are borne.

A Four-Stretcher Type

Some use under certain conditions is also likely to be made of vehicles built to another design, in which the stretchers are not in any way sprung from the body, but the body itself is more stoutly constructed and is of larger dimensions. This second arrangement gives accommodation for four stretchers, two of which rest on the floor, while the other two are carried on supports slung by chains or ropes from the roof. The system should be satisfactory enough at low speeds over fairly good road surfaces, and one advantage of the arrangement is that the body can conveniently be constructed with a well,



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Rear view of American Women's War Relief four-stretcher automobile ambulance illustrated on the opposite page, showing arrangement of stretchers the floorboards of which can be hinged back. The idea of this is that when a number of men who are able to travel without stretchers have to be carried, the well can be opened and the vehicle is then turned into a sort of rough wagonette with seating accommodation along either side. This makes it possible to carry about twelve men at a time, or alternatively, to carry a couple of stretchers on one side of the well, and half-a-dozen men sitting on the other side.

So far as the chassis are concerned, the British Red Cross Society has to depend on the generosity and patriotism of motorists who are asked to lend their cars, and, if possible, their own or their chauffeurs' services for driving, without any charge. It is an easy matter to get offers from motorists to carry out specific jobs for the government or any accredited society like the Red Cross. It is, however, far less easy to persuade them to allow their cars to be made useless for ordinary purposes for a considerable length of time on the chance of their being needed sooner or later for urgent ambulance work. At a time when everyone feels that he would would like to be doing something useful, it is very difficult to get people to realize that the most useful thing to do may quite possibly be to sit down and wait patiently until one's services are needed.

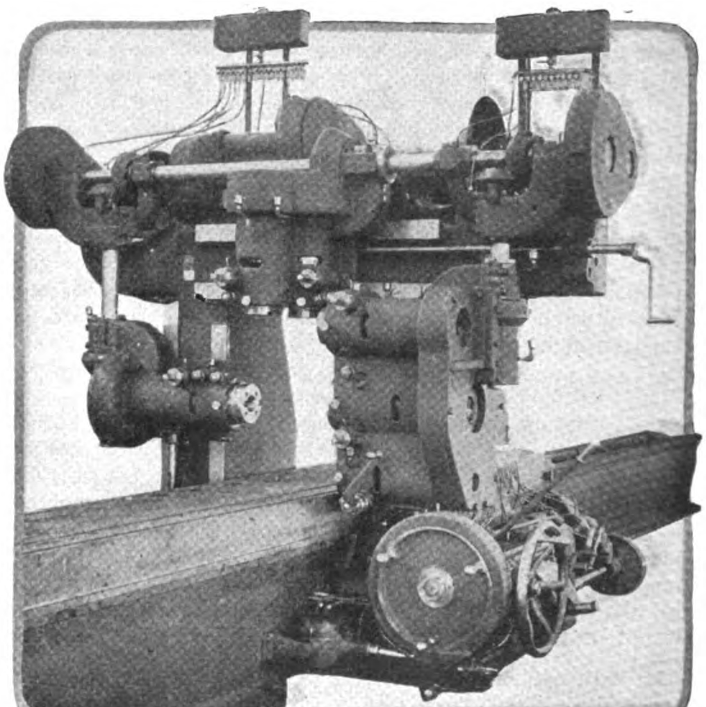
A Matter of Short Notice

It is not, of course, possible even to state with certainty whether the military authorities will need any help on a considerable scale from the British Red Cross Society as regards the supply of motor ambulances. On the other hand, it is likely enough that if such help is wanted, it will be wanted at short notice. Consequently, it is not enough to have cars ready to be converted when required; the conversion ought to be carried out beforehand, and the cars should be standing in some convenient garage available to be sent out to any point where they may be needed at a very few hours' notice. A considerable number of British motorists have offered themselves and their cars for ambulance service either at home or upon the Continent, but, as is indicated above, the main difficulty in the way of perfecting the whole organization is the uncertainty as to what will be required, and the extent to which the Red Cross Society will in fact be called into cooperation by the government.

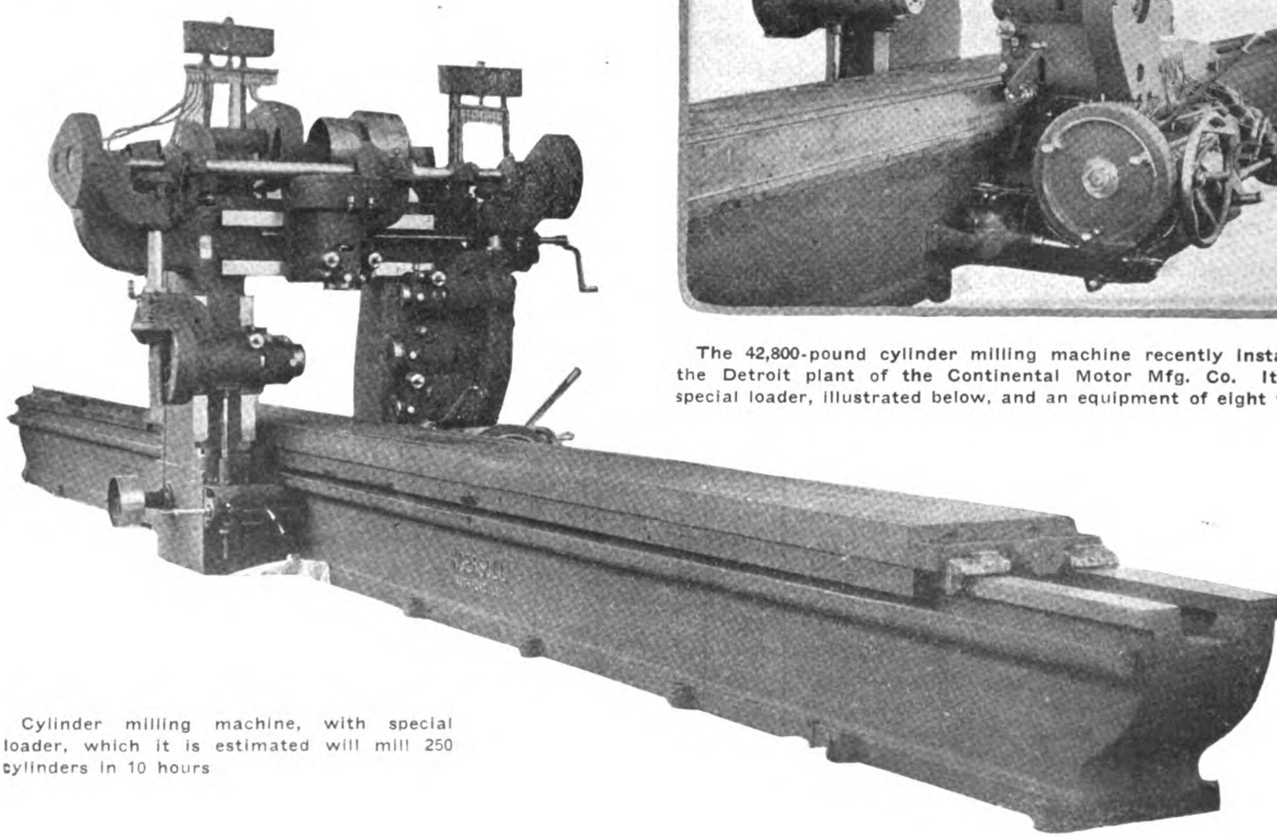
To Mill 250 Continental Motor Cylinders in 10 Hours

¶ *"A 42-centimeter gun in the motor building business," is what an official calls the new 40-foot milling machine recently installed at the Detroit plant of the Continental Motor Mfg. Co. This is said to be the largest device of its kind ever built and set up in any motor plant in the world. The weight is 42,800 pounds.*

¶ *In order to get the machine into place, it was first necessary to tear down a section of the solid east wall of the large Continental machine room. The highest production possible will be obtained when this great milling machine is finally ready for work, with its special loader and its complete equipment of eight fixtures. It has been estimated that a new record of 250 milled cylinders in 10 hours will be set when the giant gets to grinding away.*



The 42,800-pound cylinder milling machine recently installed at the Detroit plant of the Continental Motor Mfg. Co. It has a special loader, illustrated below, and an equipment of eight fixtures



Cylinder milling machine, with special loader, which it is estimated will mill 250 cylinders in 10 hours

A Field for 750,000 Trucks

Figures Based on Horse Population in United States of 25,000,000—30,000 Users Have 70,000 Trucks Worth $140,000,000—329 Firms Building Commercial Vehicles

NEW YORK CITY, Dec. 16—"Seven hundred and fifty thousand motor trucks carrying an average load of 2 tons each would be needed to handle the freight of 2,000,000,000 tons carried each 12 months by our railroads, this allowing for 300 working days per year, and handling this freight at both ends of the line." In these words Horace M. Swetland, president of the Class Journal Co., and a pioneer in the automobile publication field as well as a critical student of automobiling, summed up the future possibility of the motor truck industry at the annual meeting of the Motor Truck Club of America held in this city tonight. Mr. Swetland in a measure verified this estimate by a consideration of the annual stock yards' report which shows that approximately 25,000,000 horses and mules are employed in this country for all purposes, and if one-tenth of these are employed solely in trucking work and assuming that the motor truck will do as much work as three horses, this brings the same conclusion, namely, that 750,000 trucks would be needed if all horses were supplanted.

8 Years' Progress

In his opening address Mr. Swetland referred to an address made 8 years ago before a national team-owners' convention at which his remarks on the future of the motor truck were received with ridicule by the team-owners present. "Today," continued Mr. Swetland, "I might further inform you, that 30,000 users have 70,000 motor trucks, an average of 2 1-2 trucks per user, representing an investment in vehicles alone of $140,000,000; that 329 different motor truck makers are attempting to supply the demand for these vehicles; and that the daily consumption in labor and supplies for operation of these 70,000 motor trucks and delivery wagons is $560,000; and that this expenditure produces a daily transportation of practically 1,500,000 tons of freight. To this great industry which has grown up in the past 8 years must be added the hundreds of passenger vehicles used solely in this service. Today 30,000 individual firms have adopted motor trucks.

"But this great development could not be inaugurated without many failures, without much reconstruction, without the adoption of new methods involving the regulation of street traffic, the betterment of roads, and a thorough reorganization of the system of handling tons of freight and thousands of passengers. And, so, for many years the struggle against inefficient conditions, inefficient machines and inefficient operation has gone forward until today we are positive that the machine is cheaper than the horse for any continuous and regular service.

"Perhaps road-making has been the greatest essential to the success of this modern development, and it is true that it is possible to wade a horse through a mire hole and have him drag a few pounds after him where it would be impossible to operate a motor-driven vehicle, but the mire hole is being eliminated, and solid macadam and substantial paving have already proved essentials to both horses and machines. It naturally follows that the development of this great industry has followed the improvement of city highways and suburban roads. In the State of Massachusetts, which was among the first to preach the doctrine and demonstrate the serviceability of good roads, and which has ever lived up to its ideals in this particular, the registrations of truck sales show an increase of 40 per cent. in 1914 over 1913, and wherever the improved highway has blazed the trail sufficiently plain, the motor truck has followed and followed successfully.

Early Selling Methods

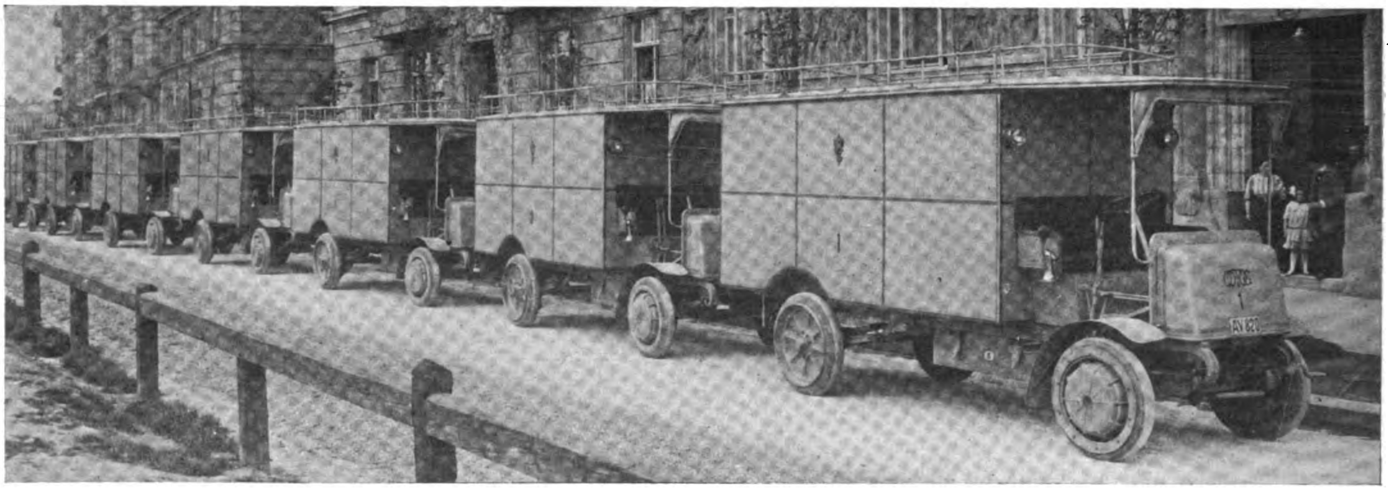
"When the salesman first started to sell trucks, he sold them on the same basis that pleasure cars had been sold, that is, on any kind of a basis to get the sale and get the money. All sorts of extravagant claims were put forth by the salesman, absolutely ridiculous and unheard of guarantees were inserted into contracts, and the over-ambitious salesman did as much to block the progress of this industry as any other single contribution. He was strongly backed up by the manufacturer, who inherited from the pleasure car business the old idea that the people would buy anything that had four wheels under it, and looked like the real thing, was foisted on an innocent and ignorant constituency. Then the owner added the last straw to the camel's back, and while he purchased a 1-ton truck which the salesman had suavely assured him would carry 2 or 3, he had simply looked at the luggage space, smiled up his sleeve and said, 'I can easily put 4 tons of my material into this wagon-box,' with the result that the unfortunate machine, however well it may have been designed, and however faithfully it may have performed its 1-ton truck service, was wholly insufficient for two or three times that amount.

"The machine was not only overloaded but was placed in wholly incompetent hands, and the man who had given the lash of the whip to the horse, applied the same method to the truck, and finding the beast inanimate and insensible of his threats and his whip, had adopted the only other method which could reach its vitals, that is, that of starvation, inattention and over-driving.

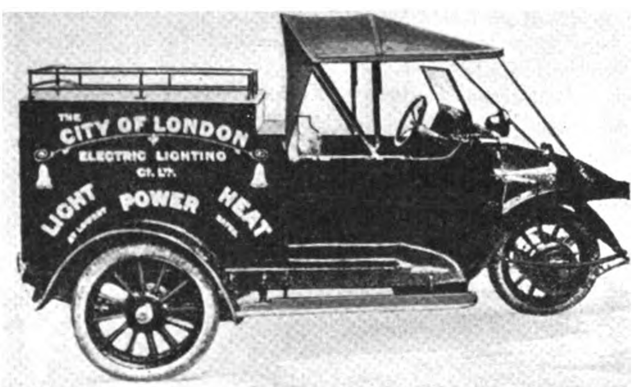
A Broader Education

"If all the educational matter which is handed to us through the various institutions of learning were confined to the individual efforts of a single intelligence, our education would probably begin with the table of addition, and end in long division. The mass of educational facilities which are at our disposal today is the result of the broadest individual experience and investigation, combined with the facilities for the interchange of the information thus obtained. In this we are able to take advantage of the experience of others, and while we may individually contribute our mite to this mass of information, it is the possibility of knowing what everybody else knows that multiplies our educational advantage. Therefore, any organization which has for its object the assimilation and distribution of facts pertaining to a thing common with the experience of others in the same line, not only becomes a powerful factor for individual advantage, but raises the whole standard of educational opportunity to a plane of the highest efficiency. It is when your experience in eliminating the waste time and delay consequent to loading and unloading, can be exchanged for the experience of another relative to the development of motor efficiency, and when this can be exchanged with all others who have made careful study and experiment along other lines, that the greatest results can be attained."

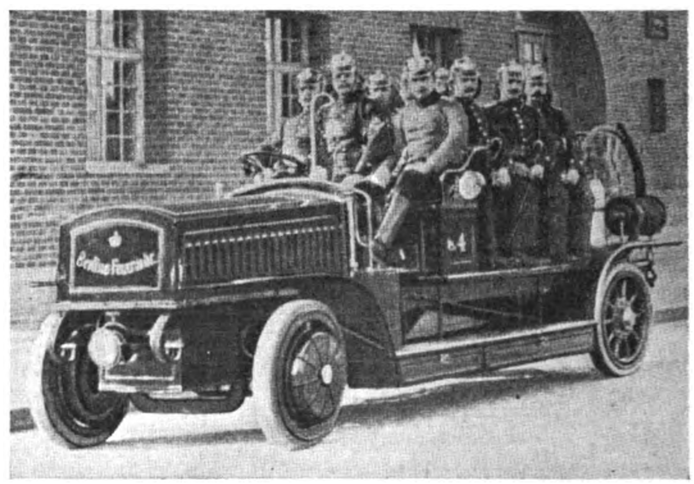
How Electrics Are Used Abroad



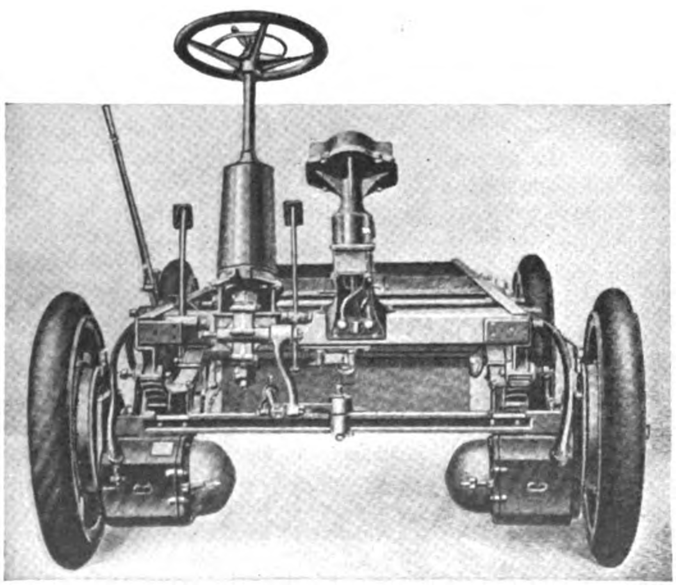
Part of the fleet of thirty 2.5-ton Electro-Daimler wagons put into mail service in Vienna. Chassis were constructed by the Austrian Daimler company. The bodies are of special design and are built by the Imperial Wagon Works, of Austria. Wheelbase of the machines is 130 inches. Two-motor, front wheel drive is used, the two motors giving a maximum of 15 horsepower at 90 volts. Batteries are of the forty-two cell lead type and are rated at 300 ampere hours, giving a mileage of 43.4. Each battery weighs 1,918 pounds



Three-wheeled Torpedo electric, with van body, used in London. The driver is protected by the top and windshield



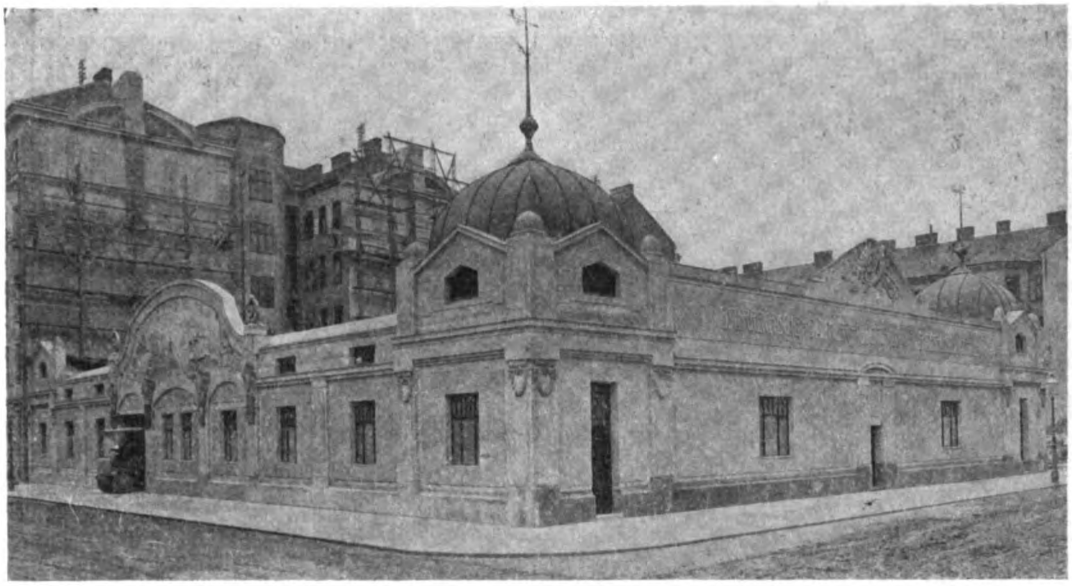
The Berlin Fire Brigade was using twenty-four electrically-driven vehicles in March of this year. The type illustrated above is one of the powerful machines designed for carrying hose, chemicals, etc., besides a crew of firemen. Note motors for driving front wheels and brakes on front wheels



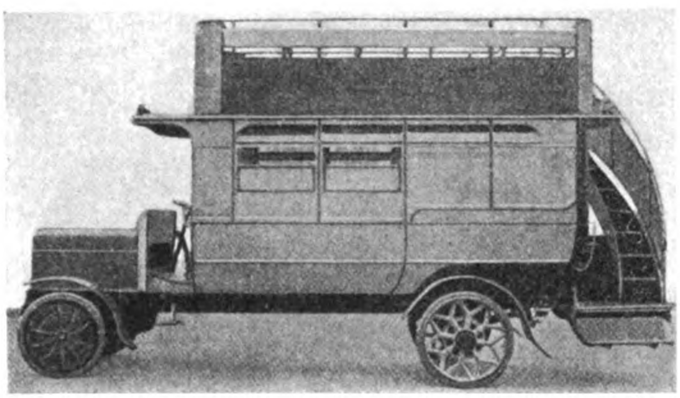
Chassis of Namag electric made in Germany. Note motors for driving front wheels. Also front wheel brakes. The type of control is similar to that employed on gasoline-driven cars

F.R.A.M. 4-ton garbage cart with steel body used in Paris. These trucks weigh about 9 tons and have a speed of 8 miles per hour. The chassis are De Dion-Bouton-Fram products. Batteries are lead and weigh 1 ton each

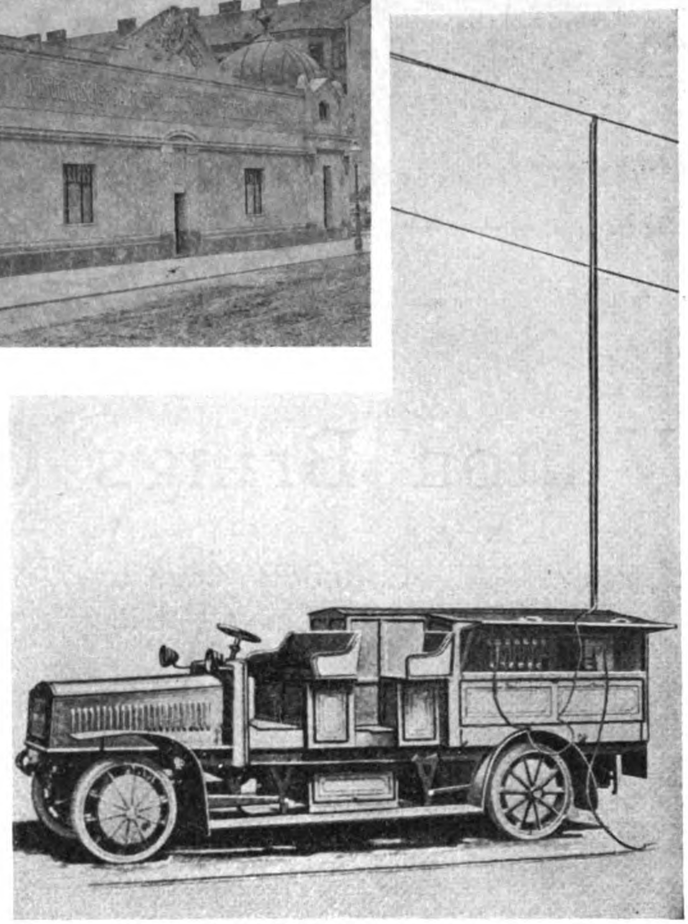
Illustrations and data appearing on these pages are from the paper of P. D. Wagoner, entitled European Development of the Electric Vehicle Industry, read at the Convention of the Electric Vehicle Assn. of America in Philadelphia, October 19-21



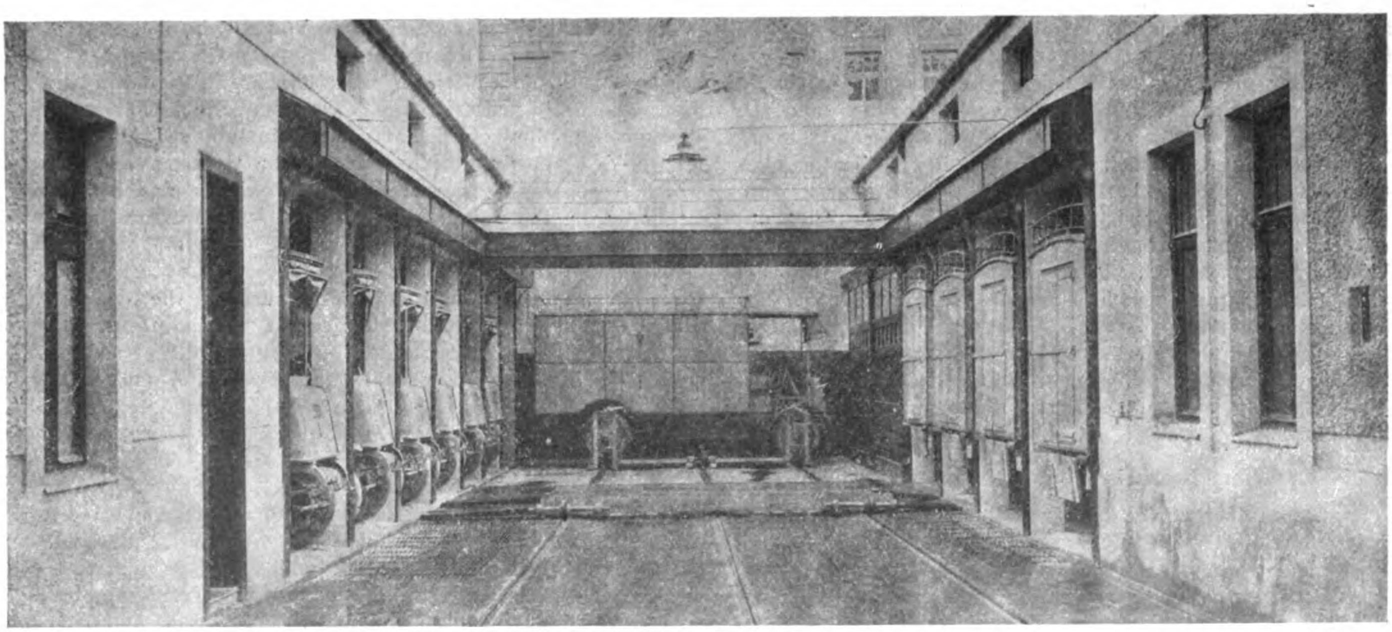
Where the electric mail vans are garaged in Vienna. The building is 131 by 102 feet, of one story and basement, and fronts on three streets. The interior, together with the idea of stalls for the cars, is illustrated below



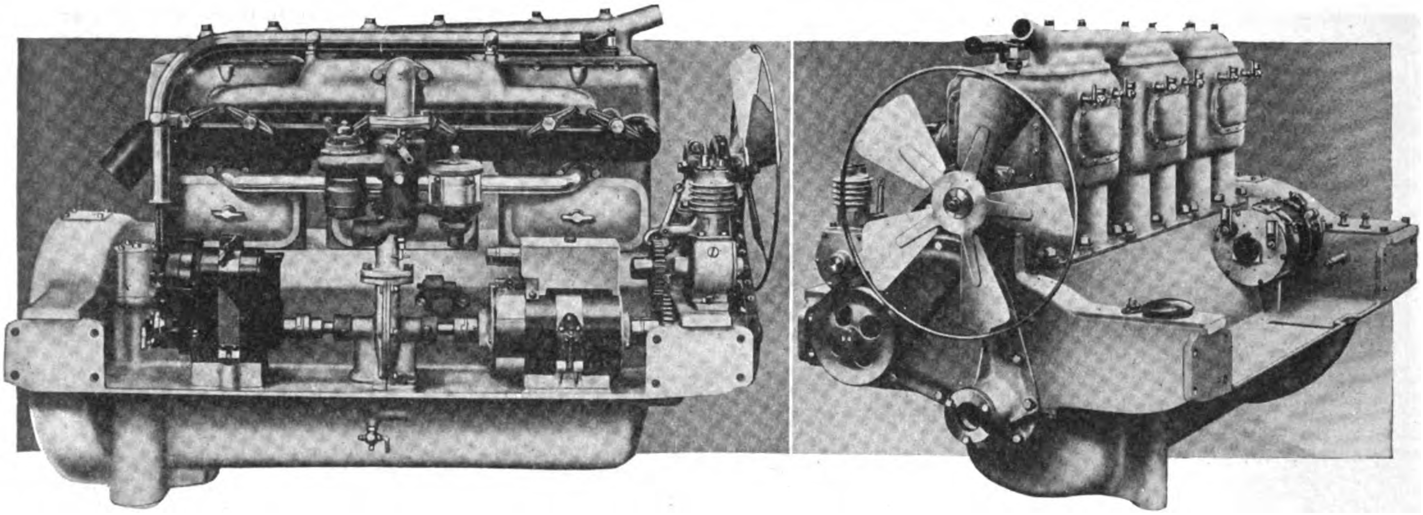
Cedes gearless electric bus with latest type of London body. **There are only a few score electric buses in existence in the various European countries and fleets made up of vehicles of this type are unknown there**



The 3-ton electric used by the Great Berlin Tramways for repair work. It may be charged from the trolley, as illustrated



Interior view of garage for electric mail wagons in Vienna, showing stalls for the cars, turntable mounted on rails for shunting them to any desired aisle, etc. By an ingenious arrangement, batteries are brought up directly under the vehicles as on an hydraulic lift



Left—Right side of motor used in new Winton smaller six, showing high mounting of carbureter. Note electric generator, tire pump and magneto. Right—Left side, showing mounting of starting motor

Winton Brings Out Smaller Six

Cylinders 3.625 by 5.25 Inches—Spiral Bevel Axle Drive—Electric Starting and Lighting

WINTON has announced another model in addition to model 21. It is known as model 21-A and is a smaller six than the Winton of the past few seasons. While in general design the new car is similar to the larger model which is continued, there are many changes in dimensions throughout giving a lighter vehicle in all particulars.

Model 21, the present Winton, has a 4.5 by 5.5-inch motor, but the new 21-A is 3.625 by 5.25. The S. A. E. rating of model 21 is 48.6 and that of the new car 31.6. The larger Winton sells for $3,250 and the new one for $2,285 with a five-passenger body and full equipment. The new car is 2 inches shorter than its running mate, having a wheelbase of 128 inches. The tires are also smaller, being 36 by 4.5 whereas the larger car uses the 37 by 5 size

The power plant has six L-head cylinders with valves on the left. The valve action is completely inclosed and the crankcase is extended back to include the flywheel. This is a difference in design which is noticeable in the Winton 21-A as in model 21, the flywheel is exposed. The valves are operated from a single camshaft with integral cams. The camshaft is removable through the front end of the crankcase without altering the valve adjustment and is driven by steel spiral gears completely inclosed in an oil-tight housing. The valves are interchangeable in size, but are tungsten steel for the exhaust and carbon steel with nickel-steel heads for intake. The valve springs, plungers and adjustment nuts are covered by steel plates which are detachable by removing hand screws.

Chrome-Vanadium Crankshaft

The crankshaft is of chrome-vanadium steel having a tensile strength of 125,000 pounds to the square inch. It is carried on four plain bearings lined with Parsons white brass. All the bearings are contained in the upper half of the crankcase.

As will be noted from the illustration showing the right side of the motor the carbureter is carried quite high and is bolted by means of a short elbow against a balanced intake manifold. This new model has the carbureter and magneto on the same side. In the model 21 the carbureter is on the left and the magneto on the right. The installation of the magneto, water pump and generator is along the same horizontal shaft on the right. The mountings for the pump and the two generating instruments, the magneto and generator, are secured by bases built up on a horizontal crankcase flange. The air pump is carried at the forward end of the crankcase on the right side; but, instead of being a four-cylinder model, as in the larger six, is a single cylinder.

Lubrication is by a pressure-feed system in which the oil is circulated by a gear pump located in the crankcase. This pump takes its drive by spiral gears from the camshaft and delivers oil through a lead in the crankcase to the main bearings, whence it passes to the lower connecting-rod bearings through the hollow crankshaft. An adjustable overflow valve is provided allowing oil to pass to the timing gears after which it returns by gravity to the crankcase and is again circulated by the pump. This gives a pure pressure system with the exception that the cylinders, cams and camshaft bearings are fed by the oil which is thrown by centrifugal force off the cranks. Oil grooves are used in the pistons to distribute the oil over the surfaces of the cylinders. The quantity of oil fed is regulated by a bypass. As the motor speeds up less oil is fed through the bypass and more to the motor.

Bosch Dual Ignition

Ignition is by Bosch magneto with battery to supply auxiliary current for starting. The magneto is connected to the driveshaft by an adjustable Oldham coupling placed between the magneto and the water pump. The balance of the electric equipment for lighting and starting is made up of the Bijur two-unit system.

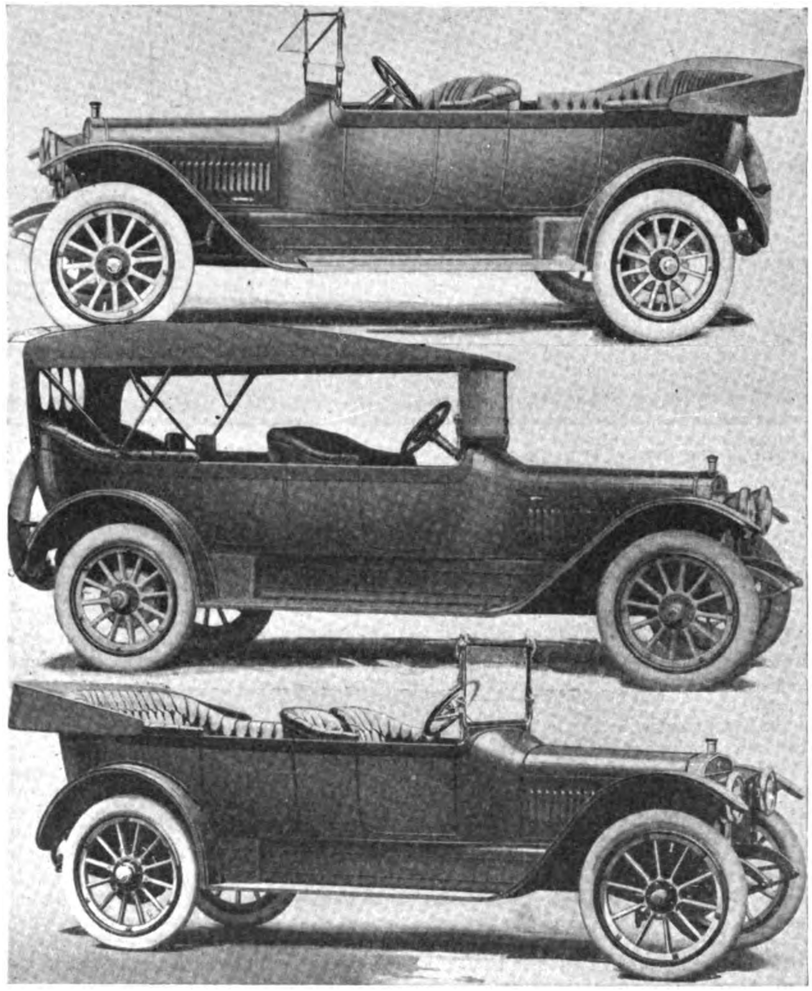
The cooling water is circulated by gear-driven centrifugal pump. To keep the water pure and to prevent corrosion each surface is plated with an anti-rust coating. The radiator is a honeycomb bolted to the drop frame. The tension on the fan belt is adjustable by a slotted bracket.

The dry-plate disk clutch has eleven disks in all, six attached to the driven shaft and five keyed to the drums driven by the flywheel and the clutch can be removed and replaced without interfering with either the gearbox or the crankcase. Power is transmitted by means of a four-speed selective gearbox with direct drive on third speed and with fourth speed geared above direct. The driveshaft is designed to be practically horizontal under normal load and has a universal joint at each end. The floating rear axle uses a pressed steel housing. The axle shafts, differential gears and bearings may be removed without lifting the wheels from the ground. The differential is a bevel design but the drive from the driveshaft to the large gear wheel is by spiral bevel. The gears and pinions are of nickel steel and throughout the entire rear system is carried upon Timken roller bearings.

Elliott Front Axle

The front axle is an Elliott type drop forging of I-beam section with practically horizontal connection between the steering gear and the left front wheel. Worm and gear mechanism is used to transmit the steering moment from the 18-inch steering wheel. Self-lubricating bushings are provided on the steering column and the steering links are adjustable. The steering arm is over the front axle and two yokes and two adjustable ball joints are provided.

A low center of gravity is secured by a pronounced drop in the frame just forward of the rear axle. The frame is narrowed forward and is constructed without a subframe. Either wood or wire wheels are offered as an option to the purchaser. The Firestone tires are non-skid in the rear as regular equipment.



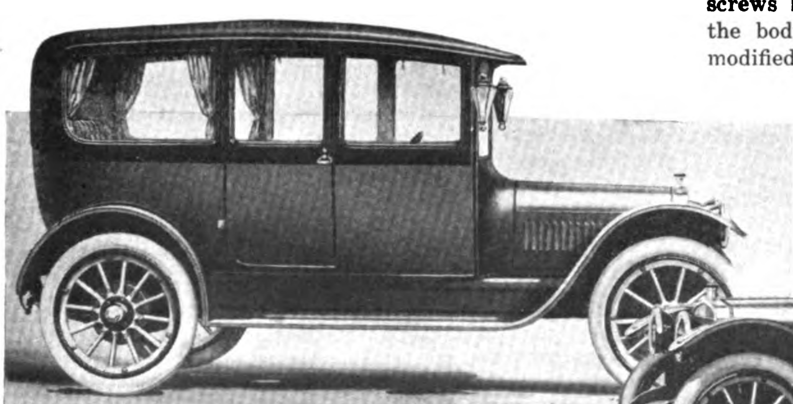
Upper—Five-passenger touring car mounted on Winton larger six-cylinder chassis and selling for $3,250
Middle—Seven-passenger type on same chassis as above. It lists at $3,500. Note stream lines and spare tire at rear
Lower—The new smaller six model Winton fitted with a five-passenger body and selling for $2,285

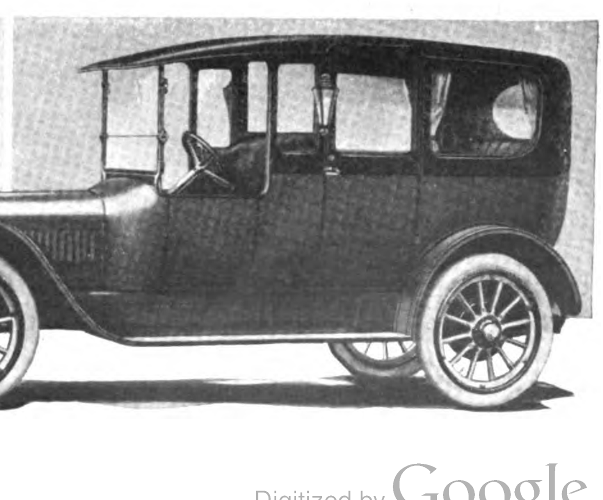
Five gear reductions are offered as optional. These are 4 1-12, 3 10-13, 3 1-2, 3 4-15 and 3 1-16 to 1. The following table shows the speed of the car in miles per hour on each of the four speeds for three of these reductions:

Final reduction	4 1-12 to 1	3 10-13 to 1	3 1-2 to 1
First speed	7.8	8.4	9.1
Second speed	16.0	17.2	18.6
Third speed	25.5	27.6	29.8
Fourth speed	32.4	35.0	37.8

Left drive and center control are used. The horn button is in the center of the steering column. The clutch and brake pedals are adjustable for length.

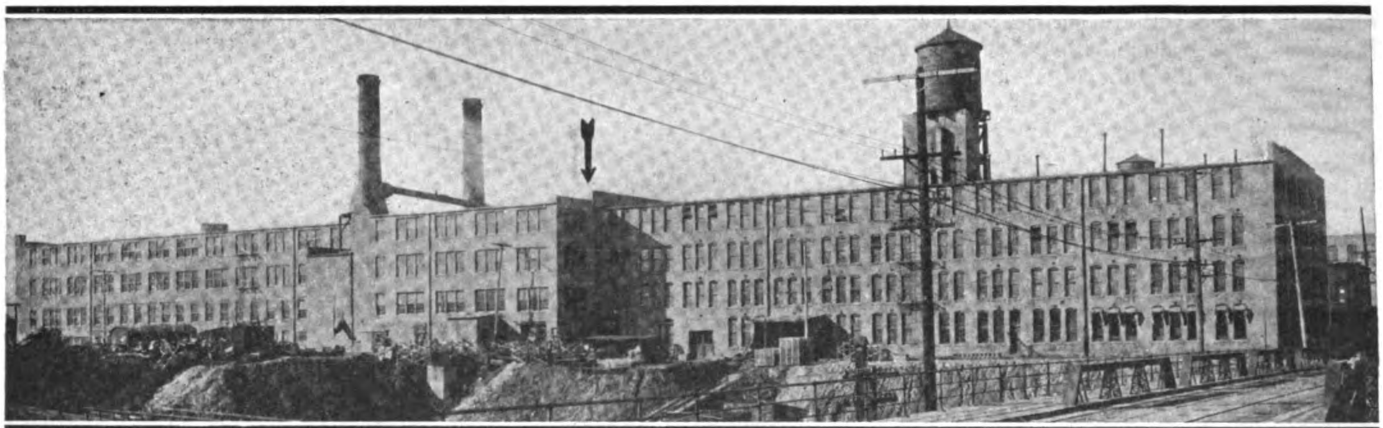
All the instruments are carried on the cowl board and include the lighting switches, ammeter, carbureter control, primer, speedometer, clock and ignition switches. Over the cowl board is a ventilating, rain-vision windshield. There are no side lights, but dimming lights are carried in the head lamp. All the wires are inclosed in flexible tubing and the wires running from the chassis to the body terminate on a terminal strip secured to the lower side of the fusebox, located on the engine side of the dash. The removal of two screws breaks all connection between the chassis wires and the body. The distinctive Winton body lines are slightly modified to conform with streamline practice.





Above—Sedan body mounted on the smaller Winton chassis and selling for $3,500

Right—Three-quarter limousine on new chassis, $3,250



Plant of the Racine Mfg. Co., Racine, Wis., the portion to the left of the arrow being the large addition made this year. The additional floor space amounts to 200,000 square feet. Cost of additions was $75,000

Car, Truck and Accessory Plants Expand

(*Continued from page* 1153)

Atlas Drop Forging Co., Lansing, Mich., has occupied an entire new factory of five buildings comprising 50,000 square feet of floorspace at a cost of $150,000. About $45,000 was expended for new machines.

The Allegheny Steel Co., Pittsburgh, Pa., has expended $161,894 for new machinery and equipment.

Allen Auto Equipment Co., New York City. Machinery, $1,000.

A warehouse and stockroom added to the plant of the American Die & Tool Co., Reading, Pa., increasing its floorspace 2,500 square feet. Machinery, $10,000.

A complete new factory has been occupied by the American Ever Ready Works, Long Island City, N. Y. The new factory has eight floors each 200 by 300 feet and represents an expenditure of $1,000,000.

The new factory of the Ashland Mfg. Co., Ashland, O., comprises two buildings, one 50 by 150 and the other 55 by 100 feet. Both are two story frame structures. The company suffered loss to the extent of $1,200. Machinery, $3,500.

The Atlas Crucible Steel Co., Dunkirk, N. Y., lost $50 by fire during the year. Machinery, $5,000.

A new factory has been occupied by the Automatic Transportation Co., Buffalo, N. Y., two stories in height and 53 by 150 feet and a machine shop of 15,000 square feet has been added at a cost of $40,000. Machinery, $10,000.

The Automobile Hospital Co., Cleveland, O., has moved to a new location, a two-story building 30 by 90 being occupied. New machinery worth $1,000 was installed.

The Automobile Supply Mfg. Co., Brooklyn, N. Y., has expended $31,000 on new machinery.

The Auto Parts Co., Providence, R. I., has added a new assembly and office building of 12,000 square feet of floorspace at a cost of $25,000.

The Barth Mfg. Co., Milwaukee, Wis., has spent $500 for new machinery.

An increase of 100 per cent. in floorspace has been made by the Bijur Motor Lighting Co., Hoboken, N. J., representing 50,000 square feet. Machinery, $100,000.

The Breeze Carbureter Co., Newark, N. J., has added about 120 square feet at a cost of $1,500. Machines, $2,800.

The Brown Co., Syracuse, N. Y., is occupying a new two-story and basement factory 175 by 60 feet, has $5,000 on new machinery and is adding more.

The Brown-Lipe-Chapin Co., Syracuse, N. Y., has expended $60,000 on new machinery.

The Central Brass & Fixture Co., Springfield, O., has increased its manufacturing space 4,000 square feet at a cost of $1,000. Machinery, $500.

A four-story addition comprising 45,000 square feet has been made by the Champion Spark Plug Co., Toledo, O. The addition cost $60,000. Machines, $100,000.

By the purchase of adjoining factory the George P. Clark Co., Windsor Locks, Conn., has added 11,000 square feet to its floor space and added machine equipment worth $6,000.

Large additions have been made by the Continental Motor Mfg. Co., Detroit, Mich., comprising a machine-shop, test room, hardening plant, stamping dept., stockroom and garage, totaling $75,000 square feet. The additions cost $50,000. Machinery $150,000.

The Davis Mfg. Co., Milwaukee, Wis., is now building a new plant 290 by 250 feet.

About $500 has been invested by the Dayton Body Co., Dayton, O., for new machines.

Dayton Rubber Mfg. Co., Dayton, O., has added new machinery worth $25,000.

The Detroit Gear Machine Co., Detroit, Mich., has added 10,000 square feet of floorspace at a cost of $17,000. Up to November 1, the company spent $16,000 for new machinery.

Detroit Leather Works, Detroit, Mich., spent $600 for new machines.

Diamond Chain Mfg. Co., Indianapolis, Ind., added machinery worth $100,000 during the year.

Two additions totaling $10,000 square feet were added by Edmunds & Jones Mfg. Co., Detroit, Mich., at a cost of $25,000. The company has partially occupied a new factory, one building being 35 by 120 and one 50 by 125 feet. Machinery, $7,500.

Essex Storage Battery & Supply Co., Newark, N. J., has added 1,100 square feet at a cost of $2,800. Equipment, $2,800.

The Esterline Co., Indianapolis, Ind., has purchased machinery worth $3,500.

A finished stockroom of 4,800 feet has been added by the Falls Machine Co., Sheboygan Falls, Mich.

The Federal Rubber Mfg. Co., Cudahy, Wis., near Milwaukee, gave orders for new factory buildings to cost over $500,000 in July. When completed, these additions will mean an increase of 150,000 square feet, making the total floorspace of the company 450,000.

Fuller & Sons Mfg. Co., Kalamazoo, Mich., have spent $1,000 for new machinery.

G. & A. Carbureter Co., New York City, has spent $1,800 for new machinery.

A large wing of 1,500 square feet has been added by the Garage Equipment Mfg. Co., Milwaukee, Wis., to provide more office, storage and manufacturing space at a cost of $5,000. Machinery, $10,000.

Quarters containing 2,000 square feet of floorspace have been rented by the Gleason-Peters Air Pump Co., Brooklyn, N. Y. Machinery, $1,500.

New machinery worth $400,000 has been added by the Goodyear Tire Co., Akron, O.

Gray & Davis, Inc., Boston, Mass., expended $120,000 on additional machine equipment for its new factory.

The Emil Grossman Mfg. Co., Brooklyn, N. Y., has invested $5,000 in new equipment.

About $5,000 has been expended by the Guide Motor Lamp Mfg. Co., Cleveland, O., on new machinery.

A third story has been added by the Gurney Ball Bearing Co., Jamestown, New York. The additional space thus obtained is 6,000 square feet at an expense of about $10,000.

A two-story addition 150 by 50 feet containing 7,500 square feet of floorspace has been made by the L. P. Halladay Co., Streator, Ill., $12,000. New machinery, $10,000.

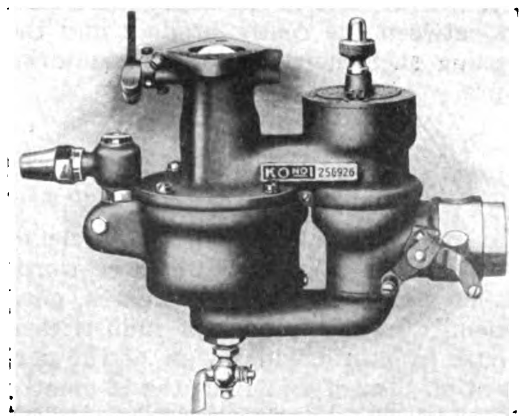
Haynes Mfg. Co., Detroit, Mich., has spent $10,000 on machinery.

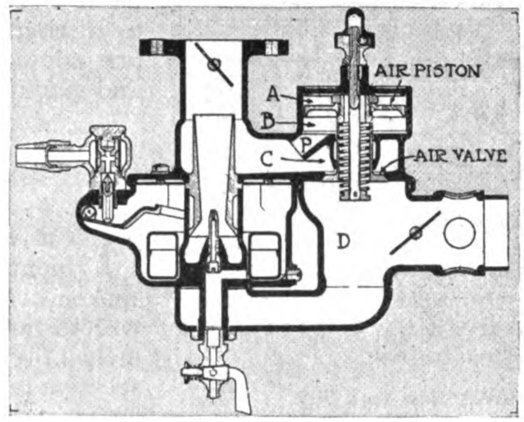
Heissler Storage Battery Co., Chicago, Ill., is occupying a new factory, 25,000 square feet, an increase of 10,000. The investment represents $30,000 to $50,000. Machinery, $15,000.

An investment of $5,600 has been made by the Hess-Spring and Axle Co., Carthage, O.

The Hilliard Clutch & Machinery Co., Elmira, N. Y., has added $500 worth of new machinery.

(*Continued on page* 1183)





Left—Exterior of new Stromberg, known as the KO. Right—Section showing balanced valve construction

Balanced Valve On New Stromberg

Takes Place of Auxiliary Air Valve—Only One Nozzle and One Air Opening

A NEW carbureter which differs radically from former Stromberg designs in that the auxiliary air valve is displaced by a balanced valve has just been announced. The new instrument has one nozzle and one air inlet.

The features of the new Stromberg, are the balanced air valve, which if its action were not known, would be referred to as an auxiliary air valve, and the method of using the air, which is taken through this valve in such a way as to give, with a single nozzle, the gasoline flow previously obtained with separate low speed and high-speed nozzles. Briefly, the balanced valve in operation diverts a portion of the air flow taken through the main inlet and this diverted air passes through the carbureter body to a point at the upper end of the venturi tube. The air passage at this point is formed like the entrance of a larger venturi tube and acts in such a way as to cause the air which has entered through the balanced valve to exert additional suction in the primary venturi tube. This additional suction and the added gasoline feed are in proportion to the auxiliary air admitted, so that while there is only one nozzle and one air inlet there are really two air currents exerting a compound action on the gasoline jet.

There is a small passage P which connects the chamber B with C. The chamber A above the piston always contains air under atmospheric pressure except when the dash control valve or air intake shutter is used, because of its communication with the chamber D through the space around the spring and up through the sleeve of the valve.

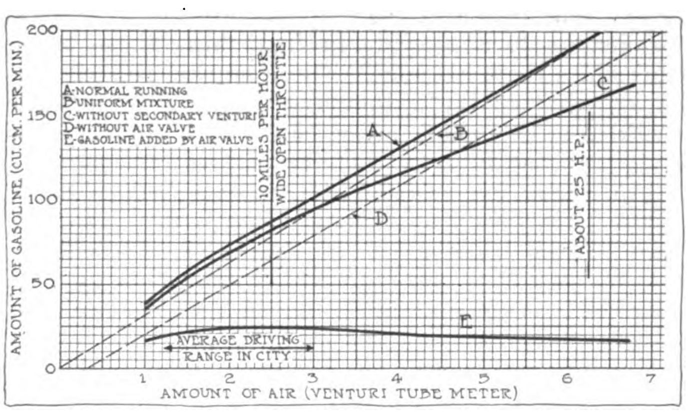
The vacuum B is substantially the same as that in C which is, of course, determined by the demand of the motor and the strength of the air valve spring. A light spring is used so that this vacuum is always very small, perhaps 8 ounces. As a result the air valve tends to move upward by difference in pressure between C and D, while the piston tends to move downward by the difference in pressure between A and B. As the piston is approximately twice the area of the valve, the whole valve opens downward but the balance between the chambers is such that the pulsations of motor suction are deadened and the valve flutter thus eliminated.

When the carbureter is in action and the engine running idle, the valve is slightly off its seat. The single nozzle feeds the gasoline and the primary venturi supplies nearly all the air. As the engine speed is increased or the throttle opened, a greater demand is made on the air valve, which opens, admitting additional air. When this air reaches the top of the venturi it increases the suction in the venturi and draws additional fuel, so that the supply taken is in proportion to the amount of air which passed through the valve. In other words, as the air valve opens there is an increase in the supply of gasoline as well as the air sent to the motor, thus the result obtained is like that given by a carbureter with two fuel nozzles and two air inlets.

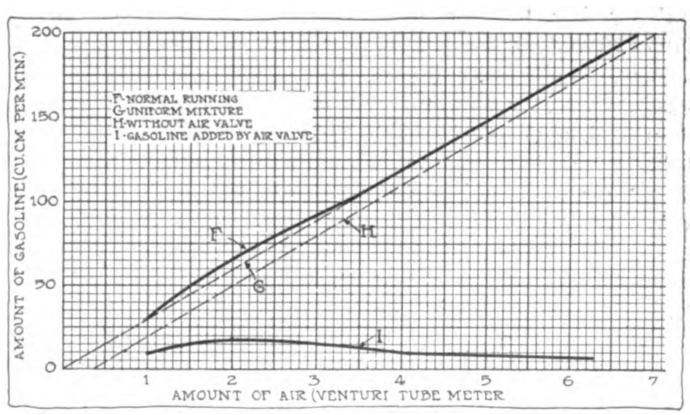
The balanced valve does not flutter, but operates gradually as the pressures vary. At low engine speeds the position of the valve regulates the mixture, but above 25 miles an hour, according to the Stromberg engineers, the valve may be opened all the way without noticeably affecting the running of the engine except to admit a slightly greater charge.

In practice all hot air is used, taken from a tube connecting with a housing surrounding a portion of the exhaust manifold.

LOS ANGELES, CAL., Dec. 5—Fourteen Beardsley electrics participated today in the Beardsley Electric Owners' Tour from this city to Orange, Cal. The winner averaged 112.1 miles on a single charge. The average mileage for all the cars participating in the run was 100.1 miles.



Characteristics of type K carbureter showing practically constant ratio of gasoline to air at all rates of air flow



In producing these curves a spring which deflected .5 inch under 1 pound load as against .267 inch in the first set, was used

The Automobile

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The Inner Circle

THREE years ago many of the semi-optimists declared that the days of shows were at an end, that novelty in automobiles had almost ceased, that the eventual while not actually arrived was close at hand excepting for the minor alterations which were sure to follow from time to time. Were those theorists here today and confronted with the many changes that are to be seen at the opening of the Grand Central Palace show their logic would have to be entirely revised, and the conclusion drawn that today we seem to be more than ever on the threshold of a great wave of efficiency reform, improvement not by the brute-strength policy of getting more horsepower by adding to the bore and stroke of the motor, more horsepower by lighter reciprocating parts, by more efficient cooling, more regular expansion and contraction of the cylinder walls, by better balance of the crankshaft and connecting-rods, by more rigidity in the crankshaft, by more efficient valve timing, by improved piston rings, by a better system of lubricating the motor—in short, we have need for shows for many years hence. These shows should aim to bring out these finer points of improvement, the buyer should be conducted into this inner circle of improvement and the sooner he realizes that all matters of car cost are not merely questions of wheelbase, tire sizes, motor dimensions, paint and lines, the sooner will the buyer learn how to distinguish between the costly product and the one not possessing such merits of design, material and manufacture.

The Day

ONCE again returns that day in the cycle of months when all should pause on those words spoken over 1,900 years ago, "Peace on earth, good will toward men." In the busiest of industries a momentary pause to gain a wider view of the perspective is essential. Too often during the 12 months we have dug a seemingly endless trench along which we travel, its objective is our business goal, its sides so high that we have lost the view of other endeavors. Our selfishness has increased, our eyes behold but one objective. If for only one day we can get out of our trench, our rut, see the zones in which others operate, see the goals for which others are striving, see the motives that are stimulating others' activities, see the possibilities of other lines of endeavor, see the humanities of our fellow man, then we can go back to our own work with a renewed vim, with a broader vision, with a higher objective, with a more human atmosphere surrounding us.

Used-Car Markets

AIMING to establish a national used-car market report to be issued once every 3 months, a plan already announced by the Chicago Automobile Trade Association, is a very worthy object. The evils of the used, or second-hand, cars have been with us for many years, numerous plans for their solution have been evolved, but this organization is the only one that appears to be operating along feasible lines. Its endeavors do not divulge any of the business secrets of any dealer contributing to the work. The price lists quoted on used cars are based on actual sales, not on appraised values set by committees but on real sales made by dealers. This is the major attraction of the scheme. This gives it reality, not an imaginary value. What Chicago has done other cities should co-operate in and make the national market report a reality. These reports are solely for the dealer and it depends on the dealer as to whether they will eventually be a national success. Every manufacturer should lend his aid to induce his dealers to co-operate in furnishing these used-car values from his zone. These market reports are as essential to the automobile dealer as the metal markets to the metal buyer, or the cotton quotations or grain quotations to their respective buyers.

For years the used-car market has been a mart where uncertainty was the only factor to be counted upon. There were no real standards of value—there was no way in which dealers, car makers or owners could tell the approximate value of any used car. By means of the national used-car reports to be issued by the Chicago association, however, these conditions will be remedied, order will be brought out of chaos and the trade will profit correspondingly.

U. S. Output 515,000 1914 Cars, $485,000,000

According to Chamber of Commerce—Trade Conditions Excellent—Ninety-Three Plants Reported On

NEW YORK CITY, Dec. 19—According to General Manager Alfred Reeves of the National Automobile Chamber of Commerce, over 515,000 cars have been manufactured in the United States during the past 12 months, the wholesale value of these being given as over $485,000,000. These figures place this country far in advance of the balance of the world in automobile and motor truck production.

Mr. Reeves returned yesterday from a western trip which completed travel that during the past 7 months took him to all the factories of the ninety-three members of the chamber. His round of the plants included forty-two cities in eleven different states, from Massachusetts and Virginia in the east to Wisconsin and Missouri in the west.

Trade Conditions Excellent

"Trade throughout the country has been excellent, considering conditions," said Mr. Reeves, "and the makers, as a class, are in good shape. They have lost the export trade in passenger cars to a large degree, but of course, truck figures have increased as a result of the war.

"My visits to the ninety-three plants and conferences with the leading men in the industry," continued Mr. Reeves, "indicate that the present position of the automobile trade has been attained only by concentrated efforts on the part of great engineers and industrial leaders who could forecast the future, and who co-operated through the N. A. C. C. with a view of attaining, in the quickest possible way, the present enviable condition. Combined with this was scientific manufacturing by men schooled in economy, who had efficiency for the keynote in every department of their plants. As a result, greater values than ever before are being offered, and the former sheds that were used for factories have been supplanted by wonderful structures of cement, steel and glass, equipped with the most modern machinery.

"In my rounds, I was forcibly impressed with the readiness of car makers to supply every demand of the public. There is no inclination to force special types, and it is this that has hastened the increased buying of automobiles. Our makers supply cars small or large; low powered or high powered and seating two or seven passengers. They supply cars that are dreams of luxury and others that are mainly for utility. They have been willing to furnish anything from one to eight cylinders, and with conveniences undreamed of a few years ago.

"Prices would appear to be almost at the minimum point, provided quality is to be maintained, materials and labor, which is incidentally 47 per cent. of the list price of the car, are most important in any manufactured article, and if skilled making and good materials are to continue in use, there would appear to be small chance of any lower prices for cars of the present type. It is worth noting that the high priced cars continue in constant demand, although of course the greatest increases have been made in the moderate priced cars that approach within the buying range of an increasing number of people."

Fenders on Chicago Motor Trucks by March 1

CHICAGO, ILL., Dec. 19—Provided a practical device is discovered in a series of tests to be started immediately after Christmas, all motor trucks operating in the city of Chicago must be equipped with fenders on and after March 1, 1915.

This was the bomb exploded in the ranks of the commercial car dealers and users by the city council and police this week. It is an old bomb with a new fuse. Already there is one ordinance, passed in June, 1913, and providing for the carrying of fenders on motor trucks, on the statute books, but it never has been enforced for the reason that it does not stipulate what kind of device shall be carried. The new ordinance, which was passed in October, but which was published for the first time this week, is an amendment to the old one and provides for the holding of a series of tests to determine upon a practical device.

The tests, which will be held under the second deputy superintendent of police, will be made of all designs submitted before December 24. Three plans already have been received. If other plans are received after the holidays, another series of tests will be conducted the first of the new year.

The tests will be made upon three dummies, representing a man, a boy and a child, in various attitudes and at speeds of 3, 7 and 15 miles an hour for use on trucks of 1-ton capacity and greater. The standard size of fender for use on commercial vehicles of 1-ton capacity or more must be attached to a standard truck of 3-tons capacity. A smaller sized fender, if submitted, must be attached to a motor vehicle of less than 1-ton capacity, not of the cyclecar or motorcycle type.

The fender to be approved must comply with several general specifications. According to the ordinance, the length, width and height of the fender shall be of a minimum consistent with the desired protection and at the same time not impede traffic, it shall have resiliency, be adaptable to varying road conditions, be reliable in operation and efficient of mechanism, shall interfere as little as possible with the operation of the truck, be neat in design and appearance and of a reasonable cost so as not to impose unnecessary hardship upon the owners of commercial vehicles.

If the ordinance is enforced, it will affect the owners of 1,911 trucks of 1-ton capacity or over.

A meeting of truck dealers and users has been called by the Chicago Automobile Trade Assn. for Tuesday noon, when the ordinance will be discussed.

Freight Increase Covers Cars and Parts

NEW YORK CITY, Dec. 21—The 5 per cent. freight rate increase asked by the railroads in Official Classification territory was granted last Friday, December 18, by the Interstate Commerce Commission. There were some exceptions, including coal, iron ore and lake-and-rail rates, but motor cars, parts and accessories are covered by the increase.

Official Classification territory is practically that east of the Mississippi river and north of the Ohio and Potomac rivers. Central Freight Assn. territory is that part of Official Classification territory west of Buffalo.

When the first decision was handed down granting a partial increase and applying it to Central Freight Assn. territory it did not affect through rates between points in the territory and points outside; the same rule applies to the latest decision; for example, rates between Boston and San Francisco will not be affected if they are through rates, but if the rate is local to the Mississippi the 5 per cent. increase will apply to the eastern half of the rate.

Shipments by rail between New York and Buffalo and thence by boat to Detroit will not be affected under the lake-and-rail exception, but all-rail shipments between New York and Detroit will be covered by the increase.

The rates are to go into effect 10 days after their publication by the railroad companies; the latter are working out their tariffs now, but those familiar with this task state that it may be February 1 or March 1 before the increases can be made to apply.

NEW YORK CITY, Dec. 18—The Electric Storage Battery Co., Philadelphia, Pa., has declared the usual quarterly dividend of 1 per cent. each on its common and preferred stocks, payable January 2 to holders of record December 21.

California State Speed Law Supreme

SAN FRANCISCO, CAL., Dec. 15—As a result of the recent decision of the Appellate Court of the Third District of California, that state is one of the first in the United States in which a uniform speed law for motor vehicles exists. The ruling of the court, which is a final decision, holds that the present state motor vehicle act supersedes municipal ordinances covering the same subject, and towns and cities cannot enforce any local regulations.

Hub Dealers Win Separator Fight

But Must Minimize Fire Risk or Separators Will Be Required —U. S. Tests Armored Trucks

BOSTON, MASS., Dec. 19—The Boston automobile dealers and proprietors of garages have won their fight against the adoption of separators in all their places of business as proposed under the new fire hazard law, and outlined by John A. O'Keefe, the commissioner in charge of that work. The results are now dependent upon the men operating such places to see that they run their places so as to minimize the hazard, or separators will be ordered installed. When the matter was first broached Commissioner O'Keefe gave a hearing to the motor interests after which he put it up to them to form a committee to cooperate with him and furnish suggestions.

President J. S. Hathaway of the Massachusetts Garage Assn. appointed a committee, to go over the matter and to formulate regulations. Blanks containing thirty questions were sent to 250 garage and service stations in Greater Boston. These were filled out by 121 owners, and then the data were carefully compiled. Then suggestions were evolved, and submitted to President Hathaway. He had a conference with Mr. O'Keefe and submitted them to him. They were as follows:

We would suggest that when any person purchases gasoline in small quantities from a garage, to be used outside a garage, that a record be kept of the name and address of said purchaser.

Make it unlawful to use gasoline for any other purpose in garages than the filling of tanks in automobiles.

No gasoline to be used by industrial institutions, tailors, cleansing establishments, dyers, etc., without special permit from the fire commissioner, and a record to be kept showing in what manner gasoline is disposed of.

Upon investigation we find that there is more danger from gasoline used by industrial institutions, cleansing establishments, etc., than from that used by garages.

A printed card, approved by the commissioner, should be placed upon the floor of every garage, public and private, stating that the use of gasoline other than for motors is prohibited. This card to be signed by the fire commissioner.

If clause 66 of the laws and regulations governing such fluids is enforced there will be no need of installing a separator, in our opinion.

Garages to be supplied with a complete set of these laws and regulations regarding the use of gasoline, etc.

We would suggest that a law be put into effect to prohibit the storage of gasoline in garages other than that kept in the tanks of automobiles, storage tanks and portable tanks.

The storage of gasoline in cans to be kept in a vault outside the garage building, same distance required for gasoline tanks. This vault to be kept locked except when in use.

Rules by January 15

Commissioner O'Keefe intends to promulgate a set of regulations to go into effect on January 15 covering this matter. These rules have not been fully determined yet, but the Commissioner told THE AUTOMOBILE correspondent today that he had decided not to insist upon separators.

"I have framed one rule to provide that if upon examination following the recommendation of Fire Department chiefs, it is found that any garage owner is allowing gasoline to go into a sewer that proprietor will be obliged to put in a separator at once. There will be allowed without special permits a portable tank containing 55 gallons in the garage. Also one can containing one gallon of gasoline. The proprietor may use a tank buried under the building if it is piped to the garage; or a tank buried outside the building, or both. Sets of regulations will be provided for every floor. Special permits may be given for a larger amount of gasoline than that provided above, but in rare cases only, and when its need is really proven. There is to be a special public meeting called to go over the matter at which all interested, including fire department heads, will be present to consider the whole subject. After the regulations are put into effect inspectors will visit garages to note if the law is being observed, and those who do not live up to it will have to install separators or their license to do business will be revoked. By impressing upon every one that more care should be used, such as obeying the 'No Smoking' signs, and having the motor stopped when the tanks in cars are being filled, together with observing our regulations, I believe the danger will be minimized to a great extent."

244 White Trucks Go to Russia

CLEVELAND, O., Dec. 21—A train-load of seventy freight cars loaded with 244 motor trucks was shipped by the White Co., Saturday, destined for the Russian army; the equipment was made up of different truck capacities, the sale being made direct through the White dealer at Petrograd. This shipment is to go to New York, thence by steamer through the Panama Canal, and across the Pacific to Vladivostok, and thence over the Trans-Siberian railroad to Petrograd. Col. J. Baldwin, the special commissioner of the Russian Imperial government, is in Cleveland, and has placed an additional order with the White Co., for 200 trucks. According to Col. Baldwin, future shipments will be sent via the Panama Canal in preference to the Archangel route, it being deemed safer from molestation by the German navy, and also because since the Russian-Japanese war the Russian government has kept a steamer route to Vladivostok open by the use of enormous ice crushers for practically the entire winter season.

Government Experiments with Armored Cars

WASHINGTON, D. C., Dec. 19—Some experiments are being conducted by the army ordnance department with improvised armored motor cars. These were obtained by purchase of motor chassis of the four-wheel-drive type, on which is being installed armor plate of a thickness and character similar to the shields of field artillery guns. It is estimated that such a car with armor will cost about $5,000.

Anderson Goes from Chalmers to Hupp

DETROIT, MICH., Dec. 21—Lee Anderson, well known in the industry and connected with the Chalmers Motor Co.'s advertising department for 5 years, has resigned to become advertising manager of the Hupp Motor Car Co. He succeeds Frank Mooney, who recently resigned. Anderson takes up his new duties January 1.

250 Owen Cars with Entz Gearset for 1915

NEW YORK CITY, Dec. 21—R. M. Owen & Co., 142nd street and Fifth avenue, this city, has secured a factory of 50,000 square feet at this address and has begun the manufacture of 250 Owen cars with the Entz electric gearset for 1915. In the new factory the electric gearset will be manufactured in its entirety and the assembly of the remainder of the chassis carried out. The Owen company is owned outright by R. M. Owen who was sales agent for Reo and Premier for several years, Stoughton A. Fletcher, banker of Indianapolis, and who is now heavily interested in numerous motor car businesses, together with R. A. Rainey of the large coke industry in Pennsylvania.

The new car as a touring model will list at $3,700 and as a three-passenger roadster at the same price. Production is already well under way, the first lot of ten cars being nearly completed. A six-cylinder motor 3 3-4 by 5 will be used, together with American Ball Bearing Co. axles, and Houk wheels.

By using the Entz type of electric gearset the conventional clutch and gearset are eliminated and with them go the magneto, electric motor starter and electric generator, the units of the electric gearset supplying all of these parts. The striped chassis weighs 3,150 pounds. The wheelbase is 136 inches, tires 35 by 5 and flat semi-elliptic springs are used in front and rear. Only a small Willard starting battery is carried.

In the electric gearset are two units, one called a clutch generator and the other a conventional electric motor. The clutch generator takes the place of the flywheel and performs two functions, first that of an electric clutch and second a generator of electricity. The second unit is an electric motor which is mounted back of the clutch generator. This electric motor uses current generated by the clutch generator and helps the gasoline motor to drive the car. There is a mechanical reverse.

Report Favors Federal Roads

Congressional Committee Advises That Comprehensive Plan for Road Building Is Urgent

WASHINGTON, D. C., Dec. 19—Within the next few days the joint congressional committee on federal aid for good roads will issue a voluminous report in which will be set forth the fact that incalculable advantages will accrue to the United States from the construction of a system of model highways throughout the country. The report is now before the committee for approval and the correspondent of THE AUTOMOBILE has been privileged to make certain excerpts from it of interest to motorists.

It is an interesting fact that the committee in this report has refrained from recommending any specific plan of action, although it had before it numerous proposals, which included former Senator Bourne's bill providing for an issue of 50 years' bonds aggregating $500,000,000.

Of particular interest in the report are the conclusions arrived at by the committee and some of these are as follows:

Congress should proceed at once to devise a broad, comprehensive plan for federal aid to the building of model roads.

The supervision of the government's highway building activities should be intrusted to a congressional commission, not an adminstrative bureau.

Care should be exercised that federal aid be scientific and effective and not degenerate into a "pork barrel" raid on the national treasury.

First class roads in this country would reduce the cost of living, improve business and ameliorate educational and social conditions in rural communities.

More than $10,000 and 2 years' time has been devoted to a comprehensive study of the good roads problem and a vast amount of information has been collected in this country and in Europe. The committee's report expresses the opinion that federal aid to state road building once undertaken never will be abandoned and therefore should be entered upon only after the most exhaustive study of the problem.

Denver Club Inaugurates New License Plan

DENVER, COLO., Dec. 20—Motor car owners belonging to the Denver Motor Club are being saved a great deal of time and inconvenience by a plan the club has inaugurated to secure the 1915 state licenses for all its Denver members. Official application blanks have been mailed to the 1,100 members living in the city and county of Denver. They can fill out these blanks at home, bring them to the club's headquarters, have the required notary work done in a few minutes and then let the club obtain a large number of licenses at one trip to the office of the secretary of state.

12 Miles an Hour Maximum Speed in Omaha

OMAHA, NEB., Dec. 19—Omaha is now lining up with the rest of the big cities in the United States in regard to proper traffic laws. A new traffic code became effective Thursday requiring lights on all vehicles, whether motor-drawn or otherwise, and extends the district wherein 12 miles per hour is the maximum speed. An ordinance requiring that the driver of every motor-driven vehicle, whether he be the owner of a limousine or the chauffeur of a taxicab, to take out a chauffeur's license has also been introduced to the city commission and will soon be passed on. With the license will go one of the metal tags.

Ten Exhibits for Salon

NEW YORK CITY, Dec. 21—France, England, Italy and the United States are represented by the ten exhibitors who have already taken space for the importers' automobile salon to be held at the Astor Hotel January 2 to 9. The exhibitors who have already taken space are the representatives in this country of De Dion-Bouton, Fiat, Isotta-Fraschini, Lancia, Renault, Rolls-Royce, Simplex, Sheffield-Simplex, Holbrook Co. and Brewster & Co.

$700 Yearly Upkeep Per Mile Is Not Excessive for Macadam Roads

NEW YORK CITY, Dec. 19—Well-constructed gravel roads will sometimes sustain years of traffic without showing marked deterioration, even when there has been no maintenance. Such roads sometimes even improve during the second season; more frequently, however, they show ruts or the formation of chuck holes. It can not be expected that the average life of a gravel surface will be greater than that of a macadam surface. The average interval for resurfacing macadam roads is between 6 and 7 years. If a sum equal to two-thirds of the original cost of the gravel surface itself is provided for renewals at 6-year intervals, it should be estimated at from $150 to $250 per mile per year. If $30 is then allowed for annual dragging and small repairs, the total annual cost of repair and maintenance of gravel roads would be from $180 to $280 per mile. The annual cost of strict maintenance is sometimes below $30. In Bennington County, Vt., during 1912, 175 miles of gravel roads were maintained at a cost of $20.70 per mile. The annual cost of maintenance and repair on sand-clay roads, including all necessary resurfacing at periodic intervals, should not be fixed at less than 10 per cent. of the original cost.

The cost of repair and maintenance of water-bound macadam roads has been determined with some considerable exactness from Massachusetts figures and checked by resurfacing charges in other states and in Germany. From $100 to $125 per year ordinarily pays for necessary small repairs, such as patching, cleaning culverts, etc., and from $400 to $425 per year is the necessary annual charge for resurfacing at periods varying from 6 to 7 years. The sum of $525 per mile, on an average, should therefore absolutely maintain macadam roads if changes and increases of traffic are not excessive. It must be understood, however, that in many instances where macadam sufficed for the volume and character of traffic prior to 1906, it will not withstand the action of the motor vehicle traffic, which has developed since that time.

Many miles of ordinary or water-bound macadam road have been resurfaced with bituminous materials and many miles of new bituminous-macadam road have been constructed. The logical maintenance of such highways is a surface treatment with bituminous material and rock screenings, clean gravel, or sharp sand. The cost of such surface treatment is from 4 to 12 cents per square yard, and it may be expected to last from 1 to 3 years, according to the density of traffic and the success of the application. Theoretically, perfect surface treatment would constitute absolute maintenance for a bituminous-macadam road. Such maintenance is seldom or never realized and bituminous-macadam roads doubtless require resurfacing at intervals. The cost of such resurfacing is not yet known.

The average cost for repair and maintenance of 7,300 miles of highway in Connecticut, Massachusetts, New York, New Jersey, and Rhode Island for the year 1912 was about $800 per mile. A large part of this money was expended for bituminous resurfacing and bituminous surface treatment. There is some question whether the expenditure correctly measures the average cost of repairing and maintaining bituminous-macadam roads. In the State of New York, however, for the years 1911 and 1912 the average cost for repair and maintenance was $724 per mile upon a total average of 2,861 miles. The annual cost of repair and maintenance on Massachusetts state roads for the years 1910, 1911, and 1912 was, respectively, $642, $647, and $676 per mile for about 850 miles. For the most part these figures for New York and Massachusetts represent the cost per mile of resurfacing with bituminous material and of maintaining bituminous-macadam and water-bound macadam roads by surface treatment with bituminous material. It is clear, therefore, that $700 per mile is not an excessive estimate at present for the annual cost of all repair and maintenance of bituminous-macadam roads.

Wisconsin Buys 18,000 Cars

Business Divided Among 1,202 Dealers, Average 15 Cars Per Dealer

MILWAUKEE, WIS., Dec. 22—A most gratifying trade situation in Wisconsin for the year 1914 is reflected by the comparative report of registrations of motor cars in private hands for the last 3 years, compiled for THE AUTOMOBILE by the motor registry division of the secretary of state's department. There were registered in Wisconsin this year 18,515 more privately-owned cars than in 1913, indicating that approximately 18,000 new cars were distributed in this state during the anual period now closing. The business was divided among 1,202 dealers, who sold on the average of 15 cars each. In 1913 the figures indicate a sale of 10,068 new cars for the year, distributed among 1,393 dealers.

The comparative statistics follow:

	1912	1913	1914
Automobiles at $5 each	$24,578	$34,646	$53,161
Motorcycles at $2 each	4,060	6,120	7,880
Dealers at $10 each	1,052	1,393	1,202
Total revenue	$136,270	$199,400	$293,585

The fact that Wisconsin assimilated more than 18,515 cars in a year that probably will go down as one of the worst, industrially, in American history, leads to the belief that this state can take care of at least 25,000 and possibly more cars during 1915, which is expected to be a boom year. It is figured that only 6,500 to 7,000 of the 18,515 cars purchased in 1914 were Fords. The population of Wisconsin is figured today at 3,000,000, and the 1914 registration shows that there is a car for every 60 persons in this state. The most important tradesmen are of the opinion that until the ratio contracts to one car to every 25 of population, their market is an attractive one. Thus there seems to be no reason why 1915 should not be the best year in motor history.

Wisconsin registration figures are reliable as a basis for figuring the number of new cars absorbed by the state for the reason that Badger licenses are annual and owners must apply for new licenses at the close of each year, for issue on January 1 of the succeeding year. Owners who dispose of a car may transfer the old license to the new for 50 cents and the purchaser must take out a new license at $5, so that such transfers do not alter the figures and the yearly gain actually represents the number of new cars purchased during the year.

The decrease in the number of dealers for 1914 compared with the previous year is taken to mean that the business of selling cars is becoming more stable and a matter of the survival of the fittest. The number of agents is 191 less than in 1913. This number probably represents the host of so-called curbstone dealers who are gradually being driven out of business or driven into legitimate agency business.

It will be seen from the report that Wisconsin motorists pay a tribute of approximately $300,000 per annum for the privilege of driving their cars over the public streets and highways. Private owners pay $5 per car; motorcyclists $2, and dealers $10. The private owner stands the greatest share of the burden, or $266,000. The manner of distributing the revenue, however, removes the pain of the sting. After the cost of adminstration is deducted, the net revenue is transferred into the highway funds of state and county. The state aid fund receives 25 per cent. of the net revenue, while 75 per cent. is turned back into the highway funds of the counties according to the amount paid in from each county for licenses.

N. Y. Registrations Gain in Value $354,411.59

NEW YORK CITY, Dec. 21—Motor registrations in New York up to and including December 15, netted that state a total of $1,525,855.86, an excess of $354,411.59 over the same period of last year. So far this year 167,930 automobiles were registered and 66,113 chauffeurs licensed. These figures reveal about 20 per cent. increase in fees, 26 per cent. increase in registrations and 19 per cent. increase in the number of chauffeurs licensed, there being 132,251 motor cars registered and 56,228 chauffeurs licensed in 1913.

Of the total number of motor vehicles registered, 150,678 are pleasure cars, 17,252 commercials and 2,368 owned by non-residents. One of the most notable features shown by the registration figures is that the bulk of cars or 75,042 motor vehicles are less than 25 horsepower; 50,971 less than 35; 19,943 less than 50, while only 1,298 were rated at 50 horsepower or more.

54,600 Licenses Issued in Missouri

ST. LOUIS, MO., Dec. 18—There have been issued up to December 15, in Missouri, 54,600 licenses. Of this number St. Louis had the greatest number of registrations with 12,004, while 6,749 were issued to residents of Kansas City. For the same period last year St. Louis had 9,789 plates and Kansas City, 5,494. For the entire year of 1913 the registration for the whole state was 38,140.

During the past month, November, ninety-two cars were registered from St. Louis. Thirty-five were Fords.

Hexter Truck Makers Assign

NEW YORK CITY, Dec. 19—The Roland Gas-Electric Vehicle Corp. has assigned for the benefit of its creditors to Clifford G. Ludwigh. This company was formed last November to manufacture a new type of gasoline-electric truck designed by P. K. Hexter. It had a capital of $200,000. War conditions, it is stated, coupled with the closing of the stock exchange, on which nearly all of the backers operated, interfered with the manufacturing work.

A petition in bankruptcy was filed against the company,

Automobile Securities Quotations

NEW York City, Dec. 22—A slightly weaker tone was apparent in the automobile securities market during the past week. This was not peculiar to the automobile securities, all other stocks being affected more or less. What declines there were, however, were not important and the market as a whole might be characterized as steady. Some of the week's changes are significant of the general trend. General Motors common was 5 1-2 points below last week while the preferred was slightly ahead. Firestone preferred gained 1. Goodyear and Goodrich stocks were slightly lower. Kelly-Springfield common lost 3 points while the first preferred gained 1 1-2. Maxwell stocks were a little stronger. Stewart-Warner gained 5 on the common and 1 1-2 on the preferred, U. S. Rubber 3 3-4 on the common and 2 on the preferred and White preferred rose 1 point. Willys-Overland common gained 3 points and preferred 4.

	1913		1914	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co. com	195	220	250	...
Ajax-Grieb Rubber Co. pfd	97	102	100	...
Aluminum Castings pfd	98	100	95	100
Chalmers Motor Company com	...	94	...	90
Chalmers Motor Company pfd	90	95	87½	92½
Firestone Tire & Rubber Co. com	235	242	350	360
Firestone Tire & Rubber Co. pfd	100	101	110	111
Garford Company pfd	78	90	...	...
General Motors Company com	35	36¼	79	83
General Motors Company pfd	75	78	90⅛	93
B. F. Goodrich Company com	16	17	24¼	25
B. F. Goodrich Company pfd	76	76½	93½	96
Goodyear Tire & Rubber Co. com	185	192	188	191
Goodyear Tire & Rubber Co. pfd	90	92	100	102
Gray & Davis Inc. pfd	94	101	...	...
International Motor Co. com	...	5	...	...
International Motor Co. pfd	...	15	...	...
Kelly-Springfield Tire Co. com	...	...	65	68
Kelly-Springfield Tire Co. 1st pfd	...	...	79	80
Kelly-Springfield Tire Co. 2nd pfd	...	...	95	97
Lozier Motor Company com	...	16	...	...
Lozier Motor Company pfd	...	90	...	...
Maxwell Motor Company com	2½	3	14⅝	14¾
Maxwell Motor Company 1st pfd	18	18¾	44	44½
Maxwell Motor Company 2nd pfd	6½	7	17½	18
Miller Rubber Company	115	121	160	...
Packard Motor Car Co. com	...	...	...	100
Packard Motor Car Co. pfd	90	95	90	...
Peerless Motor Car Co. com	15	25	15	20
Peerless Motor Car Co. pfd	75	80	...	55
Pope Manufacturing Co. com	1	3	...	...
Pope Manufacturing Co pfd	10	15	...	...
Portage Rubber Co. com	...	30	25	30
Portage Rubber Co. pfd	...	85	80	85
Reo Motor Truck Company	5	7	10½	11½
Reo Motor Car Company	13¾	14¾	21½	22½
Stewart-Warner Speed. Corp. com	...	55	52	54
Stewart-Warner Speed. Corp. pfd	95	97	98½	101
Studebaker Corporation com	17	18	32½	33
Studebaker Corporation pfd	65	67½	86½	88
Swinehart Tire & Rubber Co	65	70	69	71
U. S. Rubber Co. com	54⅛	55	53¾	54
U. S. Rubber Co. pfd	100⅛	100½	102	102¼
White Company pfd	105	110	108	110
Willys-Overland Co. com	58	62	83	87
Willys-Overland Co. pfd	79	85	90	95

after the assignment, by the St. Louis Car Co., with claims of $2,212; and two other creditors with claims amounting to $4. The liabilities are stated to be about $55,000, and the nominal assets about $25,000.

4,672 Motor Vehicles in Montreal

MONTREAL, QUE., Dec. 25—A census taken late this summer of the number of automobiles in the Province of Quebec shows 7,317 motors, 7,025 cars and 292 trucks. The city of Montreal has alone 4,422 cars and 250 trucks the remaining number being distributed throughout the Province.

Motometer Wins Appeal in Patent Suit

NEW YORK CITY, Dec. 19—The Circuit Court of Appeals has affirmed the preliminary injunction granted May 21 to Harrison H. Boyce and the Motometer Co., Inc., in its suit against the Stewart-Warner Speedometer Corp., charging infringement of patent No. 1,090,776 covering the Motometer, a device for showing cooling water temperature.

The patent in question was issued March 17, 1914 and the suit was commenced April 11, 1914. The order to show cause why the preliminary injunction should not be granted was made without notice and served on the Stewart-Warner Speedometer Corp., April 14. The latter filed its answer charging lack of invention in the Motometer patent May 1. On May 16, Judge Hand, in the U. S. District Court for the Southern District of New York, granted the preliminary injunction prohibiting the manufacture and sale of the Stewart-Warner radiator thermometer. The suit was originally brought against the Stewart-Warner Speedometer Corp. of Virginia, and the Stewart-Warner Speedometer Corp. of New York, but the Virginia corporation was not made a party to the suit, being outside the jurisdiction of the court.

Judge Rogers, of the Circuit Court of Appeals, held that, although there had been no prior adjudication of the validity of the patent, the lower court had not abused its discretion in granting the injunction. Some significant extracts from the decision follow:

"The complainant's device embodies the idea primarily of affording protection against the great evil of engine over-heating, for which previously there had existed no remedy."

"The defendant claimed that the complainant's device was anticipated by the prior art..........................but an examination of the patents referred to convinces us that there is absolutely nothing in the claim of anticipation by the prior art. The prior patents do not disclose or in any way suggest the invention of the patent in suit."

"The evidence shows that prior to 1912 there was nothing known in the automobile art which would enable one running an automobile to discover an undue heating of the engine in time to rectify it and avoid irremediable damage. It was not until complainant's Motometer was invented that any instrument existed which could be used in connection with automobiles to give warning of a dangerous condition of the engine. In the face of the affidavits which were presented, the utility of the complainant's device cannot be doubted."

U. S. Tire Co. Concentrates Production

NEW YORK CITY, Dec. 21—The United States Tire Co. has decided to concentrate the entire automobile tire production in the Hartford and Detroit plants. All solid tires for motor trucks, carriages and vehicles of all sorts will be made in Providence and bicycle and motorcycle tires will be made exclusively at Indianapolis. The company will continue its policy of furnishing the G. & J. brand of automobile tires, not through its branches, but through the number of large distributing agencies handling this brand.

Crescent Delivery Car Makes Appearance

LOS ANGELES, CAL., Dec. 20—A new light delivery car has made its appearance in Los Angeles. The machine is known as the Crescent car and has been placed on the market by the Mission Motor Car Co., of the Southern California city, designed to meet the needs of the tradesman who needs a car of no greater capacity than 600 or 800 pounds.

Atwater Kent to Build New Factory

PHILADELPHIA, PA., Dec. 19—The Atwater Kent Manufacturing Works, Wayne Junction, has under way the construction of a new brick factory building adjoining the present structure that when completed will give the company two and one-half times the present available floor space.

Nyberg Plant to Be Reopened and Operated

INDIANAPOLIS, IND., Dec. 21—The plant of the Nyberg Automobile Co., Anderson, is to be re-opened and operated at once. Albert C. Barley of Marion has acquired full control from James W. Sansberry, a banker. The company has been in litigation, Barley having filed suit against Sansberry demanding an accounting. In a compromise of this suit, Barley acquired control.

LOUISVILLE, KY., Dec. 19—Perplexity of Louisville motorists as to how to obtain their 1915 licenses was removed this week when H. L. Ramsey, deputy state commissioner of motor vehicles, attending a special meeting of the Louisville Automobile club directors, announced that an arrangement had been made with the secretary of state whereby the licenses would be issued through the office of the commissioner of motor vehicles.

NEW YORK CITY, Dec. 18—The Kelly-Springfield Tire Co. has declared a dividend of 1 1-2 per cent. on the common stock, payable February 1, 1915, to the stockholders of record at the close of business January 15, 1915. It has also declared quarterly dividends of 1 1-2 per cent. on the 6 per cent. preferred stock and 1 3-4 per cent. on the 7 per cent. second preferred stock, payable January 2, 1915, to stockholders of record at the close of business December 15, 1914.

Bretz Company Files Certificate

ALBANY, N. Y., Dec. 21—The J. S. Bretz Co., 250 West Fifty-fourth street, New York City, importer of F. & S. ball-bearings, filed a certificate of dissolution with the secretary of state on November 28.

Market Reports for the Week

This week's market reports showed a few changes in the metal, rubber and silk quotations. In the metal market, both coppers underwent a drop of $0.00 1-8 per pound. The tone of the copper market is weak, although producing interests are still making little effort to attract business. There is small demand from the consumers and second hands are more anxious to sell at concessions. Tin also experienced a decline, a weaker tone having developed this week, in sympathy with the same in London. This metal closed at $33.50 per 100 pounds, a drop of $0.88. Both Bessemer and open-hearth steels, however, went up in prices, closing at $18.50 per ton, at a gain of $0.50. The crude rubber market this week retained a firm tone with no material change. Up-River fine Para closed at $0.76 at a gain of $0.03. Para is very scarce, as there is apparently little obtainable at less than $0.76 a pound. The consumers were purchasing sparingly, and there was little doing among the dealers. Reports from London state that rubber is easier for plantation.

A report states that arrangements soon would be completed looking to a removal of the embargo under restrictions against the export of rubber from the British colonies to the United States. While the details of the arrangements have not been fully worked out the State department has been given to understand that the American importers of rubber will be required to give guarantees that none of the product shall reach Great Britain's enemies.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Change
Antimony	.12½	.12½	.12½	.12½	.12½	......
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	......
Bessemer Steel, ton	18.00	18.50	18.50	18.50	18.50	+.50
Copper, Elec., lb	.13¼	.12¼	.13	.13⅛	.13⅛	—.00⅛
Copper, Lake, lb	.13⅜	.12¼	.13	.13¼	.13¼	—.00⅛
Cottonseed Oil, bbl	5.65	5.73	5.60	5.65	5.65	......
Cyanide Potash, lb	.21	.21	.21	.21	.21	......
Fish Oil, Menhaden, Brown	.38	.38	.38	.38	.38	......
Gasoline, Auto, bbl	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	.90	......
Lead, 100 lbs	3.80	3.80	3.80	3.80	3.80	......
Linseed Oil	.50	.50	.50	.50	.50	......
Open-Hearth Steel, ton	18.00	18.50	18.50	18.50	18.50	+.50
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.71	.71	.71	.71	.71	......
Rubber, Fine Up-River, Para	.73	.73	.73	.75	.76	+.03
Silk, raw, Ital	..	3.90	..	..	3.90	......
Silk, raw, Japan	..	3.20	..	..	3.27½	+.27½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	......
Tin, 100 lb	34.38	34.38	33.50	33.50	33.50	—.88
Tire Scrap	.05	.05	.05	.05	.04½	—.00½

Repairs, 22.7 Cents per 1,000 Miles

Twenty Winton Prize Winners Drive 359,116 Miles for $49.97

NEW YORK CITY, Dec. 18—The Winton Motor Car Co.'s seventh annual repair expense contest, begun on April 1, 1914, and ended on November 30, was won by John Grau, chauffeur for J. F. Casey, of Pittsburgh, who drove his Winton Six 24,362 miles with no repair expense. The twenty winners of Winton prizes drove 359,116.2 miles with a total repair expense of $49.97, or an average of 22.7 cents per 1,000 miles. For the seven contests, 110 cars have traveled 1,689,076.2 miles with a total repair expense of $383.68.

The year 1911 seems to have the best record so far as total mileage and total repair expense are compared. That year twenty cars made 394,333.9 miles with a total repair expense of $20.88. The next best year is 1913 when twenty cars totaled 294,774.8 with a total repair expense of $31.46. In 1910 ten drivers went 165,901.9 miles at a total repair expense of $6.96. The first year the contest was started, 1908, ten drivers went 65,687.4 miles at a repair expense of $15.13.

The winner receives the prize of $1,000. The second prize of $500 went to W. H. Franklin, chaffeur for the Boston Last Co., Boston, Mass., who drove a Winton Six 27,432.6 miles at a repair expense of $18. Third prize, $250, went to W. M. Newsome, who won third prize last year. His mileage with a car belonging to M. R. Hirsch, Atlanta, Ga., was 22,175 with no repair expense.

The following list gives the seventeen remaining winners, who received each a prize of $100:

Name.	Owner	Mileage	Total Repair Expense
F. C. Batt	State of New York	22,208.9	$20.15
Thomas Brown	M. J. Finnigan, Worcester, Mass.	19,445	1.20
G. T. Macone	F. E. Coursen, Stockbridge, Mass.	20,379	5.35
Thomas Murren	J. M. Anderson, Medford, Mass.	18,693	None
H. B. Vaughn	Celia Bell, Terre Haute, Ind.	18,385.3	None
C. D. Spiller	J. L. Bailey, Fitchburg, Mass.	18,746.8	.85
G. M. Lewis	E. R. Caldwell, Syracuse, N. Y.	18,486.8	2.10
J. W. Tracy	J. C. Biggert, Crafton, Pa.	17,026	None
F. S. Weaver	S. R. Bush, Easton, Pa.	16,579	2.32
J. J. Hickey	T. Pariseau, Manchester, N. H.	15,360	None
Hugo Larson	R. W. Stevens, Highland Park, Ill.	15,321	None
Ernest Fries	L. M. Willis, Kenilworth, Ill.	14,940.7	None
R. Clements	F. H. Jones, Andover, Mass.	14,821	None
W. E. Ochsie	Martin Daab, Hoboken, N. J.	14,057.4	None
Herbert Lewis	George Spottiswoode, Orange, N. J.	14,017	None
J. F. Kerrigan	F. W. Carter	13,865	None
M. H. Murphy	R. T. Heitemeyer	12,815	None

The judges were: J. A. Dickson, *Youth's Companion;* D. G. Newton, *Cosmopolitan Magazine;* G. C. Pierce, Associated Sunday Magazines; R. M. Banhart, *National Geographic Magazine*, and R. G. Howse, *Literary Digest*.

Indianapolis Seating Capacity Raised to 75,000

INDIANAPOLIS, IND., Dec. 19—Construction of a new grand stand, seating 15,000 people, has been started on the south turn of the course, raising the total seating capacity of the plant to 75,000, which is equalled only by the new Yale bowl at New Haven. Over a mile of grand stands, the longest in the world, will soon be a speedway fixture.

Additional improvements are the erection of a communal garage, accommodating forty cars, in back of the judges' stand,—the old garages having been torn down, and their site turned into parking space,—the widening of the track on the inside by 15 feet, and the erection of a concrete safety wall all around. A club house for drivers, complete with gymnasium, tennis courts, and swimming pool, are contemplated for next spring.

Omaha Speedway Opening July 5

OMAHA, NEB., Dec. 19—July 5 was tentatively selected by the management as the date for the opening race meet at the new automobile speedway here.

Chicago Speeders Give Appearance Bond—No Jail

CHICAGO, ILL., Dec. 17—No longer will Chicago motorists have to go to jail for infractions of the local ordinances which apply to the control of traffic. A new order goes into effect January 1 which will change all this. Chief Justice Harry Olson of the municipal court, and Max Korshak, assistant corporation counsel, have approved an appearance bond which violators may sign and go on their way. The next day they must appear in court or a jury will be called and a judgment entered fining the violator. An execution then will issue and the accused either must pay or go to jail.

Republic Rubber to Open Foreign Branch

YOUNGSTOWN, O., Dec. 21—The Republic Rubber Co., this city, is going to open a European branch in London early in the new year and Frank V. Springer, manager of the railroad sales department of the company for the last 10 years, will be in charge. Mr. Springer has had headquarters in New York City. The London branch will care for continental business as well.

1 Hour Limit for Parking Detroit Cars

DETROIT, MICH., Dec. 19—Beginning December 21, automobiles found parked in front of stores and offices more than 1-hour are to be removed by the police either to special parking places or to streets where they will not interfere with the shoppers or with traffic. The owners are to be called before the traffic department officers and may be fined.

The policemen specially detailed for that work will be provided with stickers to be affixed upon the car tires. Upon the sticker the policeman will mark the time or hour when this sticker was placed upon the tire and when returning to check up the cars and upon finding cars parked beyond the allowed time of 1 hour he will have the car removed.

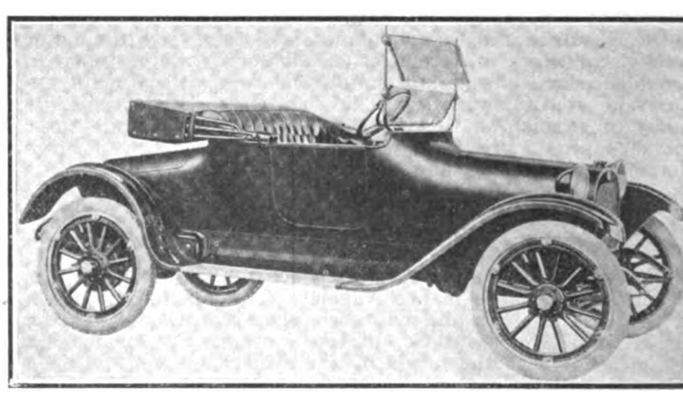
Lozier Creditors' Meeting Dec. 29

DETROIT, MICH., Dec. 19—Efforts to re-organize the Lozier Motor Co., have not been abandoned notwithstanding that 10 days ago the company was declared bankrupt. A committee of creditors acting on its own responsibility has formulated plans for a re-organization of the company and has arranged for a general meeting of creditors to be held December 29 at 2 p. m. in the United States District Court, in Detroit.

Two Petitions for Hassler Co.

INDIANAPOLIS, IND., Dec. 19—The United States Court at Indianapolis has under consideration two petitions concerning the Hassler Shock Absorber Sales Co. One, filed by Robert H. Hassler, asks for the appointment of a receiver, and the other, filed by Robert H. Hassler, Inc., Asa P. Romertson, doing business as The Auto Exchange, and the Advertisers' Press, creditors, asks that the concern be adjudged bankrupt. The state courts on November 27 appointed Homer L. Archer receiver for the company.

INDIANAPOLIS, IND., Dec. 19—Earl Cooper has been engaged by the Stutz Motor Car Co., Indianapolis, Ind., to drive for it in the Vanderbilt and Grand Prize Races which will be run at San Francisco.



Dodge Bros., Detroit, has supplemented its touring model by a roadster body on the same chassis of 110 inches wheelbase. Like the touring model, the roadster is an all-steel construction, including the frame. Doors are wide and have concealed hinges and handles, and there is a sloping rear deck with a door giving access to a spacious luggage compartment. The characteristic oval, molded fenders are fitted. Price $785, same as touring car

Car, Truck and Accessory Plants Expand

(*Continued from page* 1174)

The Houk Mfg. Co., Buffalo, N. Y., added one story to the one-story machine shop for wheel assembly, giving an increase of 25,000 square feet at a cost of $35,000.

The Hyatt Roller Bearing Co., Newark, N. J., has added a six-story and basement structure 75 by 200 feet, to provide for increased business. This gives an increase in floorspace of 150,000 square feet.

Kelsey Wheel Co., Detroit, Mich., spent $50,000 on new machinery.

The Otto Konigslow Mfg. Co., Cleveland, O., spent $3,500 for new machines.

The K-W Ignition Co., Cleveland, O., has added 28,750 square feet in three buildings as follows, two one-story buildings 65 by 125 feet, and one 85 by 125 feet and an addition 25 by 75 feet. The additions cost $55,000 and new machinery $60,000.

The Leather Products Co., Cincinnati, O., spent $500 for new machinery.

The Lee Tire & Rubber Co., Conshohocken, Pa., added sufficient equipment during the year to increase the output 200 tires per day making the total daily production 1,000 to 1,200 tires.

A new one-story building to be used as a heat-treating department has been added by the Link-Belt Co. to its Ewart works at Indianapolis, Ind. It is 48 by 148 feet and cost $11,000.

About $10,000 was expended by the Lovell-McConnell Mfg. Co., Newark, N. J., on new machinery.

A four-story addition 60 by 20 feet, and having a floorspace of 4,800 square feet has been made the plant of the Mansfield Tire & Rubber Co., Mansfield, O. New machinery to the extent of $20,000 has been purchased.

Paul M. Marko & Co., Brooklyn, N. Y., have occupied larger quarters adding 3,750 square feet. The three-story building is 25 by 90 feet, $50,000. Machinery, $60,000.

One building has been added to the plant of the McCord Mfg. Co., Detroit, Mich., giving an increase of 14,000 square feet. It will be used as a storage and repair department and represents an expenditure of $10,000. New machinery, $6,000.

Metal Auto Parts Co., Indianapolis, Ind., has rented additional space of 8,800 square feet. New machinery, $10,000.

The Mohawk Rubber Co., Akron, O., has added a machine shop, press room, storage building and office, totaling about 30,000 square feet, $50,000. Machinery, $60,000.

The New Departure Mfg. Co., Bristol and Hartford, Conn., has added a five-story and basement structure containing executive offices, light machine departments, inspection and packing and shipping departments at a cost of $250,000. The total floor area of the company's plants is now close to 500,000 square feet.

The New Process Gear Corp., Syracuse, N. Y., has added a new heating plant and made an addition to its office increasing its floorspace 8,000 square feet at a cost of $45,000. Machinery, $175,000.

The Niagara Fabric Mfg. Co., New York City has added 2,500 feet at a cost of $500. Machines $500.

A building containing 20,000 square feet has been added to the plant of the Oakes Co., Indianapolis, Ind., at a cost of $20,000. It will be used for machines and assembling. New machinery, $10,000.

The Osborne & Stephenson Mfg. Co., Plainville, Conn., spent $18,000 for new machinery.

An entire floor of 16,280 square feet has been added by the Perkins-Campbell Co., Cincinnati, O., for manufacturing purposes.

In addition to the original factory at Peru, Ind., having 175,000 square feet, the Pittsburgh Model Engine Co., Pittsburgh, Pa., has a new factory at Pittsburgh which adds 75,000 square feet and represents an expenditure of $600,000. Additional machinery, $150,000.

At an expenditure of $6,250 the C. D. Pruden Co., Baltimore, Md., has added a building 40 by 160 feet giving an additional floorspace of 6,400. New equipment, $1,250.

A four-story addition 300 by 120 feet for building closed bodies has been made by the Racine Mfg. Co., Racine, Wis., which has also added largely to its dry kilns giving the capacity of 200,000 square feet of lumber to be dried at one time. Separate building 80 by 80 has also been added for making wood bendings. The additional floorspace totals 200,000 square feet. Expenditures on the plant amount to $75,000. New machinery, $25,000.

Remy Electric Co., Anderson, Ind., has bought $75,000 worth of new machinery.

The Ross Gear & Tool Co., Lafayette, Ind., has expended $5,000 on new equipment.

Saginaw Sheet Metal Works, Saginaw, Mich., spent $6,000 on new machinery.

The Salisbury Wheel & Mfg. Co., Jamestown, N. Y., bought $2,000 worth of new machinery.

Light Mfg. & Foundry Co., Pottstown, Pa., added $15,000 worth of new machinery.

The right hand wing of the S. K. F. Ball Bearing Co.'s plant, Gothenburg, Sweden, has been added during the past year.

The Sparks-Withington Co., Jackson, Mich., added 50,000 square feet for its nickel-plating and shipping departments.

A new plant consisting of five buildings is occupied by the Standard Machinery Co., R. I. The main building is 75 by 525 feet, the heat treating building 120 feet square, gas plant 40 feet square, power plant 70 feet square and garage 40 feet square.

The Standard Thermometer Co., Boston, Mass., has added a new building 80 by 20, 3,200 additional square feet.

The Standard Welding Co., Cleveland, O., has a new warehouse 240 by 60 increasing the floorspace by 14,400 square feet and is to be used for the storage of rims and bands. It cost $21,000. New machinery, $25,000.

The Stewart-Warner Speedometer Corp., Chicago, Ill., has a new plant which is estimated at $200,000.

Stromberg Motor Devices Co., Chicago, Ill., spent $5,000 on new machinery.

Sunderman Safety Carbureter Corp., Newburgh, N. Y., has added $1,000 worth of machinery.

Swinehart Tire & Rubber Co., Akron, O., spent $15,000 for a new machine.

The Timken-Detroit Axle Co., Detroit, Mich., expended $50,000 on new machinery.

Todd Mfg. Co., Minneapolis, Minn., spent $300 on new machines.

The Van Sicklen Co., Aurora, Ill., started with 8,000 square feet and now has 10,000. It expects to move into a new two-story and basement plant extending into the adjoining buildings in the near future. New machinery, $9,000.

Wagner Electric Mfg. Co., St. Louis, Mo., has added 50,000 square feet at a cost of $160,000 in a four-story building 272 by 45 feet. New machinery, $30,000.

The Warner Mfg. Co., Toledo, O., $50,000, new machinery.

An addition of 7,000 square feet has been made to the machine shop of the Waukesha Motor Co., Waukesha, Wis., $7,500. New equipment, $15,000.

The Westinghouse Air Spring Co., New Haven, Conn. Machinery, $15,000.

The Whitney Mfg. Co., Hartford, Conn., added a steel storage room 50 by 160 feet, giving an increase of 8,000 square feet.

The Willard Storage Battery Co., Cleveland, O., is building an entirely new factory which, when completed, will comprise ten buildings, containing 6 acres of floor area. An idea of the large size of the plant may be gained from the illustration on page 1153.

1914 A Good Contest Year—120 Sanctioned Events

(*Continued from page* 1147)

The 15, 20, 25 and 75-mile 1-mile circular dirt track records were broken by Burman in his Peugeot, the first one at Peoria, Ill., the next two at Springfield, Ill., and the last at Galesburg, Ill.

Fuel efficiency tests were gone into more extensively this year. Such companies as the Buick, Chandler, Franklin, Saxon, Moon, Carnation, Studebaker and Overland held special fuel economy tests. A Buick six made 38.9 m.p.g., and a four, Model B-25 made 22.5 m.p.g. During May the Franklin company held a nation-wide competition, the result of which showed that ninety-four cars averaged 32.8 m.p.g., the highest mileage being 51.2 and the lowest 17.2. A Chandler six made 23.7 m.p.g. and a 1915 Overland model 80 equipped with a Stromberg made 29 m.p.g. In May, 180 Saxons averaged 34.75 m.p.g. Each of the competing cars was driven 200 miles without stopping the engine. The average mileage scored was at the rate of less than 1-4 cent a mile for fuel for each passenger. The transcontinental Saxon averaged 30 m.p.g. for 3,389 miles. A number of the cars averaged more than 47 m.p.g., while the lowest was 26.7. A Studebaker six in a series of 200-mile runs around Buffalo, averaged 15.15 m.p.g. In June a Carnation made 29 m.p.g. in a 24-hour non-stop run around New York City.

Two hill-climbs were held during the year, Atlanta and Uniontown. The Atlanta climb was won by a Pope-Hartford and the record for the hill broken, time 20 2-5 seconds. A KlineKar won the 2-day hill climb at Uniontown, making the best time for the 3-mile ascent, 3.57 4-5.

CASE Force Increased—By reason of heavy orders for tractors and motor trucks for export account, it is reported the J. I. Case T. M. Co., of Racine, Wis., has increased its force to 1,400 men and hopes to bring this number up to 1,800 by January 1. Nearly all of the export orders come from the Case branch at Odessa, Russia, and the material is for war use.

U. S. Reclaiming Works Damaged by Fire—Damage amounting to $75,000 was recently done by fire in the United States Rubber & Reclaiming Co. plant, Buffalo, N. Y.

Morrow Plant to Be Enlarged—The plant, it is stated, of the A. P. Morrow Mfg. Co., manufacturer of automobile parts, Elmira, N. Y., will be enlarged by the construction of a shop costing about $125,000.

Western Auto Supply Will Equip—The Western Auto Supply Co., Kansas City, Mo., recently incorporated with a capital stock of $20,000, will equip a plant for the manufacture of automobile accessories, etc.

Goodrich Adds $5,000 Addition—A permit has been granted by the building department of Akron, O., for a two-story addition to the plant of the B. F. Goodrich Co., to cost $5,000. It will be an addition to plant No. 26.

Pierce-Arrow Purchases Site — The Pierce-Arrow Motor Car Co., Buffalo, N. Y., has purchased a site at Elmwood avenue and the New York Central R. R., upon which will be erected a plant for the manufacture of commercial vehicles.

New Plant for Akron—Another rubber company will be started in Akron, O., with local men operating it, to make automobile tires. It will be known as the Rubbertown Tire Co. The capital is $10,000. O. J. Schwab, M. Greenberger and J. F. Darcy are interested.

Jones Will Operate Two Plants—J. J. Jones, of the Jones Six Co., Wichita, Kan., announces that that company will operate two factories in that city. The old Neely furniture store building, which was purchased recently, is being transformed into an automobile factory. The company is contemplating erecting a truck factory also.

Mecca Plant in Trenton—Negotiations have been made by the Mecca Tire Co., Philadelphia, Pa., for the purchase by it of the American Lamp & Brass Co., situated on Mulberry street, Trenton, N. J. The land upon which the plant is located is 385 by 300 feet. The plant comprises six brick buildings, each 30 by 90 feet. Five of the buildings are 2½ stories high, while one is 3½ stories. The company, it is said, will begin operations in March. The concern is incorporated under the laws of Delaware for $500,000.

Milwaukee Co. Adds—The C. H. & E. Mfg. Co., 321 Mineral street, Milwaukee, Wis., manufacturing gasoline engines, tractors, gasoline cars and portable sawrigs and similar equipment, has awarded contracts for the erection of a new machine shop and factory building at Clinton and Mineral streets, to cost $30,000. The building will be of brick and steel construction, 2 stories high, 100 by 100 feet in size, and will permit the output to be doubled. At the head of the company is Frank J. Edwards, president of the Kissel Kar Co., of Milwaukee, and the Edwards Motor Car Co., Milwaukee agent for the Dodge.

New Ford Plants—The Ford Motor Co., Detroit, Mich., is planning to build an assembling plant in San Diego, Cal. It has also announced a $500,000 plant for Louisville, Ky. An architect from Detroit was in that city recently to determine the plans for a new assembly plant which is to be erected on the property of the concern at Third street and the L. & N. railroad crossing. The new structure will be four stories in height and will be similar to Ford assembly plants in other cities. It is planned to have the new building ready for occupancy when the local branch, now located at 931 South 3d street, proves inadequate for the growing business of the company in that territory.

Sphinx Plant Busy—Operations at the plant of the Sphinx Motor Car Co., York, Pa., are being gradually increased and scores of agencies, who will handle the new car, are being booked throughout the different parts of the country. It was stated by a member of the company that the combined contracts for 2,000 cars approximates $1,000,000 worth of business. The several departments of the factory are being increased and by the first of the year will be operated to their fullest capacity. The transfer of the plant, formerly occupied by the Hart-Kraft Motor Car Co., from the receiver, Donald H. Yost, to Howard Rohrer, M. G. Hollis and G. C. Aumen, of the Sphinx company, was entered this week in the office of the recorder of deeds.

The Automobile Calendar

Jan. 2-9 .... New York City, Annual Automobile Show, Grand Central Palace.
Jan. 2-9 .... New York City, Automobile Salon, Grand Ball Room of Astor Hotel, Automobile Importers' Alliance, E. Lascaris, Pres.
Jan. 3-10 .... Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 5-7 .... New York City, Engineering Societies' Bldg., Winter Meeting Society of Automobile Engineers.
Jan. 8-14 .... Milwaukee, Wis., Show—Auditorium, Milwaukee Auto. Dealers' Assn.
Jan. 8-14 .... Kansas City, Mo., Show.
Jan. 9 .... San Diego, Cal., Road Race.
Jan. 9-16 .... Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.
Jan. 16 .... Detroit, Mich., Show.
Jan. 16-23 .... Cleveland, O., Show., Cleveland Automobile Show Co., F. H. Caley, Mgr.
Jan. 20-28 .... Lancaster, Pa., Hiemenz Auditorium.
Jan. 23-30 .... Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 23-30 .... Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 25-30 .... Fall River, Mass., Show.
Jan. 25-30 .... Buffalo, N. Y., Show, Broadway Auditorium, Buffalo Automobile Dealers' Assn.
Jan. 30-Feb. 6 .... Columbus, O., Show, Memorial Hall, Columbus Auto Club and Columbus Auto. Trades Assn.
Jan. 30-Feb. 6 .... Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb .... Portland, Ore., Show, Portland Auto Trade Assn.
Feb .... Toledo, O., Show, Toledo Auto Show Co.
Feb. 1-6 .... Louisville, Ky., Show, Louisville Auto. Dealers' Assn., First Regiment Armory.
Feb. 2-7 .... Kalamazoo, Mich., Show, Armory.
Feb. 15-20 .... Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids *Herald;* C. L. Merriman.
Feb. 15-20 .... Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 15-20 .... Bridgeport, Conn., Show, State Armory; B. B. Sterber.
Feb. 22 .... San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27 .... Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.
Feb. 23-27 .... Syracuse, N. Y., Show, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.
Feb. 27 .... San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13 .... Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 9-15 .... Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14 .... San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
April .... Calumet, Mich., Show, Coliseum.
May 17-18 .... Boston, Mass., A. A. A. Annual Meeting.
May 29 .... Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 9 .... Galesburg, Ill., Two-mile Track Meet.
June 16 .... Chicago, Ill., Speedway, 500-Mile Race, Speedway Park Assn.
June 25 .... Sioux City, Ia., Track Meet.
July 4 .... Tacoma, Wash., Road Race.
Aug. 20-21 .... Elgin, Ill., Road Race.
Sept. 20-25 ...... San Francisco, Cal., International Engineering Congress.

The Week in  the Industry

Motor Men in New Roles

PULCHER President Wolverine Club—Martin L. Pulcher, vice-president and general manager of the Federal Motor Truck Co., Detroit, Mich., was elected unanimously as president of the Wolverine Automobile Club, at a meeting of the board of directors.

Petersilge Manager Standard Motor Truck—Emil Petersilge has become manager of the Standard Motor Truck Sales Co., Cleveland, O.

Belden Minneapolis Club Pres.—G. K. Belden was re-elected president of the Automobile Club of Minneapolis. All other officers were renamed.

Hamburg Heads Newark Club—A. V. Hamburg was elected president of the Automobile Club of Essex County, Newark, N. J. A. S. Cole was elected treasurer.

Hoopengarner Resigns from Swinehart—E. O. Hoopengarner, for 10 years branch manager in New York City for the Swinehart Tire & Rubber Co., has resigned. He has not stated his future plans.

Walton Resigns—E. A. Walton, during the last 3 years advertising manager of the Timken-Detroit Axle Co., Detroit, Mich., has resigned to return to the Burroughs Adding Machine Co., in the same position.

Tooker Advertising and Sales Manager—The American Bronze Co., Berwyn, Pa., maker of "Non-Gran" bearing bronze, announce the promotion of Marc L. Tooker to the head of its advertising and sales department.

Frampton Sales Manager—G. O. Frampton has been appointed by Cooper, the tire man, as general sales manager of the Cooper agencies at Cincinnati, Dayton, Columbus, O., Indianapolis, Ind., Nashville, Tenn., Knoxville, and Chattanooga, Tenn.

Stevens Makes a Change—H. E. Stevens has been appointed manager of the used car department of the New England branch of the Locomobile Co., Boston, Mass., following 9 years' service at the company's branch in New York City.

Kroh Gets New Appointment—Henry A. Kroh, who has been in the Boston motor field for some years, has been appointed New England representative for the Continental Asbestos Co., with headquarters at 171 Huntington avenue, Boston, Mass.

Kinnaird Columbus Club President—The annual election of the Columbus Automobile Club, Columbus, O., which was held December 14, resulted as follows: C. M. Kinnaird, president; Walter A. Pfeifer, first vice-president; C. Edward Born, treasurer, and Forest H. Tharpe, secretary.

Anderson and Brubaker Exchange Positions—A. R. Anderson has been appointed St. Louis manager of the International Harvester Co., St. Louis, Mo. He succeeded H. L. Brubaker who takes charge of the company's branch in Madison, Wis., where Mr. Anderson formerly held forth.

Changes in Boston Studebaker—H. T. Myers, for some years manager of the wholesale branch of the Studebaker Corp., Boston, Mass., has been promoted to have charge of the commercial car sales at the factory and G. N. Jordan, traveling sales representative in New England, has been appointed New England branch manager.

Carmichael Heads Star Rubber—With the reorganization of the Star Rubber Co., Akron, O., its new charter shows a capitalization of $200,000. The newly-elected officers are: President, G. W. Carmichael; vice-president, J. W. Miller; W. E. Wright, treasurer and secretary and general manager, E. M. Caldwell. G. E. Hall was elected sales manager.

Case Superintendent Resigns—J. C. Peil, superintendent of the molding department of the South Works of the J. I. Case Threshing Machine Co., Racine, Wis., and previously for 16 years superintendent of the foundries of the Pierce Motor Co., Racine, now part of the Case interests, has resigned to become superintendent of the foundry of the Maxwell Motor Co. at Dayton, O.

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Garage and Dealers' Field

Sheboygan Has New Co.—The Auto Service Co., Sheboygan, Wis., has been organized by F. F. Fuller and A. A. Freund to give repair service on all makes of cars with a full line of Ford parts.

N. Y. Eisemann Moves—The Eisemann Magneto Co. has leased large offices and repair rooms in the Chandler building, 245 West 55th Street, New York City, and has given up its other branch at 123 West 52d street.

Agent for Winona Radialite Device—The Washington state distributing agency for the Winona Radialite device has been placed with J. H. Mudie, of 750 Central Bldg., Seattle Wash. The Winona product is a device that automatically turns the headlights of a motor car.

Cincinnati Winton Moves—The Cincinnati agency of the Winton Six has moved from its former location on West 7th street to 2812 May street, Walnut Hills. The new location, which is near one of the most beautiful residence sections in the suburbs, was formerly the sales room of the Eddy Automobile Co.

Reo Agents Have Dinner—All the New England agents for Reo cars, comprising about sixty, had their annual dinner at the Hotel Oxford, Boston, Mass., last week as the guests of James M. Linscott, New England distributor, and they were addressed by J. C. Brandimore and H. G. Etabler, two of the factory officials from Lansing, Mich.

Overland Dealers Meet—The annual banquet of the Overland dealers identified with the Connell & McKone Company, Eastern Massachusetts distributors, was held last week at the Boston Athletic Association, with nearly 50 dealers present. William J. Connell was toastmaster. Col. Isaac Kinsey and Mr. Van Beaver, foreign factory man, represented the Overland Company as special guests.

Milwaukee Adds Ford Accessory Branches—Milwaukee's list of motor supply branches handling Ford accessories and supplies exclusively has been increased by two by the establishment of a Ford branch of the Auto Mart at 813 Grand avenue, and the J. J. Dougherty Co. at 803 Grand avenue. Some time ago the Auto Supply Co., 127 Second street, opened an exclusive Ford supply store at 140 Eighth street, directly opposite the new Milwaukee branch of the Ford Motor Co. All of the new Ford supply stores are within a block of the new Ford branch.

International Cyclecar Office Moved—The sales manager's office of International Cycle Car and Accessories Co. has been removed from Chicago to the factory of Woods Mobilette Co., Harvey, Ill. All matters pertaining to dealers' contracts, car shipments and orders for Woods Mobilette parts and equipment will be cared for at the office at Harvey, Ill., which is in charge of O. R. Wolfe, sales manager, and J. C. Long secretary and treasurer of the company. The executive offices of International Cycle-Car and Accessories Company will be retained as formerly at 1109 Security Bldg., Chicago, and the show room and local sales room at 1509 Michigan Boulevard, Chicago.

Engineering Students Visit Jeffery Plant—A washing machine for laundering oily cotton waste was one of many money-saving appliances that made a profound impression on a party of engineering students from the University of Kansas when they visited the Jeffery automobile works recently. The students were in charge of Dean P. F. Walker, of the mechanical engineering department, and were visiting places of technical interest in and around Chicago. The tour included the Western Electric Company's plant at Hawthorne, Ill., the generating and sub-stations of the Commonwealth Edison Company at Chicago, and the automobile factory of The Thomas B. Jeffery Co., Kenosha, Wis. J. W. DeCou, in an impromptu speech, told how waste of all kinds has been avoided in the manufacture of Jeffery pleasure cars and motor trucks. Thus the oily waste is now laundered, much of the oil is retrieved, and the consumption of waste has been cut from over 1.000 pounds to less than 100 pounds a week. The waste is now used over again many times before it has to be thrown away. Formerly, the cost of small tools, such as taps, reamers, drills, files, etc., used to reach a staggering total. By the aid of efficiency ideas, this cost has been cut 60 per cent. For instance, the installation of a file-cutting machine, by which the worn files are resharpened instead of being thrown away, has turned a heavy liability almost into an asset.

Recent Incorporations in the Automobile Field

Canada

OTTAWA—Superior Tubes and Accessories, Ltd.; capital, $300,000; manufacture accessories. Incorporators: W. A. J. Case, J. B. Taylor, C. G. Lynch, all of Toronto.

TORONTO—Anglo-Canadian Motor Sales Co.; capital, $50,000; automobile manufacturer. Incorporators: A. G. Browning, 6 Adelaide, east, Toronto; G. E. Buchanan and others.

Colorado

DENVER—Denver Ford Starter Co.; capital, $50,000; manufacture of Ford and Metz starters. Incorporators: C. Miercort, A. A. Carnine.

Connecticut

HARTFORD—Charter Oak Motor Car Co.; capital, $20,000; dealer. Incorporators: Frank Zimmerman, E. H. Harris, F. W. Lycett, of Hartford.

Delaware

DOVER—Penn Rubber Traffic Co.; capital, $150,000; manufacture and sale of automobile tires and inner tubes. Incorporators: W. Boyd, W. I. N. Lofland, W. F. P. Lofland.

WILMINGTON—Hester Tire & Rubber Co.; capital, $300,000; tire manufacture. Incorporators: B. H. Friel, L. A. Brownhill, G. H. Purcell, all of Wilmington.

WILMINGTON—Motor Car Repair Shop; capital, $25,000. Incorporators: E. E. McDaniel, R. C. Pancoast, W. S. Hilles.

WILMINGTON—Pneumatic-Hub-Tire-Wheel Co.; capital, $500,000; manufacturer of wheels and tires. Incorporators: G. J. Lampton, N. M. Rowland, L. C. Evans, Louisville, Ky.

WILMINGTON—Sterling Motor Car Co.; capital, $10,000; manufacturer and dealer in automobiles. Incorporators: H. E. Latter, W. J. Maloney, O. J. Reichard.

Georgia

ATLANTA—Tatum Carbureter Co.; capital, $10,000; manufacturer. Incorporators: F. C. Myers, I. I. Tatum.

Illinois

ANNA—Anna Machine Shop & Garage Co.; capital, $5,000. Incorporators: R. W. Hynes, H. P. Sealey, J. P. Hynes, H. W. Smith.

CHICAGO—Adams Motor & Mfg. Co.; capital, $25,000; manufacturer in motors and machinery. Incorporators: W. E. Adams, H. W. Beaton, T. J. Mullen.

CHICAGO—Partin-Palmer Motor Car Co.; capital, $300,000; manufacturer and dealer. Incorporators: C. E. Heckler, Guy Guernsey, R. D. D'Autremont.

EDWARDSVILLE—American Standard Automobile Co.; capital, $100,000; parts and accessories. Incorporators: Peter Burnhardt, C. H. Gerling, Louis Kirsch.

MOLINE—Hager & Rank Automobile Co.; capital, $5,000; dealer. Incorporators: George Hager, Axel Sorling, R. W. Rank.

MOLINE—Moline Muffler Mfg. Co.; capital, $10,000; manufacturer. Incorporators: Ray Pupton, A. C. Walker, E. D. Jones.

PEORIA—Fashion Electric Garage; capital, $15,000. Incorporators: B. E. Adams, F. B. Kamarel, W. R. Bennett.

Indiana

GOODLAND—H. & D. Co.; capital, $10,000; dealer. Incorporators: A. P. Hawn, C. A. Doland, J. E. Hawn.

INDIANAPOLIS—Delaware Tire Sales Co.; capital, $1,500; dealer. Incorporators: C. M. Nesbit, W. T. Allen, C. L. Sawyer.

INDIANAPOLIS—Eclipse Mfg. Co.; capital, $50,000; spark plug manufacturer. Incorporators: W. S. Brown, W. S. Brown, Jr., B. M. Franklin.

INDIANAPOLIS—Indianapolis Garage Owners' Assn.; capital, $5,000. Incorporators: H. L. Bevington, A. W. Bowen, K. R. Vaught and others.

Kentucky

LOUISVILLE—Co-Operative Motor Car Co.; capital, $10,000; dealer. Incorporators: W. H. Reese, Herbert Stuber, W. R. Reese.

LOUISVILLE—Falls City Auto Co.; capital, $6,000; dealer. Incorporators: E. C. Pearson, S. J. McElliott, John Schildt, Henry Bosse.

Maine

PORTLAND—General Transit Co.; capital, $1,000,000; manufacturer in accessories and automobiles. Incorporators: E. E. Noble, E. V. Mann, all of Portland.

Massachusetts

BOSTON—Hood Tire Co.; capital, $20,000; deal in any kind of tires, rims and wheel equipment for automobiles. Incorporators: E. I. Aldrich, H. C. Mason, H. E. Rose, Robert Muir, C. W. Dailey, Jr.

Michigan

DETROIT—Dewesee Auto Safety Signal Co.; capital, $1,500. Incorporators: A. A. and I. P. Gottfield, Charles Edison, Charles Young.

DETROIT—National Electric Starter Co.; capital, $1,000; to market Ford starters built by Disco Electric Starter Co. Incorporators: M. B. and E. K. Sulzberger, J. S. Folz.

LANSING—Reliance Service & Supply Co.; capital, $3,000; accessories. Incorporators: E. L. Dunn, C. L. Winsor, M. B. Lipsitz.

Missouri

KANSAS CITY—Western Auto Supply Co.; capital, $20,000; dealer. Incorporators: George Pepperdine, Lena Pepperdine, E. R. Baker.

ST. LOUIS—St. Louis Welding Co.; capital, $150,000; to manufacture automobile wheel rims and do general metal welding, forging, machine and foundry business. Incorporators: Leo Ganahl, G. Becherer.

North Carolina

FAYETTEVILLE—Armfield-Percival Motor Co.; capital, $10,000; dealer. Incorporators: E. W. Percival, Jr., M. D. and D. F. Armfield.

New Jersey

PLAINFIELD—Queen City Auto Co.; capital, $30,000; dealer. Incorporators: F. Endress, F. Waller, L. Endress.

New York

BROOKLYN—Jack London Motor Car Service; capital, $500; dealer. Incorporators: H. L. Delatour, L. M. Denham, R. H. Sternberg, 315 Snediker avenue, Brooklyn.

BROOKLYN—Jefferson Automobile Co.; capital, $1,000; dealer. Incorporators: J. R. Howlett, 265 Jefferson avenue, Brooklyn; T. J. Howlett, C. E. Fiske.

BROOKLYN—Kestler Auto Service; capital, $5,000; dealer. Incorporators: Richard Kestler, Lawrence Kestler, 167 Clymer street, Bronx, New York City.

FAR ROCKAWAY—Traver Puncture Proof Tire Co.; capital, $400,000; tire manufacturer. Incorporators: Gustav Koenig, 10 Mott avenue, Far Rockaway; P. C. Traver, J. J. Higgins.

FREDONIA—Fredonia Garage Co.; capital, $5,000. Incorporators: Frank Apgar, Robert Forster, both of Fredonia, and Henry Lewis, Buffalo.

MT. VERNON—Albert Garage; capital, $10,000. Incorporators: P. E. Hendrick, M. C. Hendrick, F. C. Hendrick.

UTICA—Utica Mitchell Motor Car Co.; capital, $1,000; dealer. Incorporators: Isaac Denosky, Ida Denosky, J. W. Seton, all of Utica.

WALTON—H. S. Wakeman Co.; capital, $3,000; dealer. Incorporators: H. S. Wakeman, M. T. Smith, W. G. Smith, all of Walton, N. Y.

New York City

Armored Motor Car Corp.; capital, $6,000; armored automobile manufacturer. Incorporators: J. H. Allen, R. J. Baulsir, R. E. Rogers, all of 2 Rector street, New York City.

Automobile & Machine Spring Co.; capital, $10,000; automobile supplies, sundries and machinery. Incorporators: Ida and Ely Bramson, Morris Kleinburg.

C. S. and R. Co.; capital, $50,000; to manufacture motors, automobiles, etc. Incorporators: F. T. Harbach, 3681 Broadway, New York City; J. H. Pease, 549 2d avenue, Long Island City; F. W. Ritter.

Cochran's Garage; capital, $1,000. Incorporators: Julius Spalla, Louis Spalla, 151 Brook avenue, Bronx; John Spalla.

Cherokee Garage Co.; capital, $10,000. Incorporators: J. F. Fay, 104 E. 117th street, New York City; James Fay, F. Wengraf.

Federal Body Co.; capital, $1,000; automobile bodies. Incorporators: O. D. Shonnard, 246 Lenox avenue, New York City; S. Goldblatt, J. A. Cameron.

Greater New York Garage Co.; capital, $5,000. Incorporators: A. J. Beers, H. C. and J. T. Owens, 3647 Broadway.

Grand Concourse Service Co.; capital, $1,000; dealer. Incorporators: J. M. Ireland, M. A. Ireland, Caroline Haffen, all of 2505 Creston avenue, Bronx, New York City.

Globe Steel Products Corp.; capital, $5,000; ball bearings and automobile parts. Incorporators: C. F. Suitemeyer, J. R. Quinn, Max Vieweger, all of 50 Church street, New York City.

Natlus Auto Renting Co.; capital, $5,000. Incorporators: S. I. Goldberg, M. M. and J. S. Davis, 605 W. 111th street.

United Supply Stores; capital, $5,000; accessory dealer. Incorporators: A. S. Stein, L. G. Duquet, A. W. Chatfield, 312 W. 52d street, New York City.

X Protectyre Co.; capital, $20,000; to manufacture tire protecting devices and other automobile accessories. Incorporators: Isidore Neustaedter, H. J. Rosenbloom, both of 63 Park row, New York City; Alfred Alexander.

Ohio

CINCINNATI—Ford Supply Shop Co.; capital, $5,000; parts manufacturers. Incorporators: Walter Pursell, Bruce Schoolfield, A. W. Kops, H. N. Smith, T. J. O'Neill.

CLEVELAND—Ford Tire & Tube Co.; capital, $10,000; tire manufacture. Incorporators: E. E. Rodd, C. V. Liggett, U. L. Henry, C. A. Levy, Lee Ulmer.

COLUMBUS—Fourth-Chestnut Auto Repair Co.; capital, $10,000; garage. Incorporators: J. F. Steele, J. L. Steele, C. A. Lusch, E. T. Lusch, F. M. McSweeney.

COLUMBUS—Remington Auto Sales Co.; capital, $10,000; dealer. Incorporators: C. M. Shira, Orrin Thacker, W. A. Jackson, W. E. Penrose, G. H. Mosier.

MIDDLETOWN—C. C. Fouts Co.; capital, $75,000; to manufacture metal garages. Incorporators: C. C. Fouts, C. B. Oglesby, Paul Fouts, A. A. Amler.

Pennsylvania

BURLINGTON—Gamble-Waggener Co.; capital, $25,000; general motor car and sporting goods business. Incorporators: J. N. Gamble and others.

SCRANTON—Scranton Automobile Co.; capital, $100,000; to manufacture and deal in automobiles and engines and accessories. Incorporators: H. R. Shaw, Tracy Prevost, L. G. Stark, all of Scranton.

PHILADELPHIA—Standard Tire & Rubber Co.; capital, $250,000; to buy, sell and deal in all kinds of articles used in the manufacture of automobiles. Incorporators: F. R. Hansell, G. C. Seymour, G. H. B. Martin, of Camden, N. J.

Texas

EL PASO—Lone Star Motor Co.; capital, $25,000. Incorporators: Frank T. Pickrell, E. G. Perry and L. J. Trotti.

PORT ARTHUR—Port Arthur Garage; capital, $3,000. Incorporators: T. P. Smith, Albert Perkins and T. E. Linn.

Virginia

CLIFTON FORGE—Interstate Garage; capital, $1,000 to $5,000; motor car business. Incorporators: Eugene Mathews and L. W. Farrier, both of Clifton Forge.

DANVILLE—Crowell Auto Co.; capital, $30,000; dealer. Incorporators: A. J. Crowell, Charlotte, N. C.; A. B. Crowell.

RICHMOND—Service Sales Co.; capital, $1,000 to $10,000; motor cars. Incorporators: C. E. Rixford and E. J. Smith, both of Norfolk.

West Virginia

MANNINGTON—C. R. & J. I. Phillips; capital, $10,000; automobile dealers. Incorporators: C. R. Phillips, J. I. Phillips, Mary Phillips, Ortha Phillips, Laura McCrea, all of Mannington.

Washington

BELLINGHAM—Bay City Motor Car Co.; capital, $20,000; motor cars. Incorporators: W. A. Knight, Arthur Burgess and C. E. Abrams.

NORTH YAKIMA—Service Garage & Supply Co.; capital, $4,000. Incorporators: W. C. L. Halsey, K. M. Woods.

SPOKANE—Spokane Cycle & Auto Supply Co.; capital, $125,000. Incorporators: J. D. Alexander, H. A. McKellar and J. B. McKenzie.

Wisconsin

EAU CLAIRE—Taylor Motor Car Co.; capital, $5,000; to deal in motor cars and accessories, conduct a garage and repair shop, etc. Incorporators J. A. Taylor, F. N. Ferguson, Frank H. Stillman and Alexander McDonnell.

HORICON—Horicon Truck Co.; capital, $100,000; to manufacture commercial motor vehicles. Incorporators: Mackie Wells, B. M. Tallmadge and John A. Dietrich.

MADISON—Star Tire & Rubber Co.; capital, $5,000; general motor car supply business. Incorporators: John W. Mart, C. E. Mart and Minnie Mart.

MILWAUKEE—Edwards Motor Car Co.; capital, $10,000; to deal in motor cars. Incorporators: Frank J. Edwards, Arthur A. Mueller and Margaret Mollerus.

MILWAUKEE—Modern Stamping & Mfg. Co.; capital, $150,000; to manufacture tools, machinery, appliances and die castings, stampings, etc. Incorporators: J. P. Foley, A. C. Jorgenson and H. F. Friedrich.

MILWAUKEE—Wisconsin Garage Co.; capital, $20,000; to conduct a general motor vehicle business and operate a repair-shop and livery. Incorporators: George Ashley DeWitt, George A. Daly and Louis M. Kotecki.

MILWAUKEE—L. & H. Auto Sales Co.; capital, $10,000; deal in automobiles. Incorporators: L. E. Ehrhardt, H. E. Toelle, Benjamin Ross.

MILWAUKEE—Burgett & Co.; capital, $25,000; to deal in motor cars and operate a garage and service station. Incorporators: J. C. Coxe, W. G. Burgett and F. C. Durham.

MILWAUKEE—DeWitt-Schank Motor Sales Co.; capital, $50,000; deal in automobiles. Incorporators: G. A. DeWitt, W. G. DeWitt, E. S. Schank.

ST. CLAIRE—Taylor Motor Car Co.; capital, $5,000; to deal in automobiles and operate a garage. Incorporators: J. A. Taylor, F. N. Ferguson, F. N. Stillman, Alexander McDonald.

CHANGES IN CAPITALIZATION

District of Columbia

WASHINGTON—Matheson Motor Car Co. to Premier Motor Sales Co.

Michigan

DETROIT—Scripps-Booth Co., from $50,000 to $150,000.

Missouri

ST. LOUIS—Velie Motor Co., from $10,000 to $20,000.

Ohio

EAST PALESTINE—East Palestine Rubber Co., from $150,000 to $500,000.

NEW PHILADELPHIA—Ohio Sales Co., from $20,000 to $50,000.

Washington

WILBUR—Enterprise Garage Co.; capital, $8,000; to operate a garage. Incorporators: E. L. Farnsworth, A. Alexander, R. H. Schriber and Bernt Pedersen.

Wisconsin

RACINE—Racine Rubber Co. to $1,500,000.

Accessories for the Automobilist

COMBS Spring Tire—Presley S. Combs, Seattle, Wash., is inventor of a new type of tire, Fig. 1, that operates on a cantilever spring principle. The tire in reality is a demountable rim to which are securely fastened forty-eight springs of the cantilever type. At the ends of these springs are twenty-four blocks, faced with rubber to a thickness of one and a half inches. Two springs are attached to each block, one at each end. The weight of the car presses down on the springs, and in that matter produces the resiliency of a pneumatic, it is claimed. In addition to possessing long wearing qualities, the maker claims it is positively immune from skidding. It has been tried out on trucks and a series of tests are being made on pleasure cars.

The device is known as the Combs tire and will be manufactured by the Combs Auto Tire Company, temporary offices of which are at 2005 Alaska Building.

Revivo Storage Battery—A lead battery, Fig. 2, which uses a semi-liquid electrolyte is the Revivo, made by a new concern, the Kentucky Revivo Battery Co., Louisville, Ky.

The grids or plates are made very much as are other lead plates but the difference between this and other storage batteries consists in the formation and character of the electrolyte, which ordinarily consists of sulphuric acid in solution at about 1,280 specific gravity, while that used in the Revivo battery consists of a solution of sulphuric acid, a solution of sodium silicate and asbestos, in proportions to form a jelly, the asbestos absorbing and holding the solutions, and this is placed in the cells, filling the space between the plates completely. As its name indicates, it revives quickly and can be run down to 1.5 volts or less, it is said.

There are many points claimed for the Revivo dry storage batteries for vehicle propulsion over other types. It is claimed they will not buckle, corrode, scale, be injured by short circuit, spill or slop over, destroy wood work, be injured by heat or cold and require no attention other than recharging, and that they can be charged the same as a wet battery, used in any position, and will give full electro-motive force from the start, will stand overcharging without injury, complete discharge without injury, stand freezing, remain active if cells are broken, and show long life.

Sampson Repair Plug—Repairing punctures in tubes by mechanical means is the advantage offered by the Sampson Repair plug made by Stevens & Co., 375 Broadway, New York City. This plug differs from the ordinary brass plug in that it is made of soft rubber with a metal core to reinforce it. The soft rubber prevents chafing and cutting of the tube. The plug consists of two flat disks that are screwed together clamping the tube between them. The projecting part of the screw is then cut off with a file.

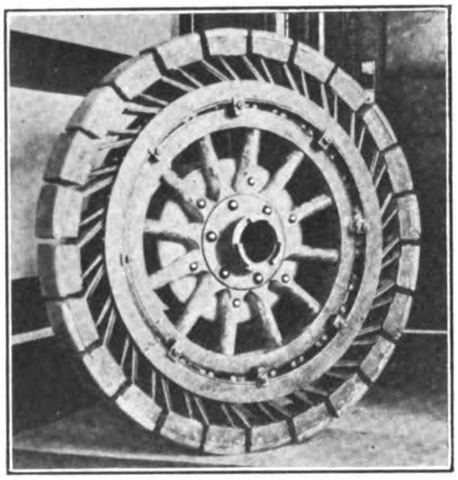


Fig. 1—Combs cantilever type spring tire

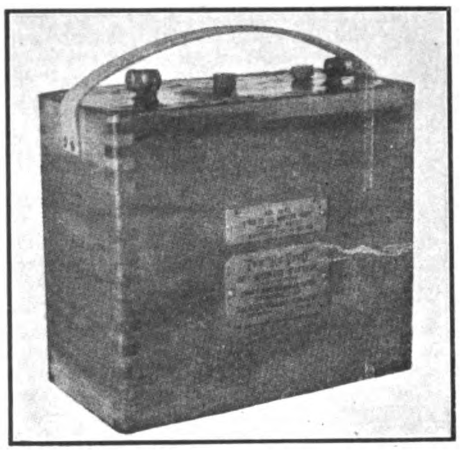


Fig. 2—Revivo storage battery

Newtype Mirror Search Light—The combination of the Newtype electric search light and a diminishing light mirror serves a double purpose in allowing the driver the use of a light where and when he wants it at night and in the day time the use of a regular mirror for seeing vehicles approaching from the rear.

Fig. 3 illustrates the mechanism of this device which comes complete with all necessary brackets and wiring attachments to the lamp so the lamp may be installed on the car in a few minutes time. The switch is in the handle of the lamp so that the driver can turn this light off and on as desired without interfering with the other lights. By wiring this lamp direct to the battery an emergency lamp is made which can be used in case the other lights go out from wire trouble and fuses blowing out.

This lamp is manufactured by the Wood Mfg. Co., Fairfield, Conn.

Dover Emergency Gasoline Tank—A one-gallon tank for storing gasoline for emergency use is made by the Dover Stamping & Mfg. Co., Cambridge, Mass. It measures 8.5 by 3 by 12 inches, is made of steel and is protected by a wood casing. The price is $1.

Rotobrush—This device consists of a high-speed revolving brush propelled by a water-motor. The brush is flooded with water and therefore it will quickly remove dirt from any surface. The Rotobrush is made of aluminum and sells for $10. It is manufactured by the Edgar Mfg. Co., 104 Hanover street, Boston, Mass.

Safeguard Mechanical Hand Horn—A hand-operated horn for $5 is made by the Duplex Electric Mfg. Co., Pittsburgh, Pa. It is enameled black and it is stated that all metal parts are made from fine heat-treated tool steel and the diaphragm from a fine grade of Swedish metal.

Keep Kool Ventilator—The Gahm Mfg. Co., Streator, Ill., has brought out a ventilator for Ford cars that allows the lower end of the windshield to be moved back so that a current of air may be supplied to the front compartment. The ventilator is easily attachable and is made in triangular shape, which makes it sufficiently strong and rigid for the most exacting service.

The adjustments can be slid forward and backward from the dashboard without loosening the adjustment which holds the windshield, so that there is no danger of the windshield slipping out of adjustment.

Freeman Self-Filling Grease Gun—A grease gun which may be simply and easily filled in a few seconds without soiling the hands is made by the Elmar Mfg. Co., Alameda, Cal.

To fill the gun, the nozzle cap is swung open and held back with the lever. Then the piston rod is drawn out its full length and while held here the handle is turned to the right until the piston rod engages the inner tube. The piston rod is pushed in again and the slotted inner tube will extend from the barrel. Then the inner tube is imbedded in the grease its full length. Turn the entire gun to the right to cut out the load. Then the filled inner tube is drawn back into the barrel by

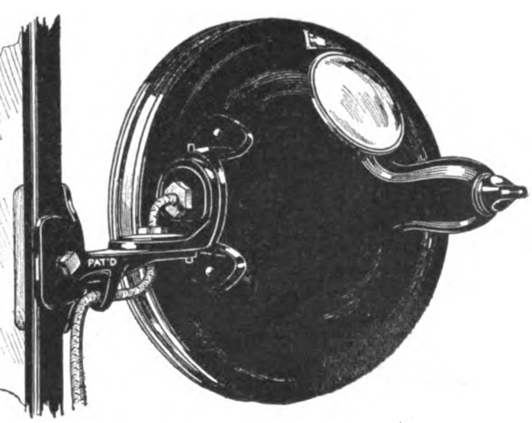


Fig. 3—Newtype mirror searchlight

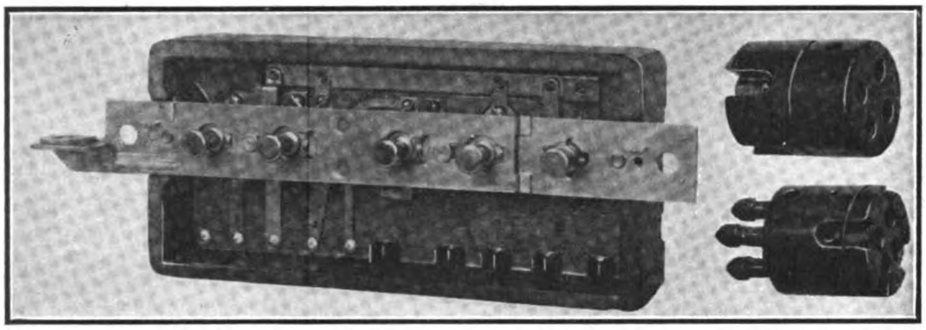


Fig. 4—Thermoplax and Pyroplax insulating materials to resist high temperatures

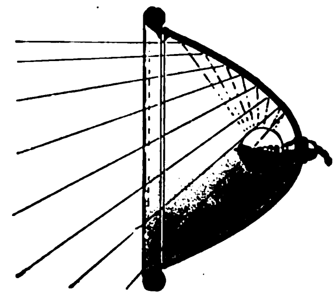


Fig. 5—Hick-Meyer deflector

pulling the piston rod out again. The nozzle cap is then closed.

The price is $2.

Hick-Meyer Deflector—A new non-glare headlight, Fig. 5, is made by the Hick-Meyer Deflector Co., Toledo, O., in which the light rays are never more than 4 feet above the ground. The light is more intense than can be produced by an ordinary lamp, it is claimed, for the reason that all the light is deflected forward and downward.

The deflector is made of special steel, shaped to fit snugly on the lower half of the light bulb, and has a mirror polish inside.

This has the effect of throwing all the light rays against the upper half of the lamp's parabolic reflector, from which they are sent forward and downward, in a safe and highly serviceable manner.

To the oncoming driver a lamp thus equipped has no glaring rays. The upper half seems well, but not dangerously illuminated while the lower half has only a faint glow.

Perfect Starter—The Perfect Starter, Fig. 6, is a one-unit device made in two sizes which operates as a motor or compressor and is placed under the hood. It is a four-cylinder machine with the cylinders arraigned V-shape. As a two-stage air compressor it will provide air at 300 pounds. The complete device is very simple; there is but one shut off valve in the entire system. The seat of this valve is of special design and it is stated, will not leak even after long service.

The small starter is 8.75 by 7.63 by 4.06 inches and it weighs 55 pounds with complete equipment. It is designed for the average car. For exceptionally large motors a starter weighing 75 pounds and measuring 11 by 9.38 by 5.13 inches is used.

The Perfect starter is made by the Motor-Compressor Co., 30 Halsey street, Newark, N. J.

Accessories for the Trade

GISHOLT Periodograph — This instrument automatically keeps track of each workman's time. It consists of a master clock, a panel board for the tickets and registers throughout the shop conveniently located, for the workmen to record the time on the job. In recording his time the workman simply puts his card into a slot in the nearest register and pulls a lever once. The time spent on each job is automatically recorded. The Periodograph does not operate during lunch hour or after hours, therefore only the actual working time is taken account of.

The instrument takes its name from the principle upon which the records are made. A unit of time, usually one-tenth

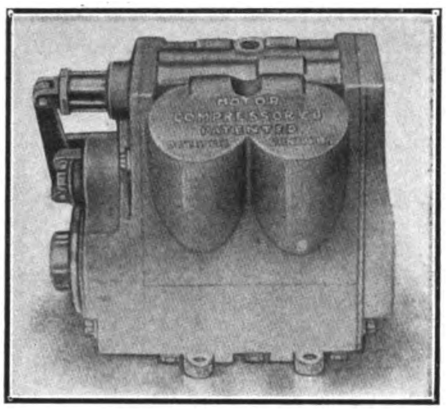


Fig. 6—Perfect starter and air-compressor with V cylinders

of an hour, is called a period, although the unit may be any fraction of an hour. These units are numbered or counted continuously throughout the working hours of the day, week or month, as desired. Distinctive overtime records are provided.

It is made by the Gisholt Machine Co., Madison, Wis.

Thermoplax and Pyroplax—Two composition insulation materials, Fig. 4, for electrical insulating work are made by the Cutler-Hammer Mfg. Co., Milwaukee, Wis.

Thermoplax is a black molded composition insulation which will resist heat up to 600 degrees Fahrenheit, and it is stated, will not warp, shrink, expand or soften when subjected to temperatures ranging from 30 degrees below zero to 600. It has a dielectric strength of 70 volts per mil and a cross-breaking strength of 1,100 pounds per square inch. It can be highly polished and may be moulded into any shape without difficulty.

Pyroplax has the same general characteristics but will resist temperatures up to 1,000, has a cross-breaking strength of 1,400 pounds and a dielectric strength of 60 volts per mil. It is made in two grades, white or plain, where intense heat is to be encountered, and brown or impregnated where a water-proof material is required.

Esterline Battery Charger—The Esterline company has perfected a dynamo, Fig. 7, suitable for charging both 6 and 12-volt batteries. The outfit is made up as nearly automatic as possible, so that it requires no attention on the part of the operator other than connecting up of the batteries and disconnecting them when they have been fully charged.

The dynamo is fitted with a pulley suitable for belting to a line shafting on an electric motor. It is fully enclosed to keep out dust and dirt and is fitted with ball bearings of large size running in oil.

The dynamos are furnished in two capacities, rated at 12 and 18 amperes respectively.

The switchboard is fitted with a zero center, nickel plated ammeter for showing the charging current; and an automatic switch for connecting the batteries to the generator and for immediately disconnecting them in case the generator should for any reason be shut down. Provision is also made on the board for connecting four batteries to the dynamo at one time.

The switchboard is 10 by 20 inches and is made for mounting on or near the wall. All permanent connections are made in the rear of the board and the battery connections on the front.

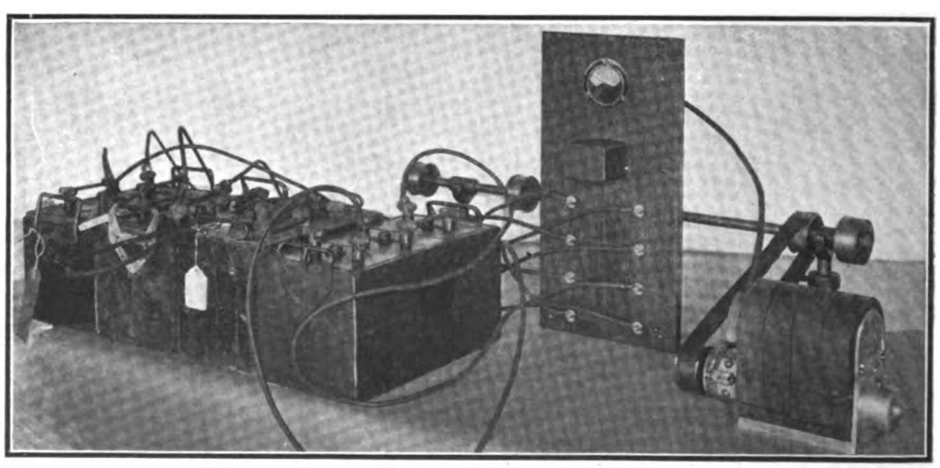


Fig. 7—Esterline charging generator suitable for charging 6 and 12-volt batteries. The generator is driven from a motor by a belt

The Automobile
NEW YORK SHOW ISSUE

1915—A 7-League Stride

Eight-Cylinder Motors—Sixes for Less Than $800—Vacuum Feed—Spiral Bevel Gears —Better Equipment—The Year's Milestones

SIXES for less than $800; eight-cylinder motors; block-cast, unit power plants; high stroke-bore ratios; spiral-bevel drive; vacuum-feed; cantilever springs; lower weights; smaller tire and maintenance expense are the giant strides in the automobile industry during 1914.

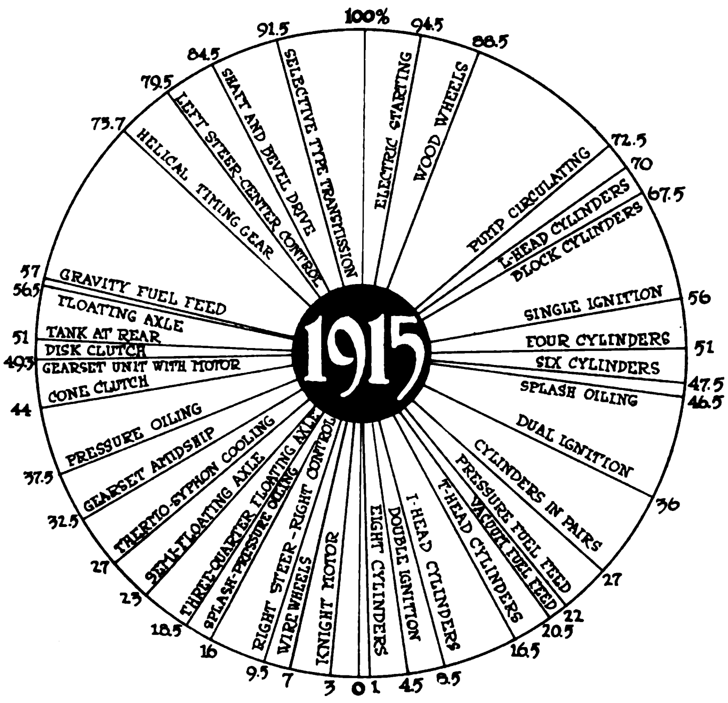
Cars are lower priced. A year ago the cheapest six was $1,500, now it is $750—a 50 per cent. reduction.

With the reduction in weight have come longer, lower lines. Cleanness of design has been typified in the rush to the standards of block design. Although S. A. E. horsepowers on the average are reduced, the growth of the high-speed, high-efficiency design has put our motors on a higher plane than ever before.

Better equipment is offered at the lower price. The average car of today sells for $2,005; lower than at any time in the history of the industry. Yet the car of today is more comfortable, easier riding and has far more to offer in the way of comforts for its passengers than ever before. The one-person top, cord tires, fine dash equipment, better control features, motor-driven tire pumps, and luxurious upholstery even on cars selling for below $1,000 are noteworthy features in development.

Bodies are handsomer. The clean moulded lines have developed during the year. Side lamps have been eliminated; battery boxes taken from the running boards. The introduction of vacuum feed and the removal of the tank from below the front seat has permitted lower lines. Prominent makers have increased the drop in the frames, heightening this effect. Electric starting and lighting is used on cars costing as low as $600.

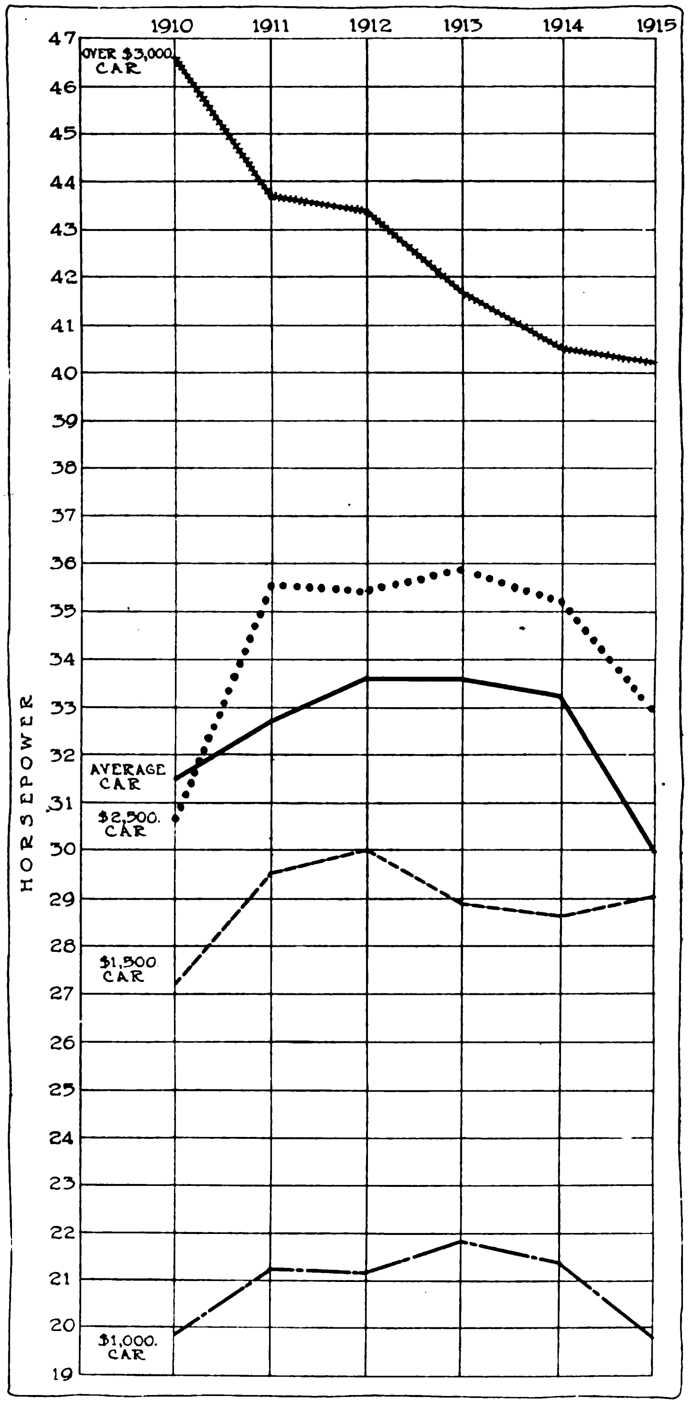
In numbers our automobile manufacturers are fewer than they were a year ago, and in fact the numbers have been annually growing fewer ever since 1911. We have now listed 119 manufacturers as against 133 in January 1914, 156 in 1913, 193 in 1912, 270 in 1911, and 239 in 1910. The year of 1911 was the zenith in the number of manufacturers.



THE 1915 CYCLE OF PROGRESS IN DESIGN
Nearly half our cars are sixes; 70 per cent. have L-head cylinders; 67.5 per cent. have the cylinders cast in block; vacuum fuel feed, unused a year ago, is now fitted on 20.5 per cent. of the cars; left steer and center control is used on 79.5 per cent., and helical timing gears on 73.7 per cent.

Fewer Chassis Models

The number of chassis models has had its rise and fall in the same proportion. In 1910 there were 364 chassis, in 1911, 393; in 1912, 381 and in the remaining 3 years to January, 1915, 339, 236 200. Although there are but 200 chassis offered by the manufacturers, there are 535 cars, an average of more than 2.5 car models to the chassis. The number of cars offered a year ago was 607. These cover all types of body and offer a broad choice



HORSEPOWER TRENDS FOR 5 YEARS

The average horsepower is lower now than a year ago. In the car at over $3,000 it has descended steadily. In the $2,500 car it has zigzagged for 5 years and similarly in the other price classes. It is now lower in every class except that of the $1,500 car

to the purchaser in size, price and important specifications.

Fifty-eight of our makers are listing but one chassis. In these, twenty-seven are selling cars below $1,250, twelve are selling cars between $1,250 and $1,999, eleven from $2,000 to $2,999 and eight at more than $3,000. These four price classifications cover the range of cars and, since the selling price must govern the allowable cost of manufacture, and hence, the whole groundwork of engineering design, it is purposed to study the trends in each of these classes independently. For convenience, we will call them the $1,000, $1,500, $2,500 and $4,000 cars.

Two reasons may be given for the increase in wheelbase length during the past year. The principal one is the increase in sixes. These, which have grown remarkable in numbers in the $1,500 class are universally longer than the fours which they have replaced. In other instances a longer wheelbase has been taken up in the body. The biggest increase was made by Hupmobile which is now 13 inches longer; the greater length being required by the larger motor and roomier body. Several other makers have increased the wheelbases 1 to 2 inches, the added space going into the body.

Wheelbase Has Increased

We have wavered between 121 and 122 inches alternately since 1912. In 1911 the average wheelbase was 114 inches and in 1910, 112 inches. The years of the biggest change in wheelbase were between 1910 and 1912 as in these 2 years it increased 9 inches, whereas, since that time it has only varied within the limits of 1 inch. The general average of all chassis is 122.2 inches, in 1914 it was 121 inches, for 1913 it was 122, the same as for 1915, and in 1912 it was the same as for the 1914 season.

The $1,000 car is only .37-inch longer than it was in 1914, but between 1913 and 1914 there was a gain of 4 inches; between 1912 and 1913 there was a loss of 1 inch. Thus in the low-priced cars also we find the years of doubt in length to be from 1912 to 1915, when the wavering of figures was between 103 and 107. As in the general average, the upward trend in wheelbase was in 1910 to 1912, when it rose from 96 to 104 inches.

The wheelbase of the $1,500 car has increased steadily during the last five years, reaching its highest point in 1915, 121.6 inches or a gain of 3 inches over 1914. From 1910 the growth of wheelbase was steady until last year when it was .5 inch less than in 1913. The figures are: 1910, 109 inches; 1911, 114 inches; 1912, 116 inches; 1913, 119 inches; and 1914, 118.5 inches.

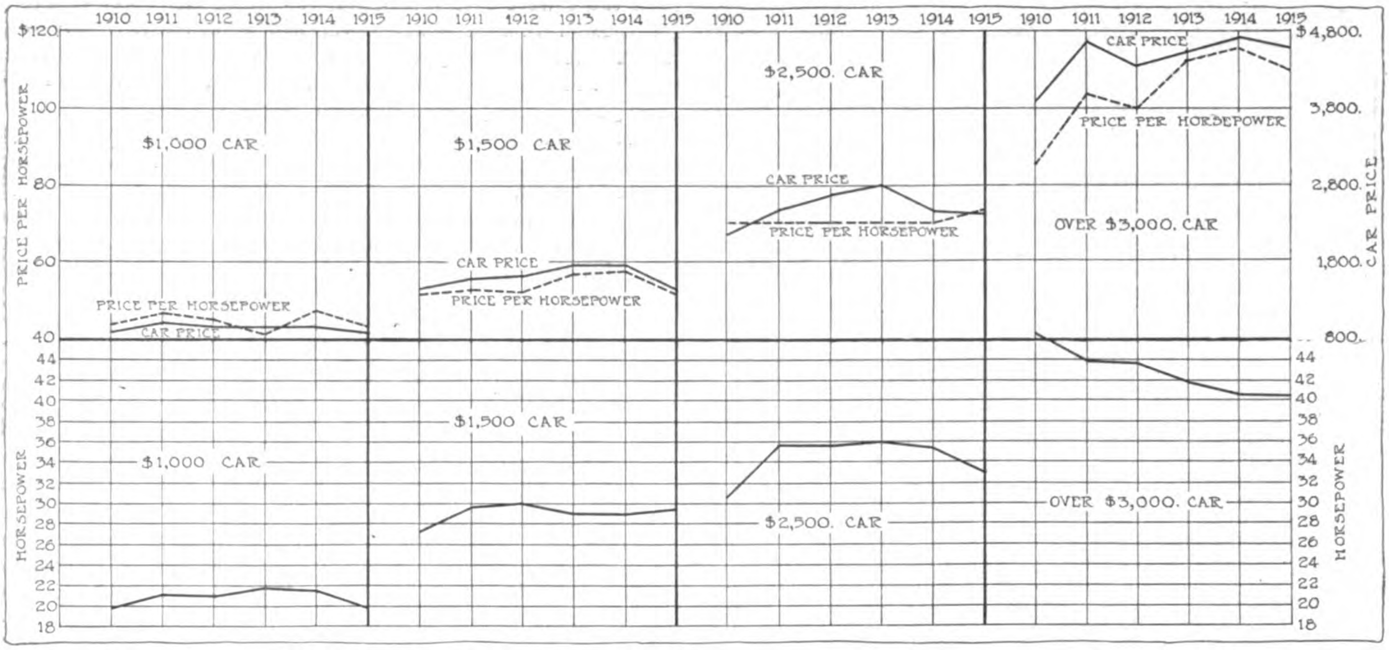
In analyzing the wheelbase trends in the $2,500 car during the past 5 years there have been two pronounced periods of lengthening, first when the average increased 6 inches between 1910 and 1911 and again between 1912 and 1913 when 7 inches were added. The first increase was due to the general movement to build longer cars for riding comfort and the second between 1912 and 1913 was due entirely to the six-cylinder movement. The increase from year to year is shown in the following figures: 1910, 113 inches; 1911, 119 inches; 1912, 120 inches; 1913, 127 inches; 1914, 125.8 inches; and 1915, 126.6 inches.

The wheelbase of the average car listing at over $3,000 has increased steadily for 5 years, jumping from an average of 124 inches in 1910 to 133.2 for 1915. In this period there has only been one perceptible increase, 5 inches, between 1911 and 1912, and since then it has steadily climbed up 1 inch per year. The 5-inch jump was due to the six-cylinder movement which in that year grew from practically zero to 44 per cent.

Tires Are Smaller

The increase in economy of the chassis while at the same time an increase in length has been made, indicates that steps must have been taken to lighten the weight and simplify the component parts. That this is so, is shown alone in the tire size, which is this season smaller than at any other time since 1911. It is now in the 1915 car 34 by 4 on the average chassis. For 1914 and 1913 the average tire size was 35 by 4.5. In 1912 it was 35 by 4. The tire size for 1910 and 1911 was 34 by 4 so that now we have come back to the tire size of 5 years ago. This was the day before the manufacturer fully equipped his car and it would now seem if unit tire weights are the same, that the added weight of electric equipment and the other comfort features throughout has been compensated for by the development of the other parts of the chassis.

Big changes in motor design have been made during 1914. Block castings have jumped to supremacy, sixes have still continued to gain, stroke-bore ratios have increased, L-head cylinders are now well in the lead, and bores are smaller and



CAR PRICE AND ITS RELATION TO HORSEPOWER

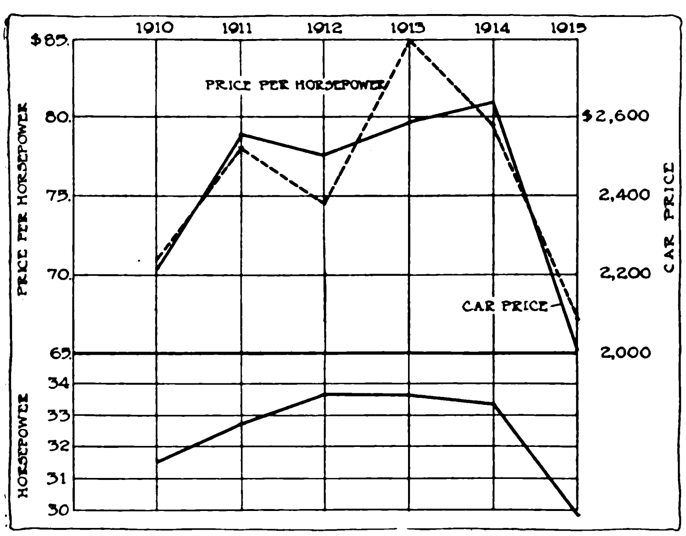
The price per horsepower in every class has been an uncertain factor for the last 5 years. Up to 1914 the trend was generally upward, the reason being that each year makers were compelled to charge more for the equipment that they added. For 1915 this has undergone a change, and now the unit price is lower than a year ago

strokes about the same length. In the motor auxiliaries mountings have been simplified, adjustment points are more accessible, carbureters are higher.

In the motor systems: cooling, ignition, lubrication and cranking, many detail improvements may be noted. Thermo-syphon is on the increase, pump circulation has dropped due tc the influx of low-priced cars using thermo-syphon. Air-cooling is only used by Franklin. The single ignition system is rapidly ascending the scale of popularity, displacing the dual. Pressure oiling is growing with the use of the high-speed motor and electric cranking and lighting systems are lighter, more efficiently connected, simpler and have better electrical characteristics than a year ago.

Average Horsepower Less

While chassis have universally been increasing in length since 1910, motor sizes have risen to their highest point in the years of 1912 and 1913 and are now on the descending scale.



PRICE DEFLECTION AND HORSEPOWER

Car selling price reached its zenith in 1914, after a steady upward trend since 1910, and yet the drop on the average car has been so great during the past year that for 1915 the average selling price is lower than at any time in the last 5 years

The trends of motor design are discussed under a separate head, but what manufacturers of cars are doing in a general way should be mentioned here.

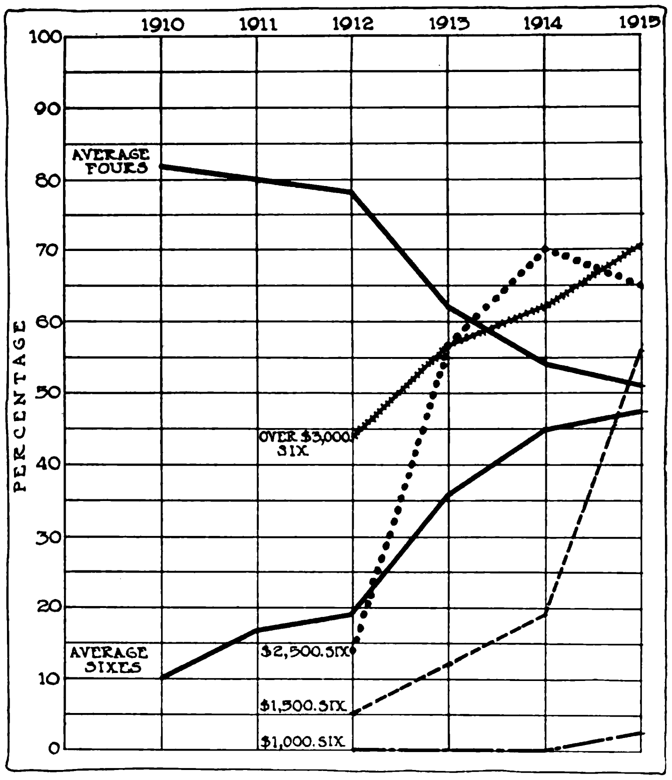
The highest average horsepower reached by all manufacturers is 33.6 and these figures held good for the years of 1912 and 1913. In the 2 years since then, it has fallen to 33.2 in 1914 and 29.97 for 1915. It would be expected that since the prices of cars are on the whole lower, the average horsepower of the cheaper cars would be more, but the contrary is true, and the only car which has risen in horsepower is that in the $1,500 class.

Horsepower figures for the $1,000 car show a rise from 1910 to 1913 of from 19.85 to 21.86; in 1914 the figure was 21.4 and in 1915 the drop has been accentuated by a fall to 19.78. In this price class the drop can be accounted for by the addition of the miniature car. A year ago, there were many cyclecars. These have passed and in their place we find the development of another class of car which may be known as the miniature. It is replete with many of the comfort features of the larger cars but it is small in size and has a motor with a bore which is in such examples as the Saxon six, the Grant six and in fours made by these two concerns and others such as Scripps-Booth, Remington, Rayfield, and Vixen under 3 inches. The examples of the two sixes, the Grant at $750 and the Saxon at $785, mark the commencement of a new era in motor characteristics in cars of this price.

Cars of $1,500 have an average of 29.01 S. A. E. horsepower for 1915 as compared to 28.6 for 1914. The reason is in the large increase in sixes in this price class. The highest point in horsepower in cars of this class was in 1912 when it was above 30, being 30.01. This was the culmination of a rise from 27.20 in 1910 to 29.53 in 1911.

In the $4,000 price class there has been practically no horsepower variation for 1914 and 1915. These figures being resepctively 40.50 and 40.22. Unlike in any other price class, the highest horsepower was in 1910 and since that time the curve of S. A. E. horsepower has shown a steady downward tendency, losing a little each year as will be noted from the chart.

The coming season marks the introduction of the six into the low-price field and Grant and Saxon are the pioneers. On the whole the six has gained ground, having risen from 45



NUMBER OF CYLINDERS

The six has been gaining ground steadily since 1910. The four has correspondingly fallen off in percentage and the curves are practically complementary. In the price classes the six has risen everywhere, being now even in the $1,000 class

per cent. in 1914 to 47.5 in 1915. The gains of the six through the various years will be discussed under motors, but in the different priced classes it may be mentioned here that it has gained everywhere except in cars selling for $2,500. The gain in the $1,500 class has been most marked. In 1914, but 19 per cent. of $1,500 cars were sixes, now more than half or a percentage of 55 are sixes. In 1912 the six was introduced into the $1,500-class in the same way that the six is now being introduced into the $1,000 class. It made its entrance with 5 per cent. and in 1913 this had risen to 12. Another 7 per cent. was gained in 1914, bringing it up to 19 per cent. This year has come the landslide and now there are but 40.2 per cent. which are fours and in addition to this the entering wedge of the eight has appeared. The eights are in the number of 4.1 per cent.

A drop of 5 per cent. in sixes has occurred from 1914 to 1915 in the $2,500 class. In 1914, 70 per cent. of all the $2,500 cars were sixes and 30 per cent. fours. This year the 1915 season opens with 65 per cent. sixes, 33.3 per cent. fours, and 1.7 per cent. eights. The drop in percentage of sixes in the $2,500 class is not due to a drop in popularity of the six, because if that were so it would be shown in the average figures for all classes. The number of makers of $2,500 cars, however, has dropped from 60 to 42 and as will be noted in the examples mentioned under the head of motors, a large number of the concerns which have been eliminated were manufacturers of sixes in this class.

Fewer Expensive Cars

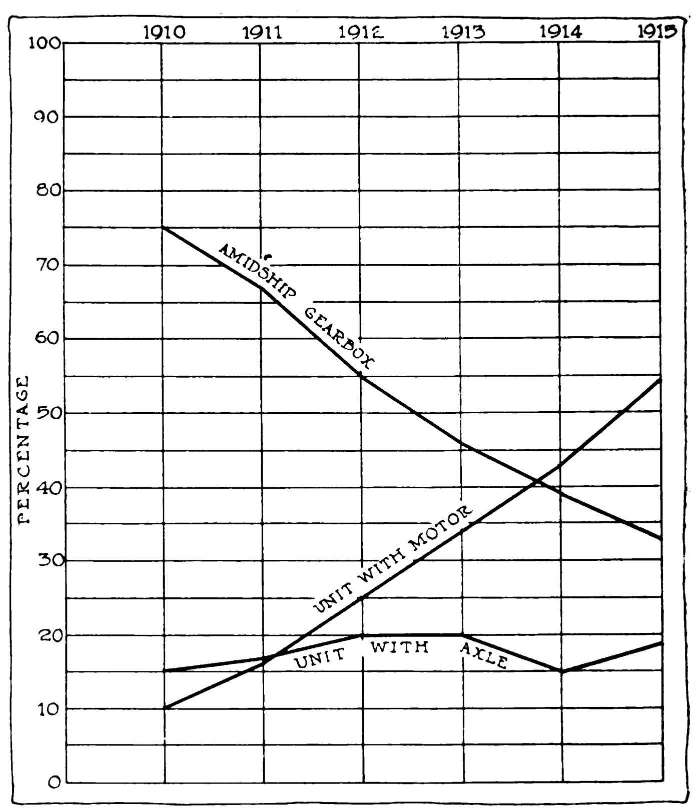
Among makers of expensive cars, the falling off in numbers has been greater than any other, but in spite of this the percentage of sixes has grown. It must be remembered that a large proportion of the cars listed in this price class are on chassis which would sell in a lower-priced class were they fitted with touring or roadster bodies. Sixes are used on 70.5 per cent. of the $4,000 cars. The rise since 1912 has been continued. In that year there were 44 per cent. using the six, in 1913 there were 57 and in 1914, 62. Thus the curve of sixes for cars of this class has never had a depression since the introduction of this type of motor. The eight is also in this class when equipped with the inclosed types of bodies. Percentage is not important however, being but 1.5.

Developments in the entire drive system do not show any radical change in the types of units used. The percentage of disk clutches is the same now as it was in 1911 and very little change has taken place during this lapse of time. The same may be said of cone clutches and working back through the gearbox, driveshaft and final drive, it is only in the rear axle and suspension that the changes are of great enough degree to attract more than passing attention. Yet throughout the entire transmission system, gains in efficiency have been made.

Disk Clutch in Majority

Only in 1 year, 1912, was the majority of cars equipped with a cone clutch, but the percentage of cone as compared with disk has always been close. In 1912 52 per cent. were equipped with cone clutches and 44 per cent. had disks. In 1915, 51 per cent. have disks and 44 per cent. cones. The difference between these figures and 100 per cent. is made up by the small percentage that use the expanding and contracting band type or that have no clutch at all, such as the Cartercar, Lambert and Metz with friction drive or the Owen with its electro-magnetic transmission.

Clutches in themselves have been improved. It must be remembered that the broad classification of disk clutches includes many minor types that differ quite widely in their use. The disk-in-oil with its many plates is not like the dry-plate type with its fewer plates or like the three-plate type which is clearly described by its name. The dry-plate clutch has gained in percentage over the disk-in-oil since 1910, but during the last 2 years has remained nearly stationary. Improvements in the engaging springs, making them gradual



GEARBOX LOCATION

Unit power plants have gone up steadily and amidship gearboxes have dropped steadily since 1910. The other classification, that of the axle unit, has zigzagged between 15 and 20 per cent. during the 5 years and yet eliminating slip which was the early enemy of the disk-in-oil clutch, have been consummated during the past 3 years. There has been a tendency towards dividing the clutch spring into three parts, making a more uniform distribution of the spring load.

Little Change in Cones

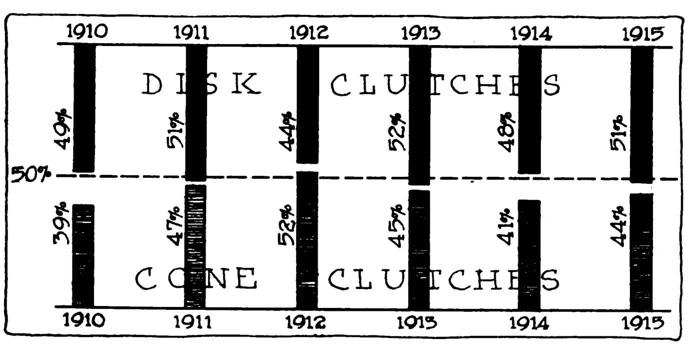
In cone clutches little change has been made during the year and where it has been made it is in the direction of easy engagement or accessibility. Marmon, for instance, has introduced the circular disk spring beneath leather, and Empire has improved the assembly so that the average driver may adjust the tension on the clutch spring without trouble. Diameters of clutch cones have not changed on the average installation, but the faces are inclined to be slightly wider, giving a greater bearing surface for the leather. The pressed steel cone is in the ascendancy. Cadillac has changed from cone to disk and McFarlan from disk to cone.

The expanding band clutch has fallen off since 1914, but the difference in percentage is very slight being .5 as compared to 3 per cent. Peerless continues to use it on one model and is the last remaining devotee of this design. The contracting band is still used on 4.5 per cent. and has lost but .5 per cent. since 1914, when it was higher than at any time of which there is previous record. In 1910 3 per cent. used contracting-band clutches and 6 per cent. used the expanding band. Percentage of contracting-band dropped to 1 per cent. for 1911 and 1912 and 2 per cent. in 1913. The makers who employ the contracting-band clutch are Apperson and Haynes.

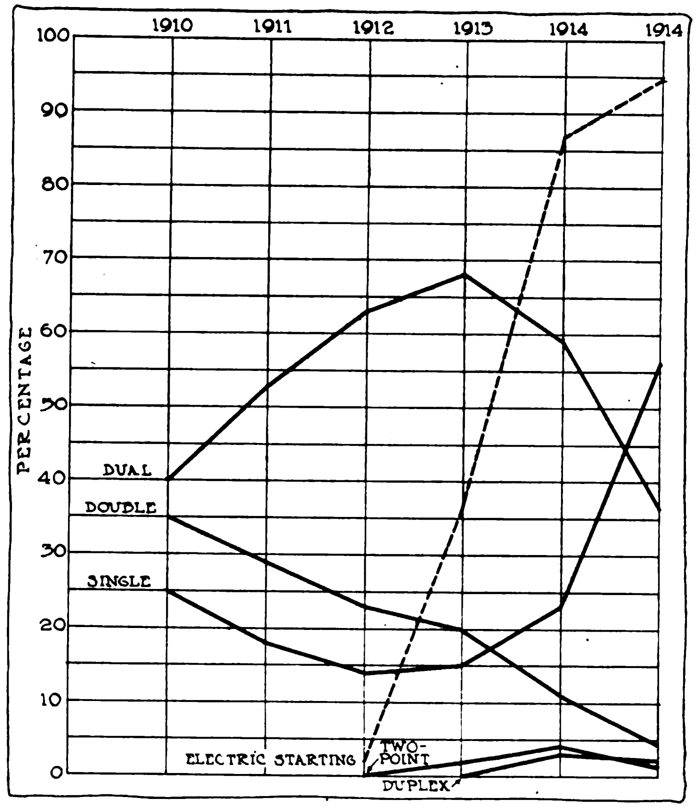
Center Control Aids Simplicity

In gearset design no radical changes can be said to have been made during the past year. With the introduction of center control on the large percentage of our cars it has been possible to greatly simplify the linkage which connects the gearshifting lever to the gearbox. On center control cars it is now common practice to mount this lever directly on the gearbox cover and thus avoid the bell cranks and shafts which were necessary with the side levers. Gear faces are almost universally wider, although the material in the gearbox has improved. This combination of wider toothfaces and better material has had a great effect on the increase of life of the gearbox. It has also tended to make it noiseless. The throw of the gearshifter lever in making changes, is less than it was. This is due to shorter shafts in the gearbox to secure the maximum stiffness and to avoid changes in alignment.

The location of the gearbox is an interesting study. Ever since 1910 the percentage of those using the amidship location has steadily decreased and the chart indicates that this decrease has been practically uniform. Starting with a record of 75 per cent. of all the installations in 1910, the drops during the succeeding years have been to 67, 55, 46, 39 until 1915 when it is 32.5. In almost inverse ratio the unit power



DISK AND CONE CLUTCHES
The fight for supremacy between the disk and cone clutch has resulted in a practical deadlock since 1910. As will be noted from the curve, cone clutches were over the 50 per cent. line but once, whereas disk clutches have passed it three times



IGNITION FLUCTUATIONS
Dual ignition was gaining ground until 1913, when the rapid introduction of electric starting caused the falling off of its progress and the growth of the single system

plant has been increasing; whereas, in 1910 it was only used in 10 per cent., it has steadily increased until in 1915 the figure is 49.3 per cent. In 1911 it was 16; in 1912, 25.

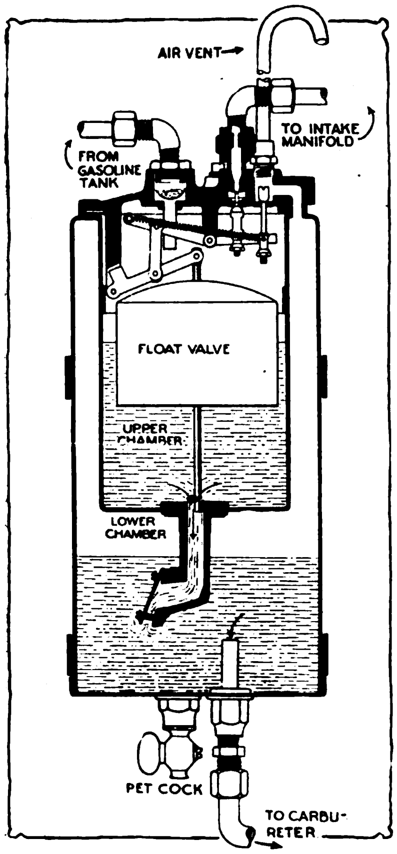
The percentage of cars using the gearbox in a unit with the axle has not varied much in the past 5 years. In 1910 it was 15 per cent. and in 1915 it is 18.2 per cent. In the interim it has been up as high as 20 per cent. which position it held for the years of 1912 and 1913, but in 1914 it was at its lowest since 1910, being 15 per cent. In other words it is again on its way towards a more popular position, having gained 3.2 per cent. during the past year. This is due in part to the discontinuance of a few concerns that used other gearboxes and also to its adoption by Chalmers, Mitchell, Saxon, Trumbull, Twombly and Vixen. On the other hand Maxwell, Studebaker and Velie have abandoned it.

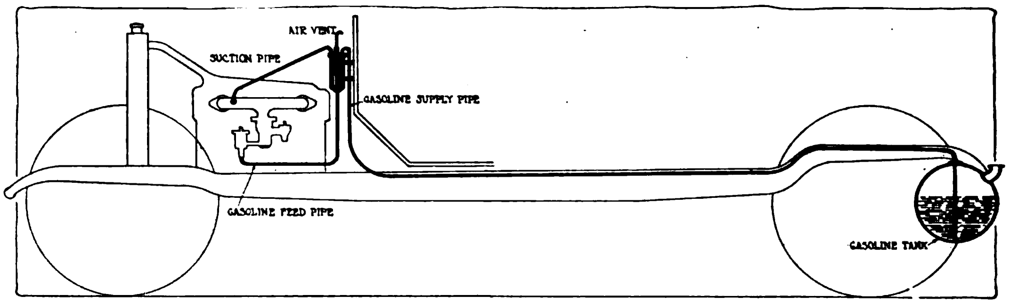
Unit Power Plant Gains

There is no doubt that the unit power plant and the block-cast motor which has gained substantially in popularity during the past year are complementary effects of the same trend. Three-point suspension is another effect of making the entire motor in one single unit in conjunction with the housing for the gearbox and clutch. This use of a flexible support which is independent of frame stresses finds favor on 90 per cent. of the block-cast motors.

Four-speed gearboxes reached their highest percentage in 1914. In this year 29.5 per cent. were so equipped. For 1915 the percentage has dropped to 23.5, a loss of 6 per cent. of the installations, giving a corresponding gain for the three-speed of 7 per cent. Those who have abandoned the four-speed gearbox during the year are Austin, Cameron, Interstate, Kline, Moon and Rayfield. In addition several who used it are now out of business, for example, American, Correja and Vaughan. Friction drive and two-speed gearboxes have lost ground. This is in line with a steady development of trend since 1910.

Floating axles, while not as popular as 2 years ago are still





VACUUM FUEL FEED SYSTEM

Vacuum feed is one of the infant prodigies of the past year, having grown from an unrecognized factor in 1914 to more than 20 per cent. for 1915. Its introduction has caused a marked rearrangement in tank locations

used on more chassis than all other types together. The curve of popularity has had a rise and fall. Starting in 1912 with 50 per cent., the figure for 1913 was 67 per cent., for 1914, 65 per cent. and for 1915, 56.5 per cent. The high spot was 1913. The reason for the falling off in popularity of the floating axle is in the introduction of a large number of low-price cars. The floating construction is more expensive to manufacture and the lower-priced cars as a rule use the other designs.

Semi-floating axles have decreased in popularity steadily since 1912, having traveled down the scale from 49 per cent. to 23 per cent. The percentages year by year were: 1912, 49; 1913, 26; 1914, 17 and 1915, 23.

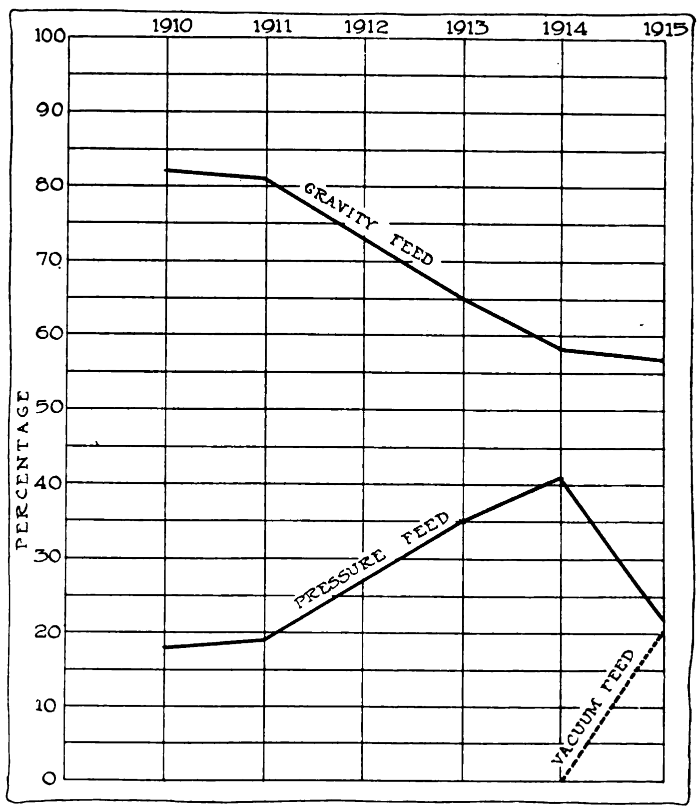
Three-Quarter Floating Axle Coming

The three-quarter floating axle has grown in favor from 4 per cent. in 1913, when it was introduced, to 18.5 per cent. in 1915. It has found favor on the medium-price cars because it offers the desired amount of bearing surface for the rear wheels, is accessible and at the same time is cheaper to manufacture than the floating design.

With alterations in axle design, a change has begun to make itself felt in the arrangement of the final drive. The spiral bevel rear axle has increased from 1 per cent. in 1914 to 9.5 per cent. in 1915. Worm drive has increased from 1 to 1.5 per cent. and chain drive from 4 to 4.5 per cent. These upward trends have cut into the numbers of those using the orthodox shaft and bevel with the result that in place of the 93 per cent. of makers who had cars so driven in 1914, only 84.5 per cent. have the bevel drive for 1915.

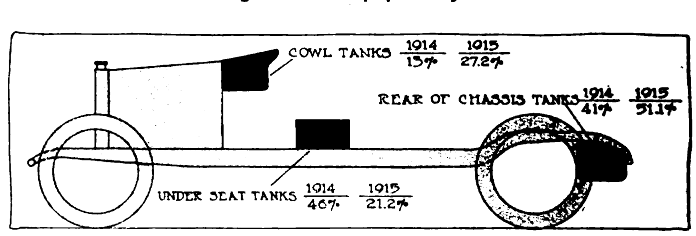
Spiral-Bevel a New Factor

Following Packards lead of a year ago the spiral-bevel drive has met with immediate favor. It has been now adopted by concerns such as Hudson, Cadillac, Reo, Speedwell, Marmon, Jeffery, Winton, Peerless, Stearns, Singer, Crawford, Cunningham, Dorris, Franklin and Kline. The difference in efficiency between the spiral-bevel and the straight bevel gear is so small that none of the makers who have adopted it think the power sacrificed to gain silence is sufficient to even reckon among the serious power losses in the car. Some state that the spiral-bevel is about 2 per cent. less efficient than the straight bevel under loads ranging from 8 to 45 horsepower. In addition to the silence, another advantage which is claimed for the spiral gear is that it does not require as careful handling in the matter of adjustments. In other words an adjustment which would be very bad in the straight bevel type would be perfectly quiet in the helical, due to the gradual engagement of the teeth as compared with the shock engagement with the straight bevel. On the whole, tests show that the helical bevel is just as efficient under all conditions as the straight bevel. The reason that the helical gear is an improvement is that in the straight tooth bevel gear any given tooth goes into or out of mesh at one time along its entire length. In the spiral-bevel the meshing starts



FUEL FEED SYSTEMS

Gravity feed has lost ground since 1910. Pressure gained since 1910 in the same proportion until the introduction of vacuum feed in 1914 caused a falling off in its popularity



TANK LOCATION ARRANGEMENTS

Vacuum feed is responsible for the changes in tank location. To show its effect the figures for 1914 and 1915 are given in the diagram above at one end of the given tooth and gradually moves toward the other end and the unmeshing does the same. There are at least two helical teeth in partial mesh all the time.

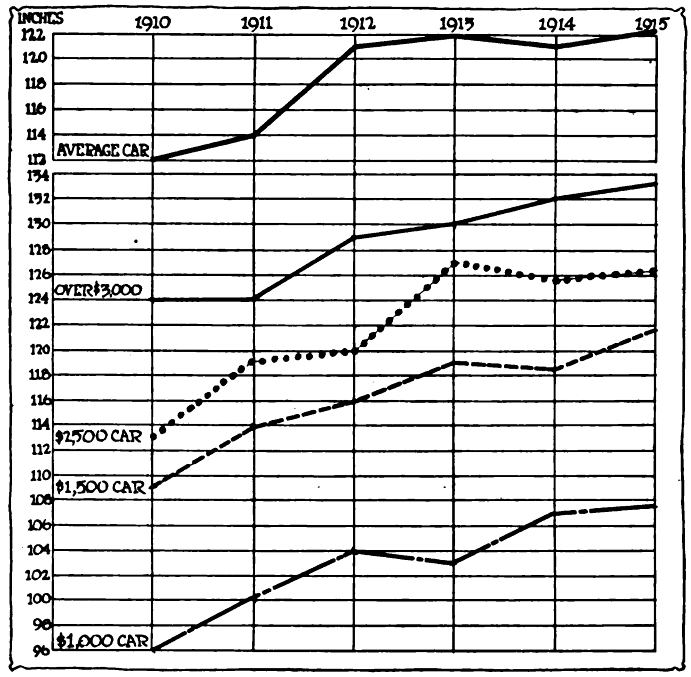
The problems of body room and clearance brought up by the overhead and under worm are not met with in the spiral-bevel, which takes up no more room than the straight bevel.

Outside of the axle construction of the rear system the materials employed have also, especially on the higher-priced cars, undergone a change for the better. The cars for 1915 are using more vanadium and chrome-nickel steel in the gears, not only in the gearset but in the differential, than any previous years. Nickel-steel shafts for the main drive and for the axles are also stronger than ever before, giving the car greater life. Broader bearing and tooth surfaces are also universal. Tubular drive shafts are now used on many cars; for example: Velie, Jeffery, Oakland, Hudson, Pierce, Peerless, Winton, Cunningham, Stearns, Dorris, Lexington, Moyer and Premier. Nearly all these are new.

Fifty-two Have Spring Drive

The method of taking the propulsion of the car and its suspension have changed together. Fifty-two manufacturers making ninety-five chassis drive through the spring. This is a percentage of 48. Following this in popularity in the manner of taking the drive is the torque tube which is used on 26 per cent. Radius rods take the drive in 26 per cent. and the torque arm in 6 per cent. Eighteen manufacturers, or 15

(*Continued on page* 1270)



VARIATIONS IN WHEELBASE LENGTH
Wheelbases have increased almost uniformly in every price class. In the average car they are 122 inches for 1915

Comparison of Features of the Average American Car for 5 Years

General Averages	1915	1914	1913	1912	1911	1910
Horsepower, S. A. E. rating	29.97	33.2	33.60	33.60	32.7	31.5
Bore	3.82	4.12	4.19	4.34	4.42	4.85
Stroke	5.10	5.28	5.15	4.97	4.46	4.68
Stroke-bore ratio	1.33	1.28-1	1.23-1	1.09-1	1.01-1	1.03-1
Piston displacement	307.38	349	345	316.2	313.2	281.5
Wheelbase	120.89	121	122	121	114	112
Gear ratio	3.88-1	3.6-1	3.57-1	3.62-1	....	....
Tires	34x4	35x4½	35x4½	35x4	34x4	34x4
Number cars	535	607	....	....	....	....
Number chassis	200	236	339	381	393	364
Number makes	119	133	156	193	270	239
Price	$2,005	$2,635	$2,585	$2,508	$2,560	$2,214
PERCENTAGE						
Number of Cylinders						
One cylinder	0	0	0	1	1	5
Two cylinders	.5	1	1	1	2	3
Four cylinders	51.0	54	62	78	80	82
Five cylinders	0	0	1	1	0	0
Six cylinders	47.5	45	36	19	17	10
Eight cylinders	1.0	0	0	0	0	0
Shape of Cylinders						
T-cylinder type	16.5	30	31	30	22	20
L-cylinder type	70.0	59	56	55	60	56
I-cylinder type	8.5	6	9	9	14	18
Knight type	3.0	3	3	2	1	0
Two-cycle	1.0	1	1	4	3	6
Mondex-Magic type	0	1	0	0	0	0
Cylinder Arrangement						
Cylinders cast separate	4.0	6	15	22	28	39
Cylinders cast in pairs	27.0	42	48	58	60	53
Cylinders cast in block	67.5	39	29	18	12	8
Cylinders cast in threes	10.5	13	8	2	0	0
Cooling						
Air-cooled	.5	2	4	5	6	7
Thermo-syphon	27.	19	17	19	28	23
Pump circulating	72.5	79	79	76	66	70
Ignition Systems						
Single ignition	56	23	15	14	18	25
Dual ignition	36	59	68	63	53	40
Two-spark ignition	1.45	4	2	0	0	0
Double ignition	4.55	11	15	23	29	35
Duplex ignition	2.0	3	0	0	0	0
Motor Lubrication						
Splash oiling	46.5	42	53	68	81	0
Splash-pressure oiling	16	39	32	20	0	0
Oil in fuel	0	1	1	2	3	6
Pressure oiling	37.5	18	14	10	19	0
Engine Starting						
Electric starter	94.5	87	37	2	0	0
Acetylene starter	0	1	14	0	0	0
Air starter	0	4	9	2	1	1
Optional starter	1.5	2	5	0	0	0
Mechanical starter	.5	1	4	0	0	0
No starter as stock	3.5	5	31	98	99	99

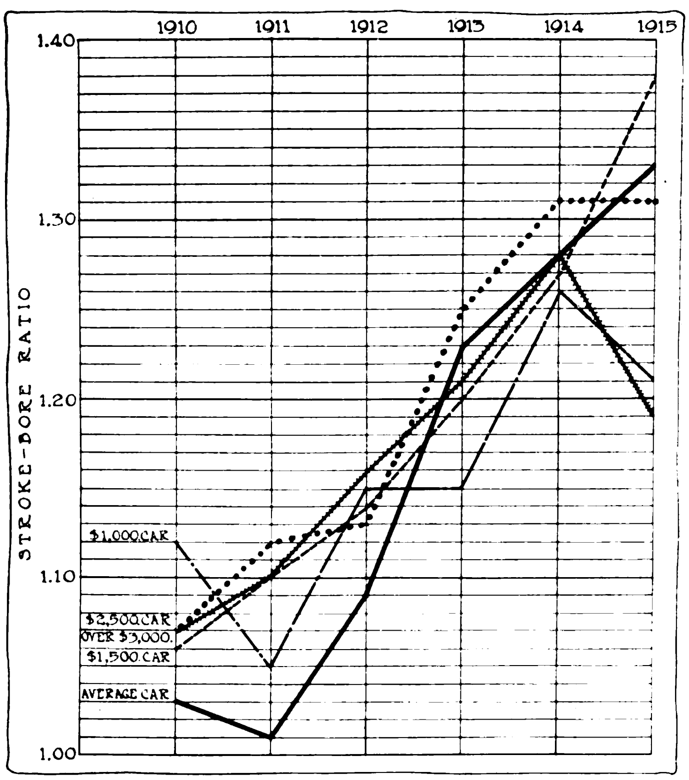
General Averages	1915	1914	1913	1912	1911	1910
Fuel Feed						
Gravity fuel feed	57	58	65	0	81	82
Gravity-pressure fuel feed	.5	1	0	0	0	0
Pressure fuel feed	22	41	35	0	19	18
Vacuum feed	20.5	0	0	0	0	0
Gas Tank Location						
In cowl	27.2	13	......	....	....	....
At rear	51.1	41	....	....	....	....
Under seat	21.2	46	....	....	....	....
Type of Clutch						
Disk clutch	51	48	52	44	51	49
Cone clutch	44	41	45	52	47	39
Expanding band clutch	.5	3	1	3	2	6
Contracting band clutch	4.5	5	2	1	1	3
None	....	3	....	....	....	....
Type of Gearset						
Selective	91.5	95	94	92	90	85
Progressive	3.5	1	2	5	1	8
Planetary	1.0	1	1	2	4	4
Friction	2.5	3	3	1	5	3
Location of Gearset						
Amidship	32.5	39	46	55	67	75
Unit with axle	18.2	15	20	20	17	15
Unit with motor	49.3	43	34	25	16	10
None	....	3	....	....	....	....
Steering and Control						
Right steering right control	9.5	24	58	70	81	93
Right steering center control	3	10	13	15	11	4
Left steering center control	79.5	57	25	13	6	2
Left steering left control	3.5	2	4	2	2	1
Optional steering	4.0	4	0	0	0	0
Electric gearshift (left steer)	0	3	0	0	0	0
Wheels						
Wire wheels, demountable	7.0	4	3	0	0	0
Wood wheels	88.5	96	96	100	100	100
Optional	4.5	0	0	0	0	0
Final Drive						
Shaft and bevel	84.5	93	94	92	91	89
Chain	4.5	4	4	6	8	11
Shaft and worm	1.5	1	1	1	0	0
Roller	0	1	1	1	1	0
Shaft and worm-bevel	9.5	1	....	....	....	....
Type of Axle						
Floating	56.5	65	67	50	0	0
Semi-floating	23.0	17	26	49	0	0
Three-quarter floating	18.5	14	4	0	0	0
Seven-eighths floating	0	1	0	0	0	0
Dead rear axle	2.0	3	3	1	0	0
Timing Gear Drive						
Spur gear	16.1	13	83	....	....	....
Helical or spiral gear	73.7	77	10	....	....	....
Silent chain	9.1	10	7.	....	....	....
Worm	1.1	0	0	0	0	0

Block Castings the Big Trend

67.5 Per Cent. of Cars on Market Use Block Types—Sixes Increase by 2.5 Per Cent.—I-Heads Gained—Stroke-Bore Ratio Higher—Horsepower Lower

AN avalanche towards block-cast motors is the feature of motor development for this season. Of the 200 odd chassis on the market this season, 67.5 per cent. have their cylinders formed in a single casting as compared to 39 per cent. last season. The result of this change is exhibited all through the car. Without an increase in wheelbase makers have been able to provide more body space, owing to the shorter hood. The opportunity for inclosing every moving part of the motor afforded by the block casting has been taken advantage of to simplify the exterior. Coupled with the increase in unit power plants and three-point suspensions, the block-cast tendency has resulted in the adoption of a compact unit in which the clutch and gearbox housing are a part of the crankcase and in which all four or six cylinders are in one piece.

Some of the notable concerns who have adopted or returned to block casting in some models, during the year, are: Overland six, Chalmers six, Cole six-50, Enger six, Haynes, Norwalk, Peerless, Pullman, Stearns, Stutz and Velie. In addition to these there are a large number who have gone over to the block type of casting in one or two models, making their entire line block-cast. Apperson, Austin, Lenox and Moon are examples of this. Another reason for the growing percentage of blocks is that a large number of the new makers who have entered the field have used the block method of casting. Dodge and Scripps-Booth, who has abandoned the cyclecar, are two examples.



Above set of curves shows the general upward trend of stroke-bore ratios during the past 5 years. The average car has increased in stroke-bore ratio steadily since 1911, but those in the different price classes have risen and fallen during this period. The general upward trend, however, will be noted from the inclination of the average curve

Block Sixes Increase

It is in the six-cylinder motor that the increase of block castings is the most remarkable. A year ago some makers were inclined to be dubious of the six-cylinder block casting, believing that it was apt to be of inferior workmanship and consequently would result in an increased percentage of scrapped material. The improvement of foundry work has done much toward eliminating this fear, and consequently pair castings have fallen from 42 per cent. in 1914 to 27 per cent. in 1915 and casting in threes has also dropped from 13 per cent. to 10.5 per cent. In proportion six-cylinder blocks have risen from 45 to 63 per cent. during 1914.

In cylinder shapes the trends noticed in 1914 have been accelerated. In place of the gradual dropping off of T-head cylinders from 31 in 1913 to 30 per cent. in 1914; a quick fall to 16.5 per cent., has resulted from the marked gain of the L-head cylinder and also from the slight gain of the valve-in-head motor. For 1915, 70 per cent. of our motors have L-head cylinders, a fact not a little accounted for by the adoption of the block design. The L-head lends itself better to this method of casting than any other and these two developments have gone hand in hand until they now are the most distinguishing features of American design.

I-Heads Increase

The bulwarks of I-head construction continue to be such concerns as Buick, Franklin, Chevrolet, and Dorris, whose entire line is so constructed. Only two have dropped out. These are the Knox Automobile Co., and Cameron and they may not be out long. In addition to those who have had valve-in-head motors for the past few seasons there are new recruits who are instrumental in bringing the percentage up to its 2.5 per cent. gain. Among these may be mentioned Chalmers, Olds, Partin, Grant, Kearns, Owen and F. R. P. The total percentage of I-head motors is 8.5 as against 6 for 1914.

A 2 5 per cent. increase in valve-in-head construction gives rise to the question as to whether or not we are on the threshold of a marked change to this style of motor. The practice of overhead camshaft in connection with the valve-in-head motor has driven its entering wedge into the industry. The Weidely motor now sold for the trade and the new F.R.P. are two examples.

But all the developments in motors are not brought out in percentage tables. The growth of the long-stroke, high-speed powerplant is increasing. The stroke-bore ratio of American motors has risen in steady steps since 1911. At that time it was 1.01 to 1, now it is 1.33 to 1 on the average car.

Longest Stroke 7 Inches

Mitchell-Lewis and Pierce bear the distinction of having the motors with the longest stroke, this dimension being 7 inches. Fiat follows with 6.69 inches. There are several motors with 6-inch stroke among whom may be mentioned Peerless and Moline. Perhaps the most radical change in motor specifications is in the Inter-State which went from a six-cylinder 4 by 5 in 1914 to a four-cylinder 3.5 by 5 for

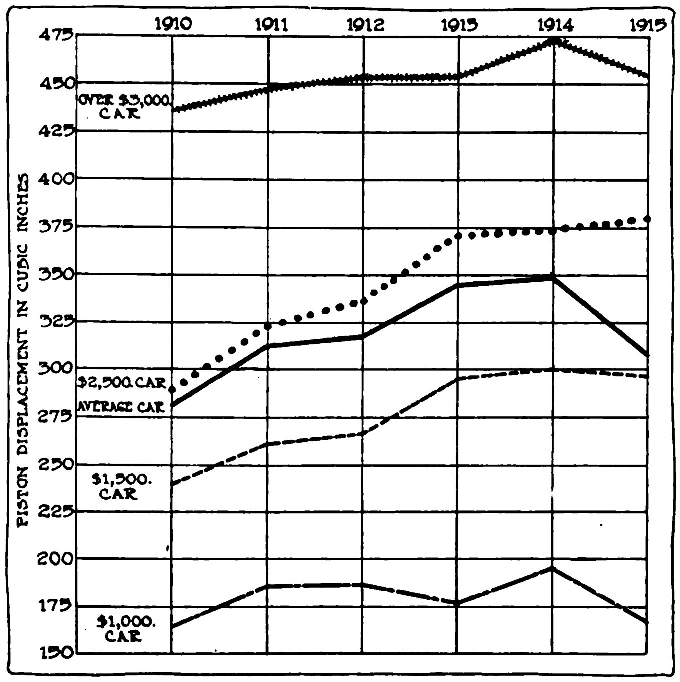
1915. The greatest stroke-bore ratio is that in the 4 by 6 cars which is 1.66.

In spite of the increase in stroke-bore ratios the square motor is not a thing of the past. One of our big-output manufacturers Buick, still continues to market a 3.75 by 3.75. There are no automobile companies listing motors with the stroke shorter than the bore. A big factor in the increased stroke-bore ratio is the gain in popularity of the 3.5 by 5 motor. This is used in 12 per cent. of our chassis, both fours and sixes. In 1914 it was only used in 4 per cent.

This lengthening of the stroke is not the only factor that has changed since the inception of the high-speed type. Lighter reciprocating weights have been such an object in motor design that it may be said conservatively that 5 per cent. has been cut from the weights of piston and connecting-rod assemblies.

The S. A. E. horsepower of the American motor for 1915, when taking the average of the entire gamut of cars, is 29.97. In 1914 it was 33.2, and yet were the formula neglected and the dynamometer test substituted as the judge of power, the 1915 motor with its smaller bore and greater stroke-bore ratio would doubtless outrank those of the past two seasons. It is certain that with its better balance and lighter parts that vibration would be found to be greatly reduced and the motor life correspondingly lengthened.

The figures for piston displacement reached their zenith in 1914. At that time the average American motor had a



Piston displacement has fallen off in every car except in the $2,500 range. Here it has gone slightly upward.

Motor Characteristics in the Different Price Classifications for the Past 5 Years

	$1,000 CARS						$1,500 CARS					
	1915	1914	1913	1912	1911	1919	1915	1914	1913	1912	1911	1910
Numbers												
Makes	50	35	32	56	52	43	50	54	81	86	86	75
Chassis	57	50	42	65	76	72	63	84	112	122	125	102
Cars	100	60	76	130	136	114	122	130	238	257	298	174
Average												
S.A.E. H.P.	19.78	21.4	21.86	21.18	21.23	19.85	29.01	28.6	28.9	30.01	29.53	27.20
Bore, in.	3.52	3.72	3.75	3.78	4.01	3.79	3.78	4.07	4.18	4.26	4.19	4.14
Stroke, in.	4.28	4.69	4.32	4.37	4.21	4.25	5.21	5.15	5.05	4.86	4.64	4.41
Ratio	1.21	1.26	1.15	1.15	1.05	1.12	1.38	1.27	1.20	1.14	1.10	1.06
Piston disp.	166.7	195.0	178.0	186.2	185.8	164.5	296.4	300	295	266.5	262.0	238
Wheelb'se, in.	107.37	107	103	104	100	96	121.60	118.5	119	116	114	108
Tires, in.	32x3½	32x3½	32x3½	32x3½	32x3	32x3	34x4	34x4	34x4	34x4	34x4	34x4
Price	$855	$950	$920	$954	$1,002	$879	$1,419	$1,650	$1,662	$1,595	$1,585	$1,430
Gear ratio	....	....	....	....	....	....	....	3.7-1	3.6-1	....	....	....
Percentage												
Six cyl	3.5	0	0	0	....	....	55.7	19	12	5	....	....
Four cyl	94.8	89	81	87	....	....	40.2	81	88	95	....	....
Two cyl	1.7	11	19	10	....	....	....	0	0	0	....	....
Eight cyl	....	....	....	....	....	....	4.1	0	0	0	....	....
Cylinder Shape												
I-head cyl.	18.4	12	14	5	10	17	3.7	0	0	0	18	3
T-head cyl.	1.6	3	5	7	11	13	10.9	34	21	15	12	10
L-head cyl.	82.0	82	69	74	73	70	84.2	66	75	78	70	87
Knight	0	0	0	0	0	0	1.2	0	0	0	....	....
How Cast												
Block	85.6	67	38	31	27	12	67.0	49	45	30	19	24
Separate	7.2	13	31	37	40	52	4.0	6	15	24	21	58
Pairs	7.2	20	31	32	33	36	25.0	42	38	45	60	18
Threes	0	0	0	0	0	0	3.0	3	2	1	0	0
Cooling												
Pump	25	16	29	39	24	30	85.5	86	74	66	49	50
Air	0	8	19	13	15	4	0	0	2	2	3	42
Ther'o-syph.	75	76	52	48	61	66	14.5	14	24	31	48	42
Oiling												
Splash	69	57	64	79	68	85	48.5	....	....	....	....	....
Splash-pres.	27.5	40	24	11	32	15	43.5	....	....	....	....	....
Pressure	3.5	2	2	0	0	0	8.0	....	....	....	....	....
Ignition												
Dual	13.8	40	50	60	48	40	43.0	77	78	75	67	49
Single	86.2	55	43	38	39	45	52.3	13	10	12	13	8
Double	0	5	7	2	13	15	1.6	10	12	13	17	43
Two-point	0	....	....	....	....	....	0	0	0	0	....	....
Duplex	0	....	....	....	....	....	3.1	0	0	0	....	....
Engine Starter Type												
Acetylene	0	3	19	20	0	0	0	0	18	9	0	0
Elec.	....	61	0	0	0	0	100	96	38	0	0	0
Optional	....	0	2	0	0	0	0	1	8	0	0	0
Mechanical	....	3	9	5	0	0	0	0	1	2	1	0
None	....	10	70	75	100	100	0	0	31	85	99	0
Extra	....	23	0	0	0	0	0	0	0	0	0	0

	$2,500 CARS						$4,000 CARS					
	1915	1914	1913	1912	1911	1910	1915	1914	1913	1912	1911	1910
Numbers												
Makes	42	60	79	74	70	63	34	46	58	84	62	58
Chassis	54	102	93	82	76	83	48	72	92	112	116	107
Cars	126	170	235	216	234	159	187	247	359	525	395	230
Average												
S.A.E. H.P.	32.96	35.20	35.90	35.45	35.60	30.65	40.23	40.50	41.70	43.40	43.66	46.65
Bore, in.	4.03	4.03	4.23	4.40	4.43	4.31	4.45	4.46	4.63	4.65	4.87	4.76
Stroke, in.	5.28	5.29	5.27	5.00	4.96	4.75	5.32	5.68	5.62	5.41	5.39	5.11
Ratio	1.31	1.31	1.25	1.13	1.12	1.07	1.19	1.28	1.21	1.16	1.10	1.07
Piston disp.	380	378.5	372.0	336.5	324.2	287.9	454	474	453.	453	447.3	436.5
Wheelb'se, in.	126.6	125.8	127.0	120.0	119	113	133.2	132	130	129	124	124
Tires, in.	35x4½	35x4½	36x4½	36x4½	35x4	34x4	36x4½	36x5	37x5	36x4½	37x5	36x4
Price	$2,454	$2,460	$2,410	$2,470	$2,490	$2,140	$4,563	$4,700	$4,550	$4,350	$4,650	$3,917
Gear ratio	....	....	....	....	....	....	....	....	....	....	....	....
Percentage												
Six cyl	65	70	57	14	....	....	70.5	62	57	44	....	....
Four cyl	33.3	30	43	86	....	....	28.0	38	42	55	....	....
Two cyl	....	....	....	....	....	....	....	....	....	....	....	....
Eight cyl	1.7	0	0	0	0	0	1.5	0	0	0	0	0
Cylinder Shape												
I-head cyl.	9.2	3.0	8.0	6.0	15.0	17.0	14.6	13.0	13.0	15.0	27.0	17.0
T-head cyl.	23.4	34.0	45.0	44.0	28.0	26.0	29.2	37.0	41.0	42.0	34.0	53.0
L-head cyl.	60.0	62.0	47.0	50.0	57.0	57.0	47.8	42.0	36.0	34.0	38.0	26.0
Knight	7.4	1.0	0	0	0	0	8.4	8.0	8.0	0	0	0
How Cast												
Block	41.4	29.0	23.0	11.0	4.0	10.0	33.4	10.0	10.0	5.0	1.0	1.0
Separate	1.3	3.0	11.0	15.0	29.0	32.0	4.7	14.0	12.0	18.0	20.0	25.0
Pairs	32.0	39.0	46.0	68.0	67.0	58.0	22.4	58.0	71.0	74.0	79.0	74.0
Threes	24.0	29.0	20.0	6.0	0	0	19.0	18.0	7.0	3.0	0	0
Cooling												
Pump	88.5	91.0	89.0	97.0	94.0	70.0	91.5	98.0	96.0	94.0	95.0	94.0
Air	0	2.0	2.0	2.0	3.0	5.0	1.9	0	3.0	3.0	4.0	4.0
Ther'o-syph.	14.5	7.0	9.0	1.0	3.0	25.0	9.6	2.0	1.0	3.0	1.0	2.0
Oiling												
Splash	35.7	....	....	....	....	....	19.5	27.0	32.0	62.0	74.0	85.0
Splash-pres.	47.4	....	....	....	....	....	43.5	37.0	38.0	0	0	0
Pressure	16.9	....	....	....	....	....	37.0	36.0	30.0	38.0	26.0	15.0
Ignition												
Dual	39.2	57.0	72.0	61.0	50.0	32.0	52.2	47.0	66.0	50.0	50.0	39.0
Single	46.7	33.0	10.0	6.0	10.0	29.0	30.5	15.0	12.0	9.0	7.0	12.0
Double	7.0	8.0	15.0	33.0	40.0	39.0	13.1	23.0	25.0	41.0	43.0	49.0
Two-point	1.8	2.0	3.0	....	....	....	4.2	7.0	0	0	0	0
Duplex	5.3	....	....	....	....	....	0	0	0	0	0	0
Engine Starter Type												
Acetylene	0	0	7.0	10.0	0	0	0	0	16.1	10.0	0	0
Elec.	98.0	93.0	46.0	2.0	0	0	100	96.0	41.0	2.0	0	0
Optional	2.0	2.0	4.0	0	0	0	0	2.0	4.0	0	0	0
Mechanical	0	0	4.0	6.0	2.0	0	0	0	8.0	5.0	2.0	0
None	0	0	23.0	80.0	97.0	99.0	0	0	20.0	80.0	95.0	98.0
Extra	0	....	....	....	....	....	0	....	....	....	....	....

CYLINDER SHAPES PERCENTAGE	L-HEAD	T-HEAD	I-HEAD	KNIGHT
1910	56%	20%	18%	0
1911	60%	22%	14%	1%
1912	55%	30%	9%	2%
1913	56%	31%	9%	3%
1914	59%	30%	6%	3%
1915	70%	16.5%	8.5%	3%

The trend toward the L-head motor has been greatly accentuated for the 1915 season. The I-head is gaining slowly and the Knight holds its own

displacement of 349 cubic inches. This figure was reached after a steady rise from 1910 when the figure was 281.5. For 1915 it has dropped to 307.38, less than at any time since 1911. The efforts of designers toward securing better economy and more power from smaller motors are responsible in some degree for this reduction, but the addition of a large number of small cars which are of the class known as miniature automobiles has also been a deciding factor in reducing the displacement figures. In 1914 the cyclecar was a separate proposition and was not considered in averaging dimensions of the standard automobile. This season the cyclecar movement in greatly reduced form has been merged with the industry as a whole, taking the form of the miniature car.

The fact that the six continues to hold its own notwithstanding the large number of small fours, shows that the manufacturers struck a responsive chord in the purchaser when following the landslide toward the six-cylinder car which has grown steadily for 5 years. For 1915 47.5 per cent. of all our cars are sixes and 51 per cent. are fours. In 1914, 45 per cent. were sixes and 54 per cent. fours. The drop in fours has been in part accounted for by the practical elimination of the two-cylinder car and the introduction of the eight.

New entrants into the four-cylinder field are such concerns as Argo, Bauer, Briscoe, Dodge, F.R.P., Kearns, McIntyre, Remington and Sphinx. These with the exception of Dodge, Kearns, McIntyre and F.R.P. are in the small car class. In addition to these there are concerns who in 1914 made no fours but have re-entered the field for 1915. For example there are Inter-State and Peerless.

New Six Makers

To offset these additions and still have an increased percentage of sixes means that there must be several new names in the ranks of six-cylinder manufacturers. Examples of these are: Enger, Grant, Lexington, McIntyre, Monarch, Overland, Owen, Paige, Paterson, Pratt, Rayfield, Reo, Saxon and Singer. As a further aid to the cause of the six many former manufacturers of fours are now manufacturing other types. Examples of these are: Austin, Cadillac, Enger, Kline, Lexington, Monarch, Paige and Pathfinder. There are many others but these are typical examples. Such concerns as Enger and Paige have stopped making fours and are concentrating on sixes. Cadillac builds only eights.

A few have dropped out of the ranks of the six manufacturers. To give examples, there are Inter-State and Lyons.

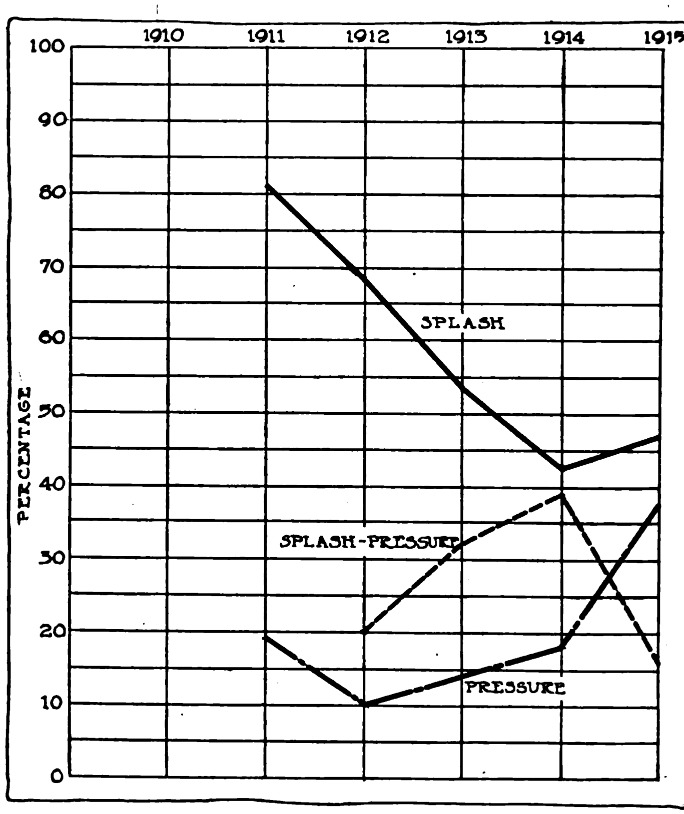
Several concerns that manufactured fours a year ago are not manufacturing at present, these including Cameron, Fal, Lozier, Marathon, Marion, Staver, Tribune and Ohio. There are also several names appearing a year ago as makers of sixes, and who have since ceased manufacturing, these including American, Colby, Correja, Henderson, Howard, Keeton, Knox, Lozier, Marion and Palmer-Singer.

No prediction of an eight-cylinder American car was heard a year ago yet at this time at least three manufacturers, Cadillac, King and Briggs, have cast their lot among those who believe in the double-four. With the necessity of arranging the cylinders differently in this class of motor the adoption of the larger number of cylinders has also marked the introduction of the V-type engine into the higher-priced cars. This, in turn, is the direct cause of other engineering developments which mark pioneer work for America. These are the yoke connecting-rod, and the other special designs necessary in arranging for the two blocks of four cylinders.

While helical gear drives for the camshaft still retain their supremacy the percentage of cars so fitted has dropped from 82 for 1914 to 76 for 1915. Spur gear drive on the other hand has risen from 10 per cent. in 1914 to 14 per cent. in 1915. Silent chain drive has risen from 8 to 10 per cent. The falling off in the helical gear percentage can be traced directly to the miniature cars. Concerns such as Argo, Cycleplane, Kearns, Peter Pan and Remington, who have brought out the new low-priced fours, do not use the helical gear, which is much more costly than the spur. Silent chain drive is used on the new Cadillac and King eights for accessory drives.

Stiffer Crankshafts Used

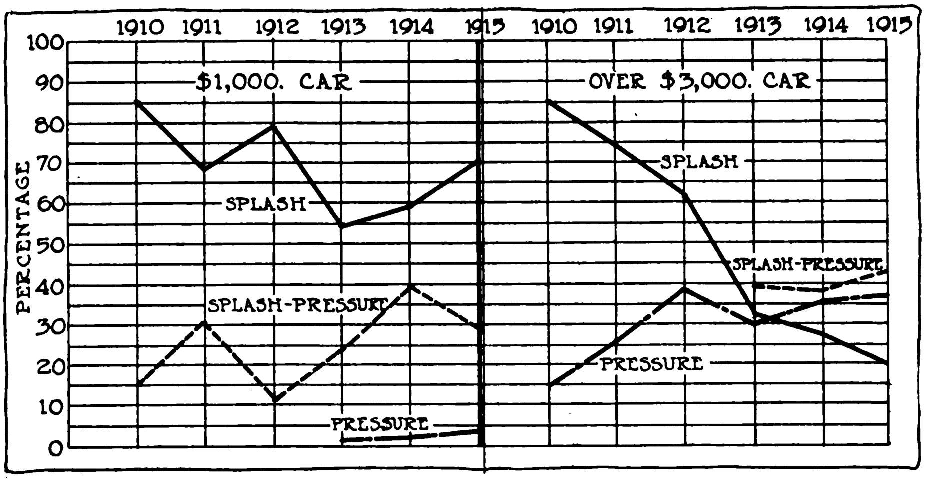
The shorter overall length of the block motor has resulted in a stiffer crankshaft but the higher speeds of the engine have increased the demands on the crankshaft to such an extent that manufacturers are still compelled to work towards an increased stiffness and strength. Larger diameters mean higher peripheral bearing speeds. The bearing is the shortest-lived part of the motor and to cut down its life still further is not desirable. To overcome this quandary manufacturers have been compelled to use the alloy-steel crankshaft and vanadium and chrome-nickel steel in this important part of the motor is not now uncommon. With the use of the alloy and a careful manipulation of the heat-treatment stiffness has not been sacrificed, while tensile strengths have gone up. It is not uncommon now to see crankshafts of 150,000 pounds per square inch tensile strength and yet with such



Both pressure and splash oiling systems are on the increase, but splash-pressure oiling is decreasing. The reason for the increase in pressure oiling lies in the use of the high-speed motor an amount of stiffness that the critical speed of vibration is above the demands of ordinary use. General practice in the average motor still favors the .40 carbon open-hearth steel for crankshaft work.

Connecting-rod practice has not changed materially. The use of alloy-steel has been common for the last 2 years, both chrome-vanadium and chrome-nickel playing an important part in the specifications. Many of the makers of lower-priced cars have found satisfactory results with .30-.40 carbon, acid, open-hearth steel, and as regards carbon content the choice seems to favor .25 per cent.

The use of tubular connecting-rods has been predicted by foreign engineers, but as yet no serious inroads on the ranks of the I-beam section have been made. The H-section connecting-rod holds its own in a small percentage of makes.

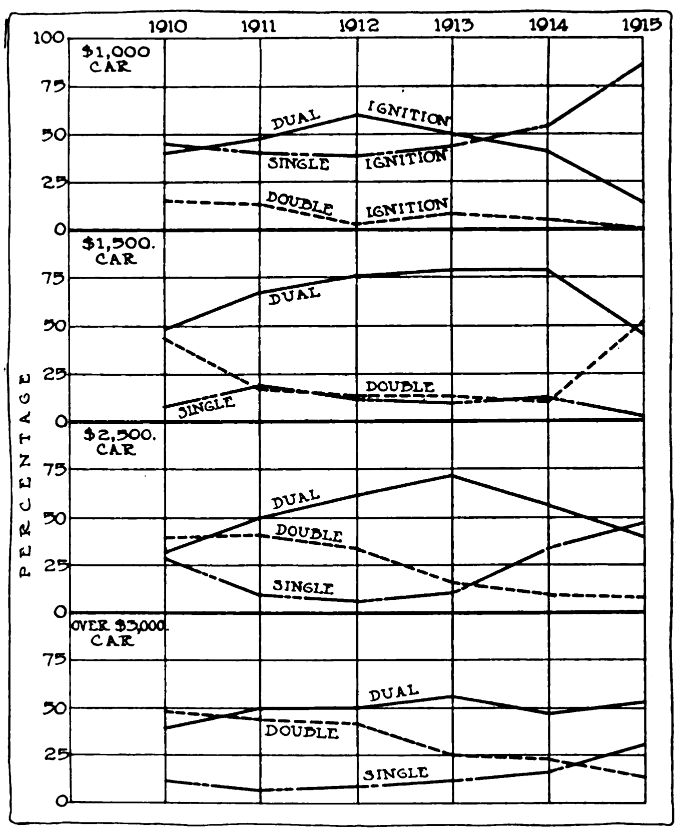


In every price class but that of cars selling for more than $3,000 dual ignition is falling off. In that class there is a slight increase. Single ignition is rapidly increasing all along the line, the reason for this being the introduction of the electric cranking outfit

It is but natural that in the search for lighter parts a few tubular constructions should begin to make their appearance. Three of the Knight cars are equipped with tubular connecting-rods. These are Moline, Stearns and Lyons-Knight. In addition to these examples there is the new F. R. P.

Lightweight Pistons

Pistons are longer and lighter, which means thinner than in 1914. Weight has been saved in the thinning of the webbing. Neater core work, especially as regards the space surrounding the piston-pin boss has made a lighter job but perhaps the biggest saving in material and weight is in the piston rings. The practice of using fewer rings at the top is growing rapidly. With the decrease in the number of rings, it is but natural that efforts would be made to make the rings themselves more efficient. The result is the growth of improved types of rings. The laminated or multiple design in which the ring is made up of several layers of metal is one instance of this. Another tendency in piston ring practice is to buy the product of specialists in piston-ring manufacture. These, as much as carbureters and magnetos, are designed with the special purpose in view of being the most efficient units for the functions that they must perform. The makers of these specialized products have secured patents on improvements of which the motor makers are beginning to be glad to avail themselves. They are proof against leakage and serve the same purpose as two or more of the ordinary rings without noticeably increasing the friction.



Splash and splash-pressure oiling are taking opposite trends in the $1,000 car. Pressure oiling, which was introduced in this class in 1913, is slowly making itself felt. In the higher-priced car the splash-pressure system is supreme, but the pressure feed is rapidly gaining

The rings used may be generally divided into two classes, the compound ring in which there are two or more complete separate rings of metal, and single rings. In the compound rings the increased surface and the staggered joints eliminate leaks and increase the life of the ring. In the single rings various lapping joints are used to insure continuity of the bearing surface and at the same time to prevent leakage.

Bearing Length Increased

Higher speeds mean reduced bearing life. When the designers increase the revolutions per minute of their motors it means an increase in bearing surface to make the life of the bearing remain the same. Increase in bearing surface has been gained by increasing the length of the bearings, although it is doubtful if diameters, on the whole, show any marked increase. Nineteen hundred and fourteen was the year of bigger crankshafts and when these reached their limit it was necessary to go into greater lengths. With the mounting of the cranking motor on the flywheel an increase of bearing length to take the side thrust of the cranking motor was required on the rear bearing. The result is an almost universal tendency towards longer rear main bearings.

In the exterior fittings of the motor greater accessibility exists throughout. The adoption of vacuum-gravity gasoline feed has enabled the carbureter to be mounted much higher than on gravity-fed cars. The raising of the carbureter is synonymous with the shortening of the intake manifold header, and in many instances the latter is eliminated altogether and the carbureter is bolted directly against the casting which contains the intake manifold as an integral part. When the carbureter bolts against the casting a vertical flange is most often used. This has led to the development of the horizontal type of carbureter. Overland, on the new six uses a short elbow to retain the vertical carbureter and on cars using the new high-speed Continental motor the carbureter is bolted directly to the cylinder block on which there is a vertical, integral flange.

The raising of the carbureter has cleared the way for accessibly mounting the horizontal shaft driving the water pump, magneto, generator and other auxiliaries. It is a growing practice to extend the web at the juncture of the two halves of the crankcase making this horizontal flange a shelf to carry the entire auxiliary layout. This is one of the steps towards the clean exterior maintained on this year's motors.

Thermo-Syphon Cooling Gains

Thermo-syphon cooling continues to increase in percentage. For 1914 its chief advocates were among the lower-priced cars. It is now used on 27 per cent. of American chassis as compared to 19 per cent. Pump circulation is used on 72.5 per cent. This is a falling off of 6.5 per cent. as compared with 1914 and the reason can be assigned to the introduction of the miniature cars.

Air cooling has dropped from 2 per cent. to .5 per cent., now leaving Franklin as the only exponent of this method of cooling. In connection with this it is only fair to mention the successful demonstration made in the fall of this year by the Franklin motors, which, driven by representatives all over the country, successfully negotiated 100 miles on low gear without overheating.

Another big influence in the falling off of the air-cooled motor is the practical elimination of the cyclecar as a factor in the industry. Many of these cars had motorcycle motors with air cooling ribs. These have now disappeared and in their place are the small thermo-syphon cooled fours. The Duryea is an example of air-cooled car listed for 1914 but not included in the 1915 lists.

The arrangement of the valves has been greatly improved. The redistribution of the auxiliaries due to the higher mounting of carbureters, which in turn is a development due to the introduction of vacuum feed to a large extent, has allowed for the more accessible placing of valve adjustments. There can be no doubt that the intention to make exteriors simple and accessible has been a leading factor in development, and full advantage has been taken of the higher carbureter to place the valve adjustment parts in reach. Another valve development continued from 1914 and augmented this season is in the adoption of the tungsten steel valve. A score of representative makers are using these valves to eliminate the necessity for grinding. Many use them for the exhausts only and for the inlet employ nickel steel.

Bigger Waterjackets

Another point in which an improvement has been made in water circulation is in the employment of larger waterjackets by practically every manufacturer who has redesigned his motor for this season. The tendency, is to have a greater volume of water surrounding the cylinders and also to have this greater volume in constant circulation. We find, therefore, that water pumps are also more efficient or larger; and radiators of increased capacity. Hupmobile and Winton are good examples of those who have increased their radiator capacity.

There are three primary classes of motor lubrication. These are the splash, pressure, and a combination of the two which can be called splash-pressure.

In the splash system every bearing is lubricated by the splash from troughs or wells beneath the connecting-rods. The oil may be fed by pump, which is the generally-used method, or by gravity from a tank. The oil may be recirculated or simply fed as required to replace that used. It remains a splash system so long as every bearing surface of the motor, cylinders, pistons, crankshaft, camshaft, wristpins and timing gears are so lubricated.

In the pressure system, the oil is taken up from a reservoir by a pump and forced under pressure to the main bearings. At these points it enters the hollow crankshaft and flows through this to the lower connecting-rod bearings. After oiling these it is forced through hollow leads to the wristpins and thence to the cylinder walls. There is no dipping of the connecting-rods into pools of oil but a certain amount of spray is always present. This is due to the oil thrown off by centrifugal force from the cranks. In a pressure-feed system the camshafts and the timing gears are generally oiled by independent leads.

Splash System Described

In the splash-pressure system the oil is carried under pressure to the main crankshaft bearings. The quantity pumped to these bearings under pressure is far in excess of that required to lubricate them. Consequently there is a continuous overflow which is utilized to fill the splash troughs or wells. The splash part of the system takes care of every bearing except the main bearings. There are many modifications of the splash-pressure system, some in which the camshaft bearings are fed by pump pressure direct, and others in which the oil under pressure is fed to the cylinder walls.

Motor lubrication, which was distinctive in 1914 on account of the increase in the number of those using pressure oiling, is like other features of the motor in enjoying an accentuated continued trend. Today 37.5 per cent. of our makes of cars are lubricated by pressure in which the oil is carried to the crankshaft bearings and thence by means of the hollow crankshaft to the lower connecting-rod bearings and finally through leads to the wristpins. The gain in pressure oiling is represented by the loss in splash-pressure systems. Splash oiling in which every bearing surface is taken care of by the lubricant splashed from troughs by the connecting-rods is also on the increase, having risen during the past season from 42 per cent. to 46.5 per cent. This is the first season in which no stock models are listed as feeding the lubricant with the fuel, since 1910. In 1913 and 1914, 1 per cent. of the manufacturers used this method and in 1910, 6 per cent. of our motors were so oiled. The elimination of the two-cycle motor is the reason.

Single Ignition Increases

The most striking trend in ignition is the adoption of the single system. There can be no doubt that if the magneto had not established itself as such an instrument of reliability, an even greater trend toward the single battery system would have been noted. As it is, single systems, whether by battery or magneto, have gained the ascendency, having displaced the dual system from the leadership. The reason for the adoption of the single system is in the success of the electric starter. Most manufacturers feel that it is no longer necessary to have one source of current for starting and another for running.

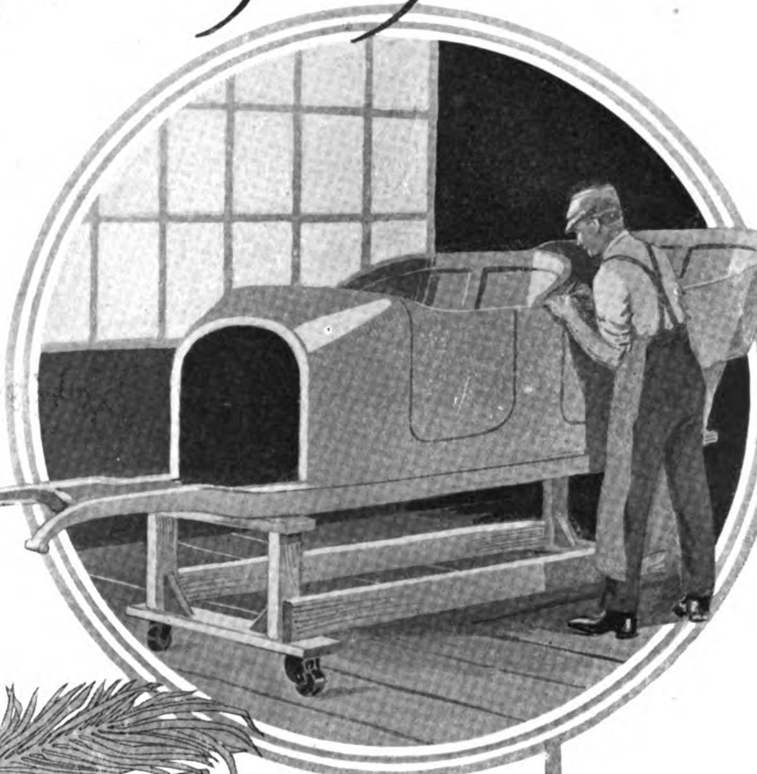
Where the single magneto system is used, it is considered that the cranking motor can turn the engine over so rapidly that starting on the magneto is as readily accomplished as starting on the battery. Where the single battery system has been adopted, it is because there is no need for two current generating outfits. The generator supplies the current to the battery and the battery to the remainder of the electrical instruments including the ignition distributer as well as the lamps and the cranking motor.

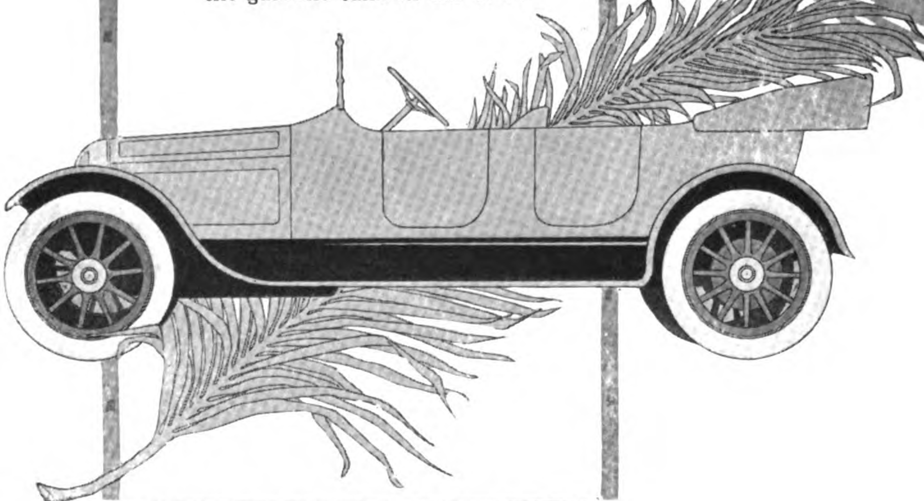
Single Ignition Gains

In the percentage column we find single ignition on 56 per cent. In 1914 it was used on but 23 per cent. While dual ignition was in the majority in 1914, having 50 per cent. of all the installations, it is now relegated to second place with but 36 per cent. Double ignition also continues to fall off. Last season 11 per cent. were so equipped. This year but 4.5 per cent. use it. Two-spark ignition is used on 1.4 per cent. this season as compared to 4 per cent. last, and duplex 2 per cent. for 1915 against 3 per cent. for 1914. The differences are absorbed in the gain in single ignition.

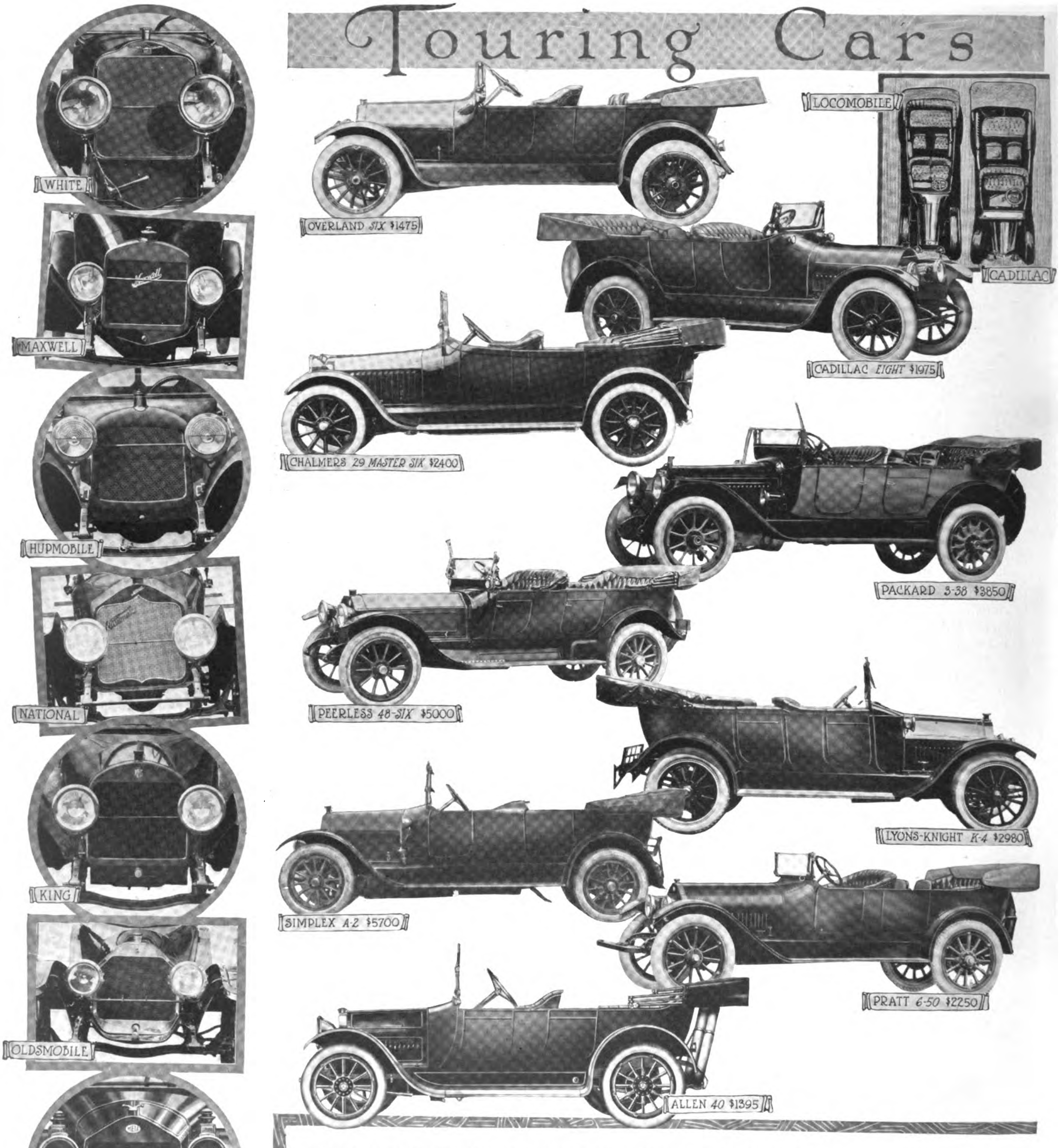
Car Bodies of 1915

FOLLOWING its custom of previous years The Automobile presents in the following pages its Car Illustrated Department showing the leading makes of open touring cars, runabouts and combination types for 1915. Grouping the makes side by side permits the reader to study the individual types and also to compare designs as well as enabling him to generalize on leading trends. An analysis of the groups shows a perceptible lowering of many designs and a greater effort to link the hood and body lines into one by a cowl that plays the part of a uniting member, not a few incorporating the gasoline tank in the cowl.





Touring Cars



Overland, 82, $1,475, Six, 3½ x 5¼, 125 W.B., 35 x 4½-inch tires.

Chalmers Master, Six, $2,400, Six, 3½ x 5½, 125½ W.B., 34 x 4½-inch tires.

Peerless, 48-Six, 4½ x 6, 137 W.B., 37 x 5-inch tires.

Simplex, A-2-38 H.P., $5,700, Four, 4⅞ x 6½, 137 W.B., 35 x 5-inch tires.

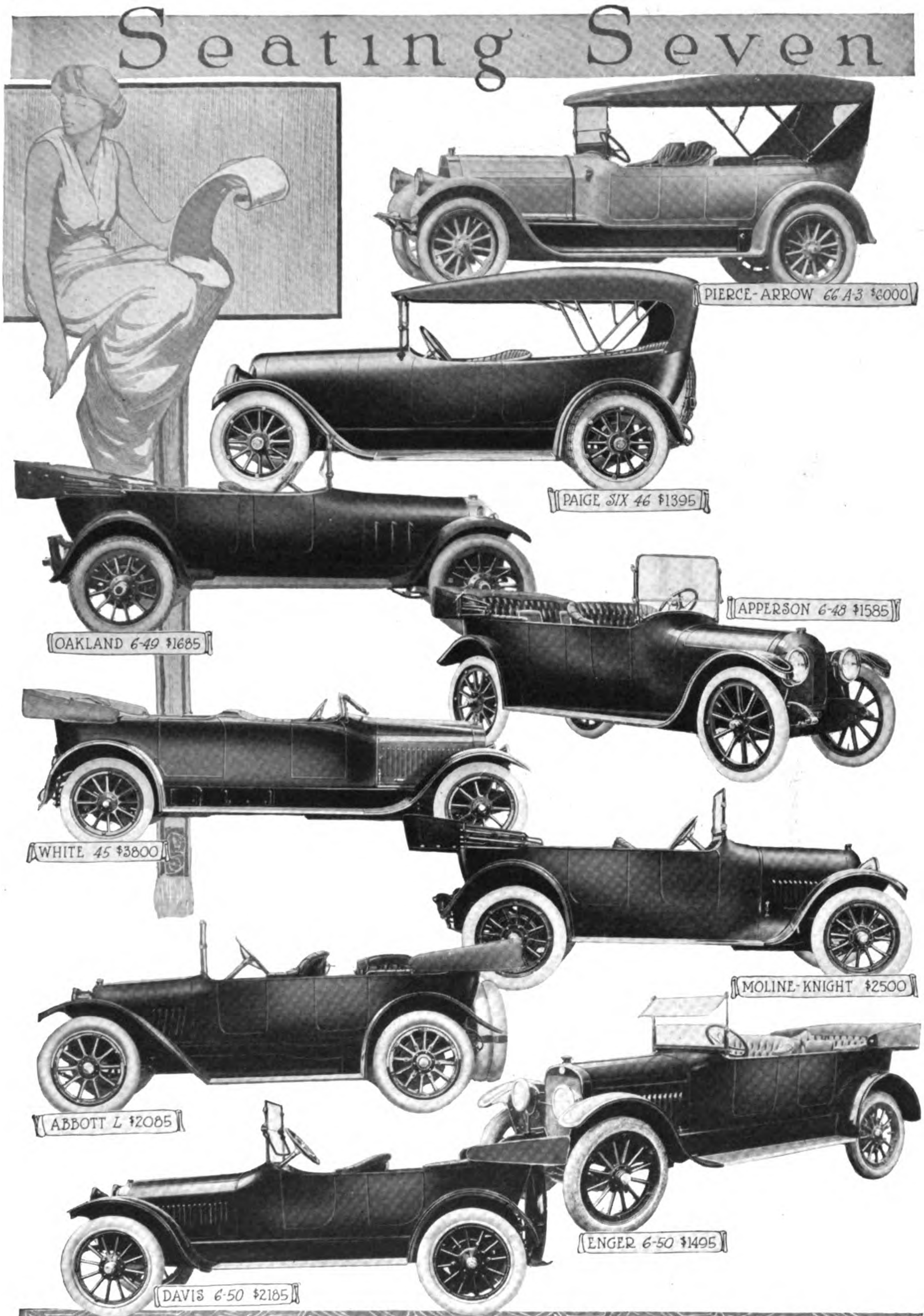
Allen, 40, $1,395, Four, 4⅛ x 5, 118 W.B., 35 x 4½-inch tires.

Cadillac, Eight, $1,975, Eight, 3⅛ x 5⅛, 122 W.B., 36 x 4½-inch tires.

Packard, 3-38, $3,850, Six, 4 x 5½, 140 W.B., 37 x 5-inch tires.

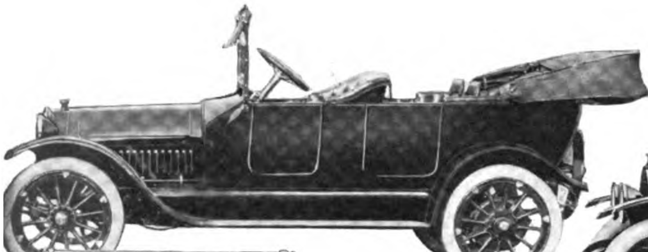
Lyons-Knight, K-4, $2,980, Four, 4½ x 5½, 130 W.B., 37 x 5-inch tires.

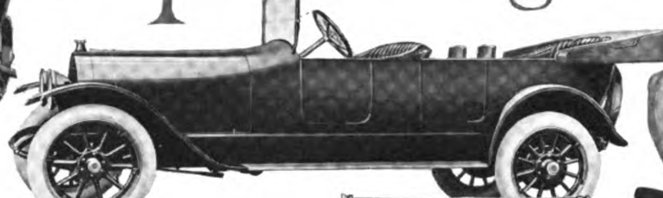
Pratt, 6-50, $2,250, Six, 3¾ x 5¼, 132 W.B., 37 x 4½-inch tires.

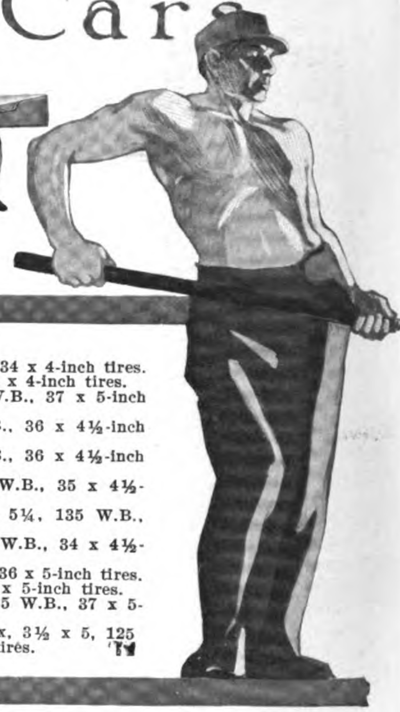


Oakland, 6-49, $1,685, Six, 3½ x 5, 123½ W.B., 35 x 4½-inch tires.
White, 45, $3.800, Four, 4¼ x 6⅜, 132¾ W.B., 34 x 4-inch tires.
Abbott L, $2,085, Four, 4½ x 5½, 121 W.B., 36 x 4½-inch tires.
Davis, Six-50, $2,185, Six, 3¾ x 5¼, 128 W.B., 37 x 4½-inch tires.
Paige, Six-46, $1,395, Six, 3½ x 5¼, 124 W.B., 34 x 4-inch tires.
Apperson, 6-48, $1,585, Six, 3½ x 5⅛, 126 W.B., 34 x 4-inch tires.
Moline-Knight, $2,500, Four, 4 x 6, 128 W.B., 36 x 4½-inch tires.
Enger, 6-50, $1,495, Six, 3½ x 5, 125 W.B., 34 x 4-inch tires.
Pierce-Arrow, 66-A-3, $6.000, Six, 5 x 7, 147½ W.B., 38 x 5½-inch tires.

Touring Cars

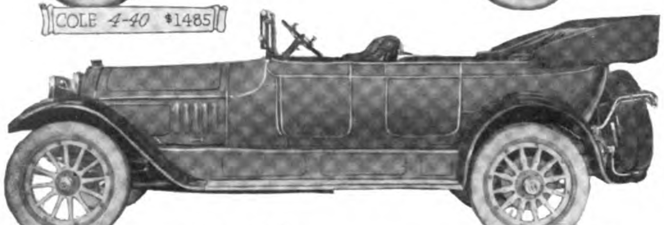

STUDEBAKER SIX $1450

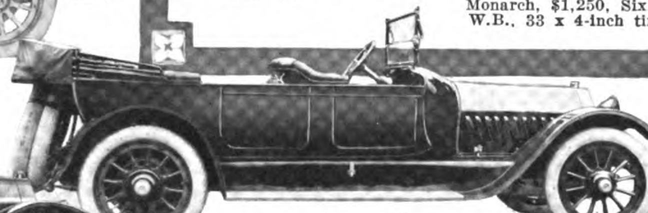

JEFFERY BIG 6 $2400

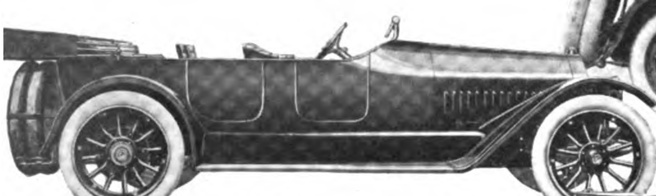


Studebaker, Six, $1,450, Six, 3½ x 5, 121 W.B., 34 x 4-inch tires.
Cole, 440, $1,485, Four, 4¼ x 5¼, 118 W.B., 34 x 4-inch tires.
Locomobile, 6-48, $5,100, Six, 4½ x 5½, 140 W.B., 37 x 5-inch tires.
National, A A, $2,500, Six, 3¾ x 5½, 132 W.B., 36 x 4½-inch tires.
Imperial, 6-56, $2,200, Six, 3¾ x 5¼, 130 W.B., 36 x 4½-inch tires.
Klinekar, 6-42 A, $1,850, Six, 3½ x 5⅛, 127 W.B., 35 x 4½-inch tires.
Pathfinder, Leather Stocking, $2,750, Six, 4⅛ x 5¼, 135 W.B., 35 x 5-inch tires.
Jeffery, Big Six, $2,400, Six, 3¾ x 5¼, 133½ W.B., 34 x 4½-inch tires.
Oldsmobile, 55, $2,975, Six, 4½ x 5¼, 139 W.B., 36 x 5-inch tires.
Marmon, 48, $5,000, Six, 4½ x 6, 145 W.B., 37 x 5-inch tires.
Speedwell Rotary Six, $2,590, Six, 4⅛ x 5¼, 135 W.B., 37 x 5-inch tires.
Monarch, $1,250, Six, 3½ x 5, 125 W.B., 33 x 4-inch tires.


COLE 4-40 $1485


LOCOMOBILE SIX 48 $5100

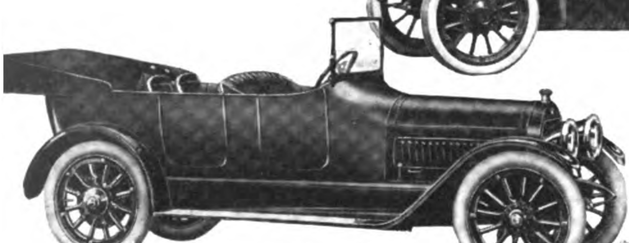

OLDSMOBILE 55 $2975

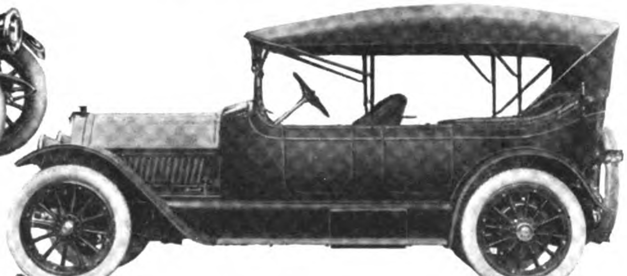

NATIONAL AA $2500


OAKLAND

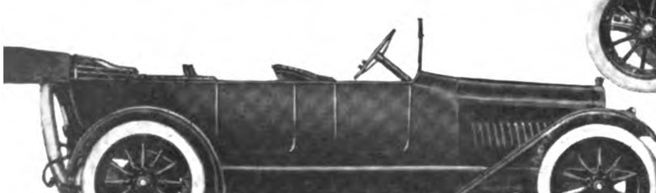

MARMON 48 $5000


JACKSON

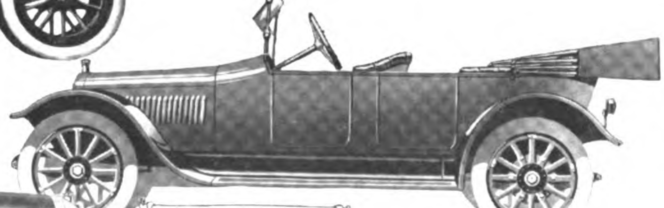

IMPERIAL 6-56 $2200


SPEEDWELL ROTARY SIX $2590


BUICK


KLINEKAR 6-42A $1850


VELIE

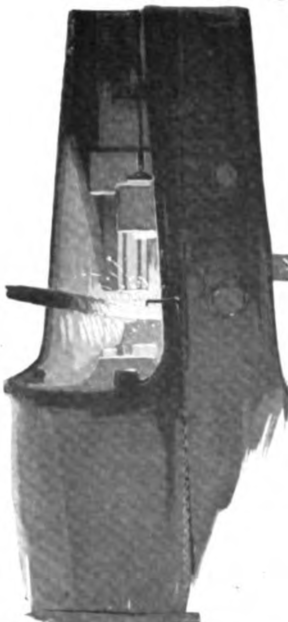

MONARCH $1250


REGAL

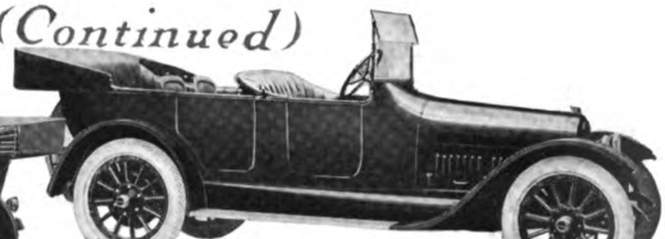

PATHFINDER LEATHER STOCKING $2750


BUICK PIERCE-ARROW

Seating Seven (Continued)



HUDSON 6-54 $2350



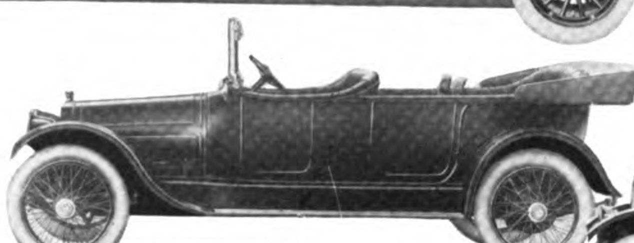
BUICK C-55 $1650

Hudson, 6-54, $2,350, Six, 4⅛ x 5¼, 135 W.B., 36 x 4½-inch tires.
Stevens-Duryea, DD 6, $4,800, Six, 4 7/16 x 5½, 138 W.B., 37 x 5-inch tires.
Cunningham, Touring, $3,750, Four, 4¾ x 5¾, 129 W.B., 37 x 5-inch tires.
Republic, E., $2,950, Six, 4¼ x 5, 133 W.B., 36 x 4½ tires.
Paterson, 6-48, $1,495, Six, 3½ x 5, 124 W.B., 34 x 4 tires.
Buick, C-55, $1,650, Six, 3¾ x 5, 130 W.B., 36 x 4½ tires.
Packard, 5-48, Salon Touring, $4,850, Six, 4½ x 5½, 144 W.B., 37 x 5-inch tires.
Mitchell, Six DeLuxe, $2,350, Six, 4¼ x 7, 144 W.B., 37 x 5-inch tires.
Fiat, 6-50, $5,150, Six, 4¼ x 5⅞, 135 W.B., 37 x 5 tires.
Chadwick, 19, $5,500, Six, 5 x 6, 133 W.B., 37 x 5 tires.
Touraine, Touring, $3,250, Six, 4 x 5½, 134 W.B., 34 x 4½-inch tires.
Pilot, Light Six, $1,885, Six, 3½ x 5¼, 125 W.B., 34 x 4-inch tires.

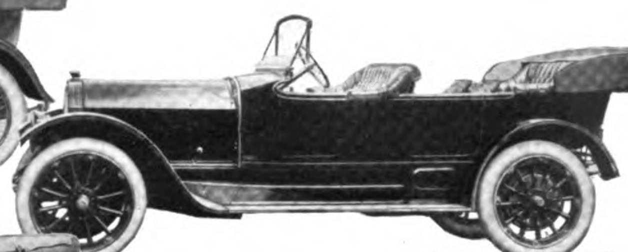
PACKARD 5-48 SALON $4850

MITCHELL SIX DE LUXE $2350

CADILLAC



STEVENS-DURYEA $4800



FIAT 6-50 $5150

WINTON

CUNNINGHAM $3750

CHADWICK 19 $5500

MOLINE

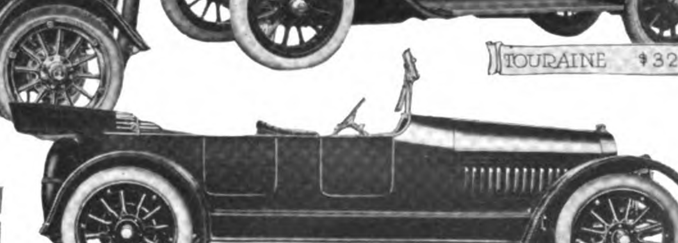
REPUBLIC R $2950

CHANDLER

TOURAINE $3250

EMPIRE

PATERSON 6-48 $1405



PILOT SIX $1885

COLE

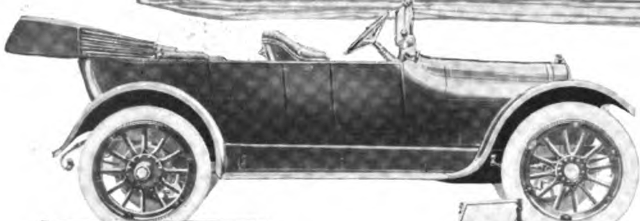
PATHFINDER

Cars Carrying

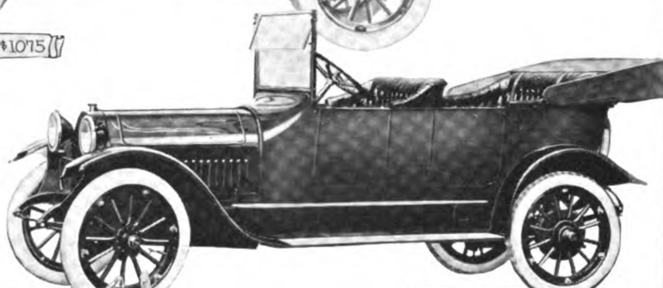
Five-Passenger Cars

This list of five-passenger cars is greater this year than ever before, this body size being the popular one in all prices of cars. There is a slight growth in popularity of four-passenger types, especially where narrow style of body is desired

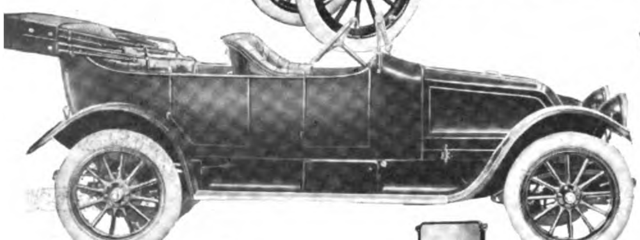
Overland, 80, $1,075, Four, 4⅛ x 4½, 114 W.B., 34 x 4-inch tires.
Studebaker Six, $1,385, Six, 3½ x 5, 121 W.B., 34 x 4-inch tires.
Franklin, $2,150, Six, 3⅝ x 4, 120 W.B., 34 x 4½-inch tires.
Kisselkar, 42-Six, Two-door, $1,650, Six, 3⅝ x 5½, 126 W.B., 35 x 4½ tires.
Regal, D, $1,085, Four, 3¾ x 5, 112 W.B., 32 x 3½-inch tires.
Stearns-Knight, Light Four, $1,750 3¾ x 5⅝, 119 W.B., 34 x 4-inch tires.
Pullman, Junior, $740, Four, 3¾ x 4¼, 110 W.B., 30 x 3½-inch tires.
Sphinx, $695, Four, 3⅜ x 5, 112 W.B., 30 x 3½-inch tires.
Pathfinder, Daniel Boone, $2,222, Six, 3¾ x 5¼, 125 W.B., 34 x 4½ tires.
Cartercar 9, $1,250, Four, 3½ x 5, 106 W.B., 33 x 4-inch tires.
Empire, 31-40, $975, Four, 3¾ x 4½, 108 W.B., 32 x 3½-inch tires.
Paterson, 4-32, $1,095, Four, 3½ x 5, 112 W.B., 33 x 4-inch tires.



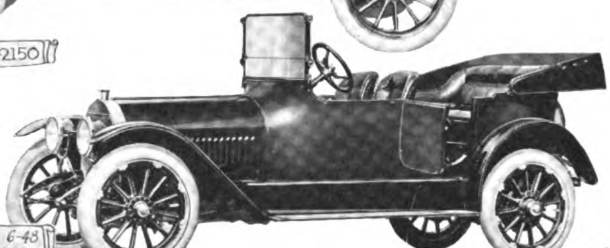
OVERLAND 80 $1075



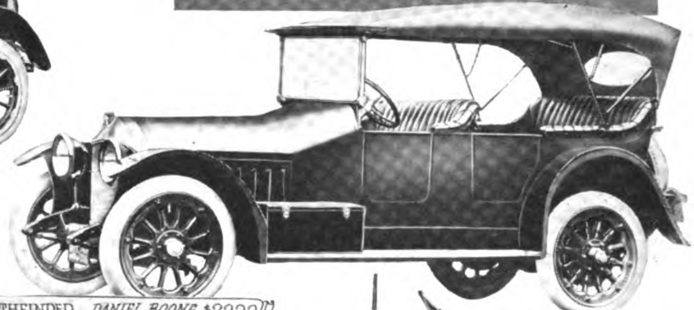
STUDEBAKER SIX $1385



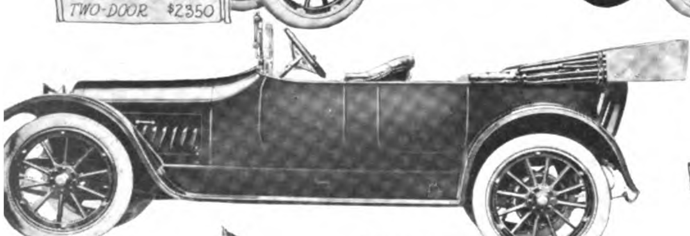
FRANKLIN $2150



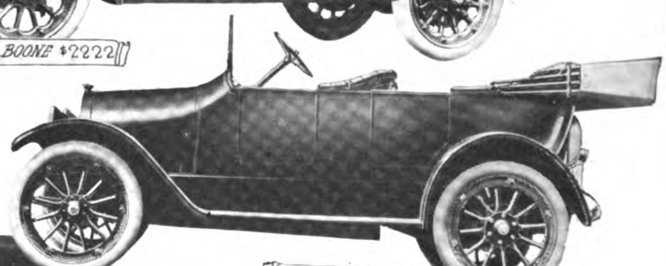
KISSELKAR 6-48 TWO-DOOR $2350



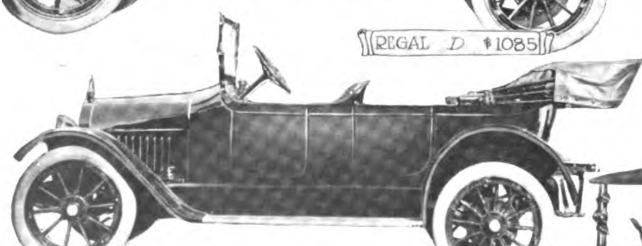
PATHFINDER DANIEL BOONE $2222



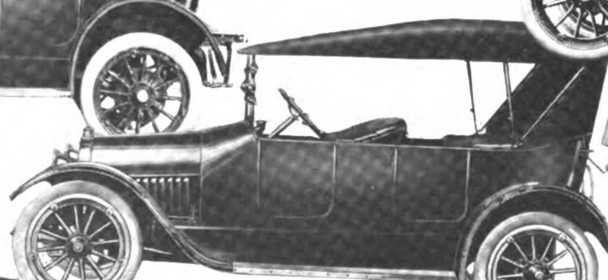
REGAL D $1085



CARTERCAR 9 $1250

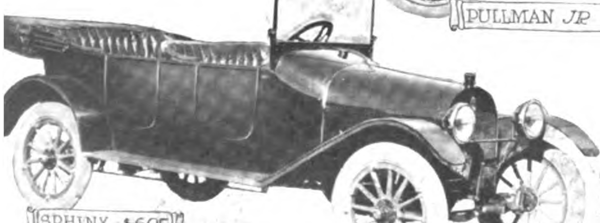


STEARNS-KNIGHT FOUR $1750

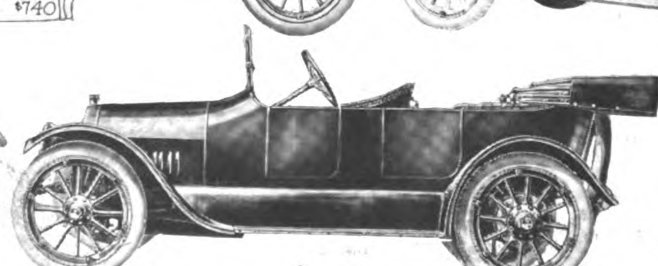


PULLMAN JR $740

EMPIRE 31-40 $975

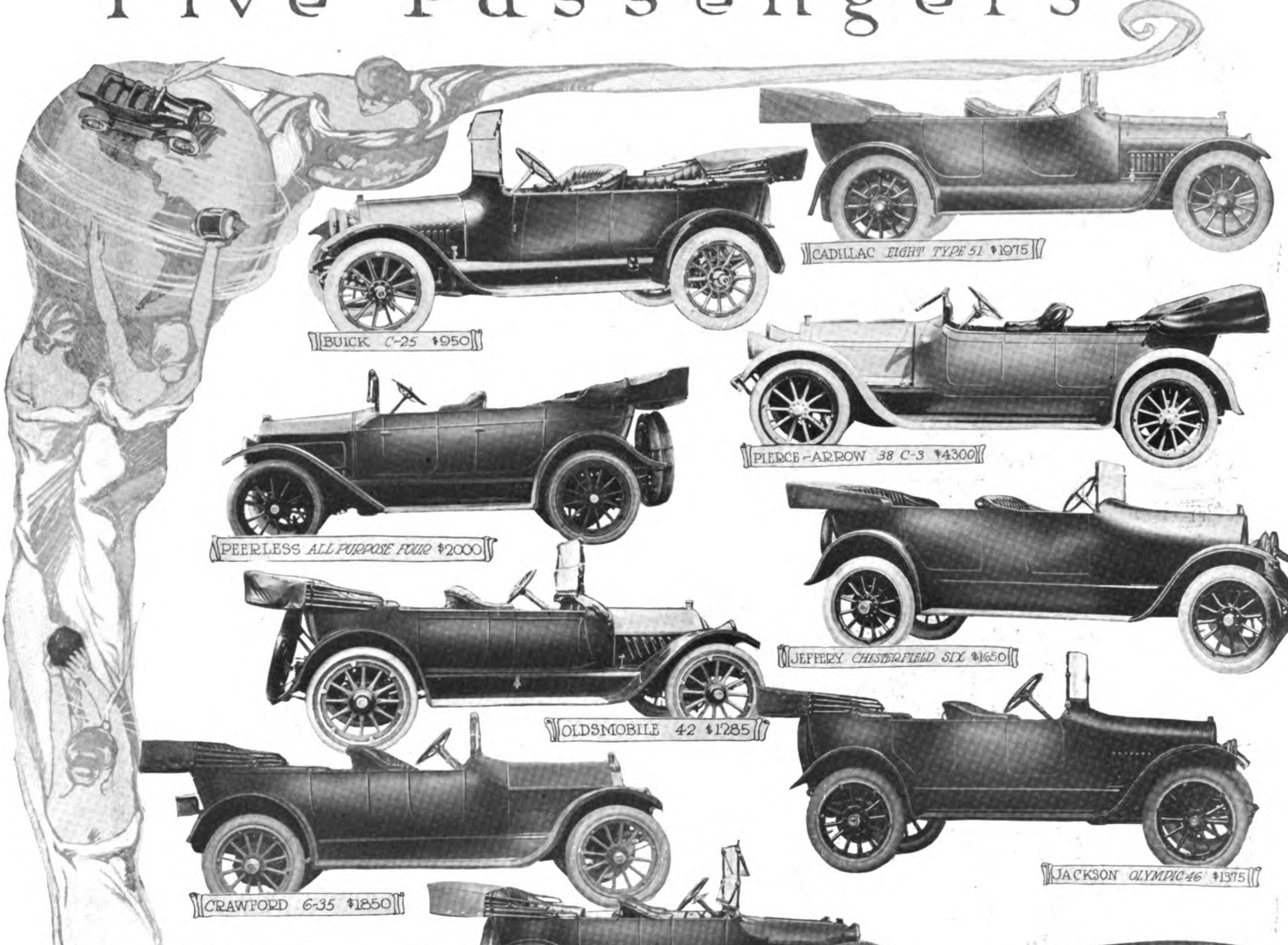


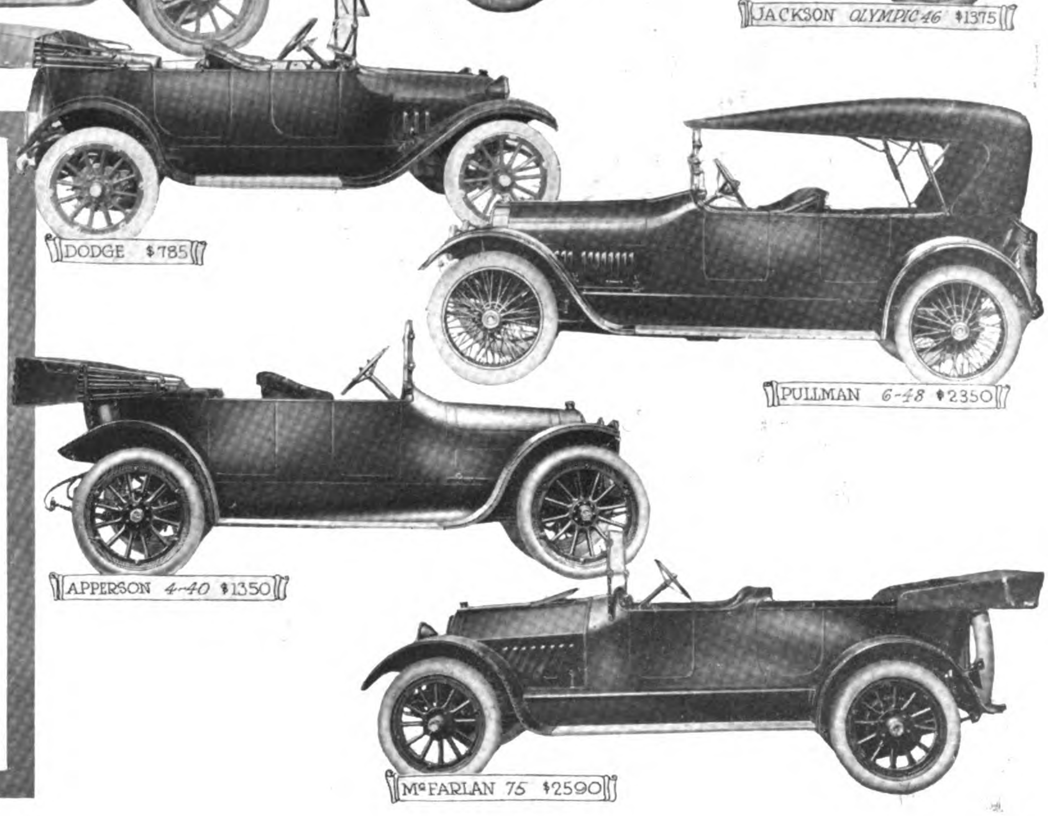
SPHINX $695



PATERSON 4-32 $1095

Five Passengers





Buick, C-25, $950, Four, 3¾ x 3¾, 106 W.B., 32 x 3½-inch tires.

Peerless, All-Purpose, $2,000, Four, 3¾ x 5, 113 W.B., 34 x 4-inch tires.

Oldsmobile, 42, $1,285, Four, 3½ x 5, 112 W.B., 33 x 4-inch tires.

Crawford, 6-35, $1,850, Six, 3½ x 5, 120 W.B., 34 x 4-inch tires.

Dodge, $785, Four, 3⅞ x 4½, 110 W.B., 32 x 3½-inch tires.

Apperson, 4-40, $1,350, Four, 4 x 5, 116 W.B., 34 x 4-inch tires.

Cadillac, Type 51, $1,975, Eight, 3⅛ x 5⅛, 122 W.B., 36 x 4½-inch tires.

Pierce-Arrow, 38-C-3, $4,300, Six, 4 x 5½, 134 W.B., 36 x 4½-inch tires.

Jeffery, Chesterfield, $1,650, Six, 3 x 5, 122 W.B., 34 x 4-inch tires.

Jackson, Olympic 46, $1,375, Four, 4⅛ x 5¼, 117 W.B., 34 x 4-inch tires.

Pullman, 6-48, $2,350, Six, 3¾ x 5¼, 134 W.B., 36 x 4½-inch tires.

McFarlan, 75, $2,590, with Six, 4 x 6, 132 W.B., 36 x 4½-inch tires, $2,900, with Six, 4½ x 6, 132 W.B., 36 x 4½-inch tires.

Cars Carrying Five

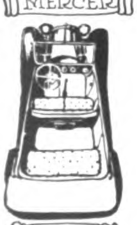

MAXWELL

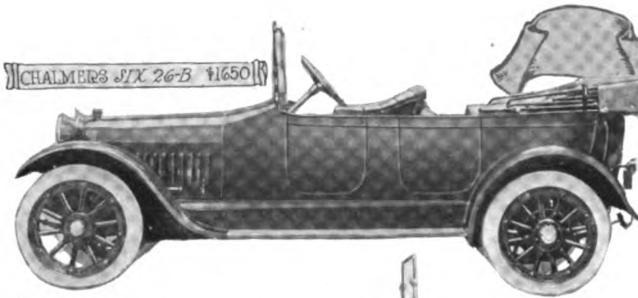

FRANKLIN


KRIT

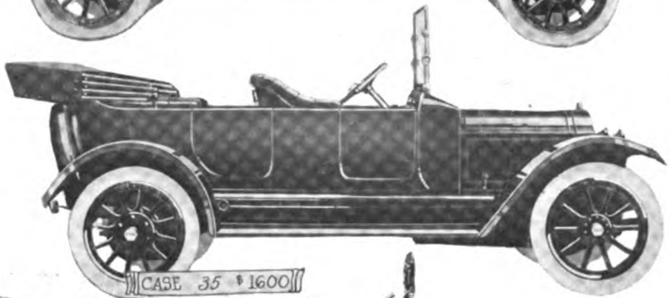

HAYNES

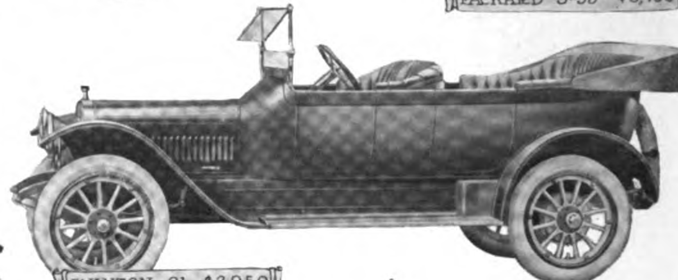

MERCER

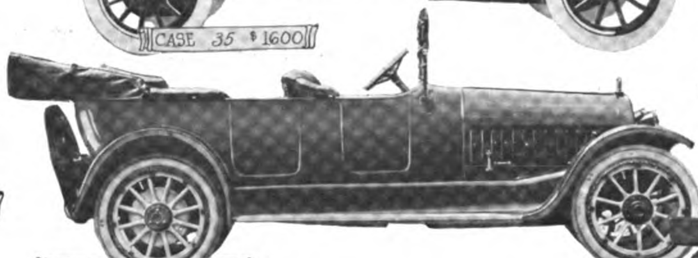

KING

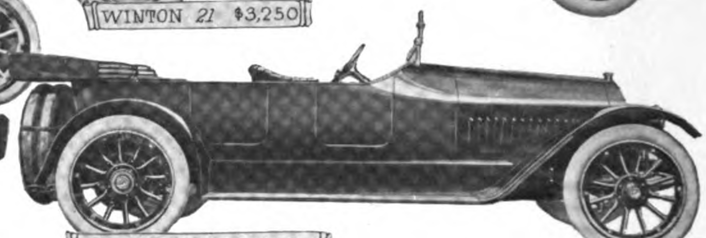

CHALMERS SIX 26-B $1650

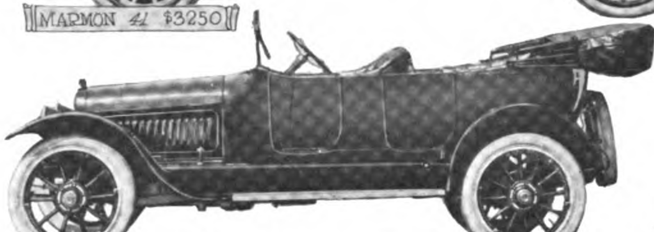

PACKARD 3-38 $3,750

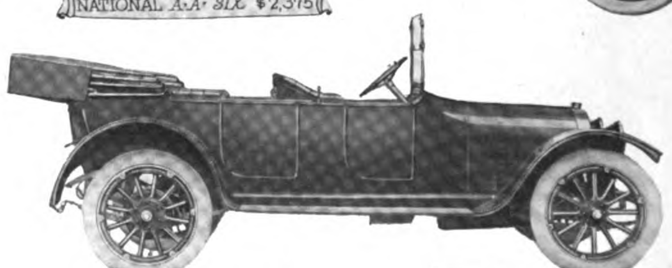

CASE 35 $1600

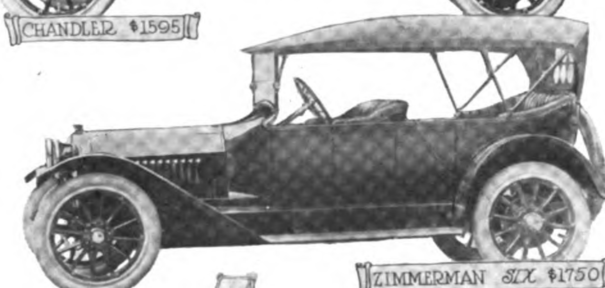

WINTON 21 $3,250


MARMON 41 $3250

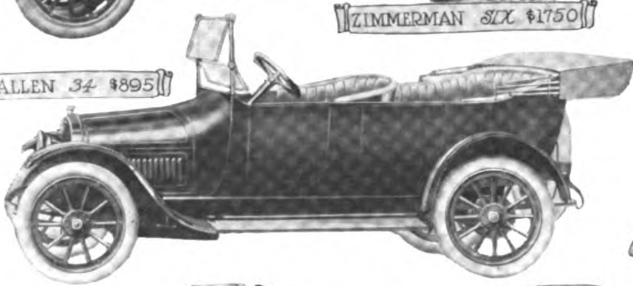

NATIONAL A-A- SIX $2,375

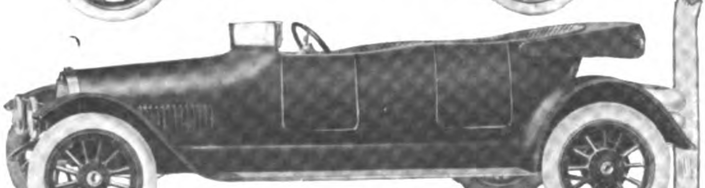

CHANDLER $1595

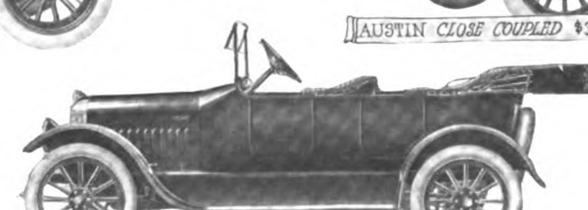

WESCOTT 30 $1150


ZIMMERMAN SIX $1750


IMPERIAL 64 $1085

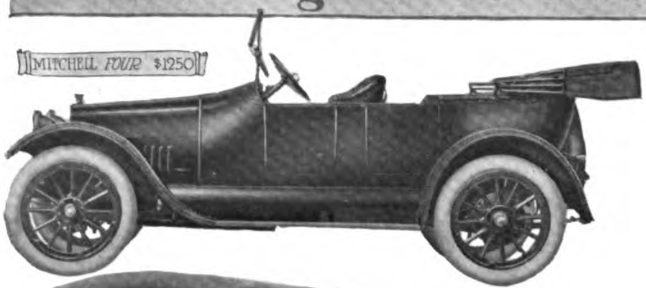

ALLEN 34 $895


AUSTIN CLOSE COUPLED $3,600


GRANT SIX $795

Chalmers, 26 B, $1,650, Six, 3½ x 5½, 125½ W.B., 34 x 4½-inch tires.
Case, 35, $1,600, Four, 4¼ x 5½, 120 W.B., 35 x 4½-inch tires.
Marmon, 41, $3,250, Six, 4¼ x 5½, 132½ W.B., 36 x 4½-inch tires.
Chandler, $1,595, Six, 3⅜ x 5, 120 W.B., 34 x 4-inch tires.
Zimmerman, Six, $1,750.
Allen, 34, $895, Four, 3⅝ x 5, 110 W.B., 32 x 3½-inch tires.
Austin, Close-Coupled, $3,600, Six, 4⅛ x 6, 141 W.B., 34 x 4½-inch tires.
Grant, Six, $795, Six, 2⅞ x 4¼, 106 W.B., 30 x 3½-inch tires.
Packard, 3-38, $3,750, Six, 4 x 5½, 140 W.B., 37 x 5-inch tires.
Winton, 21, $3,250, Six, 4½ x 5½, 136 W.B., 37 x 5-inch tires.
Westcott, 30, $1,150, Four, 3½ x 5, 113 W.B., 33 x 4-inch tires.
National, A. A., $2,375, Six, 3¾ x 5½, 132 W.B., 36 x 4½-inch tires.
Imperial, 64, $1,085, Four, 3¾ x 5, 11[illegible] W.B., 32 x 3½-inch tires.

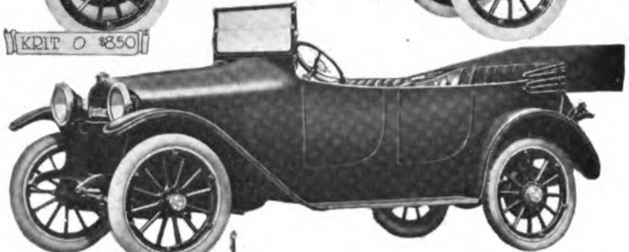
Passengers Continued


MITCHELL FOUR $1250

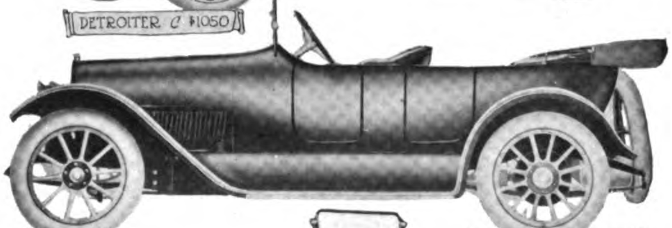

KRIT O $850

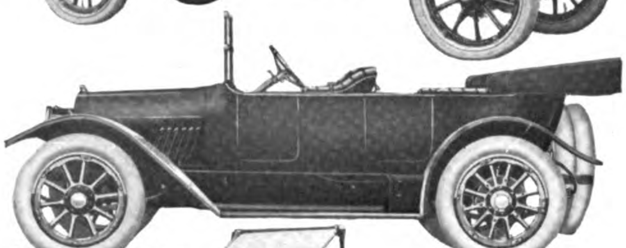

HUPMOBILE

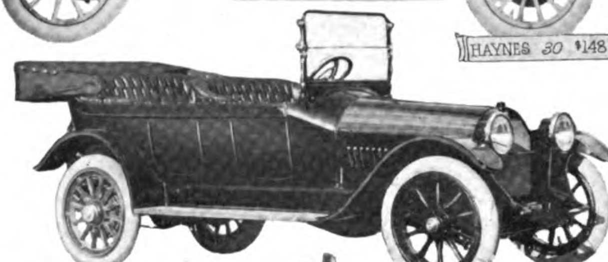

VELIE 15 $1595

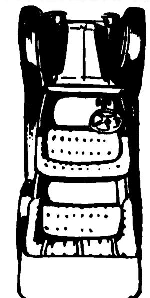

DETROITER C $1050

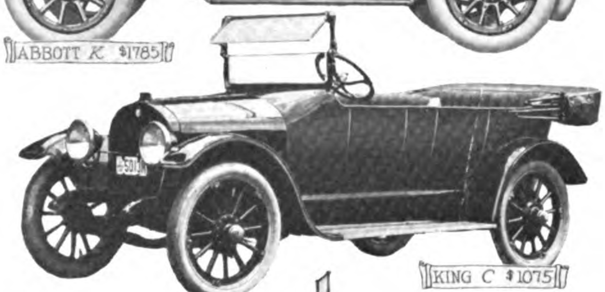

MITCHELL


HAYNES 30 $1485

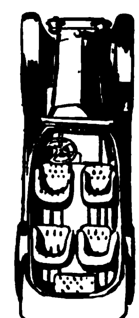

ABBOTT K $1785

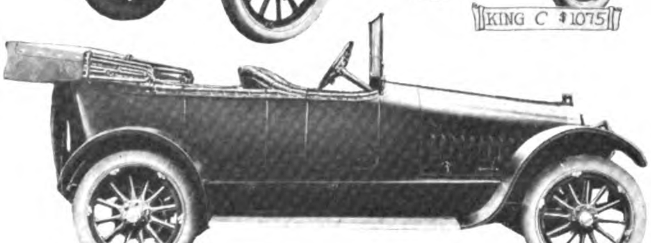

LEXINGTON 6-M-5 $2575

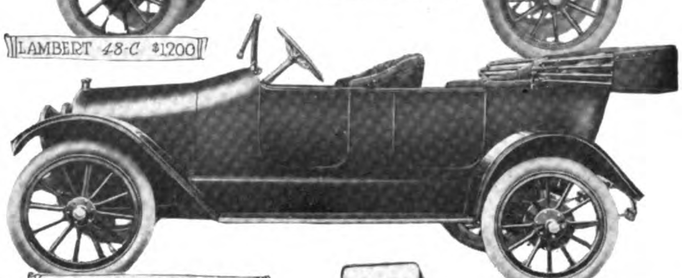

CARTER CAR

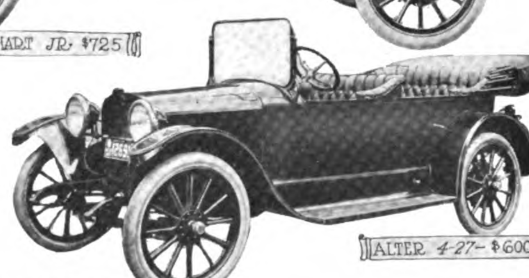

KING C $1075


LAMBERT 48-C $1200


NATIONAL

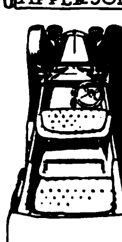

HERFF-BROOKS 6-50 $1375


CROW-ELKHART JR. $725


ALTER 4-27- $600


APPERSON


DORRIS I-A-4- $2200


EMPIRE

Mitchell, Light Four, $1,250, Four, 4 x 5½, 116 W.B., 34 x 4-inch tires.

Velie, 15, $1,595, Six, 3½ x 5, 124 W.B., 34 x 4-inch tires.

Abbott, K, $1,785, Four, 4⅛ x 5¼, 116 W.B., 34 x 4-inch tires.

King, C, $1,075, Four, 3 15/16 x 5, 113 W.B., 33 x 4-inch tires. Starter extra.

Herff-Brooks, 6-50, $1,375, Six, 4 x 4½, 124 W.B., 34 x 4-inch tires.

Krit, O, $850, Four, 3¾ x 4, 108 W.B., 32 x 3½-inch tires.

Detroiter, C, $1,050, Four, 3½ x 5, 112 W.B., 32 x 3½-inch tires.

Haynes, 30, $1,485, Six, 3½ x 5, 121 W.B., 34 x 4-inch tires.

Lexington, 6-M-5, $2,575, Six, 4⅛ x 5, 130 W.B., 36 x 4½-inch tires.

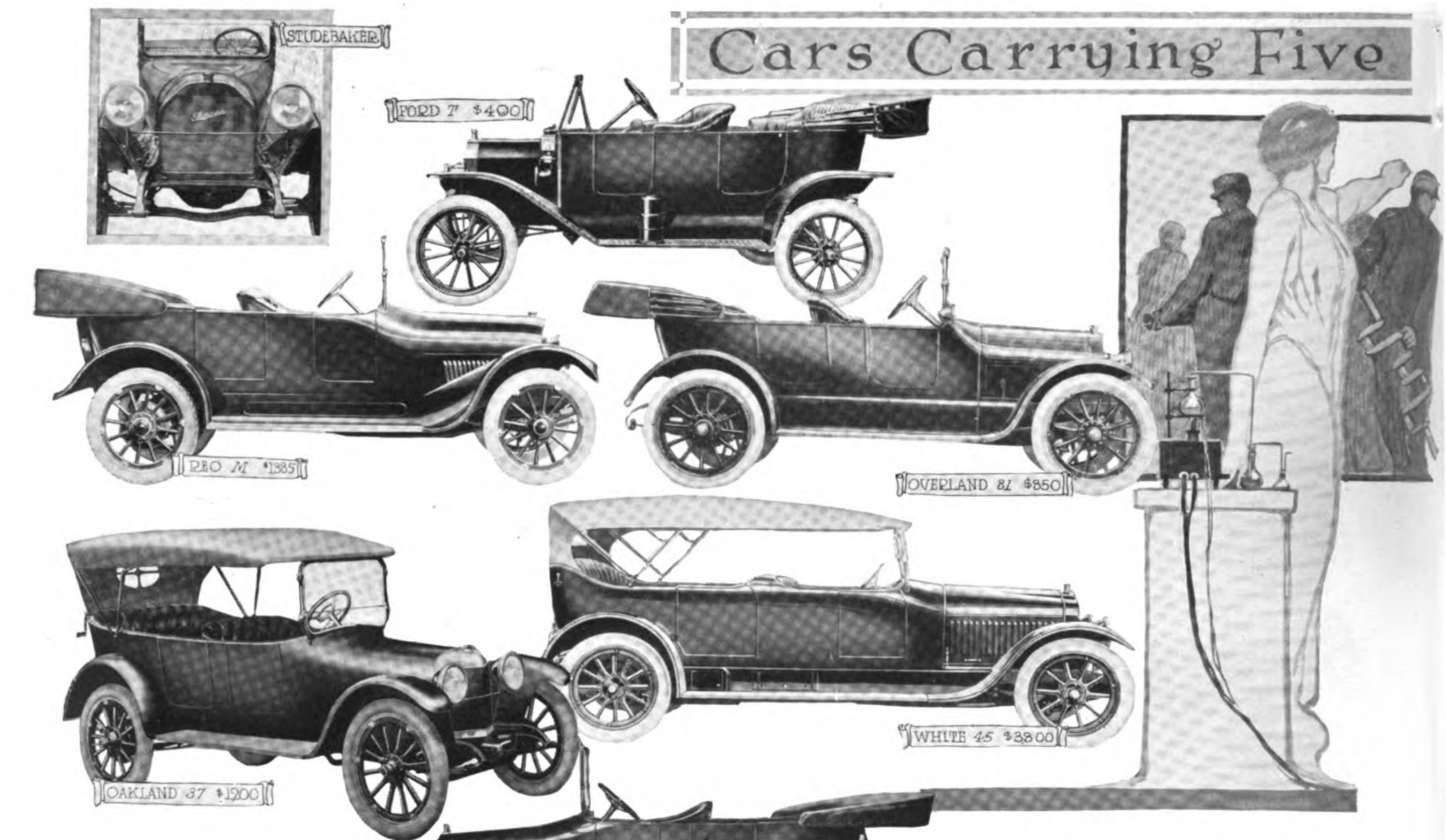
Lambert, 48-C, $1,200, Four, 3¾ x 4, 112 W.B., 32 x 3½-inch tires.

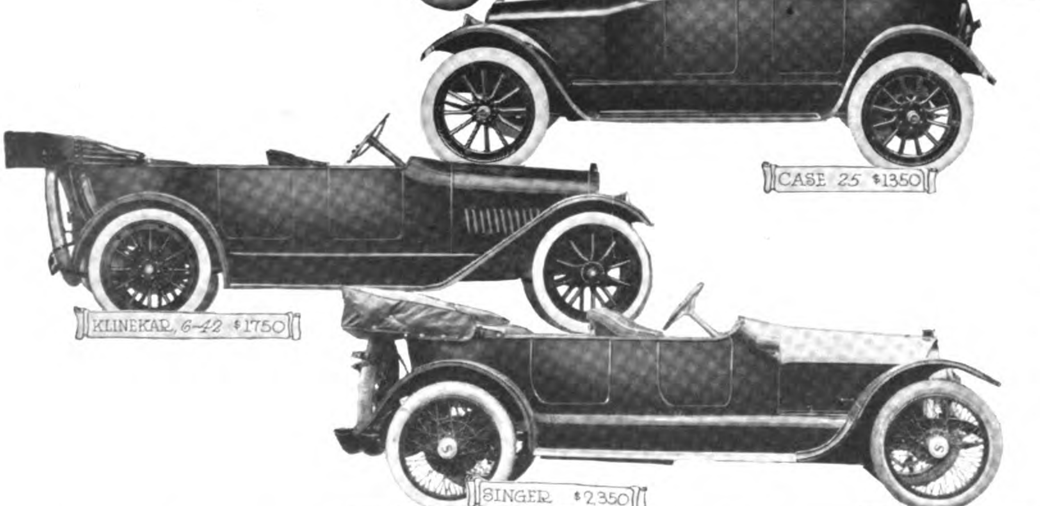
Crow-Elkhart, Jr., $725, 3⅛ x 4½, 104, 30 x 3½.

Alter, 4-27, $600, with starter $685, Four, 3¾ x 4¼, 106 W.B., 30 x 3½-inch tires.

Dorris, I A, $2,200, Four, 4⅜ x 5, 121 W.B., 36 x 4½-inch tires.

Cars Carrying Five





Reo, M, $1,385, Six, 3 9/16 x 5⅛, 122 W.B., 34 x 4-inch tires.

Oakland, 37, $1,200, Four, 3½ x 5, 112 W.B., 33 x 4-inch tires.

Klinekar, 6-42, $1,750, Six, 3½ x 5⅛, 123 W.B., 34 x 4-inch tires.

Case, 25, $1,350, Four, 3¾ x 4¾, 115½ W.B., 34 x 4-inch tires.

Singer, $2,350, Six, 4 x 5½, 135 W.B., 36 x 4½-inch tires.

Chevrolet, H, Baby Grand, $875, Four, 3 11/16 x 4, 106 W.B., 32 x 3½-inch tires.

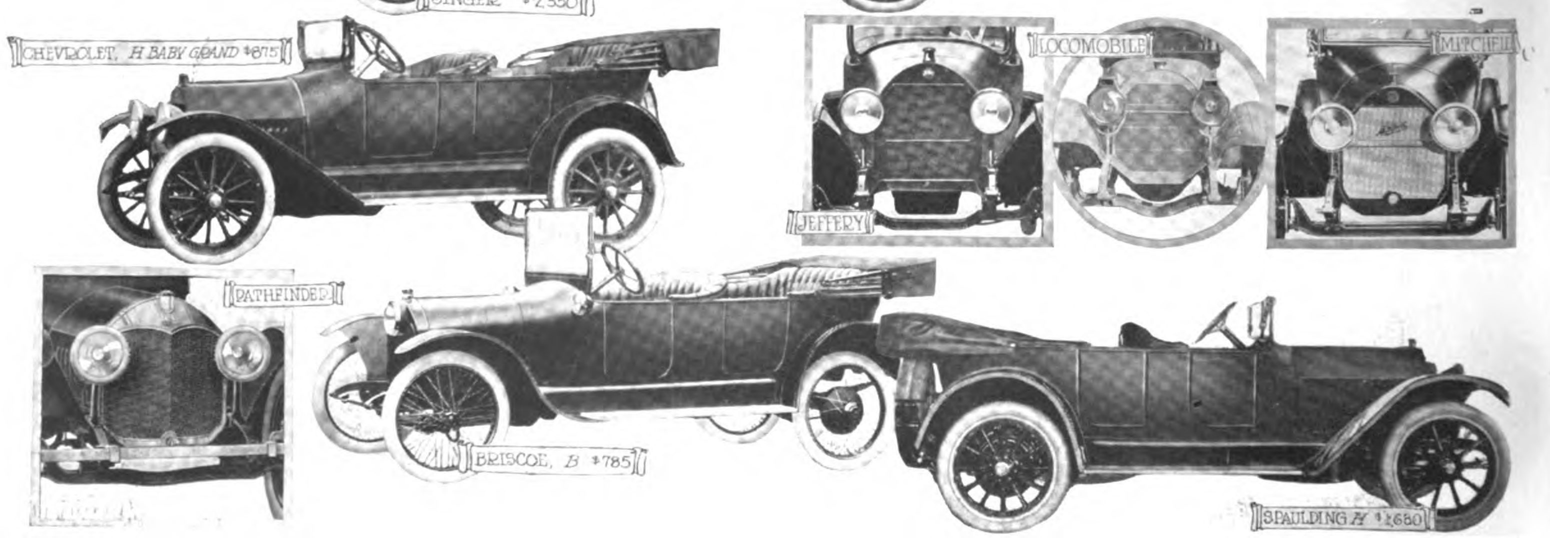
Briscoe, B, $785, Four, 3⅛ x 5⅛, 107 W.B., 30 x 3½-inch tires.

Ford, T, $490, Four, 3¾ x 4, 100 W.B., 30 x 3½-inch tires.

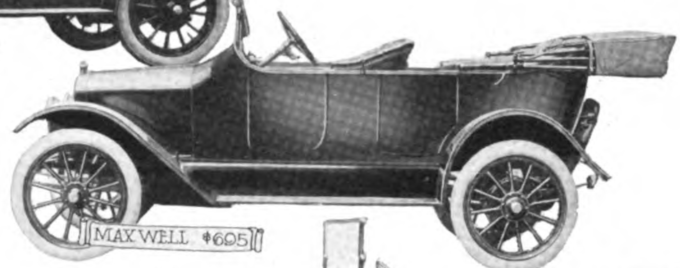
Overland, 81, $850, Four, 4 x 4½, 106 W.B., 33 x 4-inch tires.

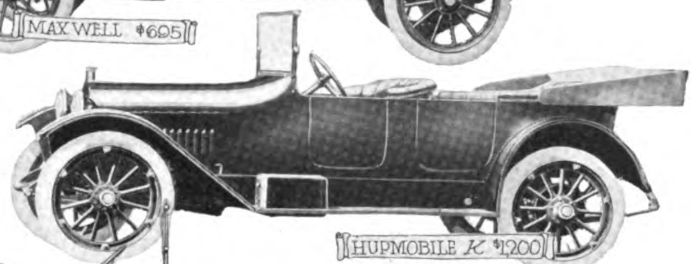
White, 45-Touring, $3,800, Four, 4¼ x 6¾, 132¾ W.B., 34 x 4½-inch tires.

Spaulding, H, $1,680, Four, 4¼ x 5½, 120 W.B., 36 x 4-inch tires.



Passengers Continued





Glide, 30, $1,195, Four, 3½ x 5, 114 W.B., 32 x 4-inch tires.

R. C. H., $900, Four, 3¼ x 5, 110 W.B., 32 x 3½-inch tires.

Studebaker, Four, $985, Four, 3½ x 5, 108 W.B., 33 x 4-inch tires.

Maxwell, Touring, $695, Four, 3⅝ x 4½, 102 W.B., 30 x 3½-inch tires. Starter extra.

Hupmobile, K, $1,200, Four, 3¾ x 5½, 119 W.B., 34 x 4-inch tires.

Reo, R, $1,050, Four, 4⅛ x 4½, 115 W.B., 34 x 4-inch tires.

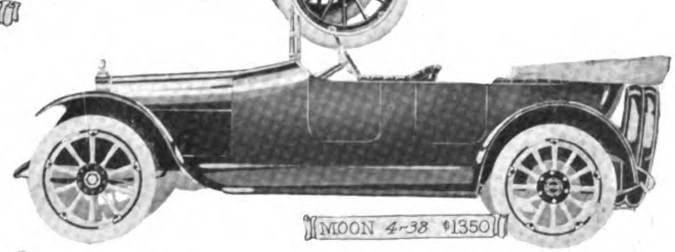
Moon, 4-38, $1,350, Four, 3¾ x 5, 122 W.B., 34 x 4-inch tires.

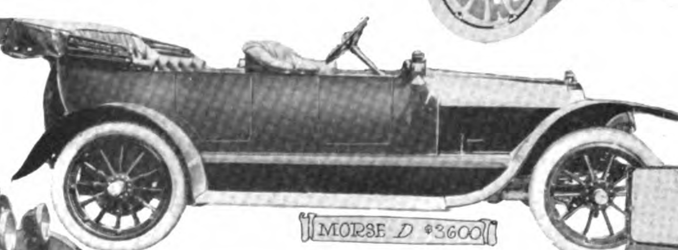
Morse, D, $3,600, Four, 4⅝ x 5, 127 W.B., 36 x 4½-inch tires.

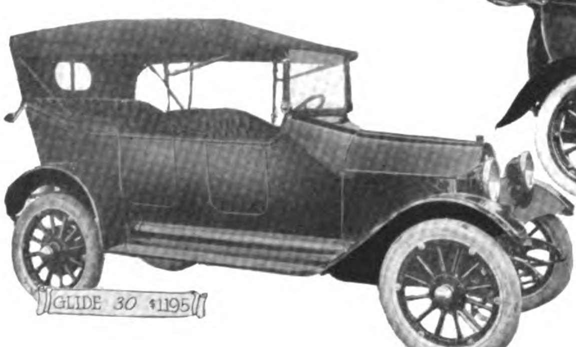
Auburn, 4-36, $1,075, Four, 3¾ x 5, 114 W.B., 32 x 4-inch tires.

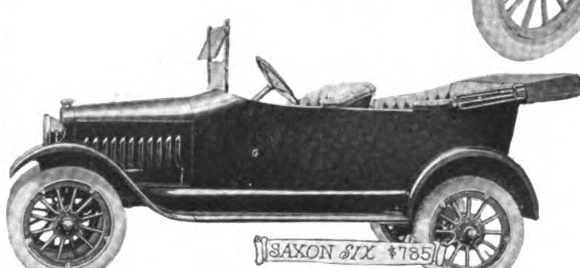
Saxon, Six, $785, Six, 2⅞ x 4½, 112 W.B., 32 x 3½-inch tires.

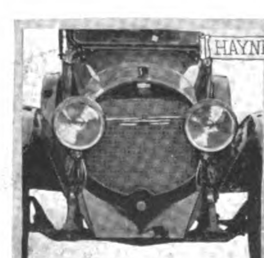
In addition to these, the following cars are made in five-passenger form but are not illustrated as such: Arbenz, Bauer, Chadwick, Corbitt, Davis, Enger, Fiat, Firestone, Great Western, Inter-State, Locomobile, Lyons-Knight, Meteor, Moline, Monarch, Paige, Pratt, Republic, Stevens-Duryea, Touraine.



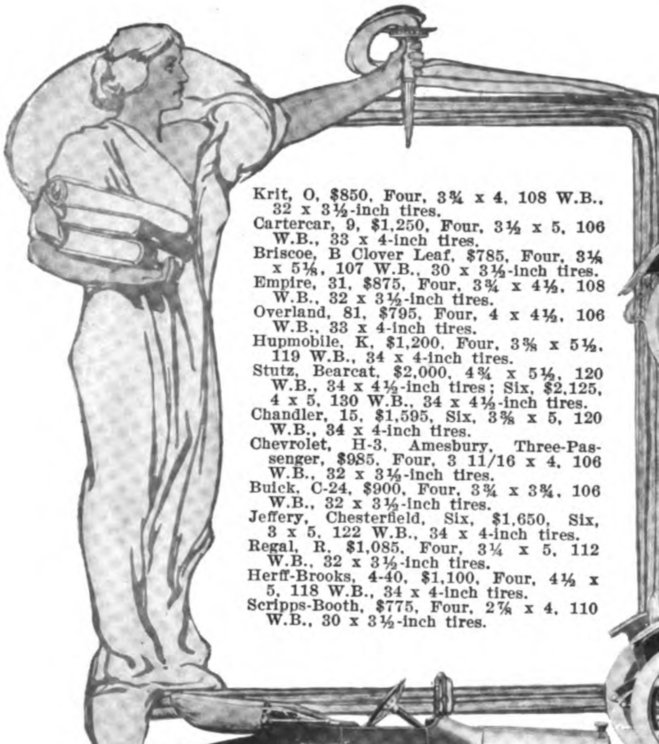




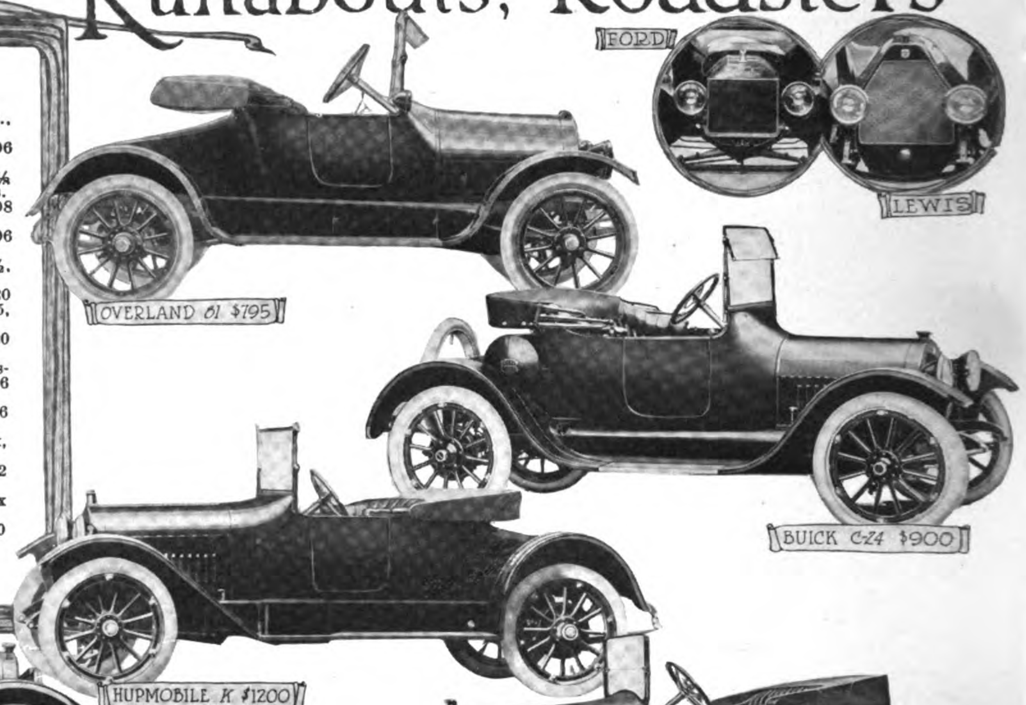


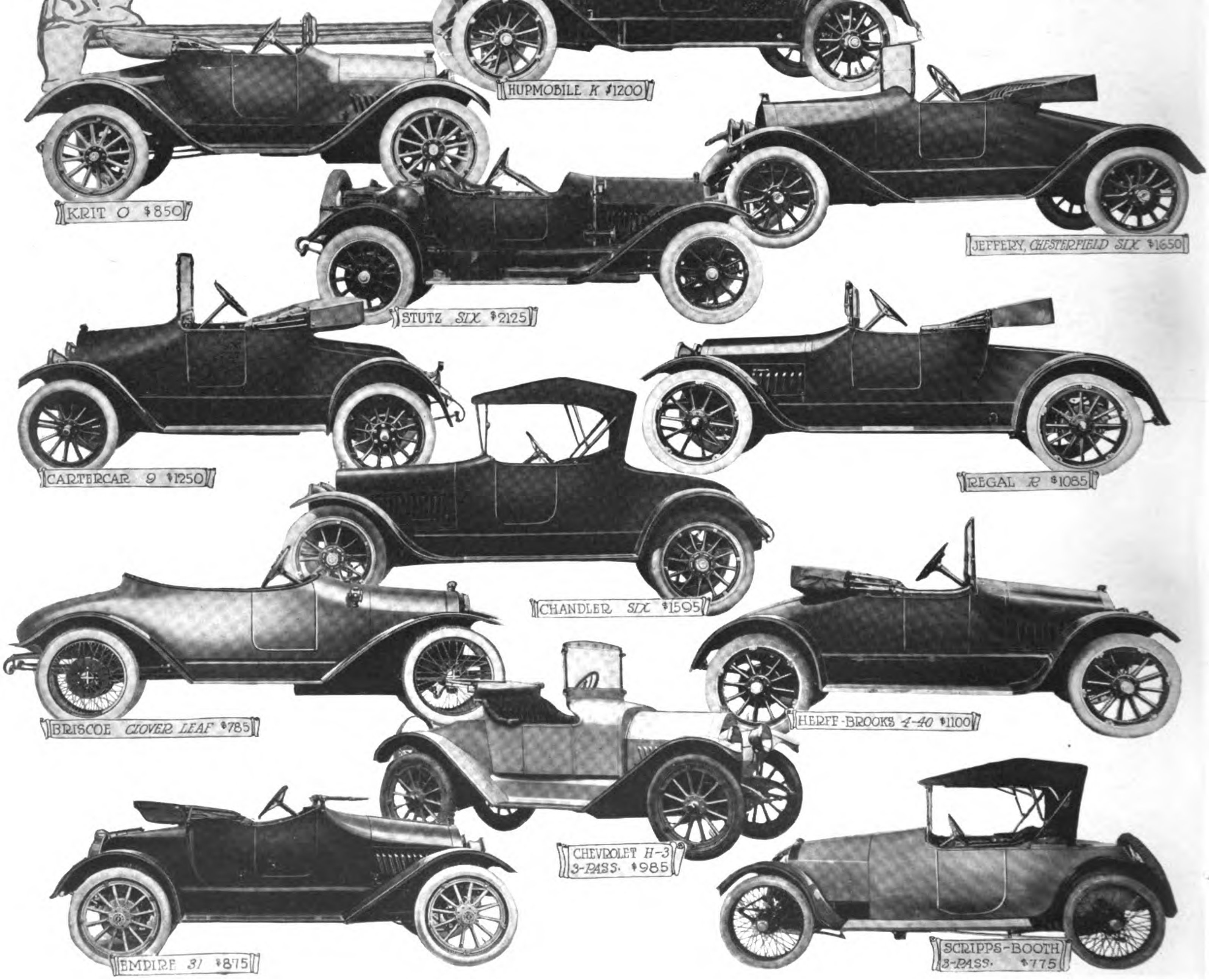


Runabouts, Roadsters

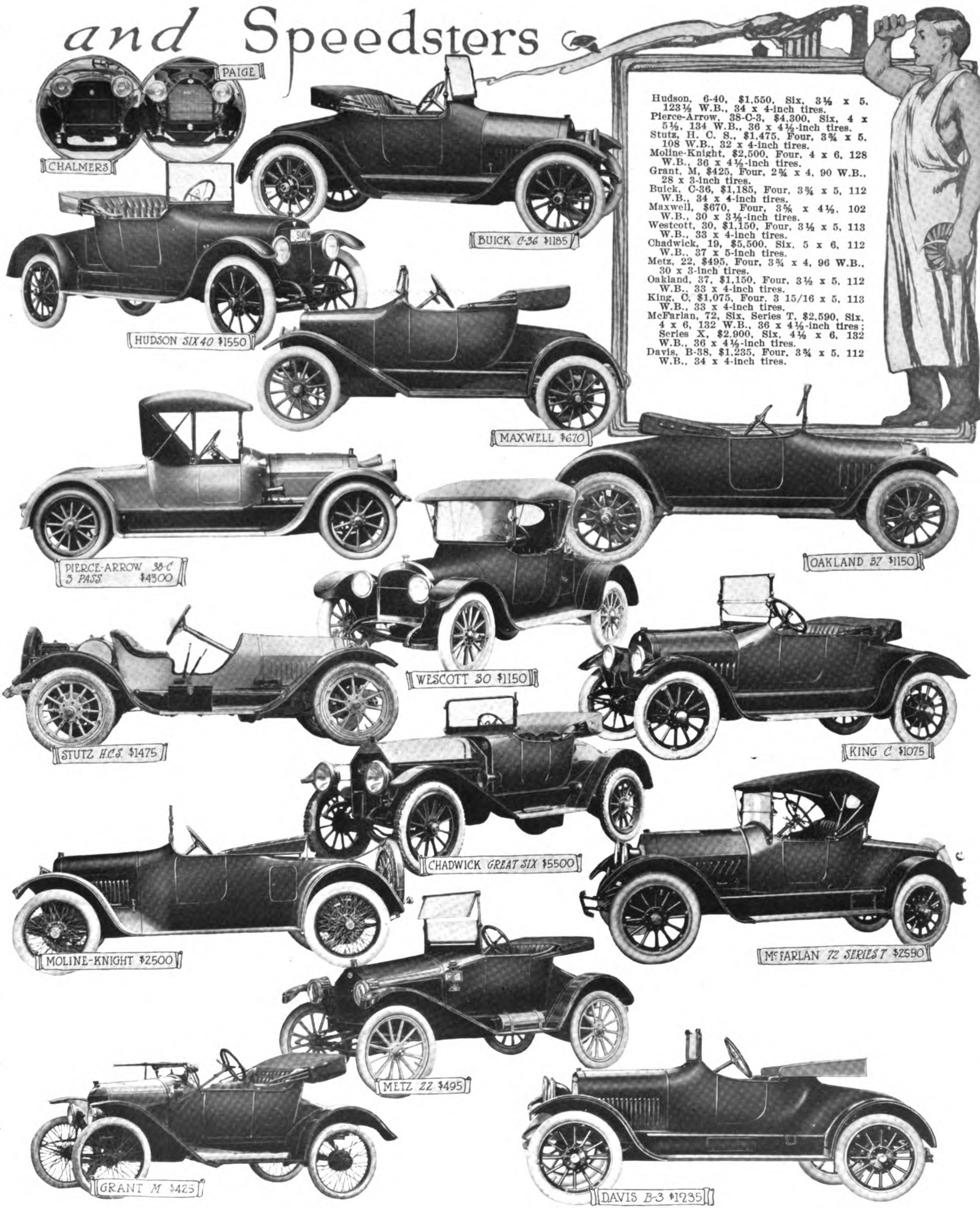


Krit, O, $850, Four, 3¾ x 4, 108 W.B., 32 x 3½-inch tires.
Cartercar, 9, $1,250, Four, 3½ x 5, 106 W.B., 33 x 4-inch tires.
Briscoe, B Clover Leaf, $785, Four, 3⅛ x 5⅛, 107 W.B., 30 x 3½-inch tires.
Empire, 31, $875, Four, 3¾ x 4½, 108 W.B., 32 x 3½-inch tires.
Overland, 81, $795, Four, 4 x 4½, 106 W.B., 33 x 4-inch tires.
Hupmobile, K, $1,200, Four, 3⅜ x 5½, 119 W.B., 34 x 4-inch tires.
Stutz, Bearcat, $2,000, 4¾ x 5½, 120 W.B., 34 x 4½-inch tires; Six, $2,125, 4 x 5, 130 W.B., 34 x 4½-inch tires.
Chandler, 15, $1,595, Six, 3⅜ x 5, 120 W.B., 34 x 4-inch tires.
Chevrolet, H-3, Amesbury, Three-Passenger, $985, Four, 3 11/16 x 4, 106 W.B., 32 x 3½-inch tires.
Buick, C-24, $900, Four, 3¾ x 3¾, 106 W.B., 32 x 3½-inch tires.
Jeffery, Chesterfield, Six, $1,650, Six, 3 x 5, 122 W.B., 34 x 4-inch tires.
Regal, R, $1,085, Four, 3¼ x 5, 112 W.B., 32 x 3½-inch tires.
Herff-Brooks, 4-40, $1,100, Four, 4½ x 5, 118 W.B., 34 x 4-inch tires.
Scripps-Booth, $775, Four, 2⅞ x 4, 110 W.B., 30 x 3½-inch tires.



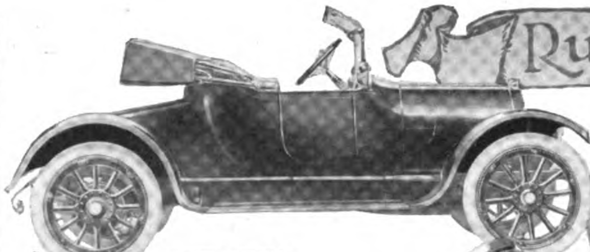


and Speedsters

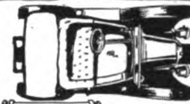


Hudson, 6-40, $1,550, Six, 3½ x 5, 123½ W.B., 34 x 4-inch tires.
Pierce-Arrow, 38-C-3, $4,300, Six, 4 x 5½, 134 W.B., 36 x 4½-inch tires.
Stutz, H. C. S., $1,475, Four, 3¾ x 5, 108 W.B., 32 x 4-inch tires.
Moline-Knight, $2,500, Four, 4 x 6, 128 W.B., 36 x 4½-inch tires.
Grant, M, $425, Four, 2¾ x 4, 90 W.B., 28 x 3-inch tires.
Buick, C-36, $1,185, Four, 3¾ x 5, 112 W.B., 34 x 4-inch tires.
Maxwell, $670, Four, 3⅝ x 4½, 102 W.B., 30 x 3½-inch tires.
Westcott, 30, $1,150, Four, 3½ x 5, 113 W.B., 33 x 4-inch tires.
Chadwick, 19, $5,500, Six, 5 x 6, 112 W.B., 37 x 5-inch tires.
Metz, 22, $495, Four, 3¾ x 4, 96 W.B., 30 x 3-inch tires.
Oakland, 37, $1,150, Four, 3½ x 5, 112 W.B., 33 x 4-inch tires.
King, C, $1,075, Four, 3 15/16 x 5, 113 W.B., 33 x 4-inch tires.
McFarlan, 72, Six, Series T, $2,590, Six, 4 x 6, 132 W.B., 36 x 4½-inch tires; Series X, $2,900, Six, 4½ x 6, 132 W.B., 36 x 4½-inch tires.
Davis, B-38, $1,235, Four, 3¾ x 5, 112 W.B., 34 x 4-inch tires.

Runabouts, Roadsters

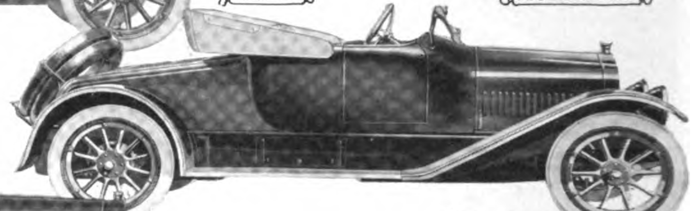


OVERLAND 80 $1050

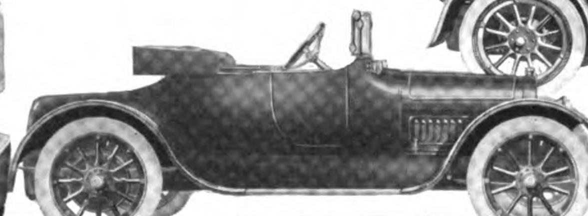


GRANT

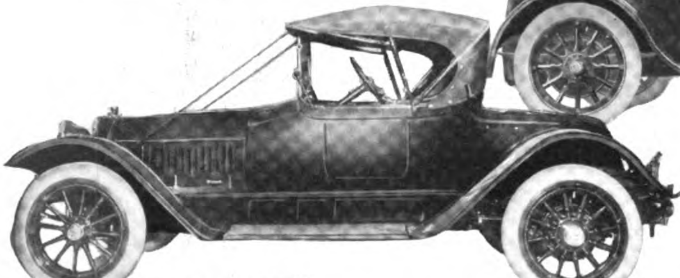
STUDEBAKER



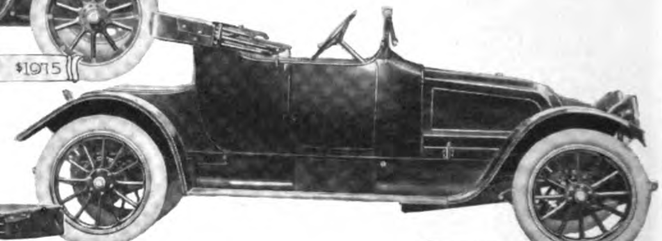
WHITE 30 3-PASS $2700



CADILLAC EIGHT 51 $1975

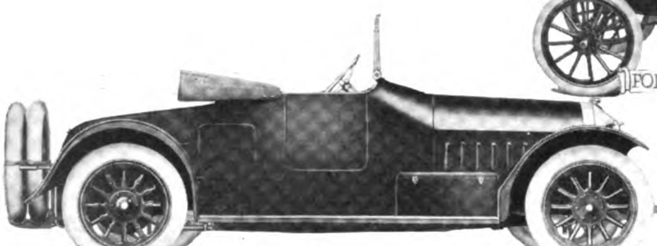


LOCOMOBILE R-4 $4400

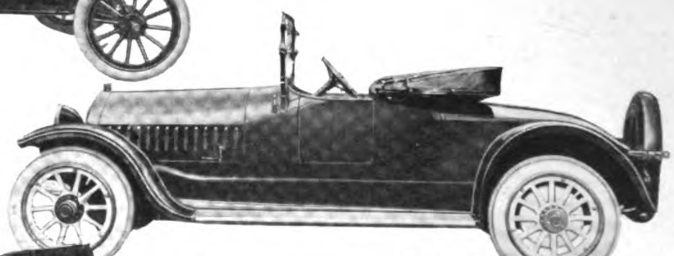


FRANKLIN $ 2150

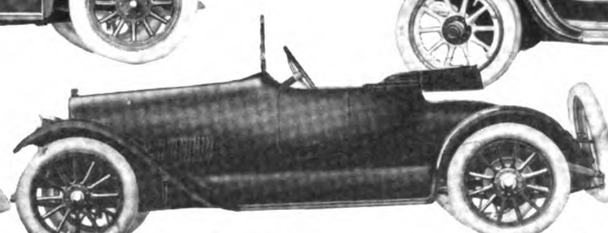
FORD 'T' $440



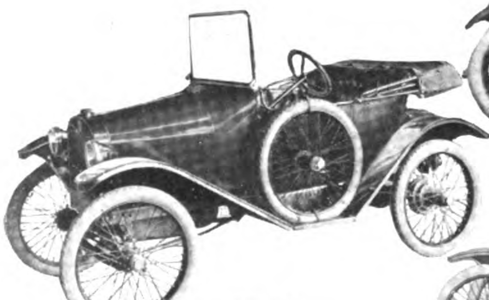
PATHFINDER DANIEL BOONE $2222



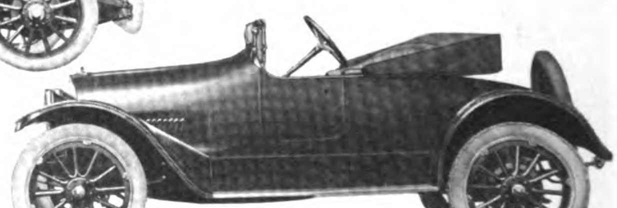
MARMON 41 $3250



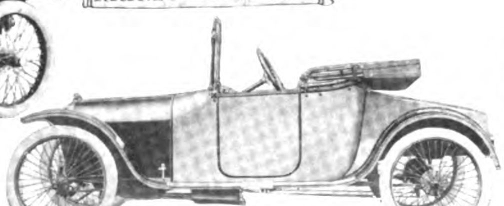
HAYNES 30-SIX $1485



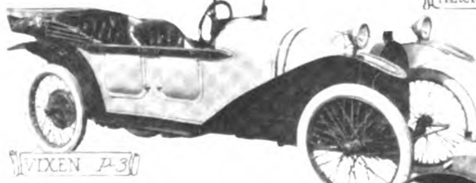
TRUMBULL 15-A $395



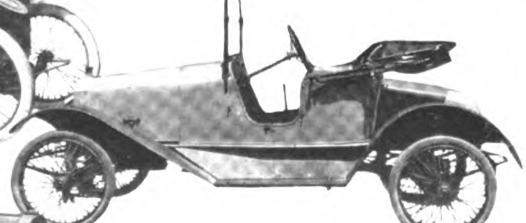
REO S-F



HERRESHOFF 4-16 $500



VIXEN P-3



ARGO A $295

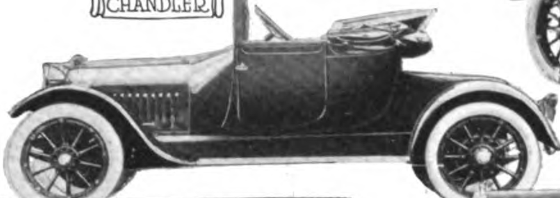
MERZ C $375

Locomobile, R-4, $4,400, Six, 4¼ x 5, 132 W.B., 37 x 5-inch tires.
Pathfinder, Daniel Boone, $2,222, Six, 3¾ x 5¼, 125 W.B., 34 x 4½-inch tires.
Trumbull, 15-A, $395, Four, 2⅞ x 4, 80 W.B., 28 x 3-inch tires.
Vixen, P-3, $395, Four, 2¾ x 4, 106 W.B., 28 x 3-inch tires.
Merz, C, $375.
Overland, 80, $1,050, Four, 4⅛ x 4½, 114 W.B., 34 x 4-inch tires.
Cadillac, Eight, $1,975, Eight, 3⅛ x 5⅛, 122 W.B., 36 x 4½-inch tires.
Haynes, 30, $1,485, Six, 3½ x 5, 121 W.B., 34 x 4-inch tires.
Herreshoff, 4-16, $500, Four, 2⅝ x 3¼, 94 W.B., 28 x 3-inch tires.
Ford, T, $440, Four, 3¾ x 4, 100 W.B., 30 x 3½-inch tires.
Argo, A, $295, Four, 2 5/16 x 4, 90 W.B., 28 x 2½-inch tires.
White, 30, Three-Passenger Roadster, $2,700, Four, 3¾ x 5⅛, 115 W.B., 32 x 4 tires.
Franklin, $2,150, Six 3⅝ x 4, 120 W.B.
Marmon, 41, $3,250, Six, 4¼ x 5½, 132½.
Reo, S. T., Four, $1,575, 4⅛ x 4½, 112 W.B.

and Speedsters Continued

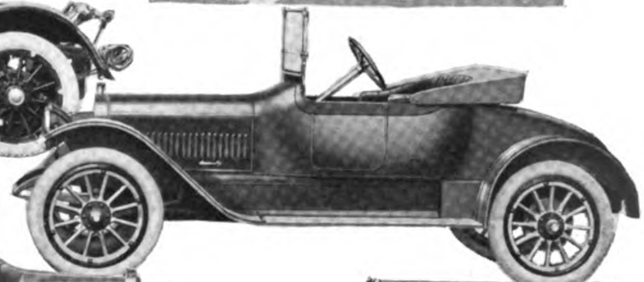
CHANDLER

STUDEBAKER FOUR 3 PASS. $985



CHALMERS COUPELET 26 B $1900

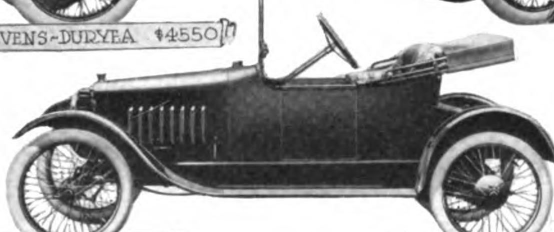
KISSELKAR 36-FOUR $1450



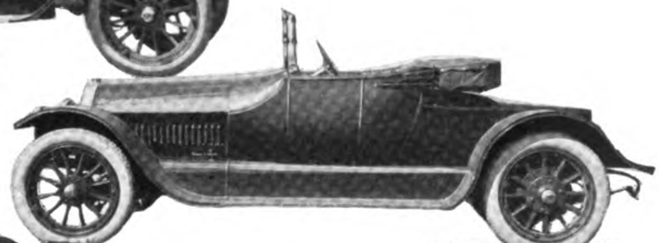
WINTON F-1 $3250

STEVENS-DURYEA $4550

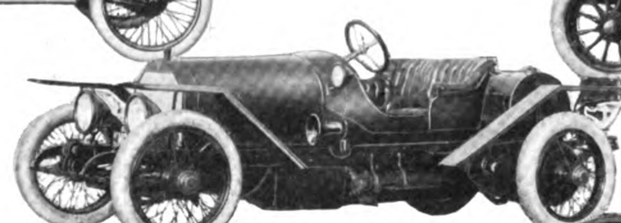
OLDSMOBILE 42 $1285



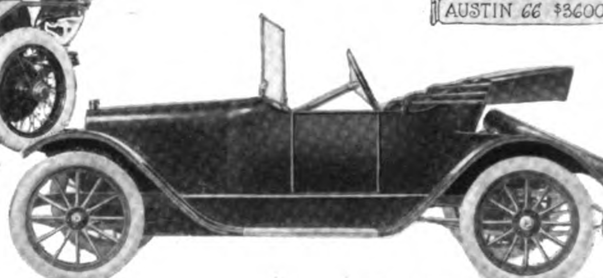
SAXON A $395



AUSTIN 66 $3600

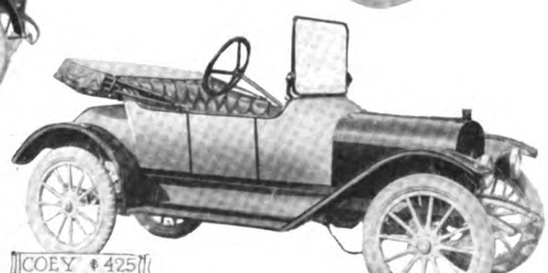


SIMPLEX SERIES F $6900



PARTIN-PALMER 20 $495

ALLEN 34 $895

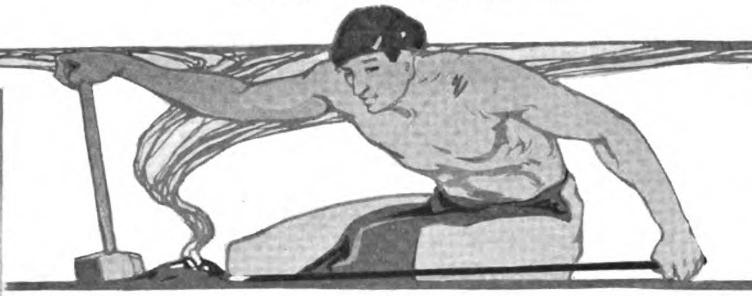


COEY $425

McINTYRE 1915 $490

REMINGTON $495

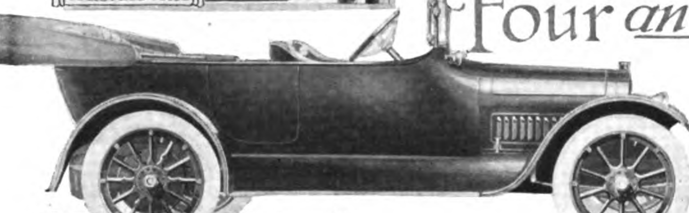
Chalmers, 26B, Coupelet, $1,900, Six, 3½ x 5½, 125 W.B., 34 x 4½-inch tires.
Stevens-Duryea, Disappearing Top, $4,550, Six, 4⅜ x 5½, 131 W.B., 37 x 4½-inch tires.
Saxon, A, $395, Four, 2⅝ x 4, 96 W.B., 28 x 3-inch tires.
Allen, 34, $895, Four, 3⅝ x 5, 110 W.B., 32 x 3½-inch tires.
Studebaker, Four, Three-Passenger, $985, Four, 3½ x 5, 108 W.B., 33 x 4-inch tires.
Kisselkar, 36-4, $1,450, Four, 4¼ x 5½, 121 W.B., 34 x 4-inch tires.
Oldsmobile, 42, $1,285, Four, 3½ x 5, 112 W.B., 33 x 4-inch tires.
Simplex, Model F, $6,900, Six, 3¾ x 5½, 130 W.B., 35 x 4½-inch tires.
Coey, Four, $425, Four 2¾ x 4½, 96 W.B., 28 x 3-inch tires.
McIntyre, 1915, $490.
Remington, $495, Four, 2¾ x 4, 100 W.B., 28 x 3-inch tires.
Winton, F-1, $3,250, Six, 4½ x 5½, 130 W.B., 37 x 5-inch tires.
Austin, 66, $3,600, Six, 4½ x 6, 141 W.B., 34 x 4½-inch tires.
Partin-Palmer, 20, $495, Four, 3¼ x 4, 96 W.B., 28 x 3-inch tires.



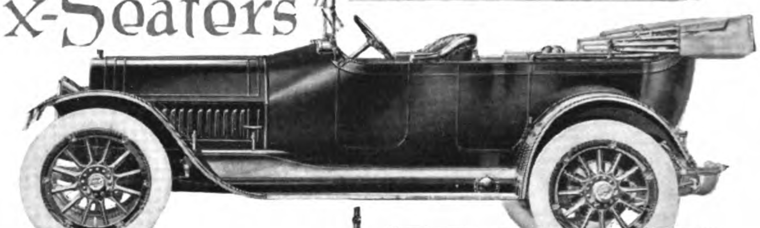
CARTERCAR

DETROITER

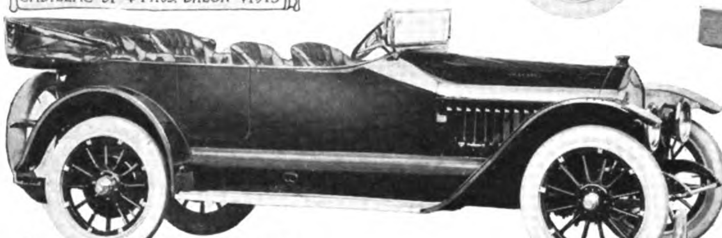
Four and Six-Seaters



CADILLAC 51 4-PASS. SALON $1975

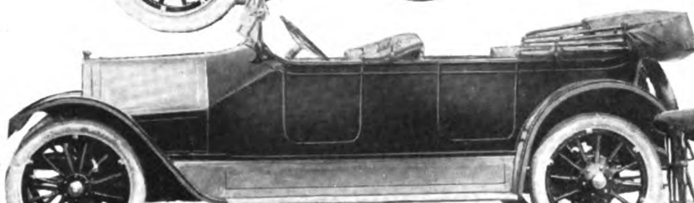


MITCHELL SPECIAL SIX 6-PASS $1995

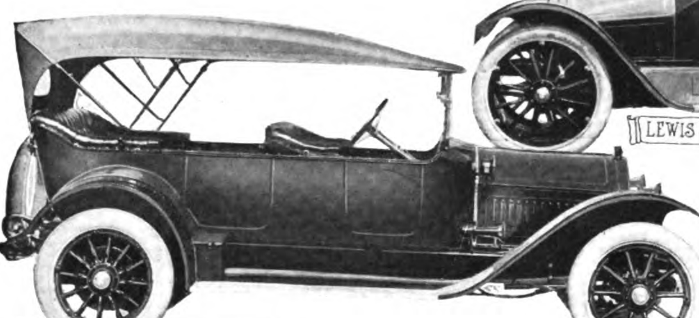


NATIONAL AA 4-PASS $2375

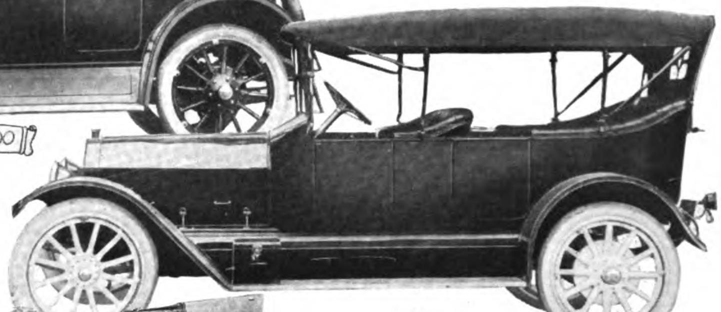
MOON 6-40 6-PASS. $1575



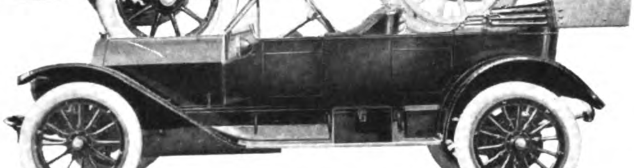
LEWIS SIX 6-PASS. $1600



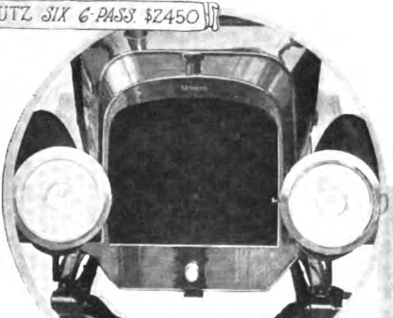
STUTZ SIX 6-PASS. $2450



CROW-ELKHART E-66 6-PASS $1945



CORBITT E 4-PASS. $1250

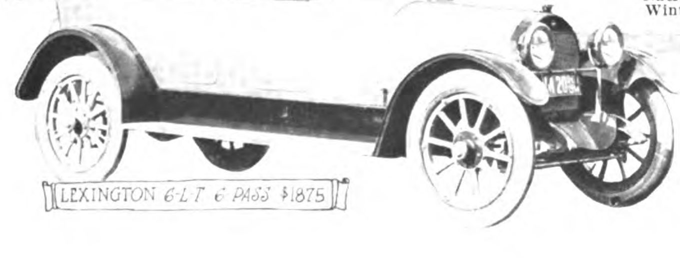


MONARCH

AUSTIN

Cadillac, 51 Salon, Eight, 3⅛ x 5⅛, Four-passenger, $1,975, 122 W.B., 36 x 4½-inch tires.
National, A. A., Six, 3¾ x 5½, Four-passenger, $2,375, 132 W.B., 36 x 4½-inch tires.
Stutz, Touring, Six-passenger, Four, 4¾ x 5½, $2,275, Six, 4 x 5, $2,450, 130 W.B., 34 x 4½-inch tires.
Lexington, 6-L-T, 3½ x 5, Six-passenger, $1,875, 128 W.B., 34 x 4-inch tires.
Lewis, Six, Six-passenger, $1,600, 135 W.B., 36 x 4-inch tires.
Corbitt, Model E, Four, 4 x 4½, Four-passenger, $1,250, 120 W.B., 34 x 4-inch tires.
Mitchell, Special Six, Six-passenger, $1,995, Six, 4¼ x 6, 132 W.B., 36 x 4-inch tires.
Moon, 6-40, 3½ x 5, Six-passenger, $1,575, 122 W.B., 34 x 4-inch tires.
Crow-Elkhart, E-66, Six-passenger, $1,945, 3⅞ x 5½, 130.
Kissel, 6-48. Two-door, Four-passenger, $2,350, Six, 4 x 5½, 132½ W. B., 36 x 4½-inch tires.

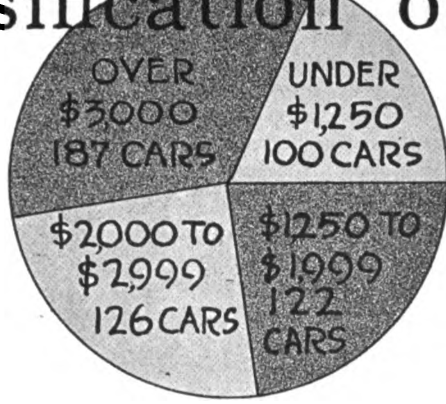
In addition to these, the following cars are made in six-passenger form but are not illustrated as such: Auburn, Austin, Davis, Great Western, Locomobile, McFarlan, National, Packard, Stearns-Knight, Velie, Winton.



LEXINGTON 6-L-T 6-PASS $1875

KISSELKAR 6-48 4-PASS. TWO-DOOR $2350

Price Classification of 1915 Cars



IN the following tables is given a list of American cars listed under four price classifications. These classes are divided as follows: The first includes all cars listing up to $1,250, the second all those from $1,250 to $1,999, the third from $2,000 to $2,999 and the fourth above $3,000.

These tables are a guide to the buyer. They tell him the type of body he can get on a car of any price. They give the power of the motor, the length of wheelbase, the tire size and left or right drive. The average price of cars in these four classes are as follows: $855, $1,419, $2,454, and $4,563. This is a reduction all along the line as compared with 1914 when the four prices of average cars were respectively $950, $1,650, $2,460 and $4,700. The average price for 1915 of all American cars is $2,005, for 1914 it was $2,635.

Automobiles Listed Under $1250

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Allen, 34	Roadster, 2	895	4	21.08	110	32x3½	Left
Allen, 34	Touring, 5	895	4	21.08	110	32x3½	Left
Alter, 4-27	Touring, 5	685	4	22.50	106	30x3½	Left
Argo	Roadster, 2	295	4	8.52	90	28x2½	Left
Auburn, 4-36	Roadster, 2	1,075	4	22.50	114	32x4	Left
Auburn, 4-36	Touring, 5	1,075	4	22.50	114	32x4	Left
Bauer, 30	Roadster, 2	875	4	22.50	110	34x3½	Left
Bauer, 30	Touring, 5	1,000	4	22.50	110	34x3½	Left
Briscoe	Roadster, 3	785	4	15.64	107	30x3½	Opt.
Briscoe	Touring, 5	785	4	15.64	107	30x3½	Opt.
Buick, C-24	Roadster, 2	900	4	22.50	106	32x3½	Left
Buick, C-25	Touring, 5	950	4	22.50	106	32x3½	Left
Buick, C-36	Roadster, 2	1,185	4	22.50	112	34x4	Left
Buick, C-37	Touring, 5	1,235	4	22.50	112	34x4	Left
Chevrolet, Baby Grand	Touring, 5	985	4	21.74	106	32x3½	Left
Chevrolet, Royal Mail	Roadster, 2	860	4	21.74	106	32x3½	Left
Crow-Elkhart, E-42	Roadster, 2	1,150	4	25.60	114	33x4	Right
Crow-Elkhart, E-45	Touring, 5	1,185	4	25.60	114	33x4	Right
Cycleplane-Tourist	Roadster, 2	350	4	10.00	108	28x3	Left
Cycleplane-Tourist	Touring, 3	400	4	10.00	108	28x3	Left
Cycleplane-Traveler	Tandem, 2	250	2	9.11	96	28x2½	Centre
Davis, 38-A	Roadster, 2	1,235	4	22.50	112	34x4	Left
Davis, 38-B	Touring, 5	1,235	4	22.50	112	34x4	Left
Detroiter, C	Touring, 5	985	4	19.61	112	32x3½	Left
Dile, A	Roadster, 2	485	4	11.23	96	28x3	Left
Dodge	Touring, 5	785	4	24.22	110	32x3½	Left
Empire, 31-40	Roadster, 2	875	4	22.50	108	32x3½	Left
Empire, 31-40	Roadster, 2	975	4	22.50	108	32x3½	Left
Empire, 31-40	Touring, 5	850	4	22.50	108	32x3½	Left
Empire, 31-40	Touring. 5	975	4	22.50	108	32x3½	Left
Ford, T	Roadster, 2	440	4	22.50	100	30x3½*	Left
Ford, T	Touring, 5	490	4	22.50	100	30x3½*	Left
Ford, T	Coupelet, 2	750	4	22.50	100	30x3½*	Left
Ford, T	Town Car, 6	690	4	22.50	100	30x3½*	Left
Ford, T	Sedan, 5	975	4	22.50	100	30x3½*	Left
Glide, 30	Roadster, 2	1,195	4	19.61	114	32x4	Left
Glide, 30	Touring, 5	1,195	4	19.61	114	32x4	Left
Grant, M	Roadster, 2	505	4	12.08	90	28x3	Left
Grant, T	Roadster, 2	750	6	20.00	106	30x3½	Left
Grant, T	Touring, 5	750	6	20.00	106	30x3½	Left
Herff-Brooks, 4-40	Roadster, 2	1,100	4	32.40	118	34x4	Left
Herff-Brooks, 4-40	Touring, 5	1,100	4	32.40	118	34x4	Left
Herreshoff 4-16	Roadster, 2	500	4	12.08	94	28x3	Left
Hupmobile, H	Roadster, 2	1,050	4	16.92	106	33x4	Right
Hupmobile, H	Touring, 5	1,050	4	16.92	106	33x4	Right
Hupmobile, K	Roadster, 2	1,200	4	18.21	119	34x4	Left
Hupmobile, K	Touring, 5	1,200	4	18.21	119	34x4	Left
Imperial, 64	Touring, 5	1,085	4	22.50	115	32x3½	Left
Inter-State, 71	Touring, 5	1,000	4	19.61	110	33x4	Left
Kearns-Kar	Roadster, 2	450	4	13.37	100	28x3	Opt.
Kearns-Kar	Speedster, 2	450	4	13.37	100	28x3	Opt.
King	Roadster, 2	1,165	4	24.91	113	33x4	Left
King	Touring, 5	1,165	4	24.91	113	33x4	Left
Krit, O	Roadster, 2	850	4	22.50	108	32x3½	Left
Krit, O	Touring, 5	850	4	22.50	108	32x3½	Left
Krit, M	Roadster, 3	995	4	22.50	108	32x3½	Left
Krit, M	Touring, 5	995	4	22.50	108	32x3½	Left
Lambert, 48-C	Touring, 5	1,200	4	22.50	112	32x3½	Left
Maxwell, 25	Roadster, 2	670	4	21.09	102	30x3½	Left
Maxwell, 25	Touring, 5	695	4	21.09	102	30x3½	Left
McIntyre, 25	Touring, 5	695	4	22.50	106	30x3	Left
Meteor, 42	Touring, 5	1,075	4	25.60	114	34x4	Left
Metz, 22	Roadster, 2	495	4	22.50	96	30x3	Left
Oakland, 37	Roadster, 2	1,150	4	19.61	112	33x4	Left
Oakland, 37	Touring, 5	1,200	4	19.61	112	33x4	Left
Overland, 80	Roadster, 2	1,050	4	27.20	114	34x4	Left
Overland, 80	Touring, 5	1,075	4	27.20	114	34x4	Left
Overland, 81	Roadster, 2	795	4	25.60	106	33x4	Left
Overland, 81	Touring, 5	850	4	25.60	106	33x4	Left
Partin-Palmer, 20	Roadster, 2	495	4	15.64	96	28x3	Left
Partin-Palmer, 38	Touring, 6	1,075	4	22.50	115	33x4	Left
Paterson, 4-32	Touring, 5	1,095	4	19.61	112	33x4	Left
Peter Pan	Touring, 4	685	4	12.08	110	29x3½	Left
Peter Pan	Roadster, 2	650	4	12.08	110	29x3½	Left
Pullman, Junior	Roadster, 3	740	4	25.60	110	30x3½	Left
Pullman, Junior	Touring, 5	740	4	25.60	110	30x3½	Left
Rayfield, 20	Roadster, 2	395	4	12.08	96	28x3	Left
R.C.H., K	Touring, 5	900	4	16.92	110	32x3½	Opt.
Regal, D	Roadster, 2	1,085	4	22.50	112	32x3½	Opt.
Regal, D	Touring, 5	1,085	4	22.50	112	32x3½	Opt.
Remington	Roadster, 2	595	4	12.08	106	30x3	Left
Remington	Touring, 5	695	4	12.08	106	30x3½	Left
Saxon	Roadster, 2	395	4	11.23	96	28x3	Left
Saxon	Touring, 5	785	6	....	112	....	Left
Scripps-Booth, C	Roadster, 3	775	4	13.37	110	30x3½	Left
Scripps-Booth, C	Cabriolet, 3	....	4	13.37	110	30x3½	Left
Scripps-Booth, C	Coupe, 3	....	4	13.37	110	30x3½	Left
Sphinx, 8-15	Touring, 5	695	4	18.21	112	30x3½	Left
Studebaker, 4-SD	Roadster, 3	985	4	19.61	108	33x4	Left
Studebaker, 4-SD	Touring, 5	985	4	19.61	108	33x4	Left
Trumbull, 15-A	Roadster, 2	395	4	....	80	28x3	Opt.
Trumbull, 15-A	Coupe, 2	600	4	....	80	28x3	Opt.
Twombly	Roadster, 2	600	4	15.64	100	30x3½	Left
Twombly	Town Car, 3	750	4	15.64	100	30x3½	Left
Vixen	Touring, 3	....	4	12.08	106	28x3	Right
Vulcan, 35	Touring, 5	975	4	19.60	120	32x3½	Left
Vulcan, 35	Roadster, 2	975	4	19.60	120	32x3½	Left
Westcott, O	Speedster, 2	1,150	4	19.61	113	33x4	Left
Westcott, O	Roadster, 2	1,150	4	19.61	113	33x4	Left
Westcott, O	Touring, 5	1,150	4	19.61	113	33x4	Left

*Rear tires only; front a size smaller.

Automobiles Listing from $1,250 to $1,999

IN this price class which includes more chassis than any other, are the popular **$1,500** *cars. It is here that the low-priced six has come into its own. While last year only* **19** *per cent. of the chassis in this price class had six-cylinder motors, this year the percentage has jumped to* **55**. *The number of four-cylinder cars has dropped during the last year from* **81** *per cent. to* **40.2**. *Two makers of eight-cylinder cars have entered this field bringing the percentage of chassis so equipped up to* **4.1**. *There are now nearly as many eight-cylinder cars available in this price classification as there were six-cylinder cars in* **1912**.

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Abbott-Detroit, K	Touring, 5	1,785	4	27.20	116	34x4	Right
Ames, 44	Roadster, 2	1,745	4	27.20	118	36x4	Left
Ames, 45	Touring, 5	1,785	4	27.20	118	36x4	Left
Apperson, 4-40	Touring, 5	1,350	4	25.60	116	34x4	Left
Apperson, 6-48	Touring, 7	1,585	6	29.45	126	34x4	Left
Arbenz	Roadster, 2	1,825	4	27.20	120	36x4	Opt.
Arbenz	Touring, 5	1,885	4	27.20	120	36x4	Opt.
Auburn, 6-40	Roadster, 2	1,550	6	29.45	126	34x4	Left
Auburn, 6-40	Touring, 6	1,550	6	29.45	126	34x4	Left
Briscoe, B	Coupe, 2	1,250	4	15.64	107	30x3½	Opt.
Buick, C-54	Roadster, 2	1,650	6	33.75	130	36x4½	Left
Buick, C-55	Touring, 7	1,650	6	33.75	130	35x4½	Left
Cadillac, 51	Roadster, 2	1,975	8	31.28	122	36x4½	Left
Cadillac, 51	Touring, 5	1,975	8	31.28	122	36x4½	Left
Cadillac, 51	Touring, 7	1,975	8	31.28	122	36x4½	Left
Cadillac, 51	Salon, 4	1,975	8	31.28	122	36x4½	Left
Cartercar, 9	Roadster, 2	1,250	4	19.61	106	33x4	Right
Cartercar, 9	Touring, 5	1,250	4	19.61	106	33x4	Right
Case, 25	Touring, 5	1,350	4	22.50	115½	34x4	Left
Case, 35	Touring, 5	1,600	4	29.00	120	35x4½	Left
Case, 40	Touring, 5	1,800	4	32.40	124	37x4½	Right
Chalmers, 26-B	Touring, 5	1,650	6	29.45	125½	34x4½	Left
Chalmers, 26-B	Touring, 7	1,725	6	29.45	125½	34x4½	Left
Chalmers, 26-B	Coupelet, 2	1,900	6	29.45	125½	34x4½	Left
Chandler, 15	Touring, 5	1,595	6	27.30	120	34x4	Left
Chandler, 15	Cabriolet, 3	1,950	6	27.30	120	34x4	Left
Cole, 4-40	Roadster, 2	1,485	4	29.00	118	34x4	Left
Cole, 4-40	Touring, 7	1,485	4	29.00	118	34x4	Left
Cole, 4-40	Coupe, 3	1,885	4	29.00	118	34x4	Left
Cole, 6-50	Roadster, 2	1,865	6	29.45	126	35x4½	Left
Cole, 6-50	Touring, 4	1,865	6	29.45	126	35x4½	Left
Cole, 6-50	Touring, 7	1,865	6	29.45	126	35x4½	Left
Corbitt	Touring, 4	1,600	4	25.60	120	34x4	Right
Corbitt	Touring, 5	1,650	4	25.60	120	34x4	Right
Crawford, 6-35	Roadster, 2	1,850	6	29.45	120	34x4	Left
Crawford, 6-35	Touring, 5	1,850	6	29.45	120	34x4	Left
Crow-Elkhart, E-52	Roadster, 2	1,575	4	29.00	120	34x4	Right
Crow-Elkhart, E-54	Touring, 4	1,625	4	29.00	120	34x4	Right
Crow-Elkhart, E-55	Touring, 5	1,600	4	29.00	120	34x4	Right
Crow-Elkhart, E-56	Touring, 6	1,650	4	29.00	120	34x4	Right
Enger, 6-50	Roadster, 2	1,495	6	29.45	125	34x4	Left
Enger, 6-50	Touring, 7	1,495	6	39.45	125	34x4	Left
Firestone-Columbus, 82-E	Roadster, 2	1,925	4	27.20	116	34x4	Left
Firestone-Columbus, 86-E	Touring, 5	1,925	4	27.20	116	34x4	Left
Great Western, A	Roadster, 2	1,710	4	29.00	117	36x4	Right
Great Western, A	Touring, 4	1,710	4	29.00	117	36x4	Right
Great Western, A	Touring, 5	1,710	4	29.00	117	36x4	Right
Haynes, 32	Touring, 5	1,660	4	29.00	118	34x4	Left
Haynes, 30	Roadster, 2	1,485	6	29.45	121	34x4	Left
Haynes, 30	Touring, 5	1,485	6	39.45	121	34x4	Left
Herff-Brooks, 6-50	Roadster, 2	1,375	6	38.40	124	34x4	Left
Herff-Brooks, 6-50	Touring, 5	1,375	6	38.40	124	34x4	Left
Hudson, 6-40	Roadster, 3	1,550	6	29.45	123½	34x4	Left
Hudson, 6-40	Phaeton, 7	1,550	6	29.45	123½	34x4	Left
Hudson, 6-40	Cabriolet, 4	1,750	6	29.45	123½	34x4	Left
Jackson, Olympic	Roadster, 3	1,375	4	32.40	117	34x4	Left
Jackson, Olympic	Touring, 5	1,375	4	32.40	117	34x4	Left
Jackson, 48	Touring, 5	1,650	6	29.45	125	34x4½	Left
Jeffery, 4	Roadster, 2	1,525	4	22.50	116	34x4	Left
Jeffery, 4	Touring, 5	1,450	4	22.50	116	34x4	Left
Jeffery, 4	Convert'l, 2	1,750	4	22.50	116	34x4	Left
Jeffery, Chesterfield	Roadster, 2	1,650	6	21.60	122	34x4	Left
Jeffery, Chesterfield	Touring, 5	1,650	6	21.60	122	34x4	Left
Jeffery, Chesterfield	Convert'l, 2	1,950	6	21.60	122	34x4	Left
King	Cabriolet, 2	1,480	4	24.91	113	33x4	Left
King, D	Touring, 5	1,350	8	24.16	113	33x4	Left
Kissel, 4-36	Roadster, 2	1,450	4	29.00	121	34x4	Left
Kissel, 4-36	Touring, 5	1,450	4	29.00	121	34x4	Left
Kissel, 4-36	Touring, 5**	1,450	4	29.00	121	34x4	Left
Kissel, 4-36	Touring, 7	1,550	4	29.00	121	34x4	Left
Kissel, 4-36	Sedan, 5	1,800	4	29.00	121	34x4	Left
Kissel, 4-36	Cabriolet, 2	1,750	4	29.00	121	34x4	Left
Kissel, 42	Touring	....	6	31.32	126	35x4½	Left
Kline, 6-42	Roadster, 2	1,750	6	29.45	123	34x4	Left
Kline, 6-42	Toy Tour., 4	1,750	6	29.45	123	34x4	Left
Kline, 6-42	Touring, 5	1,750	6	29.45	123	34x4	Left
Kline, 6-42 A	Touring, 7	1,850	6	29.45	127	35x4½	Left
Krit, M	Cabriolet, 3	1,295	4	22.50	108	32x3½	Left
Lambert, 68	Roadster, 3	1,565	4	27.20	117	34x3½	Right
Lambert, 68	Touring, 5	1,565	4	27.20	117	34x3½	Right
Lewis, 6	Roadster, 2	1,600	6	29.45	135	36x4	Left
Lewis, 6	Touring, 6	1,600	6	29.45	135	36x4	Left
Lexington, 6-L	Roadster, 3	1,875	6	29.45	128	34x4	Left
Lexington, 6-L	Touring, 6	1,875	6	29.45	128	34x4	Left
McIntyre, 6-40	Touring, 5	1,275	6	29.45	120	35x4	Right
Meteor, 45	Touring, 5	1,395	6	33.75	126	35x4	Left
Mitchell-Lewis, 4	Roadster, 2	1,250	4	25.60	116	34x4	Left
Mitchell-Lewis, 4	Touring, 5	1,250	4	25.60	116	34x4	Left
Mitchell-Lewis, 4	Touring, 6	1,300	4	25.60	116	34x4	Left
Mitchell-Lewis, 6	Roadster, 2	1,585	6	38.40	127¾	36x4	Left
Mitchell-Lewis, 6	Touring, 5	1,585	6	38.40	127¾	36x4	Left
Mitchell-Lewis, 6	Touring, 6	1,585	6	38.40	127¾	36x4	Left
Mitchell-Lewis, Special 6	Roadster, 2	1,895	6	43.50	132	36x4½	Left
Mitchell-Lewis, Special 6	Touring, 5	1,895	6	43.50	132	36x4½	Left
Mitchell-Lewis, Special 6	Touring, 6	1,995	6	43.50	132	36x4½	Left
Monarch, 6	Touring, 5	1,250	6	29.45	125	33x4	Left
Monarch, 6	Touring, 7	1,275	6	29.45	125	33x4	Left
Moon, 4-38	Roadster, 3	1,350	4	22.50	122	34x4	Left
Moon, 4-38	Touring, 5	1,350	4	22.50	122	34x4	Left
Moon, 6-40	Roadster, 3	1,575	6	29.45	122	34x4	Left
Moon, 6-40	Touring, 6	1,575	6	29.45	122	34x4	Left
Norwalk, F	Roadster, 2	1,875	6	29.45	131	37x4	Left
Norwalk, F	Touring, 4	1,875	6	29.45	131	37x4	Left
Norwalk, F	Touring, 6	1,875	6	29.45	131	37x4	Left
Oakland, 49	Touring, 7	1,685	6	29.45	123½	35x4½	Left
Oldsmobile, 42	Roadster, 2	1,285	4	19.61	112	33x4	Left
Oldsmobile, 42	Touring, 5	1,285	4	19.61	112	33x4	Left
Overland, 80	Coupe, 4	1,600	4	27.20	114	35x4½	Left
Overland, 82	Touring, 7	1,475	6	29.45	125	35x4½	Left
Paige, 6	Roadster, 3	1,395	6	29.45	124	34x4	Left
Paige, 6	Touring, 7	1,395	6	29.45	124	34x4	Left
Paterson, 6-48	Touring, 5	1,495	6	29.45	124	34x4	Left
Pilot, 55	Roadster, 2	1,885	6	29.45	126	34x4	Left
Pilot, 55	Touring, 5	1,885	6	29.45	126	34x4	Left
Pilot, 55	Touring, 7	1,985	6	29.45	126	34x4	Left
Pratt, 4-40	Roadster, 2	1,850	4	27.20	122	34x4	Left
Pratt, 4-40	Touring, 4	1,850	4	27.20	122	34x4	Left
Pratt, 4-40	Touring, 5	1,850	4	27.20	122	34x4	Left
Spaulding, H	Touring, 5	1,680	4	29.00	120	36x4	Left
Spaulding, H	Sleeper, 5	1,730	4	29.00	120	36x4	Left
Stearns, 4	Touring, 5	1,750	4	22.50	119	34x4	Left
Studebaker, 6	Touring, 5	1,385	6	29.45	121	34x4	Left
Studebaker, 6	Touring, 7	1,450	6	29.45	121	34x4	Left
Stutz, H.C.S.	Roadster, 2	1,475	4	36.15	108	32x4	Right
Velie, 4-45	Roadster, 2	1,750	4	34.28	121	37x4½	Left
Velie, 4-45	Touring, 4	1,750	4	34.28	121	37x4½	Left
Velie, 4-45	Touring, 5	1,750	4	34.28	121	37x4½	Left
Velie, Biltwel	Roadster, 2	1,595	6	29.45	124	34x4	Left
Velie, Biltwel	Touring, 5	1,595	6	29.45	124	34x4	Left
Velie, Biltwel	Touring, 6	1,645	6	29.45	124	34x4	Left
Velie, Biltwel	Convert'l, 2	1,850	6	29.45	124	34x4	Left
Westcott, U	Roadster, 2	....	6	29.45	125	35x4½	Left
Westcott, U	Touring, 6	....	6	29.45	125	35x4½	Left

*Rear tires only; front a size smaller. **2-door design.

Automobiles Listing from $2,000 to $2,999

WHILE there are only 75 per cent. as many makes in the $2,500 class the purchaser still has a wide range to choose from. There are forty-two makers listing fifty-four chassis upon which there are 126 different types of bodies. There are fewer changes to be noted in this class of cars than in any other, the size of the motor, the wheelbase and all the principal dimensions and practices of chassis work are the same. The price has varied so little that it can practically be said to be unchanged. Body refinements and better equipment, however, make the $2,500 car of this year a better value than that of last. It is in this class that many have gone from the five- to the seven-passenger touring car without altering the price.

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Abbott-Detroit, L	Touring, 7	2,085	4	32.40	121	36x4½	Right
Abbott-Detroit, F	Roadster, 3	2,190	6	33.75	130	35x4½	Left
Abbott-Detroit, F	Touring, 5	2,190	6	33.75	130	35x4½	Left
Abbott-Detroit, F	Touring, 7	2,290	6	33.75	130	35x4½	Left
Apperson, 6-60	Roadster, 2	2,200	6	40.80	122	36x4	Left
Apperson, 6-60	Touring, 5	2,200	6	40.80	128	36x4	Left
Apperson, 6-60	Touring, 7	2,350	6	40.80	134	37x4½	Left
Auburn, 6-47	Roadster, 2	2,000	6	33.75	135	37x4½	Left
Auburn, 6-47	Touring, 6	2,000	6	33.75	135	37x4½	Left
Cadillac, 51	Land.-Coupe, 3	2,500	8	31.28	122	36x4½	Left
Cadillac, 51	Sedan, 5	2,800	8	31.28	122	36x4½	Left
Case, 40	Touring, 7	2,000	4	32.40	124	37x4½	Right
Chalmers, 26 B	Sedan, 5	2,750	6	29.45	125½	34x4½	Left
Chalmers, Master 6	Touring, 5	2,400	6	38.40	132	36x4½	Left
Chalmers, Master 6	Touring, 7	2,400	6	38.40	132	36x4½	Left
Chandler, 15	Sedan, 5	2,750	6	27.30	120	34x4	Left
Cole, 6-50	Coupe, 3	2,250	6	29.45	126	35x4½	Left
Crow-Elkhart, E-62	Roadster, 2	....	6	33.75	130	36x4	Right
Crow-Elkhart, E-64	Touring, 4	....	6	33.75	130	36x4	Right
Crow-Elkhart, E-65	Touring, 5	....	6	33.75	130	36x4	Right
Crow-Elkhart, E-66	Touring, 6	....	6	33.75	130	36x4	Right
Davis, 6-50	Touring, 5	2,150	6	33.75	128	37x4½	Left
Davis, 6-50	Touring, 6	2,185	6	33.75	128	37x4½	Left
Dorris, 1-A-4	Touring, 5	2,200	4	30.65	121	36x4½	Left
Dorris, 1-A-4	Touring, 7	2,250	4	30.65	121	36x4½	Left
Dorris, 1-A-4	Sedan, 4	2,800	4	30.65	121	36x4½	Left
Firestone-Columbus, 98 E	Touring, 5	2,500	6	40.80	132	36x4½*	Left
Firestone-Columbus, 90 E	Touring, 7	2,650	6	40.80	132	36x4½*	Left
Franklin, 6-30 M	Roadster, 3	2,150	6	31.57	120	34x4½	Left
Franklin, 6-30 M	Touring, 5	2,150	6	31.57	120	34x4½	Left
Franklin, 6-30 M	Coupe, 3	2,600	6	31.57	120	34x4½	Left
Great Western, B	Roadster, 2	2,200	4	22.50	117	34x4	Left
Great Western, B	Touring, 4	2,250	4	22.50	117	34x4	Left
Great Western, B	Touring, 6	2,500	4	22.50	117	34x4	Left
Haynes, 32	Coupe, 4	2,500	4	29.00	118	34x4	Left
Haynes, 31	Touring, 4	2,250	6	43.50	130	36x4½	Left
Haynes, 31	Touring, 5	2,250	6	43.50	130	36x4½	Left
Hudson, 6-40	Coupe, 4	2,150	6	29.45	123½	34x4	Left
Hudson, 6-40	Limousine, 6	2,550	6	29.45	123½	34x4	Left
Hudson, 6-40	Landaulet, 6	2,700	6	29.45	123½	34x4	Left
Hudson, 6-54	Phaeton, 7	2,350	6	27.20	135	36x4½	Left
Imperial, 56	Touring, 7	2,200	6	33.75	130	36x4½	Left
Jeffery, 4	Sedan, 4	2,250	4	22.50	116	34x4	Left
Jeffery. 4	Limousine, 7	2,900	4	22.50	116	34x4	Left
Jeffery, 6	Touring, 7	2,400	6	33.75	133½	34x4½	Left
Kissel, 6-48	Touring, 5	2,350	4	25.60	132½	36x4½	Left
Kissel, 6-48	Touring, 7	2,350	4	25.60	132½	36x4½	Left
Kissel, 6-48	Roadster, 2	2,350	4	25.60	132½	36x4½	Left
Kissel, 6-48	Touring, 5**	2,350	4	25.60	132½	36x4½	Left
Kissel, 6-48	Sedan, 5	2,700	4	25.60	132½	36x4½	Left
Kissel, 6-48	Cabriolet, 2	2,650	4	25.60	132½	36x4½	Left
Kline, 6-42 A	Limousine, 7	2,850	6	29.45	127	35x4½	Left
Lenox, 4	Touring, 5	2,000	4	29.00	118	34x4½	Left
Lenox, 6	Touring, 5	2,465	6	33.75	130	34x4½	Left
Lexington, 6-L	Sedan, 6	2,750	6	29.45	128	34x4	Left
Lexington, 6-M	Touring, 5	2,575	6	40.80	130	36x4½	Left
Lexington, 6-M	Roadster, 3	2,575	6	40.80	130	36x4½	Left
Lexington, 6-M	Touring, 7	2,675	6	40.80	130	36x4½	Left
Luverne, 7-60	Touring, 7	2,500	6	38.40	128	36x4½	Left
Lyons-Knight	Touring, 5	2,900	4	32.40	130	37x5	Left
Lyons-Knight	Touring, 7	2,980	4	32.40	130	37x5	Left
McFarlan, T	Roadster, 2	2,590	6	38.40	132	36x4½	Left
McFarlan, T	Touring, 4	2,590	6	38.40	132	36x4½	Left
McFarlan, T	Touring, 5	2,590	6	38.40	132	36x4½	Left
McFarlan, T	Touring, 6	2,590	6	38.40	132	36x4½	Left
McFarlan, T	Touring, 7	2,590	6	38.40	132	36x4½	Left
McFarlan, X	Roadster, 2	2,900	6	48.60	132	36x4½	Left
McFarlan, X	Touring, 4	2,900	6	48.60	132	36x4½	Left
McFarlan, X	Touring, 5	2,900	6	48.60	132	36x4½	Left
McFarlan, X	Touring, 6	2,900	6	48.60	132	36x4½	Left
McFarlan X	Touring, 7	2,900	6	48.60	132	36x4½	Left
Mitchell, 7-6	Touring, 7	2,350	6	43.50	144	37x5	Left
Moline-Knight	Touring, 7	2,500	4	25.60	128	36x4½	Left
Moline-Knight	Roadster, 2	2,500	4	25.60	128	36x4½	Left
National, AA	Roadster, 2	2,375	6	33.75	124	36x4½	Left
National, AA	Toy-Tonneau, 4	2,375	6	33.75	132	36x4½	Left
National, AA	Touring, 5	2,375	6	33.75	132	36x4½	Left
National, AA	Touring, 6	2,500	6	33.75	132	36x4½	Left
National, AA	Coupe, 4	2,850	6	33.75	132	36x4½	Left
National, AA	Cabriolet, 3	2,700	6	33.75	132	36x4½	Left
National, AA	Parlor Car, 4	2,700	6	33.75	132	36x4½	Left
Oldsmobile, 55	Touring, 7	2,975	6	43.50	139	36x5	Left
Pathfinder	Roadster, 4	2,222	6	33.75	125	34x4½	Left
Pathfinder	Touring, 7	2,322	6	33.75	125	34x4½	Left
Peerless, 54	Roadster, 3	2,000	4	22.50	113	34x4	Left
Peerless, 54	Touring, 5	2,000	4	22.50	113	34x4	Left
Peerless, 54	Cabriolet, 3	2,300	4	22.50	113	34x4	Left
Peerless, 55	Roadster, 3	2,250	6	29.45	121	34x4	Left
Peerless, 55	Touring, 5	2,250	6	29.45	121	34x4	Left
Peerless, 55	Cabriolet, 3	2,250	6	29.45	121	34x4	Left
Pilot, 75	Speedster, 2	2,885	6	48.60	132	37x4½	Opt.
Pilot, 75	Roadster, 2	2,885	6	48.60	132	37x4½	Opt.
Pilot, 75	Touring, 5	2,885	6	48.60	132	37x4½	Opt.
Pilot 75	Touring, 7	2,885	6	48.60	132	37x4½	Opt.
Pratt, 6-50	Roadster, 2	2,150	6	22.50	113	36x4½	Left
Pratt, 6-50	Touring, 4	2,150	6	22.50	113	36x4½	Left
Pratt, 6-50	Touring, 5	2,150	6	22.50	113	36x4½	Left
Pratt, 6-50	Touring, 7	2,250	6	22.50	113	36x4½	Left
Premier-Weidely, A	Roadster, 2	2,700	6	21.57	132	36x4½	Left
Premier-Weidely, A	Touring, 5	2,700	6	21.57	132	36x4½	Left
Premier-Weidely, A	Touring, 7	2,750	6	21.57	132	36x4½	Left
Pullman, 6-48	Roadster, 2	2,500	6	33.75	134	36x4½	Left
Pullman, 6-48	Touring, 5	2,500	6	33.75	134	36x4½	Left
Pullman, 6-48	Touring, 7	2,550	6	33.75	134	36x4½	Left
Pullman, 6-48	Cabriolet, 4	2,800	6	33.75	134	36x4½	Left
Singer, 6	Roadster, 3	2,350	6	38.40	135	36x4½	Left
Singer,. 6	Touring, 5	2,350	6	38 40	135	36x4½	Left
Speedwell, I	Touring, 7	2,950	6	40.80	135	37x5	Left
Stearns, 4	Cabriolet, 2	2,250	4	22.50	119	34x4	Left
Stearns, 4	Limousine, 7	2,850	4	22.50	119	34x4	Left
Stutz, Bearcat	Roadster, 2	2,000	4	36.15	120	34x4½	Right
Stutz, Roadster	Roadster, 2	2,000	4	36.15	120	34x4½	Right
Stutz, Bulldog	Speedster, 4	2,250	4	36.15	120	34x4½	Right
Stutz, Bearcat	Roadster, 2	2,125	6	38.40	120	34x4½	Right
Stutz, Roadster	Roadster, 2	2,125	6	38.40	120	34x4½	Right
Stutz, Touring	Touring, 6	2,400	6	38.40	120	34x4½	Right
Stutz, Touring	Touring, 6	2,275	4	36.15	120	34x4½	Right
Velie, 12	Sedan, 5	2,450	4	34.28	121	37x4½	Left
Velie, 14	Roadster, 2	2,015	6	29.45	126	37x4½	Left
Velie, 14	Torpedo, 4	2,015	6	29.45	126	37x4½	Left
Velie, 14	Touring, 5	2,015	6	29.45	126	37x4½	Left
Velie, 14	Sedan, 5	2,715	6	29.45	126	37x4½	Left
White, 30	Roadster, 2	2,700	4	22.50	115	32x4	Left
White, 30	Touring, 5	2,700	4	22.50	115	32x4	Left
Willys-Knight	Roadster, 2	2,750	4	25.60	120	36x4½	Left
Willys-Knight	Touring, 5	2,750	4	25.60	120	36x4½	Left

*Rear tires only; front a size smaller.

Tables a Guide to Purchaser

ALTOGETHER this season, there are 119 makers listed in the annual tables. Many of these are selling cars that fall into different price classifications, but a small majority are found in the two lower-priced classes. In cars selling up to $2,000, there are 100 makers, fifty making cars selling below $1,250 and fifty from $1,250 to $1,999. There are forty-two manufacturers of cars selling between $2,000 and $2,999 and thirty-four selling above $3,000.

Out of 535 American cars, 187 are priced at more than $3,000; 126 between $2,000 and $2,999; 122 between $1,250 and $1,999 and 100 at less than $1,250. Thus we find that the makers of the high-priced cars offer their purchasers a larger choice of bodies than do the low-priced and intermediate manufacturers. Out of the chassis offered this season there are forty-eight carrying bodies priced above $3,000, fifty-four carrying cars between $2,000 and $2,999; sixty-three between $1,250 and $1,999 and fifty-seven below $1,250.

Closed Body Developments

The tendency of the makers of higher-priced cars to offer more bodies, than those of lower-priced vehicles is due to the use of the inclosed body on the higher-priced car. Those who go into the inclosed coachwork at all generally find it more profitable to manufacture three or four types of inclosed bodies rather than to bend their efforts solely towards one. While the limousine, in the first few years of inclosed body design, was supreme, its claim for first place is being challenged by the sedan and landaulet.

In the tables given on these pages the purchaser is fully informed regarding the style of body and seating capacity which the various makers are producing. The price is also given together with some of the leading specifications.

About one-quarter of the manufacturers of cars listing above $3,000 have dropped from the ranks. We miss this year such familiar names as those of Lozier, Knox, and others. But few have come to take the place of those who have dropped out. The new maker in this day of the light low-priced four and six hardly ventures to tempt fate by entering the lists with a high-priced car. On the other hand there is a steady demand for stable cars which have gained a reputation for themselves and which sell around the $4,000 mark.

While there are but thirty-four makers whose cars are listed above $3,000 more than 187 stock jobs are manufactured. The large number of cars in proportion to manufacturers is due to the practice on the part of several large makers to list a large number of inclosed bodies. As a matter of fact the list does not show the entire gamut of the high priced cars open to the purchaser. The Pierce-Arrow company, for example, lists fifty-four body styles as stock. This does not mean that these bodies are on chassis awaiting shipment on order, but it means that the patterns, drawings, etc., have been completed and are in the company's shop ready for use on order.

What is true of the Pierce company can doubtless be said of Packard, Peerless and other makers of high-priced chassis. These concerns have made but few mechanical changes during the year. Refinements in appearance which cannot be brought out by figures are universal throughout and withal there has been a price reduction of $140 on the average. The average car in this classification for 1915 sells for $4,563 whereas in 1914 it sold for $4,700. An increase of 1 inch in the average wheelbase has also been made and while it is not such a great percentage of length increase as to be of premier importance it shows that the trend inaugurated in 1911 and followed consistently ever since has not as yet passed this climax. The figure for average wheelbase is now 133.2 inches. The rise started in 1911 when it was 124 inches, jumping 5 inches in 1912, 1 inch in 1913, 2 in 1914 and now an additional inch for this season.

Many Roadsters and Touring Cars

While the greater percentage of bodies selling in the $4,000 class are the inclosed limousines, landaulets and coupés, a large percentage of the total are roadsters and touring cars. The Simplex company and the new F. R. P. are offering their cars in this class in chassis form, special bodies being put on to order.

Of the concerns selling cars in this price class only eight are listing but one chassis. The remaining twenty-six list from two to three. There are none who list more than this number. The concerns which only list one chassis are Austin, Cunningham, Porter, Morse, Owen, Republic, S. G. V. and Winton. Those who list three chassis are Peerless, Pierce-Arrow and White. There is only one concern making the high-priced car which lists only a touring body—this is the Republic. Nevertheless touring bodies are not slighted. Five manufacturers are listing those of four-passenger capacity, twelve of five-passenger capacity, five of six-passenger and eighteen of seven-passenger capacity. The most popular class of body among the $4,000 cars is the limousine. The landaulets and sedans run a close race for second choice in closed bodies being respectively 12 and 11 in number. In addition, six makers are offering coupés and six berlines.

Automobiles Listing Above $3,000

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Austin, 66	Roadster, 2	$3,600	6	48.60	141	34x4½	Left
Austin, 66	Close Cpld, 4	3,600	6	48.60	141	34x4½	Left
Austin, 66	Touring, 6	3,600	6	48.60	141	34x4½	Left
Austin, 66	Touring, 7	3,600	6	48.60	141	34x4½	Left
Austin, 66	Inclosed, 5	4,200	6	48.60	141	34x4½	Left
Austin, 66	Limousine, 7	4,700	6	48.60	141	34x4½	Left
Cadillac, 51	Limousine, 7	3,450	8	31.28	122	36x4½	Left
Cadillac, 51	Berline, 7	3,600	8	31.28	122	36x4½	Left
Chadwick, 19	Roadster, 2	$5,500	6	60.00	112	37x5*	Right
Chadwick, 19	Touring, 5	5,500	6	60.00	133	37x5*	Right
Chadwick, 19	Touring, 7	5,500	6	60.00	133	37x5*	Right
Chadwick, 19	Limousine, 7	6,500	6	60.00	133	37x5*	Right
Chalmers. 26-B	Limousine, 7	3,200	6	29.45	125½	34x4½	Left
Cole, 6	Coupe, 4	3,000	6	43.80	136	36x4½	Left

*Rear tires only; front a size smaller.

Automobiles Listing Above $3,000—Cont'd

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Cunningham, S	Touring, 7	3,750	4	36.15	129	37x5	Left
Cunningham, S	Limousine, 7	5,000	4	36.15	129	37x5	Left
Cunningham, S	Landaulet, 7	5,000	4	36.15	129	37x5	Left
Dorris, 1-A-4	Limousine, 7	3,400	4	30.54	121	36x4½	Left
Fiat, 55	Roadster, 2	4,650	4	42.20	128	37x5*	Right
Fiat, 55	Roadster, 3	4,650	4	42.20	128	37x5*	Right
Fiat, 55	Touring, 5	4,650	4	42.20	128	37x5*	Right
Fiat, 55	Touring, 7	4,650	4	42.20	128	37x5*	Right
Fiat, 55	Limousine, 7	5,650	4	42.20	128	37x5*	Right
Fiat, 55	Landaulet, 7	5,750	4	42.20	128	37x5*	Right
Fiat, 55	Berline, 7	5,950	4	42.20	128	37x5*	Right
Fiat, 50	Roadster, 2	5,150	6	46.00	135	37x5*	Right
Fiat, 50	Touring, 5	5,150	6	46.00	135	37x5*	Right
Fiat, 50	Touring, 7	5,150	6	46.00	135	37x5*	Right
Fiat, 50	Roadster, 3	5,150	6	46.00	135	37x5*	Right
Fiat, 50	Limousine, 7	6,150	6	46.00	135	37x5*	Right
Fiat, 50	Landaulet, 7	6,250	6	46.00	135	37x5*	Right
Fiat, 50	Berline, 7	6,450	6	46.00	135	37x5*	Right
Franklin	Sedan, 5	3,000	6	31.57	120	34x4½	Left
Franklin	Berline, 6	3,200	6	31.57	120	34x4½	Left
F. R. P., 45 B	Chassis	5,000	4	32.40	110–140	36x5	Right
Great Western, B	Coupe, 2	3,800	4	22.50	117	34x4	Left
Great Western, B	Sedan, 4	4,000	4	22.50	117	34x4	Left
Great Western, B	Limousine, 6	4,800	4	22.50	117	34x4	Left
Haynes, 31	Coupe, 4	3,000	6	43.50	130	36x4½	Left
Hudson, 6-54	Sedan, 5	3,100	6	40.80	135	36x4½	Left
Hudson, 6-54	Limousine, 7	3,500	6	40.80	135	36x4½	Left
Kissel, 6-60	Roadster, 2	3,150	6	48.60	142	37x5	Left
Kissel, 6-60	Touring, 7	3,150	6	48.60	142	37x5	Left
Kissel, 6-60	Limousine, 7	4,900	6	48.60	142	37x5	Left
Lexington, 6-M	Limousine, 7	3,550	6	40.80	130	36x4½	Left
Locomobile, M-5	Roadster, 2	5,100	6	48.60	140	37x5	Left
Locomobile, M-5	Touring, 6	5,100	6	48.60	140	37x5	Left
Locomobile, M-5	Touring, 7	5,100	6	48.60	140	37x5	Left
Locomobile, M-5	Limousine, 7	6,200	6	48.60	140	37x5	Left
Locomobile, M-5	Landaulet, 7	6,300	6	48.60	140	37x5	Left
Locomobile, M-5	Berline, 7	6,500	6	48.60	140	37x5	Left
Locomobile, R-4	Roadster, 2	4,400	6	43.50	132	37x5*	Left
Locomobile, R-4	Touring, 5	4,400	6	43.50	132	37x5*	Left
Locomobile, R-4	Touring, 4	4,400	6	43.50	132	37x5*	Left
Locomobile, R-4	Limousine, 7	5,400	6	43.50	132	37x5*	Left
Locomobile, R-4	Landaulet, 7	5,500	6	43.50	132	37x5*	Left
Locomobile, R-4	Berline, 7	5,700	6	43.50	132	37x5*	Left
Lyons-Knight	Sedan, 5	3,900	4	32.40	130	37x5	Left
Lyons-Knight	Limousine, 7	4,300	4	32.40	130	37x5	Left
Marmon, 41	Speedster, 2	3,250	6	43.50	132½	36x4½	Left
Marmon, 41	Roadster, 2	3,250	6	43.50	132½	36x4½	Left
Marmon, 41	Touring, 4	3,250	6	43.50	132½	36x4½	Left
Marmon, 41	Touring, 5	3,250	6	43.50	132½	36x4½	Left
Marmon, 41	Touring, 7	3,350	6	43.50	132½	36x4½	Left
Marmon, 41	Limousine, 7	4,750 / 5,250	6	43.50	132½	36x4½	Left
Marmon, 41	Landaulet, 7	4,850 / 5,350	6	43.50	132½	36x4½	Left
Marmon, 48	Touring, 7	5,000	6	48.60	145	37x5*	Left
Moline-Knight	Sedan, 5	3,250	4	25.60	128	36x4½	Left
Moline-Knight	Limousine, 7	3,800	4	25.60	128	36x4½	Left
Morse, D	Roadster, 2-3	3,600	4	34.28	127	36x4½	Right
Morse, D	Touring, 5	3,600	4	34.28	127	36x4½	Right
Morse, D	Touring, 7	3,600	4	34.28	127	36x4½	Right
R. M. Owen	Roadster, 3	3,500	6	31.57	136	35x5	Left
R. M. Owen	Touring, 7	3,500	6	31.57	136	35x5	Left
Packard, 3-38	Roadster, 2	3,750	6	38.40	140	37x5*	Left
Packard, 3-38	Touring, 6	3,350	6	38.40	140	37x5*	Left
Packard, 3-38	Salon Tour., 6	3,850	6	38.40	140	37x5*	Left
Packard 3-38	Touring, 7	3,850	6	38.40	140	37x5*	Left
Packard, 3-38	Phaeton, 5	3,750	6	38.40	140	37x5*	Left
Packard, 3-38	Limousine, 7	5,000	6	38.40	140	37x5*	Left
Packard, 3-38	Limousine, 7	4,950	6	38.40	140	37x5*	Left
Packard, 3-38	Limousine, 6	4,950	6	38.40	140	37x5*	Left
Packard, 3-38	Limousine, 6	4,900	6	38.40	140	37x5*	Left
Packard, 3-38	Coupe, 3	4,450	6	38.40	140	37x5*	Left
Packard, 3-38	Landaulet, 7	5,000	6	38.40	140	37x5*	Left
Packard, 3-38	Landaulet, 7	4,950	6	38.40	140	37x5*	Left
Packard, 3-38	Laudaulet, 6	4,900	6	38.40	140	37x5*	Left
Packard, 5-48	Roadster, 2	4,750	6	48.60	144	37x5	Left
Packard, 5-48	Touring, 7	4,850	6	48.60	144	37x5	Left
Packard, 5-48	Touring, 6	4,850	6	48.60	144	37x5	Left
Packard, 5-48	Phaeton, 5	4,750	6	48.60	144	37x5	Left
Packard, 5-48	Limousine, 7	5,950	6	48.60	144	37x5	Left
Packard, 5-48	Limousine, 6	5,900	6	48.60	144	37x5	Left
Packard, 5-48	Coupe	5,450	6	48.60	144	37x5	Left
Packard, 5-48	Landaulet, 7	6,000	6	48.60	144	37x5	Left
Packard, 5-48	Brougham, 6	6,000	6	48.60	144	37x5	Left

NAME AND MODEL	Body, Style and Seating Capacity	Price	No. of Cylinders	S. A. E. H. P.	Wheelbase Inches	Tire Size Inches	Location of Steering
Peerless, 54	Sedan, 5	3,100	4	22.50	113	34x4	Left
Peerless, 54	Limousine, 7	3,100	4	22.50	113	34x4	Left
Peerless, 55	Sedan, 5	3,350	6	29.45	121	34x4	Left
Peerless, 55	Limousine, 7	3,350	6	29.45	121	34x4	Left
Peerless, 48	Roadster, 3	4,900	6	48.60	137	37x5	Opt.
Peerless, 48	Touring, 7	5,000	6	48.60	137	37x5	Opt.
Peerless, 48	Limousine, 7	6,000	6	48.60	137	37x5	Opt.
Peerless, 48	Sedan, 5	5,900	6	48.60	137	37x5	Opt.
Peerless, 48	Landaulet, 7	6,100	6	48.60	137	37x5	Opt.
Peerless, 48	Berline, 7	6,200	6	48.60	137	37x5	Opt.
Pierce-Arrow, 38	Roadster, 3	4,300	6	38.40	134	36x4½	Right
Pierce-Arrow, 38	Touring, 5	4,300	6	38.40	134	36x4½	Right
Pierce-Arrow, 38	Touring, 4	4,300	6	38.40	134	36x4½	Right
Pierce-Arrow, 38	Coupe, 2	4,575	6	38.40	134	36x4½	Right
Pierce-Arrow, 38	Brougham, 7	5,200	6	38.40	134	36x4½	Right
Pierce-Arrow, 38	Landaulet, 7	5,350	6	38.40	134	36x4½	Right
Pierce-Arrow, 48	Roadster, 3	4,900	6	48.60	142	37x5	Right
Pierce-Arrow, 48	Touring, 5	4,900	6	48.60	142	37x5	Right
Pierce-Arrow, 48	Touring, 4	4,900	6	48.60	142	37x5	Right
Pierce-Arrow, 48	Coupe, 2	5,175	6	48.60	142	37x5	Right
Pierce-Arrow, 48	Touring, 7	5,000	6	48.60	142	37x5	Right
Pierce-Arrow, 48	Landau, 7	6,000	6	48.60	142	37x5	Right
Pierce-Arrow, 66	Roadster, 3	5,900	6	60.00	147½	38x5½*	Right
Pierce-Arrow, 66	Touring, 5	5,900	6	60.00	147½	38x5½*	Right
Pierce-Arrow, 66	Touring, 4	5,900	6	60.00	147½	38x5½*	Right
Pierce-Arrow, 66	Touring, 7	6,000	6	60.00	147½	38x5½*	Right
Pierce-Arrow, 66	Coupe, 2	6,175	6	60.00	147½	38x5½*	Right
Pierce-Arrow, 66	Landau, 7	7,000	6	60.00	147½	38x5½*	Right
Pullman, 6-48	Sedan, 4	3,200	6	33.75	134	36x4½	Left
Pullman, 6-48	Limousine	3,500	6	33.75	134	37x4½	Left
Republic, E	Touring, 4	3,000	6	29.00	133	36x4½	Left
Republic, E	Touring, 5	3,000	6	29.00	133	36x4½	Left
Republic, E	Touring, 7	3,000	6	29.00	133	36x4½	Left
S. G. V., J	Roadster, 2	3,300	4	24.22	118	34x4	Left
S. G. V., J	Touring, 5	3,300	4	24.22	118	34x4	Left
S. G. V., J	Limousine, 6	4,000	4	24.22	118	34x4	Left
S. G. V., J	Brougham, 6	4,000	4	24.22	118	34x4	Left
S. G. V., J	Landaulet, 6	4,000	4	24.22	118	34x4	Left
S. G. V., J	Sedan, 4	4,000	4	24.22	118	34x4	Left
S. G. V., J	Landau, 6	4,300	4	24.22	118	34x4	Left
Simplex, 38	Chassis	4,000	4	38.25	137	37x5*	Right
Simplex, 50	Chassis	4,500	4	46.34	137	37x5*	Right
Stearns, Big 4	Roadster, 3	3,750	4	29.00	121	36x4½	Left
Stearns, Big 4	Touring, 4	3,750	4	29.00	121	36x4½	Left
Stearns, Big 4	Touring, 5	3,750	4	29.00	121	36x4½	Left
Stearns, Big 4	Touring, 6	3,900	4	29.00	121	36x4½	Left
Stearns, Big 4	Touring, 7	3,900	4	29.00	121	36x4½	Left
Stearns, Big 4	Limousine, 7	5,000	4	29.00	121	36x4½	Left
Stearns, Big 4	Landaulet, 7	5,100	4	29.00	121	36x4½	Left
Stearns, 6	Roadster, 3	4,850	6	43.50	140	37x5	Left
Stearns, 6	Touring, 4	4,850	6	43.50	140	37x5	Left
Stearns, 6	Touring, 5	4,850	6	43.50	140	37x5	Left
Stearns, 6	Touring, 6	5,000	6	43.50	140	37x5	Left
Stearns, 6	Touring, 7	5,000	6	43.50	140	37x5	Left
Stearns, 6	Limousine, 7	6,100	6	43.50	140	37x5	Left
Stearns, 6	Landaulet, 7	6,200	6	43.50	140	37x5	Left
Stevens-Duryea, D-6	Roadster, 3	4,550	6	30.65	131	37x4½	Left
Stevens-Duryea, D-6	Touring, 5	4,550	6	30.65	131	37x4½	Left
Stevens-Duryea, D-6	Demi-Berline, 5	5,750	6	30.65	131	37x4½	Left
Stevens-Duryea, D-4	Phaeton, 5	5,400	6	30.65	131	37x4½	Left
Stevens-Duryea, D-4	Limousine, 7	5,800	6	30.65	131	37x4½	Left
Stevens-Duryea, DD-6	Touring, 7	4,800	6	28.37	138	37x5	Left
Stevens-Duryea, DD-6	Phaeton, 7	5,600	6	28.37	138	37x5	Left
Stevens-Duryea, DD-6	Limousine, 7	6,100	6	28.37	138	37x5	Left
Stevens-Duryea, DD-6	Berline, 7	6,200	6	28.37	138	37x5	Left
Stevens-Duryea, DD-6	Landaulet, 7	6,300	6	28.37	138	37x5	Left
Stutz	Sedan, 6	3,800	6	38.40	120	34x4½	Right
Stutz	Sedan, 6	3,675	4	36.15	130	34x4½	Right
Touraine, 12	Roadster, 2	3,150	6	38.40	124	34x4½	Left
Touraine, 12	Touring, 5	3,150	6	38.40	124	34x4½	Left
Touraine, 12	Coupe, 2	4,050	6	38.40	124	34x4½	Left
Touraine, 12	Touring, 7	3,250	6	38.40	134	34x4½	Left
Touraine, 12	Limousine, 7	4,550	6	38.40	134	34x4½	Left
White, 30	Town car, 5	4,000	4	22.50	115	32x4	Left
White, 30	Sedan, 5	4,000	4	22.50	115	32x4	Left
White, 45	Touring, 7	3,800	4	29.00	132¾	36x4½	Left
White, 45	Landaulet, 7	5,200	4	29.00	132¾	36x4½	Left
White, 45	Limousine, 7	5,200	4	29.00	132¾	36x4½	Left
White, 45	Semi-Touring, 7	5,300	4	29.00	132¾	36x4½	Left
White, 60	Touring, 7	5,500	6	43.80	140¾	37x5	Left
Winton, 6	Roadster, 2	3,250	6	48.60	130	36x5	Left
Winton, 6	Toy Tonneau, 4	3,250	6	48.60	136	37x5	Left
Winton, 6	Touring, 5	3,250	6	48.60	136	37x5	Left
Winton, 6	Touring, 7	3,500	6	48.60	136	37x5	Left
Winton, 6	Touring, 6	3,500	6	48.60	136	37x5	Left
Winton, 6	¾ Limousine, 7	4,350	6	48.60	136	37x5	Left
Winton, 6	Limousine, 7	4,600	6	48.60	136	37x5	Left
Winton, 6	Landaulet, 7	4,600	6	48.60	136	37x5	Left
Winton, 6	Sedan, 6	4,600	6	48.60	136	37x5	Left

*Rear tires only; front a size smaller. **2-door design.

Passenger Cars for 1915 Listed

ANNUALLY THE AUTOMOBILE publishes its table of specifications of American cars to serve as a reference during the year. The information given on these tables is taken from data sheets filled out by the respective manufacturers. This is gathered together up to the last possible moment and finally tabulated in the form below. Many of the manufacturers wait until this season of the year to make their first announcement of new models at the January show in New York. Their designs are kept secret and not shown until the exhibition.

Many of these models are described in this table but others do not appear and in a number of instances descriptions are given of the new cars in the review of the industry given on pages 1228 to 1260 of this issue.

In connection with the tables under price classifications, page 1215, the information in these pages offers a complete guide to the purchaser or student of the development of the automobile industry. In this tabulation, the cards of the manufacturer are laid upon the table and the practices which he believes are submitted to the scrutiny of those who are interested in the purchase or development of an automobile.

How to use the tables depends on the purpose of the user. For the purchaser the recommended method is to first turn to the pages of the buyers' guide, page 1215. Here will be found the names of the cars selling at the price it is intended to pay. The body styles and the principal questions of power and equipment will be answered. After the cars that meet the requirements of the buyer are selected from the buyers' guide, the table of specifications herewith answer the questions that the motorwise buyer will ask before making up his mind what car he desires.

The table follows a logical order through the chassis. First the number of cylinders is given and this season the choice of a four, six or eight will be found listed. The power of the motor is the next consideration and this is given completely by not only furnishing the bore and stroke but by giving the S. A. E. formula rating. As this formula is apt to hit under rather than over the power developed by the modern motor, the piston displacement is given in addition to complete the information.

Complete Story of the Motor

As well as a table can accomplish it the complete story of the motor is told by the details furnished on the shape of the cylinders. Whether they are L-head, with valves all on one side, T-head with valves on opposite sides or I-head carrying the valves in the head is part of the data supplied. The exact location of the valves is further told by a column devoted

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	Piston Displacement Cubic Inches	CYLINDERS		Valve Location	Camshaft Drive	Cooling Circulation	LUBRICATION		IGNITION			CARBURETION			CRANKING SYSTEM	
					Shape	How Cast				System	Type of Pump	System	Make	Control	Make of Carbureter	Fuel Feed	Is Hot Air Pipe Fitted?	Type	Make
A																			
Abbott-Detroit, 34-40 K	4	4.125x5.250	27.25	280.6	L-Head	Block	Left	Hel'l	Pump	Splash	Gear	Dual	Splitdorf	Hand	Zenith	Gravity	Yes	Elec	Auto-lite
Abbott-Detroit, 44-50 L	4	4.500x5.500	32.40	349.9	L-Head	Pairs	Left	Hel'l	Pump	Splash	Gear	Dual	Splitdorf	Hand	Zenith	Gravity	Yes	Elec	Auto-lite
Abbott-Detroit, 50-60 F	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l	Pump	Splash	Gear	Single	Bosch	Hand	Zenith	Pres	Yes	Elec	Auto-lite
Allen, 34	4	3.625x5.000	20.25	206.4	L-Head	Block	Right	Hel'l	Thermo	Splash	Piston	Single	Wsthse	Hand	Schebler	Gravity	Yes	Elec	Wsthse
Apperson, 4-40	4	4.000x5.000	25.60	251.3	L-Head	Block	Right	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Rayfield	Gravity	Yes	Elec	Bijur
Apperson, 6-45	6	3.500x5.125	29.45	295.9	L-Head	Block	Right	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Rayfield	Gravity	Yes	Elec	Bijur
Apperscn, 6-60	6	4.125x5.000	40.80	400.4	T-Head	Block	Opp	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Rayfield	Gravity	Yes	Elec	Bijur
Apperson, 6-60	6	4.125x5.000	40.80	400.9	T-Head	Block	Opp	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Rayfield	Gravity	Yes	Elec	Bijur
Apperson, 6-60	6	4.125x5.000	40.80	400.9	T-Head	Block	Opp	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Rayfield	Gravity	Yes	Elec	Bijur
Arbenz	4	4.125x5.250	27.25	280.6	L-Head	Pairs	Right	Hel'l	Pump	Pres	Gear	Single	At Kent	Auto	Schebler	Gravity	Yes	Elec	Diehl
Argo	4	2.317x4.000	8.54	67.1	L-Head	Block	Right	Spur	Thermo	Splash	Piston	Single	At Kent	Hand		Gravity	No		
Auburn, 4-36	4	3.750x5.000	22.50	220.9	T-Head	Block	Opp	Hel'l	Pump	Splash	Central	Single		Auto	Rayfield	Vacuum	Yes	Elec	
Auburn, 6-40	6	3.500x5.000	29.40	288.6	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Piston	Single		H & A	Rayfield	Vacuum	Yes	Elec	
Auburn, 6-47	6	3.750x5.250	33.75	347.9	L-Head	Pairs	Left	Hel'l	Pump	Spl-Pres	Central	Single	Bosch	H & A	Rayfield	Pres	Yes	Elec	
Austin, 66	6	4.500x6.000	48.60	572.5	T-Head	Block	Opp	Hel'l	Pump	Splash	None	Dual	Wsthse	H & A	Master	Vacuum	Yes	Elec	Wsthse
B																			
Bauer, 30	4	3.750x5.000	22.50	294.5	L-Head	Block	Right	Spur	Pump	Spl-Pres	Piston	Single	Mea	Hand	Schebler	Gravity	Yes	Elec	Emerson
Briscoe	4	3.125x5.125	15.64	157.2	L-Head	Block	Right	Chain	Thermo	Splash	Piston	Single	Splitdorf	Foot		Gravity	No	Elec	Aplco
Buick, C-24, C-25	4	3.750x3.750	22.50	165.6	I-Head	Pairs	Head	Hel'l	Pump	Splash	Gear	Dual	Delco	Hand	Marvel	Gravity	Yes	Elec	Delco
Buick, C-36, C-37	4	3.750x5.000	22.50	220.9	I-Head	Pairs	Head	Hel'l	Pump	Splash	Gear	Dual	Delco	Auto	Marvel	Vacuum	Yes	Elec	Delco
Buick, C-54, C-55	6	3.750x5.000	33.75	331.4	I-Head	Pairs	Head	Hel'l	Pump	Splash	Gear	Dual	Delco	Auto	Marvel	Vacuum	Yes	Elec	Delco
C																			
Cadillac	8	3.125x5.125	31.28	314.6	L-Head	Fours	L&R	Chain	Pump	Spl-Pres	Gear	Dual	Delco	H & A	Own	Pres	No	Elec	Delco
Cartercar	4	3.500x5.000	19.61	192.4	L-Head	Block	Left	Hel'l	Pump	Splash	Piston	Dual	Delco	Hand	Schebler	Pres	Yes	Elec	Delco
Case, 25	4	3.750x4.750	22.50	314.6	T-Head	Pairs	Opp	Hel'l	Pump	Splash	Piston	Single	Wsthse	H&A	Stromberg	Gravity	Yes	Elec	Wsthse
Case, 35	4	4.250x5.500	28.90	312.0	T-Head	Pairs	Opp	Hel'l	Pump	Splash	Gear	Dual	Bosch	Hand	Rayfield	Gravity	Yes	Elec	Wsthse
Case, 40	4	4.500x5.250	32.40	334.0	T-Head	Pairs	Opp	Hel'l	Pump	Splash	Gear	2-Pt	Bosch	Hand	Rayfield	Pres	Yes	Elec	Wsthse
Chadwick, 19	6	5.000x6.000	60.00	721.0	L-Head	Pairs	S & H	Hel'l	Pump	Pres	Piston	Doub	Bosch	Hand	Own	Pres	Yes	Elec	Wsthse
Chadwick, 19	6	5.000x6.000	60.00	721.0	L-Head	Pairs	S & H	Hel'l	Pump	Pres	Piston	Doub	Bosch	Hand	Own	Pres	Yes	Elec	Wsthse
Chalmers, 26-B	6	3.500x5.500	29.45	317.5	T-Head	Block	Opp	Hel'l	Thermo	Spl-Pres	Gear	Single	At Kent	H & A	Rayfield	Gravity	Yes	Elec	Entz
Chalmers, Master 6	6	4.000x5.500	38.40	414.7	T-Head	Block	Opp	Hel'l	Thermo	Splash	Gear	Single	Bosch	Hand	Rayfield	Pres-Gr	Yes	Elec	Entz
Chandler, 15	6	3.375x5.000	33.75	331.4	L-Head	Threes	Right	Chain	Pump	Spl-Pres	Gear	Single	Bosch	Hand	Rayfield	Pres	Yes	Elec	G & D

ABBREVIATIONS:—Valve Location: Side and head, S & H.; Left and right, L & R. **Camshaft Drive:** Helical gears, Hel'l.; Spur gears, Spur. **Cooling Circulation:** Thermo-syphon, Thermo. **Lubrication System:** Splash and pressure, Spl-Pres.; Pressure, Pres. **Type of Pump:** Flywheel, Flwhl.; Rotary, Rot.; Centrifugal, Cent. **Ignition System:** Double, Doub.; Two-point, 2-Pt. **Ignition Make:** Westinghouse, Wsthse.; Atwater Kent, At Kent.; Connecticut, Conn. **Ignition Control:** Automatic, Auto.; Hand and automatic, H&A.; Hand or fixed, H or F. **Make of Carbureter:** Optional, Opt. **Fuel Feed:** Pressure-gravity, Pres.-Gr. **Type of Cranking System:** Electric, Elec.; Electric and air, E. & Air.

*60-inch tread optional. **Tread more or less than standard except Scripps-Booth, which is optional.

with Their Principal Specifications

specifically to that purpose. Another shows camshaft drive.

The systems of the car are next considered. These are the means for cooling, lubrication, ignition, carburetion, cranking, lighting and transmission.

The systems used for cooling the car are divided into three classes: those in which the water circulation is accomplished by thermo-syphon, those in which a pump is used and motors cooled by air. In describing the method of lubrication, the motor alone is referred to. Where all the bearings are taken care of by the oil that is splashed up by the connecting-rods, the system is known as the splash. Where the oil is forced by pressure to all the bearing surfaces, generally by way of the main bearings and thence through the hollow crankshaft to the connecting-rod lower ends after which it passes through a lead to the wristpin, the system is known as pressure feed. In the splash-pressure system a combination of the two methods is used. The oil is generally fed to the main bearings under pressure and thence flows into the splash troughs allowing the splash of the connecting rods to take care of the lubrication of the other bearings.

Under ignition, the type of the system is mentioned together with the make of the distributing or generating apparatus. The control of the spark whether it is fixed, hand or automatic, is stated. Describing carburetion the table mentions the make of the carbureter and the means for feeding the fuel. The question of whether or not a hot air pipe is fitted in order to aid in the best possible evaporation of the fuel is also answered. The name of the maker of the lighting and starting systems is furnished.

The Transmission System

In taking up the transmission system the drive is traced from the motor to the rear axle. The first unit, the clutch, is divided into the broad classifications of disk, cone or band. The type of gearset and its location together with the number of forward speeds gives full information on this point. The rear system is described giving the type of final drive, whether it is through bevel gears, spiral-bevel or worm, how the propulsive thrusts of the rear wheels are delivered and the design of the rear axle stating whether floating or otherwise. The information on the drive of the car is completed by stating the gear ratio and by furnishing a description of the running gear, stating the wheelbase, tire size and material from which the wheels are made.

The remainder of the table is devoted to information on the rear spring suspension, location of the drive and control members and a description of the type of bearings used for the crankshaft, gearset, rear axle and front wheels.

Lighting System	TRANSMISSION								RUNNING GEAR					CONTROL		BEARINGS				MAKE AND MODEL
	Clutch Type	GEARSET Type	GEARSET Location	GEARSET Forward Sp'ds	Final Drive	Car Drives Through	Rear Axle	Total Gear Ratio on Direct	Wheelbase	TIRES Front	TIRES Rear	Wheels	Rear Springs	Location Steering Wheel	Gearshift Location	Crankshaft Type and No.	Gearset	Rear Axle	Front Wheel	
																				A
Auto-lite	Disk	Sel	Unit M.	3	Bevel	Rad Rd	Float	3.75–1	116	34x4	34x4	Wood	¾ Ell.	Right	Right.	Plain, 3.	Roll	B&R.	Roll	Abbott-Detroit, 34-40 K
Auto-lite	Disk	Sel	Unit M.	3	Bevel	Rad Rd	Float	3.50–1	121	36x4½	36x4½	Wood	¾ Ell.	Right	Right.	Plain, 3.	Roll	B&R.	Roll	Abbott-Detroit, 44-50 L
Auto-lite	Disk	Sel	Unit M.	4	Bevel	Tor T	Float	4.00–1	130	35x4½	35x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3.	Roll	B&R.	Roll	Abbott-Detroit, 50-60 F
Wsthse	Cone	Sel	Unit M.	3	Bevel	Springs	Semi F.	4.00–1	110	32x3½	32x3½	Wood	¾ Ell.	Left	Cent.	Plain, 2.	Ball	Roll	Ball	Allen, 34
Bijur	Con Bd.	Sel	Amid	3	Bevel	Springs	Float		116	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3.				Apperson, 4-40
Bijur	Con Bd.	Sel	Amid	3	Bevel	Springs	Float		126	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 4.				Apperson, 6-45
Bijur	Con Bd.	Sel	Amid	3	Bevel		Float		122	36x4	36x4	Wood	¾ Ell.	Left	Cent.	Plain, 4.				Apperson, 6-60
Bijur	Con Bd.	Sel	Amid	3	Bevel		Float		128	36x4	36x4	Wood	¾ Ell.	Left	Cent.	Plain, 4.				Apperson, 6-60
Bijur	Con Bd.	Sel	Amid	3	Bevel		Float		134	37x4½	37x4½	Wood	¾ Ell.	Left	Cent.	Plain, 4.				Apperson, 6-60
Wells	Cone	Sel	Rear A.	3	Bevel	Rad Rd	Float	3.75–1	120	36x4	36x4	Wood	Semi E	Opt	Cent.	Plain, 3.	Roll	Roll	Ball	Arbenz
At Kent	Cone	Prog.	Amid	2	Bevel	Tor T	Semi F.	4.25–1	90	28x2½	28x2½	Wire	Ell	Left	Cent.	Plain, 2.	Plain.	Ball	Ball	Argo
	Cone	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.08–1	114	32x4	32x4	Wood	¾ Ell.	Left	Cent.	Plain, 3.	B&R.	Roll	Ball	Auburn, 4-36
	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00–1	126	34x4	34x4	Wood	¾ Ell.	Left	Cent.			B&R.	Ball	Auburn, 6-40
	Cone	Sel	Amid	3	Bevel	Springs	Float	4.50–1	135	37x4½	37x4½	Wood	¾ Ell.	Left	Cent.			Ball	Ball	Auburn, 6-47
Wsthse	Disk	Sel	Amid	3	Bevel	Springs	Float	3.00–1	141	34x4½	34x4½	Wood	Cant.	Left	Cent.	Plain, 4.	Ball	Ball	Ball	Austin, 66
																				B
Emerson	Disk	Sel	Unit M.	3	Bevel	Rad Rd	Float	4.00–1	110	34x3½	34x3½	Wood	Ell	Left	Cent.	Plain, 2.	Ball	Roll	Ball	Bauer, 30
Aplco	Cone	Sel	Unit M.	3	Bevel	Tor T	Float	4.00–1	107*	30x3½	30x3½	Opt	S.-E.	Opt	Cent.	Plain, 2.	Pl&B.	B&R.	Ball	Briscoe
Delco	Cone	Sel	Amid	3	Bevel	Tor Rd	¾ Float.		106*	32x3½	32x3½	Wood	¾ Ell.	Left	Cent.	Plain, 3.	Ball	B&R.	Ball	Buick, C-24, C-25
Delco	Cone	Sel	Amid	3	Bevel	Tor Rd	¾ Float.	3.50–1	112*	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3.	Ball	B&R.	Ball	Buick, C-36, C-37
Delco	Cone	Sel	Amid	3	Bevel	Tor Rd	Float	3.75–1	130	36x4½	36x4½	Wood	Cant.	Left	Cent.	Plain, 4.	Ball	Ball	Ball	Buick, C-54, C-55
																				C
Delco	Disk	Sel	Unit M.	3	Sp. B	Springs	Float	4.42–1	122*	36x4½	36x4½	Wood	Plat	Left	Cent.	Plain, 3.	Ball	Roll	Roll	Cadillac
Delco		Fric	Amid		Chain	Rad Rd	¾ Float.	4.00–1	106	33x4	33x4	Wood	¾ Ell.	Right	Right.	Plain, 3.	Ball	B&R.	Ball	Cartercar
Wsthse	Disk	Sel	Unit M.	3	Bevel	Tor T	¾ Float.	4.00–1	115½*	34x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3.	Roll	Ball	Roll	Case, 25
Wsthse	Disk	Sel	Unit M.	3	Bevel	Springs	Float	3.58–1	120*	35x4½	35x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3.	Roll	B&R.	Ball	Case, 35
Wsthse	Disk	Sel	Amid	3	Bevel	Springs	Float		124*	37x4½	37x4½	Wood	¾ Ell.	Right	Right.	Plain, 3.	Roll	Roll	Roll	Case, 40
Wsthse	Band	Sel	Amid	4	Chain	Rad Rd	Dead	2.25–1	133	36x4½	37x5	Wood	Plat	Right	Right.	Plain, 4.	Ball	Ball	Ball	Chadwick, 19
Wsthse	Band	Sel	Amid	4	Chain	Rad Rd	Dead	2.25–1	112	36x4½	37x5	Wood	Plat	Right	Right.	Plain, 4.	Ball	Ball	Ball	Chadwick, 19
Entz	Disk	Sel	Rear A.	3	Bevel	Tor T	Float	4.00–1	125½	34x4½	34x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3.	Roll	Roll	Roll	Chalmers, 26-B
Entz	Disk	Sel	Unit M.	4	Bevel	Tor T	Float	4.00–1	132	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3.	Roll	Roll	Ball	Chalmers, Master 6
G & D	Disk	Sel	Unit M.	3	Bevel	Tor Rd	¾ Float.	4.00–1	120	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3.	Ball	Ball	Roll	Chandler, 15

ABBREVIATIONS:—Make of Cranking System: North East, North-E.; Gray & Davis, G. & D.; Ward Leonard, Ward L.; Bosch-Rushmore, Bosch-R.; Allis-Chalmers, Allis-C.; Leece-Neville, Leece-Nev.; Splitdorf-Apple, Spldf-Ap.; Entz-Dyneto, Entz-Dyn.; Robbins & Meyers, Rob-Myr.; Hendricks, Hendrix. **Clutch Type:** Contracting band, Con Bd.; Expanding band, Exp Bd. **Gearset Type:** Selective, Sel.; Progressive, Prog.; Frictional, Fric.; Planetary, Plan. **Gearset Location:** Unit with motor, Unit M.; Amidships, Amid.; Rear Axle, Rear A. **Final Drive:** Spiral bevel, Sp Bev. **Car Drives Through:** Radius rod, Rad Rd.; Torsion tube, Tor T.; Torsion arm, Tor A. **Rear Axle:** Floating, Float.; Semi-floating, Semi F.; ¾ floating, ¾ Float.; Non-floating, Non-Float. **Rear Springs:** ¾ elliptic, ¾ Ell.; Elliptic, Ell.; Cantilever, Cant.; Semi-elliptic, Semi E.; Platform, Plat.; **Control:** Center, Cent. **Bearings:** Roller, Roll.; Ball and roller, B&R.; Plain and ball, Pl&B.; Plain and roller, Pl&R.

Passenger Cars for 1915 Listed with Th

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	Piston Displacement Cubic Inches	CYLINDERS Shape	How Cast	Valve Location	Camshaft Drive	Cooling Circulation	LUBRICATION System	Type of Pump	IGNITION System	Make	Control	CARBURETION Make of Carbureter	Fuel Feed	Is Hot Air Pipe Fitted?	CRANKING SYSTEM Type	Make
Chevrolet, Baby Grand	4	3.687x4.000	21.38	170.9	I-Head	Block	Head	Hel'l.	Thermo	Splash	Gear	Single	Simms	Hand	Zenith	Vacuum	Yes	Elec	Auto-lite
Chevrolet, Royal Mail	4	3.687x4.000	21.38	170.9	I-Head	Block	Head	Hel'l.	Thermo	Splash	Gear	Single	Simms	Hand	Zenith	Gravity	Yes	Elec	Auto-lite
Cole, 4-40	4	4.250x5.250	28.90	297.8	L-Head	Pairs	Left	Hel'l.	Pump	Splash	Vacuum	Dual	Delco	Hand	Stromberg	Vacuum	Yes	Elec	Delco
Cole, 6	6	4.250x5.250	43.80	446.7	L-Head	Pairs	Left	Chain	Pump	Splash	Vacuum	Dual	Delco	H & A	Stromberg	Pres	Yes	Elec	Delco
Cole, 6-50	6	3.500x5.000	29.40	288.6	L-Head	Block	Left	Hel'l.	Pump	Splash	Vacuum	Dual	Delco	Hand	Stromberg	Vacuum	Yes	Elec	Delco
Corbitt, F. & E.	4	4.000x4.500	25.60	226.2	L-Head	Pairs	Left	Spur	Pump	Splash	Central	Single	At Kent	Hand	Stromberg	Gravity	No	Elec	Jones
Crawford, 6-35	6	3.500x5.000	29.45	288.6	L-Head	Block	Right	Hel'l.	Pump	Splash	Piston	Single	Wsthse	H & A	Stromberg	Vacuum	Yes	Elec	Wsthse
Crow-Elkhart, E42, E45	4	4.000x5.000	25.60	251.3	L-Head	Pairs	Left	Hel'l.	Thermo	Splash	Gear	Dual	Remy	Hand	Schebler	Gravity	Yes	Elec	Emerson
Crow-Elkhart, E52, 54, 55, 56	4	4.250x5.500	28.90	312.0	L-Head	Block	Right	Hel'l.	Thermo	Splash	Gear	Dual	Sevison	Hand	Schebler	Gravity	Yes	Elec	Emerson
Crow-Elkhart, E62, 64, 65, 66	6	3.750x5.500	33.75	364.4	L-Head	Block	Right	Hel'l.	Pump	Splash	Gear	Dual	Sevison	Hand	Schebler	Gravity	Yes	Elec	Emerson
Cunningham, S	4	4.750x5.750	36.10	407.6	I-Head	Pairs	Head	Hel'l.	Pump	Pres	Gear	Dual	Undec	Hand	Stromberg	Pres	Yes	Elec	
Cycleplane-Tourist	4	2.500x4.000	10.00	100.6	L-Head	Block	Left	Gear	Thermo	Spl-Pres	Piston	Single	Optional	Auto	Own	Gravity	Yes	None	
Cycleplane-Traveler	2	3.375x4.000	18.21	71.5	L-Head	Singly		L & H	Thermo	Spl-Pres	Piston	Single	At Kent	Auto	Schebler	Gravity		None	
D																			
Davis, 38-A, 38-B	4	3.750x5.000	22.50	220.9	L-Head	Block	Right	Hel'l.	Thermo	Splash	Piston	Single	Wsthse	Hand	Stromberg	Gravity	Yes	Elec	Wsthse
Davis, 6-50	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l.	Pump	Splash	Gear	Dup	Bosch	Hand	Stromberg	Pres	Yes	Elec	G. & D.
Detroiter, C	4	3.500x5.000	19.60	192.4	L-Head	Block	Right	Hel'l.	Thermo	Splash	Flwhl	Single	Wsthse	H&A	Stromberg	Gravity	Yes	Elec	Wsthse
Dile, A	4	2.625x4.000	11.23	86.6	L-Head	Block	Right	Spur	Thermo	Spl-Pres	Piston	Single	Berling	Fixed	Holley	Gravity	No		
Dodge	4	3.875x4.500	24.22	198.8	L-Head	Block	Right	Hel'l.	Pump	Splash	Eccen	Single	Eisemann	Hand	Own	Pres	Yes	Elec	N. E.
Dorris, 1-A-4	4	4.375x5.000	30.62	300.7	I-Head	Pairs	Head	Hel'l.	Pump	Splash	Gear	Dual	Wsthse	H&A	Stromberg	Vacuum	No	Elec	Wsthse
E																			
Empire, 34-40	4	3.750x4.500	22.50	198.8	L-Head	Pairs	Left	Chain	Thermo	Splash	Piston	Single	Eisemann	H or F	Holley	Gravity	Yes	Elec	Remy
Enger, Six-50	6	3.500x5.000	29.45	288.6	L-Head	Block	Right	Hel'l.	Pump	Spl-Pres	Piston	Single	At Kent	Auto	Rayfield	Gravity	Yes	Elec	G. & D.
F																			
Fiat, 55	4	5.118x6.692	42.0	557.0	L-Head	Block	Left	Hel'l.	Pump	Pres	Gear	Dual	Bosch	Hand	Own	Pres	No	Elec	Bosch-R.
Fiat, 50	6	4.330x5.905	45.00	529.9	L-Head	Block	Left	Hel'l.	Pump	Pres	Gear	Dual	Bosch	Hand	Own	Pres	No	Elec	Bosch-R.
Firestone-Col., 82-E, 86-E	4	4.125x5.250	27.25	280.6	L-Head	Block	Left	Hel'l.	Pump	Spl-Pres	Gear	Dual	Splitdorf	Hand	Schebler	Gravity	No	Elec	G. & D.
Firestone-Col., 90-E, 98-E	6	4.125x5.250	40.90	420.9	L-Head	Threes	Left	Hel'l.	Pump	Spl-Pres	Gear	Doub	Conn	Hand	Rayfield	Gravity	Yes	Elec	G. & D.
Ford, T	4	3.750x4.000	22.50	176.7	L-Head	Block	Right	Spur	Thermo	Splash	Flwhl	Single	Own	Hand	Holley	Gravity	Yes	None	
Franklin, 6-30	6	3.625x4.000	31.60	247.7	I-Head	Singly	Head	Hel'l.	Air	Spl-Pres	Gear	Single	Eisemann	Auto	Own	Gravity	Yes	Elec	Dyneto
F. R. P., 45-B	4	4.600x6.750	34.28	453.6	I-Head	Block	Head	Worm	Pump	Spl-Pres	Rotary	2-Pt	Bosch	Hand	Stewart	Pres	No	Elec	Bosch
G																			
Glide, 30	4	3.500x5.000	19.60	192.4	L-Head	Block	Right	Hel'l.	Thermo	Splash	Piston	Single	Wsthse	H&A	Schebler	Gravity	Yes	Elec	Wsthse
Grant, M	4	2.750x4.000	12.10	95.0	L-Head	Block	Left	Hel'l.	Thermo	Splash	Vacuum	Single	Swiss	Hand	Mayer	Gravity	Yes	Elec	Allis-C
Grant, T	6	2.875x4.250	20.00	165.5	I-Head	Block	Head	Hel'l.	Thermo	Spl-Pres	Gear	Single	At Kent	Auto		Gravity	Yes	Elec	Undec
Great Western, A	4	4.250x5.500	28.90	312.0	L-Head	Singly	Right	Hel'l.	Pump	Spl-Pres	Piston	Single	Kingston	Hand	Kingston	Gravity	Yes	Elec	G. & D.
Great Western, B	4	3.750x5.750	22.50	254.0	I-Head	Block	Head	Hel'l.	Pump	Spl-Pres	Cent	Single	Kingston	Hand	Kingston	Gravity	Yes	Elec	Bosch-R.
H																			
Haynes, 32	4	4.250x5.500	28.90	312.0	L-Head	Pairs	Right	Hel'l.	Pump	Splash	Piston	Dual	Simms	Hand	Stromberg	Pres	Yes	Elec	Leece-Nev.
Haynes, 30	6	3.500x5.000	29.45	288.6	L-Head	Block	Right	Hel'l.	Pump	Splash	Piston	Dual	Remy	Hand	Rayfield	Vacuum	Yes	Elec	Leece-Nev.
Haynes, 31	6	4.250x5.500	43.80	468.0	L-Head	Pairs	Right	Hel'l.	Pump	Splash	Piston	Dual	Simms	Hand	Stromberg	Pres	Yes	Elec	Leece-Nev.
Herff-Brooks, 4-40	4	4.500x5.000	32.40	318.1	L-Head	Singly	Left	Hel'l.	Pump	Splash	Gear	Single	Bosch	Hand	Stromberg	Gravity	Yes	Elec	Spldf-Ap.
Herff-Brooks, 6-50	6	4.000x4.500	38.40	339.2	L-Head	Singly	Left	Hel'l.	Pump	Splash	Gear	Single	Bosch	Hand	Stromberg	Gravity	Yes	Elec	Spldf-Ap.
Herreshoff, 4-16	4	2.375x3.250	8.77	57.8	L-Head	Block	Right	Hel'l.	Thermo	Spl-Pres	Piston	Single	At Kent	Auto	Carter	Gravity		Elec	Ents-Dyn.
Hudson, 6-40	6	3.500x5.000	29.40	288.6	L-Head	Block	Right	Hel'l.	Pump	Spl-Pres	Piston	Dual	Delco	H&A	Zenith	Gravity	Yes	Elec	Delco
Hudson, 6-54	6	4.125x5.250	40.90	420.9	L-Head	Threes	Right	Hel'l.	Pump	Spl-Pres	Piston	Dual	Delco	Hand	Zenith	Gravity	Yes	Elec	Delco
Hupmobile, H	4	3.250x5.500	16.90	182.5	L-Head	Block	Left	Chain	Thermo	Pres	Flwhl	Single	Bosch	Hand	Zenith	Gravity	Yes	Elec	Wsthse
Hupmobile, K	4	3.375x5.500	18.25	196.8	L-Head	Block	Left	Chain	Thermo	Pres	Flwhl	Single	At Kent	Auto	Zenith	Gravity	Yes	Elec	Wsthse
I																			
Imperial, 64	4	3.750x5.000	22.50	220.9	L-Head	Block	Right	Hel'l.	Thermo	Splash	Piston	Single	At Kent		Stromberg	Gravity	Yes	Elec	G. & D.
Imperial, 56	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l.	Pump	Splash	Piston	Dual	Splitdorf	Hand	Stromberg	Vacuum	Yes	Elec	North-E.
Inter-state, 71	4	3.500x5.000	19.60	192.4	I-Head	Block	Head	Hel'l.	Thermo	Splash	Gear	Single		Hand		Gravity	Yes	Elec	
J																			
Jackson-Olympic	4	4.500x5.250	32.40	334.0	L-Head	Pairs	Left	Hel'l.	Pump	Splash	Piston	Dual	Remy	Hand	Schebler	Gravity	Yes	Elec	Auto-lite
Jackson, 6-48	6	3.500x5.000	29.40	288.6	L-Head	Block	Left	Hel'l.	Pump	Splash	Piston	Dual	Delco	H&A	Stromberg	Gravity	Yes	Elec	Delco
Jeffery, 4	4	3.750x5.250	22.50	231.9	L-Head	Block	Right	Hel'l.	Pump	Spl-Pres	Piston	Dup	Bosch	Hand	Rayfield	Pres	Yes	Elec	U. S. L.
Jeffery, 6	6	3.750x5.250	33.75	347.0	L-Head	Pairs	Left	Hel'l.	Pump	Spl-Pres	Piston	Single	Bosch	Hand	Rayfield	Vacuum	Yes	Elec	U. S. L.
Jeffery-Chesterfield	6	3.000x5.000	21.60	212.0	L-Head	Block	Right	Hel'l.	Pump	Spl-Pres	Cent	Single	Bosch	Hand	Rayfield	Vacuum	Yes	Elec	Bijur
K																			
Kearns	4	2.875x4.000	13.37	106.1	I-Head	Block	Head	Hel'l.	Thermo	Spl-Pres	Piston	Single	Berling	Hand	Zenith	Gravity	Yes	Elec	Allis-C
King, D	8	2.750x5.000	24.16	380.1	L-Head	Fours	L&R	Chain	Thermo	Spl-Pres	Gear	Single		H&A			Yes	Elec	Ward L.
King	4	3.937x5.000	24.98	243.5	L-Head	Block	Left	Hel'l.	Thermo	Spl-Pres	Flwhl	Single	At Kent	H&A	Stromberg	Gravity	Yes	Elec	Ward-L.
Kissel, 4-36	4	4.250x5.500	29.00	312.0	L-Head	Block	Right	Hel'l.	Pump	Splash	Gear	Single	Wsthse	Auto	Stromberg	Vacuum	Yes	Elec	Own

ABBREVIATIONS:—Valve Location: Side and head, S & H.; Left and right, L & R. **Camshaft Drive:** Helical gears, Hel'l.; Spur gears, Spur. **Cooling Circulation:** Thermo-syphon, Thermo **Lubrication System:** Splash and pressure, Spl-Pres.; Pressure, Pres. **Type of Pump:** Flywheel, Flwhl.; Rotary, Rot.; Centrifugal, Cent. **Ignition System:** Double, Doub.; Two-point, 2-Pt. **Ignition Make:** Westinghouse, Wsthse.; Atwater Kent, At Kent.; Connecticut, Conn. **Ignition Control:** Automatic, Auto.; Hand and automatic, H&A.; Hand or fixed, H or F. **Make of Carbureter:** Optional, Opt. **Fuel Feed:** Pressure-gravity, Pres.-Gr. **Type of Cranking System:** Electric, Elec.; Electric and air, E. & Air.
*60-inch tread optional. **Tread more or less than standard except Scripps-Booth, which is optional.

eir Principal Specifications—Continued

Lighting System	TRANSMISSION: Clutch Type	GEARSET: Type	GEARSET: Location	GEARSET: Forward Sp'ds	Final Drive	Car Drives Through	Rear Axle	Total Gear Ratio on Direct	RUNNING GEAR: Wheelbase	TIRES: Front	TIRES: Rear	Wheels	CONTROL: Rear Springs	Location Steering Wheel	Gearshift Location	BEARINGS: Crankshaft Type and No.	Gearset	Rear Axle	Front Wheel	MAKE AND MODEL
Auto-lite	Cone	Sel	Amid	3	Bevel	Tor Rd	Semi F.	4.00–1	106*	32x3½	32x3½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	B&R.	Ball	Chevrolet, Baby Grand
Auto-lite	Cone	Sel	Amid	3	Bevel	Tor Rd	Semi F.	4.00–1	106*	32x3½	32x3½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	B&R.	Ball	Chevrolet, Royal Mail
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Semi F.	3.50–1	118*	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Cole, 4–40
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	3.93–1	136	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Cole, 6
Delco	Cone	Sel	Unit M.	3	Bevel	Tor Rd	Float	4.67–1	126*	35x4½	35x4½	Wood	S.-E.	Left	Cent.	Plain, 4	Ball	Roll	Roll	Cole, 6–50
Jones	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.00–1	120	34x4	34x4	Wood	¾ Ell.	Right	Cent.	Plain, 3	Ball	Ball	Ball	Corbitt, F. & E.
Wsthse	Disk	Sel	Unit M.	3	Sp Bev	Springs	¾ Float.	3.90–1	120	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Roll	Roll	Crawford, 6–35
Remy	Disk	Sel	Rear A.	3	Bevel	Rad Rd	¾ Float.	4.00–1	114	33x4	33x4	Wood	Ell.	Right	Cent.	Plain, 3	Plain	Roll	Ball	Crow-Elkhart, E42, E45
Ward L.	Disk	Sel	Rear A.	3	Bevel	Rad Rd	Float	4.00–1	120	34x4	34x4	Wood	¾ Ell.	Right	Cent.	Plain, 3	Plain	Roll	Ball	Crow-Elkhart, E52, 54, 55, 56
Ward L.	Disk	Sel	Unit M.	3	Bevel	Rad Rd	Float	4.00–1	130	36x4	36x4	Wood	¾ Ell.	Right	Cent.	Plain, 4	Plain	Roll	Ball	Crow-Elkhart, E62, 64, 65, 66
....	Disk	Sel	Unit M.	3	Sp Bev	Springs	Float	3.50–1	129	37x5	37x5	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Cunningham, S
....	Disk	Sel	Unit M.	3	Bevel	Rad Rd	Semi F.	3.00–1	108**	28x3	28x3	Wire	¾ Ell.	Left	Cent.	Plain, 2	Plain	B&R.	Ball	Cycleplane-Tourist
....	....	Plan	Amid	2	Chain	Rad Rd	Live	3.00–1	96**	28x2½	28x2½	Wire	S.-E.	Cent.	Right	Roll	Plain	Ball	Ball	Cycleplane-Traveler
																				D
Wsthse	Cone	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00–1	112	34x4	34x4	Wood	¾ Plat.	Left	Cent.	Plain, 3	B&R.	Roll	Ball	Davis, 38–A, 38–B
G. & D.	Disk	Sel	Unit M.	4	Bevel	Rad Rd	Float	3.75–1	128	37x4½	37x4½	Wood	¾ Plat.	Left	Cent.	Plain, 3	Ball	B&R.	Ball	Davis, 6–50
Wsthse	Disk	Sel	Unit M.	3	Bevel	Tor T.	Float	4.30–1	112	32x3½	32x3½	Wood	¾ Plat.	Left	Cent.	Ball, 2	Ball	Ball	Ball	Detroiter, C
Dyneto	Disk	Sel	Amid	3	Bevel	Springs	Semi F.	4.00–1	96**	28x3	28x3	Wire	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Ball	Dile, A
N. E.	Cone	Sel	Unit M.	3	Bevel	Tor T.	Float	3.61–1	110*	32x3½	32x3½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Ball	Dodge
Wsthse	Disk	Sel	Unit M.	3	Sp Bev	Springs	¾ Float.	4.08–1	121	36x4½	36x4½	Wood	¾ Plat.	Left	Cent.	Plain, 3	Roll	Roll	Roll	Dorris, 1–A–4
																				E
Remy	Disk	Sel	Unit M.	3	Bevel	Springs	Semi F.	4.00–1	108	32x3½	32x3½	Wood	¾ Ell.	Right	Cent.	Plain, 3	Ball	Roll	Ball	Empire, 34–40
G. & D.	Disk	Sel	Unit M.	3	Bevel	Springs	Float	3.78–1	125	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	B&R.	Ball	Enger, Six–50
																				F
Bosch-R.	Disk	Sel	Amid	4	Bevel	Tor T.	Semi-F.	....	128	36x4½	37x5	Opt.	¾ Ell.	Right	Right	Plain, 3	Ball	Ball	Ball	Fiat, 55
Bosch-R.	Disk	Sel	Amid	4	Bevel	Tor T.	Semi-F.	....	135	36x4½	37x5	Opt.	¾ Ell.	Right	Right	Plain, 4	Ball	Ball	Ball	Fiat, 56
G. & D.	Cone	Sel	Amid	3	Bevel	Tor T.	Float	3.50–1	116	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Ball	Firestone-Col., 82–E, 86–E
G. & D.	Disk	Sel	Unit M.	3	Bevel	Tor T.	Float	3.50–1	132	36x4	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Ball	Firestone-Col., 90–E, 98–E
....	Disk	Plan	Unit M.	2	Bevel	Tor T.	Semi-F.	3.63–1	100	30x3	30x3½	Wood	Cross.	Left	Pedal	Plain, 3	Plain	Roll	Ball	Ford, T
Dyneto	Disk	Sel	Amid	3	Sk Bev	Springs	Semi-F.	3.70–1	120	34x4½	34x4½	Wood	Ell.	Left	Cent.	Plain, 7	Ball	Roll	Roll	Franklin, 6–30
Bosch	Cone	Sel	Amid	4	Bevel	Tor T.	Float	Opt.	Opt.	36x4	36x5	Wire	S.-E.	Right	Right	Plain, 3	Ball	Ball	Ball	F. R. P., 45–B
																				G
Wsthse	Disk	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00–1	114	32x4	32x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Ball	Glide, 30
Al-Ch	Cone	Prog	Rear A.	2	Bevel	Rad Rd	¾ Float.	4.50–1	90	28x3	28x3	Wire	Cross.	Left	Cent.	Plain, 2	B&R.	Roll	Ball	Grant, M
Undec	Cone	Sel	Unit M.	3	Bevel	Rad Rd	Float	4.00–1	106*	30x3½	30x3½	Wood	Cant.	Left	Cent.	Plain, 3	B&R.	B&R.	Ball	Grant, T
G. & D.	Cone	Sel	Unit M.	3	Bevel	Tor T.	Float	3.50–1	117	36x4	36x4	Wood	¾ Ell.	Right	Right	Plain, 5	Roll	B&R.	Ball	Great Western, A
Bosch-R.	Cone	Sel	Unit M.	3	Bevel	Tor T.	Float	4.00–1	117	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	B&R.	Ball	Great Western, B
																				H
Leece-Nev	Con Bd	Sel	Unit M.	3	Bevel	Springs	Float	3.69–1	118	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Ball	Ball	Haynes, 32
Leece-Nev	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.00–1	121	34x4	34x4	Wood	S.-E.	Left	Cent.	Plain, 3	Ball	Ball	Ball	Haynes, 30
Leece-Nev	Con Bd	Sel	Unit M.	3	Bevel	Springs	Float	3.66–1	130	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 4	Roll	Roll	Roll	Haynes, 31
Spldf-Ap	Cone	Elec	Amid	3	Bevel	Springs	Semi-F.	4.00–1	118	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 5	B&R.	Ball	Roll	Herff-Brooks, 4–40
Spldf-Ap	Cone	Elec	Amid	3	Bevel	Springs	Semi-F.	4.00–1	124	34x4	......	Wood	¾ Ell.	Left	Cent.	Plain, 7	B&R.	Ball	Roll	Herff-Brooks, 6–50
Dyneto	Cone	Sel	Amid	3	Bevel	....	Semi-F.	4.00–1	94**	28x3	28x3	Wire	½ Ell.	Left	Cent.	Ball	Ball	Ball	Ball	Herreshoff, 4–16
Delco	Disk	Sel	Unit M.	3	Sp Bev	Springs	Semi-F.	3.77–1	123½	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Roll	Roll	Hudson, 6–40
Delco	Disk	Sel	Unit M.	4	Bevel	Springs	Float	3.77–1	135**	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Roll	Roll	Hudson, 6–54
Wsthse	Disk	Sel	Unit M.	3	Bevel	Springs	Float	3.86–1	106*	33x4	33x4	Wood	Cross.	Right	Cent.	Plain, 3	Roll	Roll	Roll	Hupmobile, H
Wsthse	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.25–1	119*	34x4	34x4	Wood	S.-E.	Left	Cent.	Plain, 3	B&R.	Ball	Roll	Hupmobile, K
																				I
G. & D.	Disk	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00–1	115	32x3½	32x3½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Ball	Imperial, 64
North-E.	Disk	Sel	Unit M.	3	Bevel	....	Float	3.87–1	130	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	....	....	....	....	Imperial, 56
....	Cone	Sel	Rear A.	3	Bevel	Tor T.	¾ Float.	4.00–1	110	33x4	33x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	B&R.	Roll	Ball	Inter-state, 71
																				J
Auto-lite	Cone	Sel	Unit M.	3	Bevel	Rad Rd	Float	3.50–1	117	34x4	34x4	Wood	Ell.	Left	Cent.	Plain, 3	Ball	Roll	Ball	Jackson-Olympic
Delco	Cone	Sel	Unit M.	3	Bevel	Rad Rd	Float	4.00–1	125	34x4½	34x4½	Wood	Ell.	Left	Cent.	Plain, 4	B&R.	B&R.	Ball	Jackson, 6–48
U. S. L.	Cone	Sel	Amid	4	Bevel	Springs	Float	4.07–1	116	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Roll	Jeffery, 4
U. S. L.	Disk	Sel	Amid	4	Sp Bev	Springs	Float	3.50–1	133½	34x4½	34x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Roll	Jeffery, 6
Bijur	Disk	Sel	Amid	4	Worm	Springs	Float	4.50–1	122	34x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3	Ball	Ball	Roll	Jeffery-Chesterfield
																				K
Allis-C	Cone	Sel	Unit M.	3	Bevel	Springs	Semi F.	4.00–1	100	28x3	28x3	Wood	¾ Ell.	Opt.	Cent.	Plain, 2	Ball	B&R.	Ball	Kearns
Ward L.	Disk	Sel	Unit M.	3	Bevel	Springs	Float	....	113	33x4	33x4	Wood	Cant.	Left	Cent.	Plain, 3	Roller	Ball	Ball	King, D
Ward L.	Disk	Sel	Unit M.	3	Bevel	Springs	Float	3.70–1	113	33x4	33x4	Wood	Cant.	Left	Cent.	Plain, 3	Plain	Ball	Ball	King
Wsthse	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00–1	121	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Kissel, 4–36

ABBREVIATIONS:—Make of Cranking System: North East, North-E.; Gray & Davis, G. & D.; Ward Leonard, Ward L.; Bosch-Rushmore, Bosch-R.; Allis-Chalmers, Allis-C.; Leece-Neville, Leece-Nev.; Splitdorf-Apple, Spldf-Ap.; Entz-Dyneto, Entz-Dyn.; Robbins & Meyers, Rob-Myr.; Hendricks, Hendrix. **Clutch Type:** Contracting band, Con Bd.; Expanding band, Exp Bd. **Gearset Type:** Selective, Sel.; Progressive, Prog.; Frictional, Fric.; Planetary, Plan. **Gearset Location:** Unit with motor, Unit M.; Amidships, Amid.; Rear Axle, Rear A. **Final Drive:** Spiral bevel, Sp Bev. **Car Drives Through:** Radius rod, Rad Rd.; Torsion tube, Tor T.; Torsion arm, Tor A. **Rear Axle:** Floating, Float.; Semi-floating, Semi F.; ¾ floating, ¾ Float.; Non-floating, Non-Float. **Rear Springs:** ¾ elliptic, ¾ Ell. Elliptic, Ell.; Cantilever, Cant.; Semi-elliptic, Semi E.; Platform, Plat.; ¾ Ell. **Control:** Center, Cent. **Bearings:** Roller, Roll.; Ball and roller, B&R.; Plain and ball, Pl&B.; Plain and roller, Pl&R.

Passenger Cars for 1915 Listed with Th

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	Piston Displacement Cubic Inches	CYLINDERS		Valve Location	Camshaft Drive	Cooling Circulation	LUBRICATION		IGNITION			CARBURETION			CRANKING SYSTEM	
					Shape	How Cast				System	Type of Pump	System	Make	Control	Make of Carbureter	Fuel Feed	Is Hot Air Pipe Fitted?	Type	Make
Kissel, 42	6	3.625x5.500	31.37	309.3	L-Head	Block	Right		Pump	Splash		Single	Wthse	Hand	Stromberg		Yes	Elec	Own
Kissel, 6-48	6	4.000x5.500	38.40	339.2	L-Head	Block	Left	Hel'l	Pump	Splash	Gear	Single	Mea	Hand	Rayfield	Vacuum	Yes	Elec	Own
Kissel, 6-60	6	4.500x5.250	48.60	501.0	L-Head	Pairs	Left	Chain	Pump	Splash	Gear	Single	Bosch	Hand	Rayfield	Pres	Yes	Elec	Own
Kline, 6-42	6	3.500x5.125	29.40	197.2	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Gear	Single	Wthse	Hand	Stromberg	Vacuum	Yes	Elec	Wthse
Kline, 6-42A	6	3.500x5.125	29.40	197.2	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Gear	Single	Wthse	Hand	Stromberg	Vacuum	Yes	Elec	Wthse
Krit, O	4	3.750x4.000	22.50	176.7	L-Head	Block	Right	Hel'l	Thermo	Splash	Flwhl	Single	Remy	Hand	Johnson	Gravity	Yes	Elec	Disco
Krit, M	4	3.750x4.000	22.50	176.7	L-Head	Block	Right	Hel'l	Thermo	Splash	Flwhl	Single	Bosch	Hand	Stromberg	Gravity	Yes	Elec	North E.
L																			
Lambert, 48-C	4	3.750x4.000	22.50	176.7	L-Head	Block	Left	Hel'l	Pump	Spl-Pres	Piston	Single	Briggs	Hand	Schebler	Gravity	Yes	Elec	Briggs
Lambert, 68-C	4	4.125x5.250	27.25	280.6	L-Head	Block	Left	Hel'l	Pump	Spl-Pres	Piston	Single	Briggs	Hand	Schebler	Gravity	Yes	Elec	Briggs
Lenox, 4	4	4.250x5.500	29.00	312.0	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Piston	Dual	Wthse	H&A	Own	Gravity	No	Elec	Wthse
Lenox, 6	6	3.750x5.500	33.75	364.4	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Piston	Dual	Wthse	H&A	Own	Gravity	No	Elec	Wthse
Lewis, 6	6	3.500x6.000	29.40	346.4	L-Head	Block	Head	Chain	Pump	Spl-Pres	Piston	Single	Remy	Hand	Stromberg	Vacuum	Yes	Elec	Remy
Lexington, 6-L	6	3.500x5.000	29.40	288.6	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Piston	Single	Wthse	H&A	Schebler	Vacuum	Yes	Elec	Wthse
Lexington, 6-M	6	4.125x5.000	40.90	400.9	L-Head	Threes	Right	Hel'l	Pump	Spl-Pres	Piston	Single	At Kent	H&A	Stromberg	Vacuum	Yes	Elec	Jones
Locomobile, M-5	6	4.500x5.500	48.60	524.8	T-Head	Pairs	Opp	Hel'l	Pump	Spl-Pres	Gear	Dual	Bosch	Hand	Own	Pres	Yes	Elec	Wthse
Locomobile, R-4	6	4.250x5.000	43.80	425.6	T-Head	Pairs	Opp	Hel'l	Pump	Spl-Pres	Gear	Dual	Bosch	Hand	Own	Pres	Yes	Elec	Wthse
Luverne, 760	6	4.000x5.000	38.60	376.9	L-Head	Pairs	Left	Hel'l	Thermo	Splash	Gear	Dup	Bosch	Hand	Schebler	Gravity	No	Elec	Jones
Lyons-Knight, K-4	4	4.500x5.500	32.40	349.9	Knight	Pairs	Sleeve	Chain	Pump	Pres	Piston	Dual	Simms	Hand	Stromberg	Gravity	Yes	Elec	North-E.
M																			
Maxwell, 25	4	3.625x4.500	20.25	185.8	L-Head	Block	Right	Hel'l	Thermo	Splash	Piston	Dual	Simms	Hand	Kingston	Gravity	Yes	Elec	Huff
McFarlan, T	6	4.000x6.000	38.40	452.4	T-Head	Block	Opp	Hel'l	Pump	Splash		Single	Wthse	H&A	Stromberg	Vacuum	Yes	E&Air	
McFarlan, X	6	4.500x6.000	48.40	572.5	T-Head	Block	Opp	Hel'l	Pump	Splash		Single	Wthse	H&A	Stromberg	Vacuum	Yes	E&Air	
McIntyre, 75	4	3.750x4.250	22.50	187.7	L-Head	Block	Left	Spur	Thermo	Splash	Piston	Single	Bosch	Hand	Holley	Gravity	Yes	Elec	Spldf-A
McIntyre, 6-40	6	3.500x4.500	29.40	259.8	T-Head	Block	Opp	Chain	Thermo	Splash	Piston	Single	Briggs	Hand	Stromberg	Gravity	Yes	Elec	Briggs
Meteor, 42	4	4.000x5.000	25.60	251.3	L-Head	Pairs	Left	Hel'l	Pump	Spl-Pres	Gear	Single	At Kent	H&A		Gravity	Yes	Elec	Spldf-A
Meteor, 45	6	3.750x5.000	33.60	331.4	L-Head	Pairs	Left	Hel'l	Pump	Spl-Pres	Gear	Single	At Kent	H&A		Gravity	Yes	Elec	Spldf-A
Metz, 22	4	3.750x4.000	22.50	176.7	L-Head	Block	Right	Spur	Thermo	Splash	Gear	Single	Bosch	Fixed		Gravity	Opt	Elec	G. & D.
Mitchell-Lewis, 4	4	4.000x5.500	25.60	276.5	L-Head	Pairs	Left	Hel'l	Pump	Spl-Pres	Piston	Single	Conn	Hand		Vacuum	Yes	Elec	Spldf-Ap
Mitchell-Lewis, 6	6	4.000x5.500	38.40	414.8	L-Head	Pairs	Left	Hel'l	Pump	Spl-Pres	Piston	Single	Conn	Hand		Vacuum	Yes	Elec	Spldf-Ap
Mitchell-Lewis, 7-6	6	4.250x7.000	43.80	595.8	T-Head	Pairs	Opp	Hel'l	Pump	Spl-Pres	Piston	Dual	Remy	Hand		Gravity	Yes	Elec	Remy
Mitchell-Lewis, 5-6	6	4.250x6.000	43.80	430.6	T-Head	Pairs	Opp	Hel'l	Pump	Spl-Pres	Piston	Dual	Remy	Hand		Gravity	Yes	Elec	Remy
Moline-Knight	4	4.000x6.000	25.60	301.6	Knight	Block	Sleeve	Chain	Thermo	Spl-Pres	Gear	Dual	Bosch	Hand	Schebler	Pres	Yes	Elec	Wagner
Marmon, 41	6	4.250x5.500	43.80	468.0	L-Head	Threes	Right	Hel'l	Pump	Pres	Gear	Dual	Bosch	Hand	Stromberg	Vacuum	Yes	Elec	Bosch
Marmon, 48	6	4.500x6.000	48.60	577.5	T-Head	Pairs	Left	Hel'l	Pump	Pres	Gear	2-pt	Bosch	Hand	Zenith	Pres	Yes	Elec	Bosch
Monarch, 6	6	3.500x5.000	29.40	288.6	L-Head	Block	Right	Hel'l	Pump	Splash	Piston	Dual	At Kent	Auto	Zephyr	Gravity	Yes	Elec	Ward L.
Moon, 4-38	4	3.750x5.000	22.50	220.9	L-Head	Block	Right	Hel'l	Pump	Spl-Pres		Dual	Delco	Hand	Opt	Vacuum		Elec	Delco
Moon, 6-40	6	3.500x5.000	29.45	288.4	L-Head	Block	Right	Hel'l	Pump	Spl-Pres		Dual	Delco	Hand	Opt	Vacuum		Elec	Delco
Morse, D-4	4	4.625x5.000	34.28	336.0	I-Head	Singly	Head	Spur	Pump	Splash	Gear	Dual	Eisemann	Hand	Stromberg	Gravity	Yes	Elec	G. & D.
N																			
National, AA	6	3.750x5.500	33.75	364.4	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Gear	Single	Eisemann	Hand	Rayfield	Pres	Yes	Elec	Remy
Norwalk, F	6	3.500x5.125	29.45	295.9	L-Head	Block	Left	Hel'l	Pump	Spl-Pres	Gear	Single	At Kent	H&A	Rayfield	Vacuum	Yes	Elec	G. & D.
O																			
Oakland, 37	4	3.500x5.000	19.60	192.4	L-Head	Block	Left	Hel'l	Pump	Splash	Piston	Dual	Delco	H&A	Marvel	Vacuum	Yes	Elec	Delco
Oakland, 49	6	3.500x5.000	29.45	288.4	L-Head	Block	Left	Hel'l	Pump	Splash	Piston	Dual	Delco	H&A	Johnson	Vacuum	Yes	Elec	Delco
Oldsmobile, 42	4	3.500x5.000	19.60	192.4	I-Head	Block	Head	Hel'l	Pump	Splash	Piston	Dual	Delco	Auto	Marvel	Pres	Yes	Elec	Delco
Oldsmobile, 55	6	4.250x5.250	43.80	446.7	L-Head	Pairs	Head	Hel'l	Pump	Splash	Piston	Dual	Delco	Auto	Marvel	Pres	Yes	Elec	Delco
Overland 80	4	4.125x4.500	27.25	240.5	L-Head	Singly	Left	Hel'l	Thermo	Splash	Gear	Single	Bosch	Hand	Schebler	Gravity	Yes	Elec	Auto-lite
Overland 81	4	4.000x4.500	25.60	226.2	L-Head	Singly	Left	Hel'l	Thermo	Splash	Gear	Single	Splitdorf	Hand	Schebler	Gravity	Yes	Elec	Auto-lite
Overland 82	6	3.500x5.250	29.40	303.1	L-Head	Block	Right	Hel'l	Pump	Splash	Piston	Single	Bosch	Hand	Schebler	Vacuum	Yes	Elec	Auto-lite
Owen	6	3.625x5.500			I-Head	Block	Head	Hel'l	Pump	Pres	Gear	Dual	Remy	Hand				Elec	Own
P																			
Packard 3-38	6	4.000x5.500	38.40	414.7	L-Head	Threes	Right	Hel'l	Pump	Pres	Gear	Single	Bosch	Hand	Own	Pres	Yes	Elec	Bijur
Packard, 5-48	6	4.500x5.500	48.60	524.8	L-Head	Threes	Right	Hel'l	Pump	Pres	Gear	Single	Bosch	Hand	Own	Pres	Yes	Elec	Bijur
Paige-Detroit, 6	6	3.500x5.250	29.45	303.1	L-Head	Block	Right	Worm	Pump	Splash	Gear	Dual	Bosch	Hand		Gravity	Yes	Elec	G. & D.
Partin-Palmer, 20	4	3.125x4.000	15.64	122.7	L-Head	Block	Left	Hel'l	Thermo	Splash	Gear	Single	At Kent	Hand	Muir	Gravity	Yes	Elec	G. & D.
Partin-Palmer, 38	4	3.750x5.250	22.50	231.9	I-Head	Block	Head	Hel'l	Thermo	Splash	Gear	Single	At Kent	Auto	Stromberg	Gravity	Yes	Elec	G. & D.
Paterson, 4-32	4	3.500x5.000	19.60	192.4	L-Head	Block	Left	Hel'l	Pump	Spl-Pres	Piston	Dual	Delco	Hand	Stromberg	Gravity	Yes	Elec	Delco
Paterson, 6-48	6	3.500x5.000	29.40	288.6	L-Head	Pairs	Left	Hel'l	Pump	Spl-Pres	Piston	Dual	Delco	Hand	Stromberg	Vacuum	Yes	Elec	Delco
Pathfinder	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l	Pump	Spl-Pres	Gear	Single	Wthse	Hand	Schebler	Gravity	Yes	Elec	Wthse
Peerless, 54	4	3.750x5.000	22.50	220.9	L-Head	Block	Right	Hel'l	Thermo	Spl-Pres	Piston	Single	At Kent	H&A	Stromberg	Vacuum	Yes	Elec	G. & D.
Peerless, 55	6	3.500x5.000	29.40	288.6	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Piston	Single	At Kent	H&A	Stromberg	Vacuum	Yes	Elec	G. & D.
Peerless, 48	6	4.500x6.000	48.60	577.5	T-Head	Pairs	Opp	Hel'l	Pump	Splash	Piston	Dual	Bosch	Hand	Own	Pres	No	Elec	G. & D.

ABBREVIATIONS:—Valve Location: Side and head, S & H.; Left and right, L & R. **Camshaft Drive:** Helical gears, Hel'l.; Spur gears, Spur. **Cooling Circulation:** Thermo-syphon, Thermo. **Lubrication System:** Splash and pressure, Spl-Pres.; Pressure, Pres. **Type of Pump:** Flywheel, Flwhl.; Rotary, Rot.; Centrifugal, Cent. **Ignition System:** Double, Doub.; Two-point, 2-Pt. **Ignition Make:** Westinghouse, Wthse.; Atwater Kent, At Kent.; Connecticut, Conn. **Ignition Control:** Automatic, Auto.; Hand and automatic, H&A.; Hand or fixed, H or F. **Make of Carbureter:** Optional, Opt. **Fuel Feed:** Pressure-gravity, Pres.-Gr. **Type of Cranking System:** Electric, Elec.; Electric and air, E. & Air.

*60-inch tread optional. **Tread more or less than standard except Scripps-Booth, which is optional. ***The Ents system comprising motor and generator replaces the gearbox

eir Principal Specifications—Continued

Lighting System	TRANSMISSION								RUNNING GEAR					CONTROL		BEARINGS				MAKE AND MODEL
	Clutch Type	GEARSET			Final Drive	Car Drives Through	Rear Axle	Total Gear Ratio on Direct	Wheel-base	TIRES		Wheels	Rear Springs	Location Steering Wheel	Gearshift Location	Crankshaft Type and No.	Gearset	Rear Axle	Front Wheel	
		Type	Location	Forward Sp'ds						Front	Rear									
Wsthse	Cone	Sel	Amid	3	Bevel	Springs	Float		126	35x4½	35x4½	Wood	¾ Ell.	Left	Cent.	Plain	Ball	Roll	Ball	Kissel, 42
Esterline	Cone	Sel	Unit M.	4	Bevel	Springs	Float	4.00-1	132½	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	Roll	Roll	Kissel, 6-48
Esterline	Cone	Sel	Amid	4	Bevel	Springs	Float	3.75-1	142	37x5	37x5	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	Roll	Roll	Kissel, 6-60
Wsthse	Disk	Sel	Unit M.	3	Sp Bev.	Springs	¾ Float.	3.75-1	123	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 4	B&R	Ball	Roll	Kline, 6-42
Wsthse	Disk	Sel	Unit M.	3	Sp Bev.	Springs	¾ Float.	3.75-1	123	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 4	B&R	Ball	Roll	Kline, 6-42A
Disco	Disk	Sel	Unit M.	3	Bevel	Tor T	Semi F.	4.00-1	108	32x3½	32x3½	Wood	Ell.	Left	Left	Ball, 2	B&Pl.	B&R	Ball	Krit, O
North E.	Disk	Sel	Unit M.	3	Bevel	Tor T	Semi F.	4.00-1	108	32x3½	32x3½	Wood	Ell.	Left	Cent.	Ball, 2	B&Pl.	B&R	Ball	Krit, M
																				L
Briggs		Fric	Amid		Chain	Rad Rd	Semi F.		112*	32x3½	32x3½	Wood	Ell.	Left	Cent.	Plain, 3		B&R	Ball	Lambert, 48-C
Briggs		Fric	Amid		Chain	Rad Rd	Semi F.		117	34x3½	34x3½	Wood	Ell.	Right	Right	Plain, 3		B&R	Ball	Lambert, 68-C
Wsthse	Cone	Sel	Rear A.	3	Bevel	Tor T	¾ Float.	3.30-1	118	34x4½	34x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Ball	Lenox, 4
Wsthse	Cone	Sel	Rear A.	3	Bevel	Tor T	¾ Float.	3.07-1	130	34x4½	34x4½	Opt.	¾ Ell.	Left	Cent.	Plain, 4	Ball	Ball	Ball	Lenox, 6
Remy	Disk	Sel	Unit M.	3	Bevel	Tor Rd	¾ Float.	3.75-1	135	36x4	36x4	Wood	¾ Ell.	Left	Cent.	Plain	Ball	Ball	Ball	Lewis, 6
Wsthse	Disk	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00-1	128	34x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3	Ball	Ball	Ball	Lexington, 6-L
Jones	Cone	Sel	Unit M.	3	Bevel	Springs	Float		130	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Lexington, 6-M
Wsthse	Disk	Sel	Amid	4	Bevel	Rad Rd	Float	3.50-1	140	37x5	37x5	Opt.	¾ Ell.	Left	Cent.	Plain, 7	Ball	Ball	Roll	Locomobile, M-5
Wsthse	Disk	Sel	Amid	4	Bevel	Rad Rd	Float	3.80-1	132	36x4½	37x5	Opt.	¾ Ell.	Left	Cent.	Plain, 7	Ball	Ball	Roll	Locomobile, R-4
Jones	Disk	Unit	Unit M.	3	Bevel	Rad Rd	Float	4.00-1	128	36x4½	36x4½	Wood	Ell.	Left	Cent.	Plain, 4	Ball	B&R	Roll	Luverne, 760
North E.	Disk	Sel	Rear A.	3	Worm	Tor T	Float	3.87-1	130	37x5	37x5	Wood	¾ Ell.	Left	Cent.	Plain, 5	Ball	Roll	Roll	Lyons-Knight, K-4
																				M
Huff	Cone	Sel	Unit M.	3	Bevel	Tor T	¾ Float.	3.58-1	102	30x3½	30x3½	Wood	¾ Ell.	Left	Cent.	Plain, 2	R&Pl.	Roll	Ball	Maxwell, 25
Wsthse	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.58-1	132	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 4	Roll	Roll	Ball	McFarlan, T
Wsthse	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.58-1	132	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 4	Roll	Roll	Ball	McFarlan, X
Spldf-Ap	Disk	Sel	Unit M.	3	Bevel	Springs	Semi F.	4.00-1	106	30x3	30x3	Wood	Cant.	Left	Cent.	Plain, 3	Ball	Ball	Ball	McIntyre, 75
Briggs	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	120	35x4	35x4	Wood	¾ Ell.	Right	Cent.	Plain, 3	Ball	Ball	Ball	McIntyre, 6-40
Spldf-Ap	Disk	Sel	Unit M.	3	Bevel	Springs	¾ Float.	3.70-1	114	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	Roll	Ball	Meteor, 42
Spldf-Ap	Disk	Sel	Unit M.	3	Bevel	Springs	¾ Float.	3.70-1	126	35x4	35x4	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	Roll	Ball	Meteor, 45
G. & D.		Fric	Amid	7	Chain	Rad Rd	Dead	2.81-1	96	30x3	30x3	Wood	Ell.	Left	Cent.	Plain, 3	Ball	Ball	Ball	Metz, 22
Spldf-Ap	Cone	Sel	Rear A.	3	Bevel	Springs	Float	4.00-1	116	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	B&R	Roll	Roll	Mitchell-Lewis, 4
Spldf-Ap	Cone	Sel	Rear A.	3	Bevel	Springs	Float	4.00-1	127½	36x4	36x4	Wood	¾ Ell.	Left	Cent.	Plain, 4	B&R	Roll	Roll	Mitchell-Lewis, 6
Remy	Cone	Sel	Amid	3	Bevel	Tor T	Float	3.35-1	144	37x5	37x5	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	Roll	Roll	Mitchell-Lewis, 7-6
Remy	Cone	Sel	Amid	3	Bevel	Tor T	Float	3.35-1	132	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	Roll	Roll	Mitchell-Lewis, 5-6
Wagner	Cone	Sel	Amid	4	Bevel	Tor T	Float		128	36x4½	36x4½	Opt.	S.-E.	Left	Cent.	Plain, 3	Ball	B&R	Ball	Moline-Knight
Bosch	Cone	Sel	Amid	3	Sp Bev.	Springs	Float		132½**	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 7	Ball	Roll	Roll	Marmon, 41
Bosch	Disk	Sel	Rear A.	3	Bevel	Tor T	Float	3.46-1	145	36x4½	37x5	Wood	¾ Ell.	Left	Cent.	Plain, 7	Ball	B&R	Roll	Marmon, 48
Rob-Myr	Cone	Sel	Unit M.	3	Bevel	Rad Rd	¾ Float.	4.00-1	125	33x4	33x4	Wood	Ell.	Left	Cent.	Plain, 3	Ball	B&R	Ball	Monarch, 6
Delco	Disk	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00-1	122	34x4	34x4	Wood	¾ Ell.	Left	Left	Plain, 3	Roll	Ball	Roll	Moon, 4-38
Delco	Disk	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00-1	122	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Ball	Roll	Moon, 6-40
G. & D.	Disk	Sel	Amid	4	Bevel	Tor T	Semi F.	3.00-1	127	36x4½	36x4½	Wood	Ell.	Right	Cent.	Plain, 5	Ball	Ball	Ball	Morse, D-4
																				N
Remy	Cone	Sel	Amid	3	Bevel	Springs	Float	4.00-1	132	36x4½	36x4½	Wood	Cant.	Left	Cent.	Plain, 4	Ball	Roll	Roll	National, AA
G. & D.	Disk	Sel	Unit M.	4	Bevel	Springs	Semi F.	4.08-1	131	37x4	37x4	Wood	S.-E.	Left	Cent.	Plain, 4	Ball	Roll	Roll	Norwalk, F
																				O
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	112	33x4	33x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	B&R	Ball	Oakland, 37
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	123½	35x4½	35x4½	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	B&R	Ball	Oakland, 49
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00-1	112	33x4	33x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	B&R	Roll	Roll	Oldsmobile, 42
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00-1	139	36x5	36x5	Wood	¾ Ell.	Left	Cent.	Plain, 4	B&R	Ball	Roll	Oldsmobile, 55
Auto-lite	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.75-1	114	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 5	Ball	Roll	Roll	Overland, 80
Auto-lite	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.75-1	106	33x4	33x4	Wood	¾ Ell.	Left	Cent.	Plain, 5	Ball	Roll	Roll	Overland, 81
Auto-lite	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	4.00-1	125	35x4½	35x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Overland, 82
Own	Elec	El***	Amid		Bevel		Float	3.00-1	136	35x5	35x5	Opt.	S.-E.	Left	Cent.	Plain, 3		Roll	Roll	Owen
																				P
Bijur	Disk	Prog	Rear A.	3	Sp Bev.	Rad Rd	Non-F.	3.93-1	140	36x4½	37x5	Wood	¾ Ell.	Left	Left	Plain, 7	Ball	Ball	Roll	Packard, 3-38
Bijur	Disk	Prog	Rear A.	3	Sp Bev.	Rad Rd	Non-F.	3.93-1	144	37x5	37x5	Wood	¾ Ell.	Left	Left	Plain, 7	Ball	Ball	Roll	Packard, 5-48
G. & D.	Disk	Sel	Unit M.	3	Bevel	Springs	Float	4.07-1	124	34x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3	Ball	B&R	Ball	Paige-Detroit, 6
G. & D.	Disk	Sel	Rear A.	3	Bevel	Tor T	Float	4.20-1	96	28x3	28x3	Wood	¾ Ell.	Left	Cent.	Plain, 2	Roll	Roll	Ball	Partin-Palmer, 20
G. & D.	Cone	Sel	Rear A.	3	Bevel	Tor T	Float	3.75-1	115	33x4	33x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Roll	Ball	Partin-Palmer, 38
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	4.00-1	112	33x4	33x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	B&R	Ball	Paterson, 4-32
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float	3.75-1	124	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	B&R	Ball	Paterson, 6-48
Wsthse	Disk	Sel	Unit M.	4	Bevel	Tor T	Float	3.75-1	125	34x4½	34x4½	Wood	Cant.	Left	Cent.	Plain, 3	Ball	Ball	Roll	Pathfinder
G. & D.	Disk	Sel	Unit M.	3	Sp Bev.	Springs	Semi F.	4.50-1	113	34x4	34x4	Wood	Plat.	Left	Cent.	Plain, 3	B&R	Roll	Roll	Peerless, 54
G. & D.	Disk	Sel	Unit M.	3	Sp Bev.	Springs	Semi F.	4.00-1	121	34x4	34x4	Wood	Plat.	Left	Cent.	Plain, 3	B&R	Roll	Roll	Peerless, 55
G. & D.	Exp Bd.	Sel	Amid	4	Sp Bev.	Rad Rd	Float	3.35-1	137	37x5	37x5	Wood	Plat.	Opt.	Opt.	Plain, 7	Ball	Ball	Roll	Peerless, 48

ABBREVIATIONS:—Make of Cranking System: North East, North-E.; Gray & Davis, G. & D.; Ward Leonard, Ward L.; Bosch-Rushmore, Bosch-R.; Allis-Chalmers, Allis-C.; Leece-Neville, Leece-Nev.; Splitdorf-Apple, Spldf-Ap.; Entz-Dyneto, Entz-Dyn.; Robbins & Meyers, Rob-Myr.; Hendricks, Hendrix. **Clutch Type:** Contracting band, Con Bd.; Expanding band, Exp Bd. **Gearset Type:** Selective, Sel.; Progressive, Prog.; Frictional, Fric.; Planetary, Plan. **Gearset Location:** Unit with motor, Unit M.; Amidships, Amid.; Rear Axle, Rear A. **Final Drive:** Spiral bevel, Sp Bev. **Car Drives Through:** Radius rod, Rad Rd.; Torsion tube, Tor T.; Torsion arm, Tor A. **Rear Axle:** Floating, Float.; Semi-floating, Semi F.; ¾ floating, ¾ Float.; Non-floating, Non-Float. **Rear Springs:** ¾ elliptic, ¾ Ell. Elliptic, Ell.; Cantilever, Cant.; Semi-elliptic, Semi E.; Platform, Plat. **Control:** Center, Cent. **Bearings:** Roller, Roll.; Ball and roller, B&R.; Plain and ball, Pl&B.; Plain and roller, Pl&R.

Passenger Cars for 1915 Listed with Th

MAKE AND MODEL	No. of Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	Piston Displacement Cubic Inches	CYLINDERS Shape	CYLINDERS How Cast	Valve Location	Camshaft Drive	Cooling Circulation	LUBRICATION System	LUBRICATION Type of Pump	IGNITION System	IGNITION Make	IGNITION Control	CARBURETION Make of Carburetor	CARBURETION Fuel Feed	CARBURETION Is Hot Air Pipe Fitted?	CRANKING SYSTEM Type	CRANKING SYSTEM Make
Peter Pan	4	2.750x4.125	12.08	392.9	I-Head	Block	Head		Thermo			Single	Berling	Hand				Mech'l	
Pierce-Arrow, 38	6	4.000x5.500	38.40	414.7	T-Head	Pairs	Opp	Hel'l	Pump	Pres	Gear	Doub	Bosch	Hand	Own	Pres	Yes	Elec	Wsthse
Pierce-Arrow, 48	6	4.500x5.500	48.60	529.8	T-Head	Pairs	Opp	Hel'l	Pump	Pres	Gear	Doub	Bosch	Hand	Own	Pres	Yes	Elec	Wsthse
Pierce-Arrow, 66	6	5.000x7.000	60.00	824.8	T-Head	Pairs	Opp	Spur	Pump	Pres	Gear	Doub	Bosch	Hand	Own	Pres	Yes	Elec	Wsthse
Pilot, 55	6	3.500x5.250	29.40	303.1	T-Head	Block	Opp	Hel'l	Pump	Splash		Single		Hand	Schebler	Gravity	Yes	Elec	Wsthse
Pilot, 75	6	4.500x6.000	32.40	381.7	T-Head	Block	Opp	Hel'l	Pump	Splash		Single		Hand	Opt	Pres	Yes	Elec	Wsthse
Pratt, 4-40	4	4.125x5.250	27.25	280.6	L-Head	Block	Left	Hel'l	Pump	Spl-Pres	Piston	Dual	At Kent	Auto	Rayfield	Gravity	Yes	Elec	G. & D.
Pratt, 6-59	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l	Pump	Spl-Pres	Piston	Dual	At Kent	Auto	Rayfield	Gravity	Yes	Elec	G. & D.
Premier-Weidely, A	6	3.625x5.250	31.57	234.8	I-Head	Block	Head	Hel'l	Pump	Spl-Pres	Gear	Single	Eisemann	Hand	Rayfield	Vacuum	Yes	Elec	Remy
Pullman-Junior	4	3.750x4.250	22.50	187.7	L-Head	Block	Left	Chain	Thermo	Spl-Pres	Piston	Single		Hand		Gravity	Yes	Elec	Spldf-Ap
Pullman, 6-48	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l	Pump	Spl-Pres	Gear	Dual		Hand		Gravity	Yes	Elec	Wsthse
R																			
Rayfield, 20	4	2.750x4.500	12.08	106.4	L-Head	Block	Right	Spur	Thermo	Spl-Pres	Gear	Single		Hand	Rayfield	Gravity	Yes	None	
R-C-H, K	4	3.250x5.000	25.39	165.9	L-Head	Block	Left	Spur	Thermo	Splash	Cent	Single	Bosch	Fixed	B-D	Gravity	Yes	Elec	Ward L
Regal, D	4	3.750x5.000	22.50	220.9	L-Head	Block	Left	Hel'l	Thermo	Splash	Piston	Dual	At Kent	Auto	Stewart	Gravity	Yes	Elec	Bosch R
Remington	4	2.750x4.500	12.03	106.4	L-Head	Block	Right	Spur	Thermo	Spl-Pres	Piston	Single	At Kent	Auto	Mayer	Gravity	No	Elec	Ward L
Reo, R	4	4.125x4.500	27.20	240.5	L-Head	Pairs	S&H	Hel'l	Pump	Splash	Piston	Dual	Remy	Hand	Holley	Gravity	Yes	Elec	Remy
Reo, ST	4	4.125x4.500	27.20	240.5	L-Head	Pairs	S&H	Hel'l	Pump	Splash	Piston	Dual	Remy	Hand	Holley	Gravity	Yes	Elec	Remy
Reo, M	6	3.562x5.125	30.51	306.6	L-Head	Threes	S&H	Hel'l	Pump	Splash	Piston	Dual	Remy	Hand	Johnson	Gravity	Yes	Elec	Remy
Republic, E	6	4.250x5.000	43.80	425.6	T-Head	Pairs	Opp	Spur	Pump	Pres	Gear	Dual	Delco	Hand	Rayfield	Vacuum	Yes	Elec	Delco
S																			
Saxon, A	4	2.625x4.000	11.00	87.4	L-Head	Block	Left	Hel'l	Thermo	Splash	Vacuum	Single	At Kent	Auto	Mayer	Gravity	Yes		
Saxon, B	6	2.875x4.500	20.00	175.3	L-Head	Block	Right	Hel'l	Thermo	Splash	Piston	Single	At Kent	Auto		Gravity			
Scripps-Booth, C	4	2.875x4.000	13.37	103.6	I-Head	Block	Head	Hel'l	Thermo	Splash	Piston	Single	At Kent	Auto	Zenith	Gravity	Yes	Elec	Bijur
S-G-V, J	4	3.875x4.375	24.22	206.4	L-Head	Block	Right	Chain	Pump	Pres	Gear	Single	Bosch	Hand	Zenith	Pres	Yes	Elec	Ward L
Simplex, 38	4	4.875x6.500	38.00	485.3	T-Head	Pairs	Opp	Spur	Pump	Splash	Gear	Dual	Bosch	Hand	Newcomb	Pres	No	Elec	Bosch R
Simplex, 50	4	5.375x6.500	46.00	590.0	T-Head	Pairs	Opp	Spur	Pump	Splash	Gear	Dual	Bosch	Hand	Newcomb	Pres	No	Elec	Bosch R
Singer, 6	6	4.000x5.500	38.40	414.7	T-Head	Threes	Opp	Hel'l	Pump	Spl-Pres	Gear	Dual	Eisemann	Hand	C.R.G.	Pres	No	Elec	Wsthse
Spaulding	4	4.250x5.500	28.90	321.0	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Piston	Dual	Simms	Hand	Rayfield	Gravity	Yes	Elec	Ents
Speedwell, I	6	4.125x5.250	40.90	420.9	Dome	Threes	Rot		Pump	Spl-Pres	Gear	Single	Wsthse	Hand	Schebler	Vacuum	Yes	Elec	Wsthse
Sphinx, A-15	4	3.375x5.000	18.21	178.9	L-Head	Block	Right	Hel'l	Thermo	Splash	Piston	Single	Splitdorf	Hand	Muir	Gravity	Yes	Elec	Spldf-Ap
Stearns, 4	4	3.750x5.625	22.50	248.5	Knight	Block	Sleeve	Chain	Pump	Pres	Gear	Single	Bosch	Hand		Gravity	Yes	Elec	G. & D.
Stearns, Big 4	4	4.250x5.500	28.90	312.0	Knight	Pairs	Sleeve	Chain	Pump	Splash	Gear	Dual	Bosch	Hand	Stromberg	Pres	Yes	Elec	G. & D.
Stearns, 6	6	4.250x5.750	43.80	489.4	Knight	Pairs	Sleeve	Chain	Pump	Spl-Pres	Gear	Dual	Bosch	Hand	Stromberg	Pres	Yes	Elec	G. & D.
Stevens-Duryea, D-6	6	4.375x5.500	46.00	496.1	L-Head	Pairs	Right	Hel'l	Pump	Spl-Pres	Piston	Doub	Bosch	Hand	Own	Gravity	Yes	Elec	Delco
Stevens-Duryea, DD-6	6	4.437x5.500	47.30	510.4	L-Head	Pairs	Right	Hel'l	Pump	Spl-Pres	Piston	Doub	Bosch	Hand	Own	Gravity	Yes	Elec	Delco
Studebaker, 4 SD	4	3.500x5.000	19.60	192.4	L-Head	Block	Left	Hel'l	Pump	Splash	Piston	Single	Remy	Hand	Schebler	Gravity	No	Elec	Wagner
Studebaker, 6	6	3.500x5.000	29.40	288.6	L-Head	Block	Left	Hel'l	Pump	Splash	Piston	Single	Remy	Hand	Schebler	Gravity	Yes	Elec	Wagner
Stutz, H.C.S.	4	3.750x5.000	22.50	221.0	L-Head	Block	Right	Spur	Thermo	Pres	Gear	Dual	Remy	Hand	Stromberg	Gravity	Yes	Elec	Remy
Stutz, 40	4	4.750x5.000	36.10	389.9	T-Head	Pairs	Opp	Spur	Pump	Pres	Gear	Doub	Bosch	Hand	Stromberg	Gravity	Yes	Elec	Remy
Stutz, 40	4	4.750x5.500	36.10	389.9	T-Head	Pairs	Opp	Spur	Pump	Pres	Gear	Dual	Eisemann	Hand	Stromberg	Pres	Yes	Elec	Remy
Stutz, 6	6	4.000x5.000	38.40	376.9	T-Head	Threes	Opp	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Stromberg	Gravity	Yes	Elec	Remy
Stutz, 6	6	4.000x5.000	38.40	376.9	T-Head	Threes	Opp	Spur	Pump	Pres	Gear	Single	Eisemann	Hand	Stromberg	Gravity	Yes	Elec	Remy
T																			
Touraine, 12	6	4.000x5.500	38.40	414.7	T-Head	Threes	Opp	Hel'l	Pump	Spl-Pres	Gear	Dual	Simms	Hand	Zenith	Pres	Yes	Elec	Wsthse
Touraine, 12	6	4.000x5.500	38.40	414.7	T-Head	Threes	Opp	Hel'l	Pump	Spl-Pres	Gear	Dual	Simms	Hand	Zenith	Pres	Yes	Elec	Wsthse
Trumbull, 15 A	4	2.875x4.000	26.74	103.6	2-cycle	Block	Right	Hel'l	Thermo	Spl-Pres	Piston	Single	Splitdorf	Fixed	Zephyr	Gravity	Yes	Elec	Ward L
Twombly	4	3.125x4.000	15.64	122.7	L-Head	Block	Left	Hel'l	Thermo	Splash	Piston	Single	Splitdorf	Hand	Opt	Gravity	Yes	Opt	Opt
V																			
Velie, 12	4	4.625x5.250	34.25	352.8	L-Head	Pairs	Left	Chain	Pump	Splash	Piston	Dual	Bosch	Hand	Stromberg	Gravity	Yes	Elec	G. & D.
Velie, 14	6	3.750x5.250	33.75	347.8	L-Head	Threes	Right	Hel'l	Pump	Splash	Gear	Dual	Bosch	Hand	Stromberg	Pres	Yes	Elec	G. & D.
Velie, 15	6	3.500x5.000	29.40	288.6	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Piston	Dup	At Kent	Auto	Stromberg	Gravity	Yes	Elec	G. & D.
Vixen, S-B	4	2.750x4.000	12.08	95.0	L-Head	Block	Left	Spur	Thermo	Splash	Cent	Single	At Kent	Hand	Zephyr	Gravity	Yes	None	
Vulcan, 35	4	3.500x5.125	19.60	197.2	L-Head	Block	Right	Spur	Pump	Spl-Pres	Gear	Single	Wsthse	Hand		Gravity		Elec	Wsthse
W																			
Westcott, O	4	3.500x5.000	19.60	192.4	L-Head	Block	Left	Hel'l	Pump	Splash	Piston	Dual	Delco	Auto				Elec	Delco
Westcott, U	6	3.500x5.000	29.40	288.6	L-Head	Block	Left	Hel'l	Pump	Splash	Piston	Dual	Delco	Auto				Elec	Delco
White, 30	4	3.750x5.125	22.50	226.4	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Gear	Single	Bosch	Hand	Own	Vacuum	Yes	Elec	Ents
White, 45	4	4.250x6.375	29.00	361.7	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Gear	Single	Bosch	Hand	Own	Vacuum	Yes	Elec	Ents
White, 60	6	4.250x5.750	43.80	489.4	L-Head	Block	Right	Hel'l	Pump	Spl-Pres	Gear	Single	Bosch	Hand	Own	Vacuum	Yes	Elec	Ents
Willys-Knight, K-19	4	4.000x5.500	25.60	251.3	Knight	Pairs	Sleeve	Chain	Pump	Pres	Piston	Single	Simms	Hand	Zenith	Pres	Yes	Elec	U.S.L.
Winton, 21	6	4.500x5.500	48.60	529.8	L-Head	Pairs	Right	Hel'l	Pump	Pres	Piston	Dual	Bosch	Hand	Rayfield	Pres	Yes	Opt	

ABBREVIATIONS:—Valve Location: Side and head, S & H.; Left and right, L & R. **Camshaft Drive:** Helical gears, Hel'l.; Spur gears, Spur. **Cooling Circulation:** Thermo-syphon, Thermo. **Lubrication System:** Splash and pressure, Spl-Pres.; Pressure, Pres. **Type of Pump:** Flywheel, Flwhl.; Rotary, Rot.; Centrifugal, Cent. **Ignition System:** Double, Doub.; Two-point, 2-Pt. **Ignition Make:** Westinghouse, Wsthse.; Atwater Kent, At Kent.; Connecticut, Conn. **Ignition Control:** Automatic, Auto.; Hand and automatic, H&A.; Hand or fixed, H or F. **Make of Carbureter:** Optional, Opt. **Fuel Feed:** Pressure-gravity, Pres.-Gr. **Type of Cranking System:** Electric, Elec.; Electric and air, E. & Air.
60-inch tread optional. **Tread more or less than standard except Scripps-Booth, which is optional.

eir Principal Specifications—Continued

Lighting System	Transmission: Clutch Type	Gearset: Type	Gearset: Location	Gearset: Forward Sp'ds	Final Drive	Car Drives Through	Rear Axle	Total Gear Ratio on Direct	Running Gear: Wheel base	Tires: Front	Tires: Rear	Wheels	Rear Springs	Control: Location Steering Wheel	Gearshift Location	Crankshaft Type and No.	Bearings: Gearset	Bearings: Rear Axle	Bearings: Front Wheel	MAKE AND MODEL
......	Disk	Sel	......	3	Bevel	......	......	......	110	29x3½	29x3½	Wood	Cant.	Left	Cent.	......	......	......	......	Peter Pan
Wsthse	Cone	Sel	Amid	4	Bevel	Springs	Semi F.	3.78-1	134	36x4½	36x4½	Wood	¾ Ell.	Right	Right	Plain, 7	Ball	B&R	Roll	Pierce-Arrow, 38
Wsthse	Cone	Sel	Amid	4	Bevel	Springs	Semi F.	3.53-1	142	37x5	37x5	Wood	¾ Ell.	Right	Right	Plain, 7	Ball	B&R	Roll	Pierce-Arrow, 48
Wsthse	Cone	Sel	Amid	4	Bevel	Springs	Semi F.	2.88-1	147½	37x5	38x5½	Wood	¾ Ell.	Right	Right	Plain, 7	Ball	B&R	Roll	Pierce-Arrow, 66
Wsthse	Cone	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00-1	126	?4x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3	Ball	Ball	Roll	Pilot, 55
Wsthse	Cone	Sel	Amid	3	Bevel	Springs	Float.	3.60-1	132	37x4½	37x4½	Wood	S.-E.	Opt	Cent.	Plain	......	Roll	Roll	Pilot, 75
G. & D.	Disk	Sel	Unit M.	4	Bevel	Springs	Float.	3.91-1	122	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Roll	Roll	Pratt, 4-40
G. & D.	Disk	Sel	Unit M.	4	Bevel	Springs	Float.	3.93-1	112	36x4½	36x5½	Wood	¾ Ell.	Left	Left	Plain, 3	Roll	Roll	Roll	Pratt, 6-50
Remy	Disk	Sel	Unit M.	3	Bevel	Springs	¾ Float.	3.87-1	132	36x4½	36x4½	Wood	S.-E.	Left	Cent.	Plain, 4	Roll	B&R	Roll	Premier-Weidely, A
Spldf-Ap.	Disk	Sel	Unit M.	3	Bevel	Tor T.	¾ Float.	4.00-1	110	30x3½	30x3½	Wood	Cant.	Left	Cent.	Plain, 3	Ball	Roll	Ball	Pullman-Junior
Wsthse	Disk	Sel	Unit M.	4	Bevel	Tor Rd.	Float.	3.90-1	134	36x4½	36x4½	Wire	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Pullman, 6-48
																				R
......	Disk	Sel	Unit M.	3	Bevel	Rad Rd.	Semi F.	3.75-1	96	28x3	28x3	Wire	S.-E.	Left	Cent.	Plain, 2	Ball	Ball	Ball	Rayfield, 20
Ward L.	Cone	Sel	Rear A.	3	Bevel	Rad Rd.	Semi F.	4.00-1	110	32x3½	32x3½	Wood	Ell	Opt	Cent.	Plain, 2	Plain	Roll	Ball	R-C-H, K
Bosch R.	Cone	Sel	Rear A.	3	Bevel	Rad Rd.	¾ Float.	3.75-1	112	32x3½	32x3½	Wood	S.-E.	Opt	Cent.	Plain, 3	Roll	Roll	Ball	Regal, D
Ward L.	Cone	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00-1	105	28x3	28x3	Wood	¾ Ell.	Left	Cent.	Plain, 2	Ball	Ball	Ball	Remington
Remy	Disk	Sel	Amid	3	Bevel	Springs	Semi F.	4.00-1	115	34x4	34x4	Wood	¾ Ell	Left	Cent.	Plain, 3	Roll	Roll	Roll.	Reo, R
Remy	Disk	Sel	Amid	3	Bevel	Springs	Semi F.	4.00-1	112	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Roll	Roll	Reo, ST
Remy	Disk	Sel	Amid	3	Sp Bev.	Springs	Float.	3.70-1	122	34x4	34x4	Wood	S.-E.	Left	Cent.	Plain, 4	Roll	Roll	Roll	Reo, M
Delco	Cone	Sel	Amid	4	Bevel	Rad Rd.	Float.	4.00-1	133	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	Ball	Ball	Republic, E
																				S
......	Disk	Prog.	Rear A.	2	Bevel	Tor T.	Semi F.	4.40-1	96**	28x3	28x3	Wire	½ Ell.	Left	Cent.	Plain, 2	Pl&R.	Ball	Ball	Saxon, A
......	Disk	Sel	Rear A.	3	Bevel	Tor T.	Semi F.	4.50-1	112	......	......	Wood	½ Ell.	Left	Cent.	Plain, 3	Roll	Roll	Ball	Saxon, B
Bijur	Cone	Sel	Unit M.	3	Bevel	Springs	Float.	4.00-1	110**	30x3½	30x3½	Wire	Cant.	Left	Cent.	Plain, 2	Ball	Ball	Ball	Scripps-Booth, C
Ward L.	Disk	Sel	Amid	4	Bevel	Springs	Semi F.	4.00-1	118	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Ball	S-G-V. J
Bosch R.	Disk	Sel	Amid	4	Bevel	Tor T.	Semi F.	2.75-1	137	36x4½	37x5	Wood	¾ Ell.	Right	Right	Plain, 3	Ball	Ball	Ball	Simplex, 38
Bosch R.	Disk	Sel	Amid	4	Chain	Rad Rd.	Dead	2.13-1	137**	36x4½	37x5	Wood	S.-E.	Right	Right	Plain, 3	Ball	Ball	Ball	Simplex 50
Wsthse	Disk	Sel	Unit M.	4	Sp Bev.	Springs	Float.	3.77-1	135	36x4½	36x4½	Opt.	Cant.	Left	Cent.	Plain, 3	Roll	Roll	Roll	Singer, 6
Ents	Cone	Sel	Amid	3	Bevel	Springs	Float.	3.75-1	120	36x4	36x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Spaulding
Wsthse	Disk	Sel	Unit M.	3	Sp Bev.	Springs	Float.	4.08-1	135	37x5	37x5	Wood	¾ Ell.	Left	Cent.	Plain, 3	Roll	Roll	Roll	Speedwell, I
Spldf-Ap.	Cone	Sel	Rear A.	3	Bevel	Springs	Semi F.	4.00-1	112	30x3½	30x3½	Wood	Cant.	Left	Cent.	Plain, 2	Roll	Roll	Ball	Sphinx, A-15
G. & D.	Cone	Sel	Unit M.	3	Bevel	Springs	Semi F.	4.00-1	119	34x4	34x4	Wood	Cant.	Left	Cent.	Plain, 3	B&R	B&R	Roll	Stearns, 4
G. & D.	Disk	Sel	Unit M.	3	Bevel	Springs	Float.	3.90-1	121	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Plain, 5	Ball	Roll	Roll	Stearns, Big 4
G. & D.	Disk	Sel	Unit M.	4	Sp Bev.	Springs	Float.	3.50-1	140	37x5	37x5	Wood	¾ Ell.	Left	Cent.	Plain, 7	Ball	Roll	Roll	Stearns, 6
Delco	Disk	Prog.	Unit M.	3	Bevel	Springs	Float.	3.62-1	131	37x4½	37x4½	Wood	¾ Ell.	Left	Left	Plain, 4	Ball	Ball	Ball	Stevens-Duryea, D-6
Delco	Disk	Prog.	Unit M.	3	Bevel	Springs	Float.	3.62-1	138	37x5	37x5	Wood	¾ Ell.	Left	Left	Plain, 4	Ball	Ball	Ball	Stevens-Duryea, DD-6
Wagner	Cone	Sel	Rear A.	3	Bevel	Rad Rd.	Float.	4.00-1	108*	33x4	33x4	Wood	Ell	Left	Cent.	Plain, 3	Pl&R.	Roll	Roll	Studebaker, 4 SD
Wagner	Cone	Sel	Rear A.	3	Bevel	Rad Rd.	Float.	3.70-1	121	34x4	34x4	Wood	¾ Ell.	Left	Cent.	Plain, 4	Pl&R.	Roll	Roll	Studebaker, 6
Remy	Cone	Sel	Rear A.	3	Bevel	Tor T.	Semi F.	4.00-1	108	32x4	32x4	Wood	S.-E.	Right	Right	Plain, 3	Ball	Ball	Roll	Stutz H.C.S.
Remy	Cone	Sel	Rear A.	3	Bevel	Tor T.	Semi F.	3.50-1	120	34x4½	34x4½	Wood	S.-E.	Right	Right	Plain, 3	Ball	B&R	Roll	Stutz, 40
Remy	Cone	Sel	Rear A.	3	Bevel	Tor T.	Semi E.	3.50-1	130	34x4½	34x4½	Wood	S.-E.	Right	Right	Plain, 3	Ball	B&R	Roll	Stutz, 40
Remy	Cone	Sel	Rear A.	3	Bevel	Tor T.	Semi F.	3.50-1	120	34x4½	34x4½	Wood	S.-E.	Right	Right	Plain, 3	Ball	B&R	Roll	Stutz, 6
Remy	Cone	Sel	Rear A.	3	Bevel	Tor T.	Semi F.	3.50-1	130	34x4½	34x4½	Wood	S.-E.	Right	Right	Plain, 3	Ball	B&R	Roll	Stutz, 6
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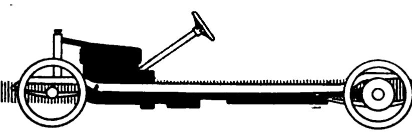
Wsthse	Disk	Sel	Unit M.	4	Bevel	Tor T.	Float.	3.50-1	124	34x4½	34x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Ball	Roll	Touraine, 12
Wsthse	Disk	Sel	Unit M.	4	Bevel	Tor T.	Float.	3.50-1	134	34x4½	34x4½	Wood	¾ Ell.	Left	Cent.	Plain, 3	Ball	Roll	Roll	Touraine, 12
Ward L.	Cone	Sel	Rear A.	3	Bevel	Tor T.	Semi F.	3.60-1	80**	28x3	28x3	Wire	Cant.	Opt	Cent.	Plain, 2	B&R	B&R	Ball	Trumbull, 15 A
Opt	Cone	Sel	Rear A.	3	Worm	Tor T.	Semi F.	4.00-1	100**	30x3½	30x3½	Wire	Cant.	Left	Cent.	Plain, 2	Ball	Roll	Ball	Twombly
																				V
G. & D.	Disk	Sel	Amid	4	Bevel	Springs	Float.	3.93-1	121	37x4½	37x4½	Wood	Ell	Left	Cent.	Plain, 3	Ball	Roll	Roll	Velie, 12
G. & D.	Disk	Sel	Amid	4	Bevel	Springs	Float.	3.93-1	126	37x4½	37x4½	Wood	Ell	Left	Cent.	Plain, 3	Ball	Roll	Roll	Velie, 14
G. & D.	Cone	Sel	Unit M.	4	Bevel	Springs	Semi F.	4.08-1	124	34x4	34x4	Wood	Ell	Left	Cent.	Plain, 3	Ball	Roll	Roll	Velie, 15
Hendrix	Disk	Sel	Amid	3	Bevel	......	¾ Float.	......	120	32x3½	32x3½	Wood	Cant.	Left	Cent.	Plain, 3	Ball			Vixen, S-B
Wsthse	......	Fric.	Rear A.	......	Chain	Springs	None	4.00-1	106**	28x3	28x3	Wire	Coil	Right	Right	Plain, 2	Ball	Ball	Ball	Vulcan, 35
																				W
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	¾ Float.	4.00-1	113*	33x4	33x4	Wood	¾ Ell.	Left	Cent.	Plain, 3	B&R	B&R	Ball	Westcott, O
Delco	Cone	Sel	Unit M.	3	Bevel	Springs	Float.	3.77-1	125*	35x4½	35x4½	Wood	Cant.	Left	Cent.	Plain, 4	B&R	Roll	Ball	Westcott, U
Ents	Disk	Sel	Amid	4	Bevel	Rad Rd.	¾ Float.	3.92-1	115	32x4	32x4	Wood	¾ Ell.	Left	Cent.	Ball, 2	Ball	Ball	Ball	White, 30
Ents	Disk	Sel	Amid	4	Bevel	Rad Rd.	¾ Float.	3.40-1	132¾	36x4½	36x4½	Wood	¾ Ell.	Left	Cent.	Pl&B, 3	Ball	Ball	Ball	White, 45
Ents	Disk	Sel	Amid	4	Bevel	Rad Rd.	¾ Float.	3.40-1	140¾	37x5	37x5	Wood	¾ Ell.	Left	Cent.	Pl&B, 3	Ball	Ball	Ball	White, 60
U. S. L.	Cone	Sel	Amid	4	Bevel	Rad Rd.	Float.	4.83-1	120	36x4½	36x4½	Wire	Cant.	Left	Cent.	Plain, 5	Ball	Ball	Roll	Willys-Knight, K-19
Opt	Disk	Sel	Amid	4	Bevel	Springs	Float.	3.92-1	136	37x5	37x5	Wood	¾ Ell.	Left	Cent.	Plain, 4	Ball	Roll	Roll	Winton, 21

ABBREVIATIONS:—Make of Cranking System: North East, North-E.; Gray & Davis, G. & D.; Ward Leonard, Ward L.; Bosch-Rushmore, Bosch-R.; Allis-Chalmers, Allis-C.; Leece-Neville, Leece-Nev.; Splitdorf-Apple, Spldf-Ap.; Ents-Dyneto, Ents-Dyn.; Robbins & Meyers, Rob-Myr.; Hendricks, Hendrix. **Clutch Type:** Contracting band, Con Bd.; Expanding band, Exp Bd. **Gearset Type:** Selective, Sel.; Progressive, Prog.; Frictional, Fric.; Planetary, Plan. **Gearset Location:** Unit with motor, Unit M.; Amidships, Amid.; Rear Axle, Rear A. **Final Drive:** Spiral bevel, Sp Bev. **Car Drives Through Radius rod,** Rad Rd.; Torsion tube, Tor T.; Torsion arm, Tor A. **Rear Axle:** Floating, Float.; Semi-floating, Semi F.; ¾ floating, ¾ Float.; Non-floating, Non-Float. **Rear Springs:** ¾ elliptic, ¾ Ell. Elliptic, Ell.; Cantilever, Cant.; Semi-elliptic, Semi E.; Platform, Plat. **Control:** Center, Cent. **Bearings:** Roller, Roll.; Ball and roller, B&R.; Plain and ball, Pl&B.; Plain and roller, Pl&R.

Engineering Development - 1915

Block-Cast Motors—L-Head Cylinders—Vacuum Feed Single Ignition—Better Equipment Are on the Roll of Honor for the Year 1915



TRENDS of design are vividly brought out by the announcements for 1915. On this and the following pages a review of the industry and the offerings of the manufacturers is furnished. On the whole the trends of last year are continued, and, in nearly every case, accentuated. The growth of the miniature car with its block-cast motor, its L-head cylinders with thermo-syphon cooling, single ignition, electric lighting and starting and full equipment, is the feature of the year.

¶ *Six-cylinder cars have not lost in the percentage tables in spite of the influx of new fours, but although the six retains its popularity, and is used in nearly as many chassis as the four, the car of 1915 has a smaller motor, a longer stroke bore ratio and a smaller piston displacement.*

¶ *Vacuum feed, the installation of starting and lighting systems on cars of extremely low price, the selling of sixes below $1,000, the increase in left drive and center control are high spots in the development for the new year. Fine equipment, both in upholstery and mechanical fittings on low-priced cars is another high spot, which the reading of the following short reviews will bring before the mind.*

Abbott Design Unaltered

Abbott has the same three cars that were offered last year, these being the 34-40, the smaller of the fours; the 44–50, the large four; and the Belle Isle Model 50–60, which is a six. The prices are unchanged.

The six a 3.75 by 5.25 motor with L cylinders cast in threes employes splash lubrication, Bosch ignition, pressure fuel feed to a Zenith carbureter and electric cranking and lighting. Other details include dry-disk clutch, four-speed gearset in unit with the engine and floating axle of 4 to 1 ratio. Left drive and center control are used, and tires are 35 by 4 1-2 on Firestone demountable rims, although wire wheels are optional.

The larger four, has pair-cast cylinders of L-head form, 4 1-2 by 5 1-2 inches. The gearbox of three speeds is unit with the motor, and drive goes back through a disk clutch to a floating axle of 3 1-2 to 1 reduction. The car has 121-inch wheelbase, gravity feed to a Mayer carbureter, electric cranking and lighting and 36 by 4 1-2 tires on Booth demountable rims.

The smallest Abbott is equipped with a 4 1-8 by 5 1-4 motor of unit power plant type, incorporating gearbox and dry-plate clutch with it, as do the others. The cylinders are L-heads and cast in block. Like the other car, the fuel feed is by gravity to a Mayer carbureter and two-unit electric starting and lighting are fitted.—Abbott Motor Car Co., Detroit, Mich.

Allen Adds Small Four

Two models instead of one is the Allen offering. This car which had its inception in the 1914 season with a four-cylinder is continued without mechanical changes. It has now been augmented by a smaller chassis also fitted with a four-cylinder model.

On the larger car 35 by 4.5 tires with non-skids in the rear are now used instead of the 34 by 4. Two auxiliary seats have been fitted, making it a seven-passenger instead of five. These seats were furnished last year along with the larger tires at an extra price, but this year they are included in the purchase price. The body has been changed to bring it up-to-date and it is now a streamline form in conformity with standard practice in this particular.

On the smaller chassis a small-bore, long-stroke, 3.625 by 5-inch block cast motor is used. The valves are all on the right side. The motor has an exceedingly short overall length and is part of a unit power plant suspended at three points. The valves are 1.625 inches in diameter and are of cast iron electrically welded to carbon steel stems. The timing gears are helical and have a 1-inch face.

The motor is oiled by a constant-level splash system in which a pump of the plunger type mounted on the outside of the crankcase takes the oil from the reservoir and circulates it to the main bearings and thence to the splash troughs. Starting and lighting is accomplished by a 6-volt electric system which is capable of cranking the engine at 150 revolutions per minute and which can carry the full lamp load when acting as a generator at 12-miles per hour. Ignition is by battery and distributer.

The transmission system consists of a leather cone clutch, a sliding selective gearset providing three forward speeds, and a Weston-Mott floating axle. The control levers which are central and on the right of the driver are mounted directly on the housing of the gearbox. The wheels are 32-inches in diameter and carry 3.5 inch tires. The wheelbase is 110 inches and the rear springs three-quarter elliptic. The rounded radiator and streamline body are in conformity with the latest ideas in carriage work. This model is made in either touring or roadster bodies.—Allen Motor Co., Fostoria, O.

Apperson Changes Cylinder Design

Two entirely new cars, one a four and the other a six, have been added to the Apperson line. This brings the number of models to four, two fours and two sixes. The new cars are similar in design although the motor dimensions and wheelbases are different. The new four model 4-40, has a 116-inch wheelbase and a 4 by 5 power plant with L-head block cylinders. It sells for $1,350. The new six at $1,485 and known as model 6-45 has a 3.5 by 5.125 motor, also L-head cylinders in a single casting.

Both cars incorporate many features of design new to Apperson practice. In the motor the air entering the carbureter is preheated by passing through a core in the cylinder casting. Another unique feature is that the casting which acts as a water outlet at the top of the cylinders, is double. Baffle plates and partitions are so arranged in the water passages on the four that the water flows up on one side and down on the other, giving a complete circulation. On the six the water is conducted along a space on the top of the cylinders until it reaches the rear of the motor where it passes a horizontal partition and flows back to the forward end.

The frame is narrower at the forward end giving a more rigid motor support and also providing a shorter turning radius. Force feed lubrication is continued, but there are independent leads to the camshaft bearings instead of splash.

In the structural work of the chassis, some slight changes will be noted, tending to lightening and simplifying. The transverse shaft which carries the brake and clutch pedals is now only one-half its former length. The rear support of the gearbox is the same as in the past and the drive members from that point back are much the same, except that in the new cars the drive is taken through the springs. The spring hangers are new, being in the case of the rear support integral with the frame gusset plates in the rear and of the strong ribbed section. The torque is taken through the rear springs which are underslung on the two new models. The Bijur lighting and starting system is regular equipment.

No change has been made in the contracting-band clutch which has formed a part of Apperson construction for several years. There are two universal joints in the drive.

The bodies supplied are of molded design with a rounded V-type radiator fitted with a distinctive shield.—Apperson Bros. Automobile Co., Kokomo, Ind.

Arbenz Improves Equipment

With the exception of such minor details as the shape of the lamps and windshields the Arbenz car will remain the same as for 1914. The line will consist of a four-cylinder chassis upon which two bodies are mounted, one a five-passenger touring and the other a two-passenger roadster.

Both these cars are mounted on a 120-inch wheelbase. The power plant is a 4.125 by 5.5 L-head, with its cylinders cast in pairs. The valves are all located on the left side and are operated by a helical gear driven camshaft. The transverse shaft, across the front end of the motor carries the magneto and water pump. The crankshaft is carried on three main bearings bushed with bronze. A dual system of ignition is used and electric lighting and starting made up of a Diehl motor, a Wells generator and a Philadelphia storage battery. The system operates at 6 volts and the battery has a capacity of 120-ampere hours.

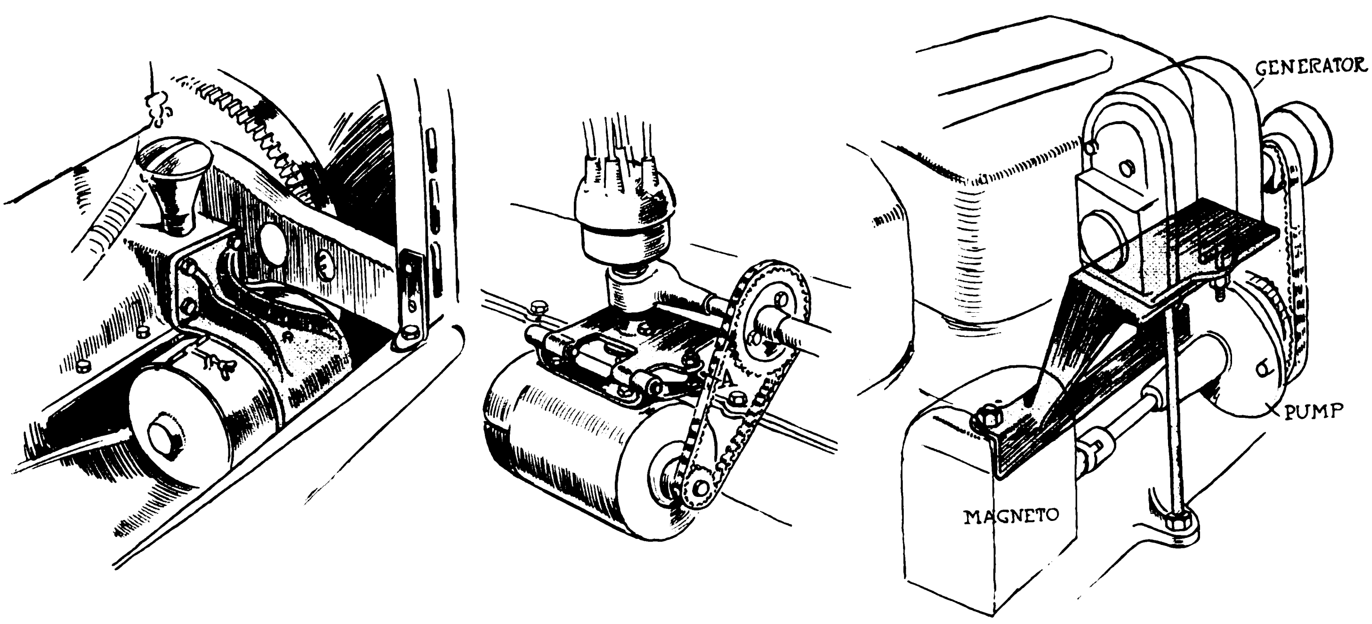
A 15-gallon gasoline tank located under the front seat supplies fuel by gravity to a Schebler carbureter. The transmission system comprises a leather faced cone clutch housed in the flywheel, a three-speed selected gearset carried in a unit with the rear axle and a beveled gear floating rear axle. The tires are 36 by 4 all around fully equipped with demountable rims.—Arbenz Car Co., Chillicothe, Ohio.

Argo a New Light Four

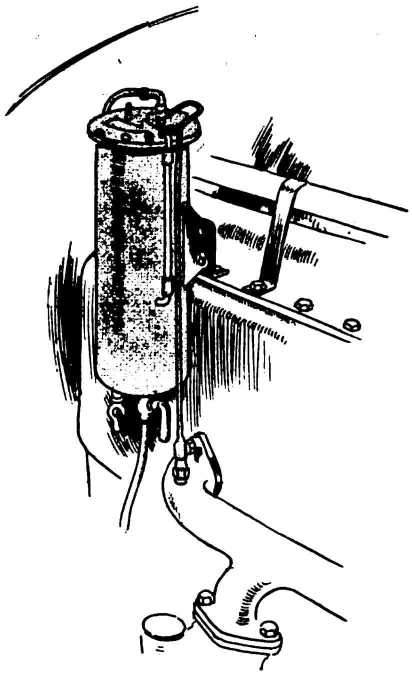
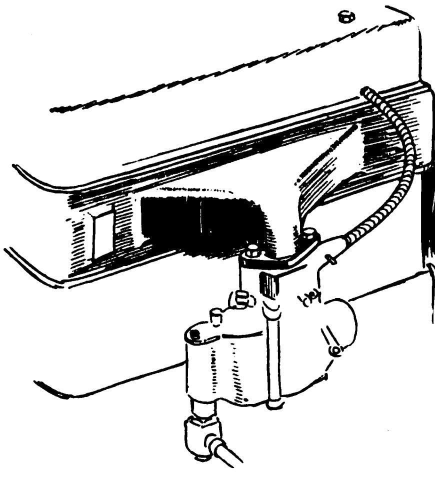
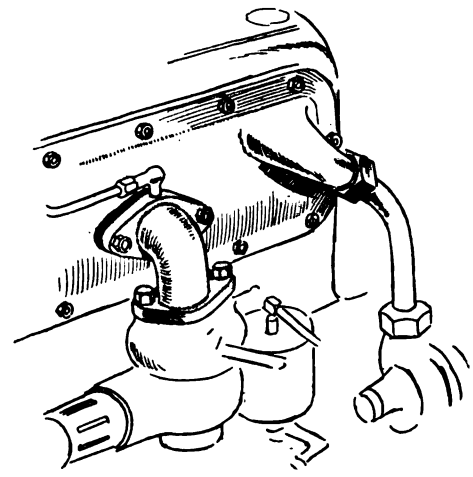
The Argo, a new small car of the year sells for $295, top and windshield being $20 extra. It comes as a roadster seating two side by side. The tread is 44 inches and the wheelbase 90.

The motor, a four-cylinder, water-cooled type, has cylinders, 2 5-16 by 4, cast in an L-shaped block. From the motor, drive goes through a cone clutch of internal type and thence to a gearset affording two speeds.

The propeller shaft carries a universal back of the gearbox and then enters a torsion tube which attaches to the



Some methods of mounting electrical units. Left—Showing how the starting motor is hung on a special bracket at the side of the crankcase on the Jeffery six. Center—On the King four-cylinder model the dynamo is suspended on a hinged bracket and provided with a short crank so that adjustment of the chain drive can be made at A. Right—Generator on the Jackson Olympic is mounted on a bracket bolted to the cylinder flange immediately above the magneto and pump shaft. A steel strut to the crankcase gives additional support

Left—Mounting of the Stewart-Warner vacuum fuel feed tank on the engine of the Kissel-kar. Center—Short waterjacketed intake manifold cast integral with the cylinders on the Oldsmobile model 42. Right—Short intake elbow on the White, showing the connection for Stewart-Warner vacuum fuel feed on upper flange

axle housing in the usual manner. The rear axle has a ratio of 4 to 1. Elliptic springs are used in front and rear.

Wire wheels with 28-inch tires are fitted, and oil side and tail lamps, horn and tools are included as regular equipment. —Argo Motor Co., 7 East Forty-second street, New York City.

Auburn Reduces Motor Sizes

The Auburn program for 1915 continues the manufacture of a four and a six as during the previous season, but these are so altered that they may really be regarded as new models. In addition, very material price reductions have been made. Model 4–36, the four-cylinder, sells at $1,075, either as a touring car or roadster, and is $415 cheaper as a roadster and $515 as a touring car. Corresponding reductions in the six model 6–40 which now is offered in either body type at $1,550, have been made, the previous six being a $2,100 touring car and $2,000 roadster.

In the six, the 3 3-4 by 5 1-4 engine has given way to a 3 1-2 by 5 1-4, L-head block-cast type with gearset in unit and suspension at three points in the chassis. The four continues to have a T-head motor, but it is a 3 3-4 by 5 in place of the formerly-used 4 1-2 by 5. Like the six, it is a unit power plant with three-point suspension.

Both cars are equipped with electric lighting and cranking, that of the six being provided by a Delco unit, while the four uses Remy apparatus. Carbureters are Rayfields, and fuel feed by the popular Stewart-vacuum system which draws the gasoline from 18-gallon rear tanks on both models. Cone clutches and three-speed selective gearsets are also incorporated in the chassis design.

The steering is on the left and control in the center. There is some difference in the drive features of the two models. The 6–40 has a double-universal open drive shaft with torque arm for drive and torque, and this operates a floating rear axle. In the four-cylinder construction, a three-quarter floating axle gets its power from a shaft having one universal, and drive is through the springs with torque on the universal.

Suspension of the cars is the same, the rear springs being three-quarter elliptic. The six has a wheelbase of 126 inches, and uses 34 by 4 front and rear tires on demountable rims. The four is a 114-inch wheelbased car, and runs on 32 by 4 tires also mounted on demountable rims.

The bodies are brought up to latest design of streamline appearance, and fenders are crowned. These are easily the most attractive cars the maker, the Auburn Automobile Co., Auburn, Ind., has ever turned out.—Auburn Automobile Co., Auburn, Indiana.

Austin Uses Double Cantilever

Model 66 Austin, with 4 1-2 by 6, six-cylinder motor and 141-inch wheelbase, is continued with a number of mechanical and body changes and a price reduction from $4,000 to $3,600. Touring, close-coupled and roadster bodies are fitted to the chassis, and much weight has been cut from the construction as compared with the 1914 cars.

An innovation is the use of double cantilever rear springs. On either side of the frame there are two light cantilever springs, attached at their centers to the frame bracket and shackling at their front ends to the frame, while the upper one attaches above the axle at the rear and the lower one below it. With this construction, two sets of torsion rods and four driving rods are provided. Easier and softer riding action is claimed for this design, for instead of supporting all the car weight of one side on one stiffer and heavier spring, two lighter springs carry it. The factor of safety is also pointed out to be much greater, because since the car weight is supported at four different points, if any one of the springs should be broken, there would still be three-quarters of the spring capacity on that side. This would be sufficient to continue any drive to its destination, though, of course, more care would have to be taken.

The Austin two-speed axle is used, but it has been redesigned and considerably lightened. One decided point of weight saving is an aluminum housing.

The motor is unchanged. It is a T-head block with a Westinghouse combination cranking, lighting and ignition set. The fuel system embodies a Master carbureter fed from a Stewart vacuum tank, the main reservoir of 25 gallons capacity being amidships under the frame. Other specifications are multiple-disk clutch in oil, left drive, center control of three-speed gear set mounted on the frame, and 34 by 4 1-2 straight side tires.

The close coupled body is new. Placed on the long wheelbase of 141 inches, the passengers are well forward of the axle. Tires and luggage compartments are placed directly over the axle.—Austin Automobile Co., Grand Rapids, Michigan.

Briscoe Remains Unaltered

Originally designed in France and brought to this country about a year ago by Benjamin Briscoe, the Briscoe car is continued with no change. The prices have been reduced from $900 to $785 for both roadster and touring with electric lighting and cranking.

The most distinctive feature is the single headlight in the radiator. Wire wheels, low-hung frame and general sloping of the body to the front aid in giving a light appearance. The wheelbase is 107 inches and tread 56.

The motor 3 1-8 by 5 1-8, of L-head design, has the cylinders and upper part of crankcase cast integrally, and uses detachable heads. The drive of camshaft and magneto is by a silent chain running over sprockets on crankshaft, camshaft and magneto shaft, and at the rear of the cylinders as distinguished from the usual forward location. Another unusual point is the casting together of intake and exhaust manifold, the exhaust gas passages being above the intakes.

The Aplco motor-generator is used for cranking and lighting, being driven through silent chain from the main drive shaft between the clutch and gearbox. The unit is placed to the left of the gearbox, and the ratio between electric unit and its driving shaft is 2 1-2 to 1.

Drive to the rear is through a drive shaft enclosed in a torsion tube, to a floating axle, which has a standard gear ratio of 3 3-4 to 1, with 4 to 1 optional. Semi-elliptic springs are used all around.

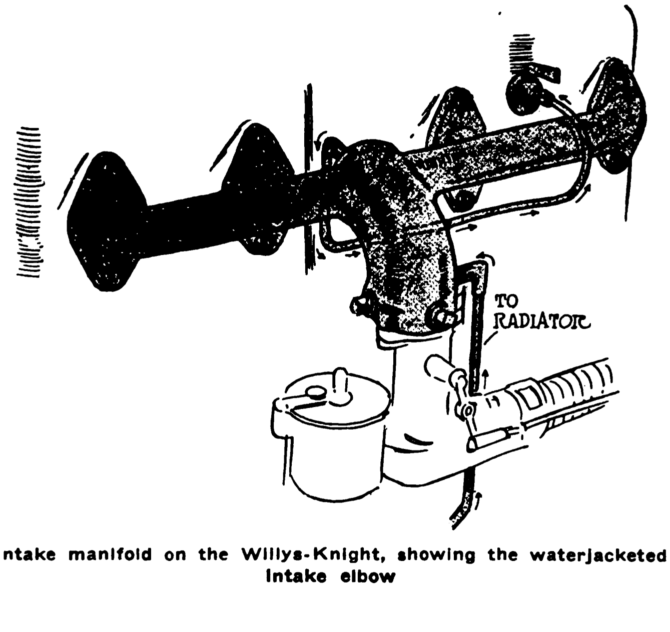
The bodies are well designed, the roadster seating being clover-leaf form, with accommodations for three by placing the center seat a little back of the two side seats. A coupe is designed similarly to the roadster.—Briscoe Motor Car Co., Jackson, Michigan.

Buick Adopts Vacuum Feed

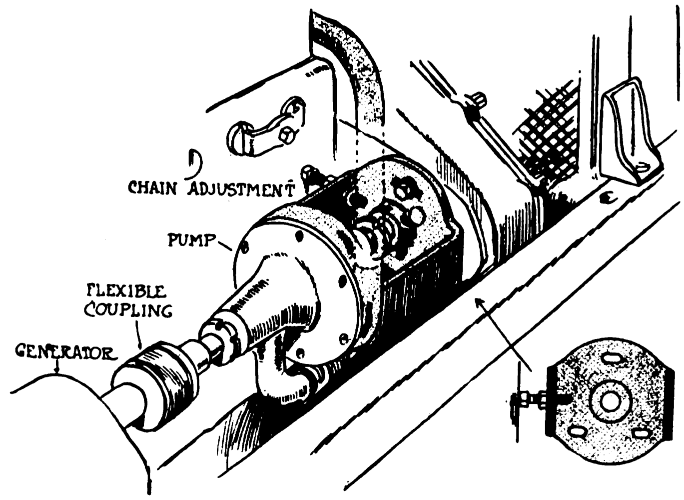
All Buick models are refined continuations. There are six four-cylinders and a six, which are built upon three chassis, and every machine has come in for some price reduction. The largest cut is the six from $1,985 to $1,650, while both large four-cylinder touring car, model C-37, and small touring, model C-25, have been reduced $100 to $1,235 and $950, respectively. The two roadsters, models C-36 and C-24, have been each cut $50, making their present prices $900 and $1,185, respectively. On each chassis a roadster and touring body is fitted.

The bodies are all newly designed, and radiators have been rounded at the top. Cowl boards are added to the fours, the six having this feature last season.

All Buicks use the valve-in-the-head motor. The six and the larger fours have 3 3-4 by 5 motors, and the small fours 3 3-4 by 3 3-4. Cylinders are in pairs. Tungsten steel valves have replaced nickel steel ones, and multiple steel piston



Intake manifold on the Willys-Knight, showing the waterjacketed intake elbow



On the Lewis six the water pump is carried on a bracket provided with adjustment for the chain drive by means of a bolt bearing against the side of the crankcase. The insert at the right shows the slots for the holding-down bolts in the base of the bracket

rings are used in place of individual rings in each groove. Pistons are longer to give a greater bearing surface and to eliminate any possibilities of piston slap.

Buicks use the Delco system, and a special feature in connection with it is the complete inclosure of all wires within conduits so that the wiring is now not only more substantially and neatly arranged, but it is proof against all conditions.

On the larger four-cylinder cars and the six, the Stewart vacuum system of gasoline feed is employed, with the vacuum tank located on the intake manifolds. The supply tanks remain at the rear. The small fours do not have this system. Another difference between these smaller cars and the others is that the gearset is not in unit with the motor in the former.

Wheelbase of the small fours has been increased 1 inch to 106 inches; that of the six is 130 and of the other fours 112. —Buick Motor Co., Flint, Michigan.

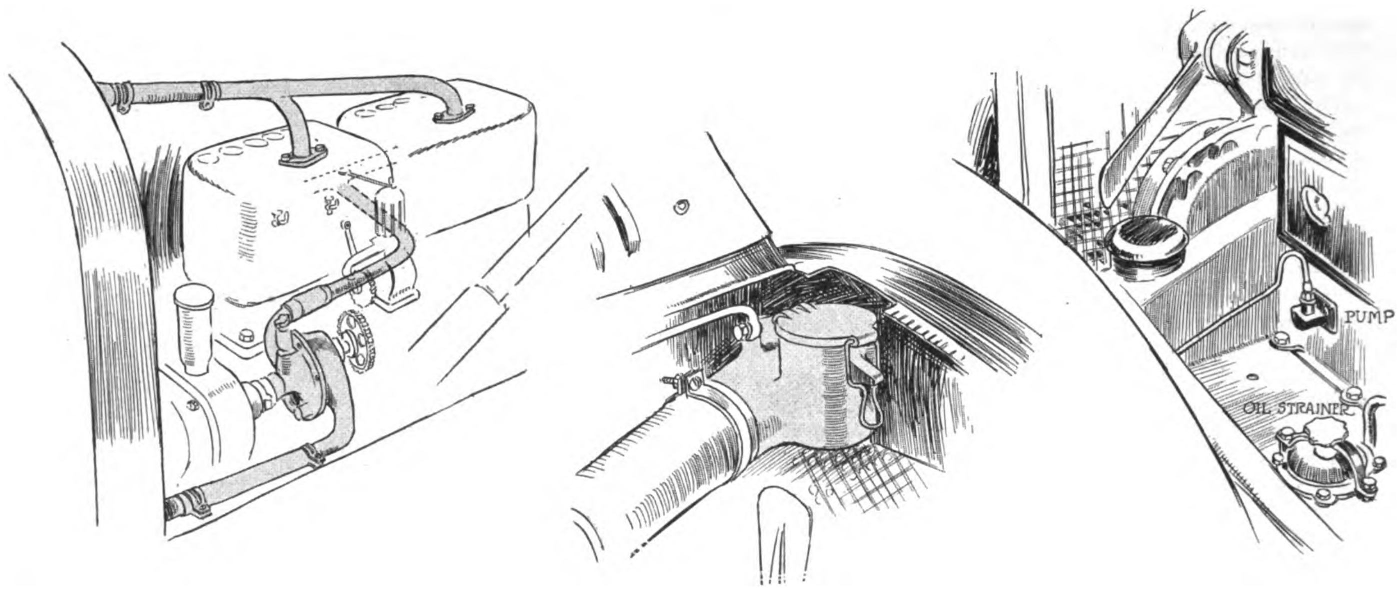
Cadillac Brings Out an Eight

Cadillac has the distinction of being the first American maker to market a motor of eight cylinders, and is equipping its chassis with this type of engine exclusively. In addition to the radical change to a 3 1-8 by 5 1-8, high-speed, V-type eight, the Cadillac chassis has other alterations as follows: The right drive and control have given way to left steer and center control, though the hinged steering wheel is retained. Wheelbase has been lengthened 2 inches to 122 inches, and the gearset, which was formerly located amidships of the chassis, is now made a unit with the motor. A disk clutch has replaced the cone type. In the rear axle, spiral-bevel gears are now fitted in place of the straight bevels used before, this change necessitating much reorganizing of the gear-cutting department of the Cadillac shops, and entailing the expenditure for some complicated machinery for the generation of the new gears.

Delco dual ignition, lighting and starting are still employed, and in most other respects the design is the same as in the past. Outward body appearance is little different than in 1914, though the bonnet, of practically the same length as heretofore, covers twice as many cylinders.

The Cadillac motor, which has created much interest among the motoring public, is said to be slightly lighter than the old four, due to the large reduction in weight of reciprocating parts and to the generous use of aluminum in the crankcase. The power curve shows that the engine develops its maximum of 70 horsepower at 2,400 r.p.m.

In the arrangement of the motor, the two sets of four cylinders are block cast and look like any block of four. They bolt to the crankcase, which is common to both sets,



Left—Water circulating system on the Pullman 6-48. Center—Filler cap under the hood of the Regal. Right—Side of Chalmers engine, showing shelf and accessible location of oil strainer and pressure pump

and their center lines are at an angle of 90 degrees to one another. Only one crankshaft is required, this being the same in design as a four-cylinder motor would use. The two connecting rod ends of opposite cylinders attach to the same bearing, one rod having a yoke end and the other rod going between the arms of this yoke. The two arms of the yoke are pinned to the bushing, which has its bearing against the shaft. The inner rod is free to move on this bushing, having its bearing on the outer surface of the latter. Only one camshaft is required, this being carried on a plate attached to the top of the crankcase. There are only eight cams, one cam operating two opposite valves through rocker arms attached to the same plate as the camshaft. Silent chains drive camshaft and Delco unit shaft, which is vertically above the other shafting and between the two sets of cylinders. At the rear end of the Delco unit are the gears for meshing with the flywheel for starting. The carbureter is also carried between the cylinder blocks, a U-shaped manifold running from it to the castings. An elaborate system of force feed oiling is used, the webs of the crankshaft being drilled and connecting with a supply pipe running along the inside of the crankcase. Another supply pipe carries oil to the camshaft bearings.

Thermostatic regulation of the cooling water temperature is another new thing to motor cars which Cadillac has adopted. By this arrangement, the water in the radiator is cut off when the temperature is low, causing only that in the jackets to circulate until the temperature rises, when a valve automatically opens the radiator supply. When the radiator supply is cut off, the water by-passes through the carbureter jacket, thus heating the carbureter quickly for starting. The temperature of the carbureter water governs the action of the thermostat.

Cadillac offers several closed types of bodies, namely, Sedan, limousine, phaeton, cabriolet and coupe on the regular chassis. These are examples of excellent coach work, and are at prices to correspond to the type of body.—Cadillac Motor Car Co., Detroit, Michigan.

Cartercar Increases Tire Size

Continuing the smaller of the two cars which were marketed for 1914, calling it model 9 instead of model 7, the Cartercar Co. has entered upon a year of one-model concentration. The model 5 of last year has been dropped entirely. This was a larger four.

Roadster and touring bodies have been redesigned and now have the popular sloping hood and cowl with smooth sided appearance. The friction drive system has had no change in design, though the copper transmission disk has been decreased 1 inch in diameter so as not to make any difference in reduction ratio between motor and rear wheels on account of the fitting of 33 by 4 tires as standard equipment instead of the 32 by 3 1-2 size which were fitted last year. The gear ratio in the rear axle has been lowered from 3.45 to 1 to 4 to 1.

The Cartercar uses a 3 1-2 by 5 four-cylinder Northway block motor, which has a detachable cylinder head. By increasing the clear opening of the valves from 1 11-16 inch to 1 13-16 inch, and by other slight differences in design, the power of the engine is made greater, the developed horsepower being 30 at 1,700 r.p.m. The construction of the engine is of the type with upper half of crankcase cast integrally with the cylinders, the flywheel being unenclosed. It is very similar to the conventional unit power plant construction but without a gearbox.

Delco combination ignition, lighting and cranking is used, the unit being driven off the end of the pumpshaft when a generator, and meshing with flywheel teeth when performing the cranking operation.

In the Cartercar drive system, the drive shaft from the engine connects to the transverse revolving transmission disk, 19 1-4 inches in diameter. Back of this and carried on a jackshaft is a fiber-faced friction wheel which revolves at right angles to the driving disk, and which is 21 1-4-inch diameter. A pedal pulls the driving disk away from the friction wheel so that the latter may be shifted into different positions with relation to the disk so as to give different speed ratios. An enclosed silent chain takes the power back from the jackshaft to the rear axle.

Steering and control are on the right, and wheelbase of model 9 is 106 inches. Equipment is complete, with demountable rims, windshield, top, electric horn, speedometer, tools and so on.—Cartercar Co., Pontiac, Michigan.

Case 5.5 Inches Longer

Continuing its three four-cylinder cars of last season with a number of improvements the Case T. M. Co., Racine, Wis., has reduced the prices of two cars and increased the price of one. The model 25, the leader, lists at $1,350 instead of $1,250; the 35 at $1,600, a drop of $250; and model 40 at $1,800, a reduction of $500.

The 35 and 40 are practically the same as in 1914, but the smaller car, the 25, has a wheelbase of 115 1-2 inches instead of 110, the tires increased from 32 by 4 to 34 by 4, the headlights equipped with double bulbs and the spark plug location shifted from the side in the valve plugs to the center of the cylinder casting in holes formerly occupied by the priming cocks. Battery ignition, using the accumulator of the Westinghouse cranking and lighting system, supplants the magneto used formerly. The brakes have been increased from 12 inches diameter to 14.

The Case company has discontinued buying its cylinder castings from an outside source, and for 1915 will do the work themselves. This applies also to the front axle, which is forged in the Case shops.

In the matter of body construction a few changes are noted. The lines have been changed completely in accordance with stream-line ideas, a foot rest is added to the tonneau, and in order to prevent the back of the front seat from becoming scratched a leather covering is provided. The improvement in body lines has allowed of a long cowl formed into a fuel tank, the container in the previous models being under the front seat. The feed, however, still is by gravity. A one-man top now is additional equipment.

The chassis of model 25 includes a four-cylinder, T-head, cast-in-pairs motor, 3 3-4 by 4 3-4, disk clutch and Brown Lipe three-speed gearset. The design of the 35 is the same as the 25; however the motor size is 4 1-4 by 5 1-2. The wheelbase is 120 inches.—J. I. Case T. M. Co., Racine, Wisconsin.

Chevrolet Increases Wheelbase

Two chassis, a four and a six, are offered for this year by the Chevrolet Motor Co., Flint, Mich. On the four, roadster and touring bodies are fitted, while the six carries only the touring type. The six, which is little altered from last year's car, a roomier body of attractive lines being the principal difference, is sold $50 cheaper than it was, the price now being $1,425.

With refined body lines bringing out the streamline effect, the fours have an increased wheelbase from 104 to 106 inches, while the brake drums have been enlarged 2 inches to a 12-inch diameter.

The six-cylinder motor is an L-head 3 5-16 by 5 1-4, with cylinders in blocks of three. Thermo-syphon cooling, constant level splash oiling, and Remy dual ignition are features of this power plant. The drive shaft is enclosed in a torsion tube, bolting at its rear end to the gearbox, the latter being in unit with the rear axle, which is three-quarter floating. Other specifications include cone clutch, platform rear spring suspension, left drive, center control and rear gasoline tank feeding by pressure.

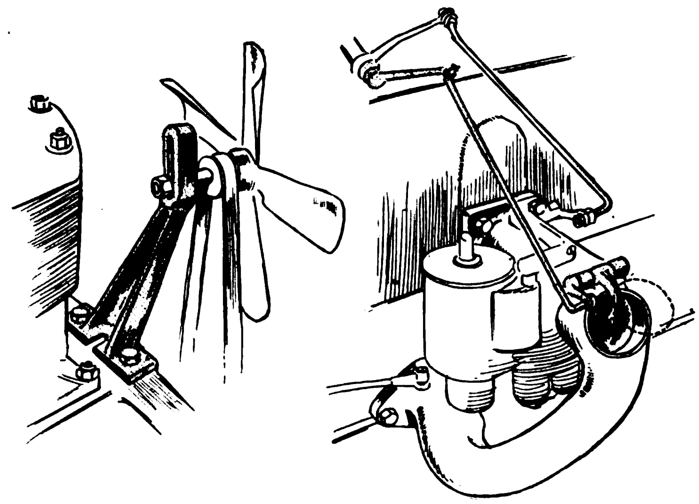
The wheelbase of the six is 112 inches, tires are 34 by 4 and Auto-Lite cranking and lighting are furnished at the price.

The fours have the distinctive Chevrolet motor with valves in the head, rockers and springs enclosed within an aluminum cover plate. Twenty-four horsepower is credited to the engine, whose dimensions are 3 11-16 by 4 inches. The cylinder head is a one-piece casting secured to the cylinder block by bolts, making a compact and readily removable assembly.

Drive is through a cone clutch to a three-speed gearset, located amidships on two frame cross members. Final drive is of the double universal unenclosed shaft type, torque being taken by a rod and drive by the rear springs, which are three-quarter elliptic. Tires are 32 by 3 1-2 on both roadster and touring car. The four-cylinder prices named do not include Auto-Lite electric cranking and lighting. When equipped with it, the price is $110 extra, five lamps and Prest-O-Lite tank being furnished at the above figures.—Chevrolet Motor Co., Flint, Michigan.

Chalmers Alters Gasoline Feed

Both the 1914 Chalmers sixes are continued this season. A number of detail refinements have been incorporated in both cars, and on the larger of the two, known as the Master



Left—Adjustable fan bracket on the Pullman Junior. Right—Application of vertical-flanged carbureter to Hupmobile. Also the new extra auxiliary air inlet with valve flap operated from dash

Six, a touring body of entirely new design has been fitted. The smaller chassis is known as the Light Six.

In fundamental features the cars are mechanically the same as for the past season, but some minor changes have been made. The cylinder dimensions are the same, but the core work has been altered to give greater water jacket space. The gasoline feed system has been altered to a combination pressure and gravity feed, the gasoline being forced by pressure to a small tank on the dash and thence flowing by gravity. This arrangement has permitted a slight raising of the carbureter, giving better accessibility. The carbureter is now the latest water-jacketed model G Rayfield, and the intake manifold has more water-jacketing space than before. While the multiple disk clutch was used in previous cars it has been improved by alternating bronze and steel disks in place of all steel.

On the smaller six Timken bearings have been added to the front axle. Both axles on the Master Six have been weighted to aid in holding the car on the road. The speedometer drive on both sixes is now the inclosed Empico.

Equipment is now better than ever before. A new design top, which is a product of the Chalmers shops, is fitted, the storage battery is of improved design, better separators being used to eliminate buckling of the plates. A volt meter has been added to the equipment and a Yale lock fitted to the electric switches. On the smaller car the tires are larger, being 34 by 4.5 instead of 34 by 4.

Five bodies are listed on the smaller car and two on the Master Six. The seven-passenger touring car on the Master Six is an innovation in that it is a boat-line design. The price of the Light Six is $1,650, or $150 less than in 1914 for the five-passenger car.—Chalmers Motor Co., Detroit, Michigan.

Chandler Lightens Flywheel

Greater power, which is obtained by lightening the flywheel and pistons, and by better balance that admits of higher operative speed, is the feature of the Chandler of 1915. Though the bore and stroke of the engine remain at 3 3-8 by 5 inches, the power increase is said to amount to 10 per cent., the motor having a rating of 35 horsepower.

With this refined motor $190 has been clipped from the price, it now being $1,595 for either open car-touring type or roadster. These bodies are much the same in general appearance as they were, having the popular stream lines and sloping hood and sides. Besides these, an attractive line of closed bodies was brought out last fall, all fitted to the same six-cylinder chassis.

The Chandler company makes a strong point of the light weight of its car. To attain this end, the chassis is simple and parts made as light as possible consistent with their functions. The six cylinders are cast in L-head fashion in blocks of three, and a unit power plant is obtained by bolting the gearset with its center control to the flywheel housing. One change in the engine equipment is the adoption of Rayfield carbureter. Bosch ignition still is used, while a two-unit Westinghouse electric system for cranking and lighting is employed.

The Chandler chassis has a 120-inch wheelbase, and rear spring suspension is of the three-quarter elliptic type. The drive from the motor is by an uninclosed shaft fitted with two universals, and paralleled by a torsion arm of pressed steel. When first brought out the car had a torsion arm made of bar stock, but the pressed steel type is lighter.

The rear axle is of floating construction, conventionally designed. Tires are 34 by 4 all around, and demountable rims, in addition to electric horn, Jones speedometer, New Haven 8-day clock, Jiffy curtains and lesser items feature the equipment.—Chandler Motor Car Co., Cleveland, Ohio.

Cole Four Is Smaller

Three chassis, two sixes and a four, make up the Cole line. The four is a revised addition of the four of last season, having the same power plant but a chassis which has been shortened two inches in wheelbase and lightened throughout. At the same time the price of this car has been cut in the touring and roadster bodies from $1,925 to $1,485. The big six is the same as for last year in every particular, except that vacuum gasoline feed has been adopted, and the remaining six is a new addition to the line built along the plans of the small sixes which have made their appearance during the past year.

The six-50, which is the added six, has a 3.5 by 5 L-head unit power plant with three-point suspension. The valves are all carried on the left side and are operated from a single integral camshaft driven by helical gears. Both manifolds are separate castings, and the water is circulated by a centrifugal pump.

Lubrication of the motor is accomplished by a non-circulating splash system in which the oil is fed by gravity sufficiently rapidly to replace the lubricant consumed by the engine. The feed is arranged to be proportional to the throttle opening. Ignition, lighting and starting is accomplished by the Delco system, providing a dual ignition outfit, with dynamo, storage battery and dry cells, and a 6-volt lighting and starting system. The battery is an Exide, 120-ampere hour. Vacuum feed takes care of the gasoline, the 15-gallon tank being on the rear end of the chassis. The clutch is a cone within the flywheel, the gearbox a three-speed selective and the rear axle a Timken floating.

The new four, which is changed from the four of last season because it is lighter in weight, has a new streamline body, a Stromberg carbureter, vacuum gasoline feed and a new Timken equipment throughout. It has the 4.25 by 5.25 L-head power plant cast in pairs. The valves are on the left side. Many other features of the chassis are similar in design to the six. The Delco electric system cone clutch, etc., being common but the rear axle is semi-floating. The wheelbase of this car is 120 inches, as compared to 118 inches on the car of last season.—Cole Motor Car Co., Indianapolis, Ind.

Crawford Alters Suspension

But two changes have been made in the Crawford 4-40, which is continued for this season. This is a five-passenger touring model, and the changes have been, first, to alter the suspension of the motor from four-point to three-point, and, second, to divide the front seat in the body to permit the exit of passengers without disturbing the driver, and also allowing passengers to change from the rear to the front seat without leaving the car. The car will be built with right drive and will be fully equipped with lighting and starting.

In addition to the four, the Crawford company will market a light six, which will be an innovation for this season. It is equipped with a 3.5 by 5 motor, forming part of a unit power plant, a Brown-Lipe gearset and a Timken axle, with a full equipment of roller bearings. The body fitted to this car is of five-passenger capacity, streamline design, and is also provided with the aisle between the front seats as described in the four. This model is left drive and center control, and though a six-cylinder sells for $250 less than the four, being listed at $1,850.

The new six, which will be the leader of the line this season, is an adaptation of the up-to-date light-weight six-cylinder car. It has its L-head cylinder cast in a single block and the crankshaft carried on three main bearings. Both the pump and camshafts are driven by helical gears, and the lubrication is by a circulating splash system. For ignition there is a Bosch magneto, and for cooling a centrifugal pump and cellular radiator. The gasoline feed is by vacuum from a 20-gallon tank carried on the rear.

A multiple disk clutch delivers the power to a three-speed gearset, and the rear axle as well as the front are Timken products, fully equipped with tapered roller bearings. The body is of sheet metal over a wood frame.—Crawford Automobile Co., Hagerstown, Md.

Crow Adds a Four

An entirely new four-cylinder car has been added to the Crow line bringing this up to four models, three of which are fours, and one a six. The new car is the smallest of the three and is an entirely new design. The other two fours which are known as E-45 and E-55 are practically the same as for last season except that they are both furnished with streamline bodies and the E-45 now has full electrical equipment. The six is known as E-62.

The new car known as the Crow-Elkhart, Jr. has a 104-inch wheelbase and is provided with a five-passenger body of streamline contour. The motor is a compact design with the 3.125 by 4.5 L-head cylinders cast in a single block and having the crankcase, timing gearcase, water manifold and intake all of aluminum. A steel stamping is used for the bottom pan. The valves are on the left side and are completely inclosed. They have a diameter of 1.125 inch and a lift of .31 inch. The piston rings are a special non-leaking design and the timing gears have a helical pitch. The crankshaft is 1.625 inch in diameter with two bearings, the front having a length of 2.5 inches and the rear 3 inches. The center distances between the bearings are 14.75 inches.

Electric lighting and starting is by the U. S. L. or Huff systems. The generator is located on the left side of the motor and the starting motor on the right. Ignition is by the Connecticut and Briggs system with the distributer mounted on a vertical shaft at the rear of the motor.

A multiple-disk clutch of the dry-plate type in which engagement of the plates is secured by three coil springs, delivers the power to a three-speed gearbox which is integral with the rear axle. The gears and the gearbox are of chrome nickel steel and are carried on New Departure and Hyatt bearings. The rear axle is a floating design having a 2.25 inch housing with a heavy truss-rod. The pinion is a 20-point carbon steel bevel having a ratio of 4.125 to 1. Thirty by 3.5 tires are used on the wood wheels.

The E-45 has a 4 by 5 motor with the L-head cylinders cast in pairs. It has a disk-in-oil clutch, rear axle gearbox and full streamline body. The E-55 differs materially from the E-45 having its four cylinders in a single block. They are 4.25 by 5.5 with the valves on the right. Right drive with center control is used on the Crow models. The price of the Junior is $725. The six has a 3.75 by 5.5

motor and a 130-inch wheelbase.—Crow Motor Car Co., Elkhart, Ind.

Cunningham Adopts Disk Clutch

One chassis, which is a continuation of the car of last season, will be built by the Cunningham company. In continuing this model a few refinements have been made, one of which has been the substitution of a dry-plate disk clutch for the cone, a simplified brake system eliminating many of the parts of the linkage and a new series of body design.

Cunningham motor is a four-cylinder 4.75 by 5.75 valve-in-the-head. The cylinders are cast in pairs, with a removable head; the manifolds are separate castings. The motor is suspended at four points.

Oil is forced under pressure to the main bearings, but all other bearings surfaces are taken care of by the lubricant which is splashed from the connecting rods. A gear pump takes care of the circulation, bringing the oil from the reservoir which is in the lower half of the crankcase.

Ignition is by a dual system and carburetion by a Stromberg model G 1.5-inch size, with a water-jacketed mixing chamber and a hot-air pipe. Fuel feed is by pressure, the gasoline tank being under the rear end of the frame and having a capacity of 20 gallons. The electric starting and lighting system operates at six volts.

The clutch is a disk having steel to steel friction surfaces and being housed in the flywheel. The gearbox is in a unit with the motor and is of the selective type, having three speeds. A spiral bevel rear drive is used in connection with a floating axle. The wheelbase is 129 inches and the tires 37 by 5.—James Cunningham, Son & Co., Rochester, N. Y.

Cycleplane Continues a Two

Two chassis upon which there are mounted three body styles is the offering of the Cycleplane company. These two models are known, respectively, as the Tourist and Traveler. On the Tourist are two bodies, one a roadster of two-passenger capacity and the other a touring of three. On the Traveler, which is a two-cylinder car, there is only a tandem roadster of two-passenger capacity.

The four-cylinder model has its L-head cylinder cast in a single block. Valves are on the left and covered, providing the neat powerplant common to the block cast design. The two-cylinder model has its cylinders cast singly, one valve being on the left and the other in the head. Cooling on both cars is by thermo-syphon and oiling by splash. The only difference in the oiling systems is that due to the necessities of two and four-cylinder practice. Both pumps are of the plunger variety, circulating the oil to the main bearings and thence to the splash troughs, where it is picked up by the connecting rods. Both cars use single ignition, in the Tourist the make being optional, while in the Traveler the Atwater Kent, with automatic spark advance, is regular equipment.

The Cycleplane company is using its own make of carbureter for the four-cylinder car, while a Schebler motorcycle model is used on the two-cylinder. A selective gearset with three speeds is used on the four and the two has a planetary gearset with two speeds. Another difference in the drive is that the four is beveled gears while the two uses the chain. The wheelbases are, respectively, 108 and 96 inches, and the tires on the four are 28 by 3 while on the two they are 28 by 2 1-2.—Cycleplane, Westerly, R. I.

Detroiter Is Lengthened

While the four-cylinder Briggs-Detroiter is fundamentally the same as in 1914, a number of chassis and body improvements are noted. The 3 by 5, L-head, block motor and all the important chassis dimensions remain the same except the wheelbase, which has been increased from 104 to 112 inches. There is an entirely new design of body, in which the use of drop forgings in place of castings for the levers and other fittings, and a light one-man top greatly reduce the weight.

In appearance the car has been considerably altered, as it has now the round radiator, tapered hood and streamline flush-sided body. A mud shield is added to the bottom of the radiator and the rear appearance changed by removing the bracket from the rear platform spring perch and in its place supporting the spring directly from the rear frame torque member. The springs have had an extra leaf added to them.

It has been found possible to raise the carbureter 4 inches, due to placing the gasoline tank under the cowl. While the motor support is still a three-point scheme, there is now a full cross member to take the rear support and a new type of front member has been fitted which permits the motor to be lifted directly out of the frame. The starting motor bolts directly against the front of the motor, whereas last year it was held on a separate shelf. This year the starting and lighting outfit is a Westinghouse, although operating at the same voltage and with practically the same connection as the previous type.

An innovation is the use of an oil level warning light, which flashes when the oil level in the crankcase drops to a dangerous point.

The bodies are now roomier and 1.5 inches lower than before, the running boards free and the doors widened to 24 inches. The fenders are crowned.—Briggs-Detroiter Co., Detroit, Mich.

Dile a New Small Car

Another new car in the low-priced class is the Dile. It is made in one-body type only, a two-passenger roadster, with a four-cylinder 2.625 by 4 block power plant, dry-plate clutch, three-speed gearbox with shaft drive to a semi-floating rear axle. All the transmission parts and axle are mounted on annular ball bearings.

Everything has been done throughout this little car to keep the weight down and at the same time provide ample power and room for the two passengers. The valves are on the right, driven by an integral camshaft, which is operated from the timing gear case by spur gears. Cooling is accomplished by thermo-syphon and lubrication by a plunger pump which is operated from the camshaft. This pump circulates the oil to the main bearings, whence it flows to the splash troughs to meet the connecting rods. The splash takes care of the cylinders, camshaft bearings, etc.

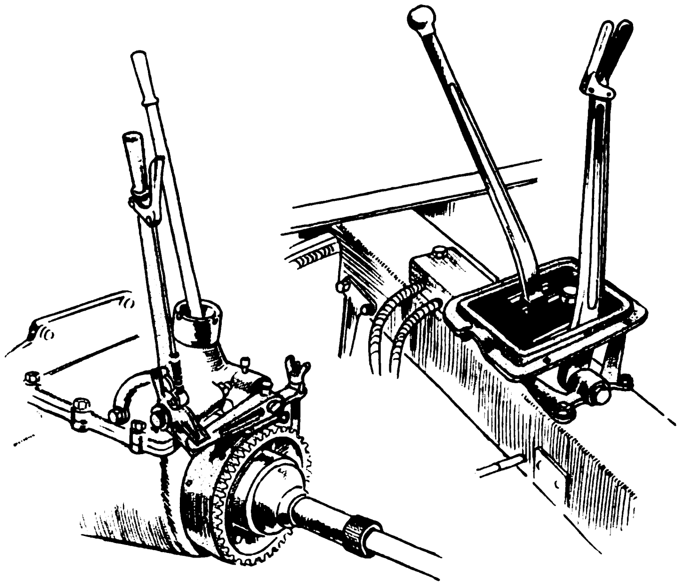
Ignition is by a single magneto system, the Berling high-tension instrument being used with fixed spark. The carbureter is a Holly and the gasoline tank of 5.5-gallons capacity, feeds by gravity from the dash. Electric starting is extra, but a Dyneto generator and Willard-Elba storage battery form part of the lighting equipment.

The dry-disk clutch is housed in the flywheel and has asbestos-against-steel driving faces. The three-speed gearset is selective and is mounted amidships. Control is in the center and the drive is on the left. The wheels are the Houk detachable wire design, and one set of the brakes is located on the rear pinion shaft of the differential and the other internal on the wheeldrum.—Dile Motor Car Co., Reading, Pa.

Dodge Has Improved Gearbox

The Dodge Bros. line was disclosed late in the fall by the announcement of a five-passenger machine of 110-inch wheelbase and equipped with a 3 7-8 by 4 1-2 motor. It can be had only in the one body type.

There is nothing unusual about the mechanical design of the car, although every detail has undergone careful testing before it was decided upon. One point of advantage is the provision in the gearset for shifting the countershaft driving gear out of mesh with the mainshaft gear when the drive is direct so that when the car is in high, the countershaft is not rotating.



Left—Emergency brake behind transmission on Lewis six. The speedometer drive is taken at this point. Right—Mounting of gate for levers on cross-member on the Studebaker

The specifications include the block-cast, L-head motor with gearbox in unit, North East cranking and lighting of single-unit type, Eisemann magneto ignition, cooling by centrifugal pump circulation, separate cylinder head held to the main casting by steel bolts, cone clutch, drive through propeller shaft enclosed in a torsion tube to a floating axle, three-quarter elliptic springs, overslung frame, left drive and center control.

Some of the equipment items are Jones speedometer, one-man top, rain vision and ventilating windshield, Willard battery, and 32 by 3 1-2 tires on demountable rims.

The intake passages are cored in the casting, extending from the single opening to the carbureter on the left to the intake ports on the other side, the cored passages being between cylinders Nos. 2 and 3. The exhaust manifold is a separate casting. The reciprocating parts are of standard design, although the use of thin steel piston rings, three to each ring groove, is specially notable.

The motor is oiled by a circulating splash arrangement, and the motor-generator, mounted on the left forward side of the engine, is of the 12-volt type driving through an inclosed silent chain from the crankshaft with a 3 to 1 reduction.

The floating axle has a pressed steel housing, and mounted on it are the brake shafts and equalizers, allowing the operating rods to run forward centrally of the frame. The latter is well-braced with three cross members, and carries a 15-gallon fuel tank at the rear. The feed is by pressure.—Dodge Bros., Detroit, Mich.

Dorris Adopts Vacuum Feed

One model, a four-cylinder, is the offering of the Dorris company for this season. This car, mounted on a 121-inch wheelbase is a direct continuation of the model marketed last year and is a result of 9 years' development by the Dorris Motor Car Co.

The four-cylinder overhead valve motor has its 4.375 by 5 cylinders cast in pairs. The Dorris dry plate clutch and fan flywheel are continued as features of the unit power plant in connection with the three speed gearbox used last season. Last year the clutch was considerably overhauled by adding a number of plates and using lighter springs. The gearbox remains the same as for the past three seasons with the exception that the levers are in a more accessible position, on account of having been moved forward slightly.

An alteration that is in line with the policy of several concerns this year, is the adoption of vacuum feed for the gasoline. Last season the gasoline feed was by pressure with the tank placed lengthwise of the chassis at the left side immediately under the body. The filler cap and gasoline gauges were then under the front floor boards. A cut in price from $2,500 to $2,200 in the five-passenger touring car body and from $2,550 to $2,250 for the seven-passenger touring is another change for this season. In body work an addition to the line is the Sedan. It is mounted on the same 121-inch wheelbase chassis as the other two cars.—Dorris Motor Car Co., St. Louis, Mo.

Empire Is Electrically Started

The same chassis as has distinguished the Empire line for the past 3 years is continued and with the same body as marketed last year for $900, can now be purchased for $850. But in addition to model 31-40, a five-passenger touring car has been added. A roadster which corresponds to the new touring car in equipment and general appearance is another addition.

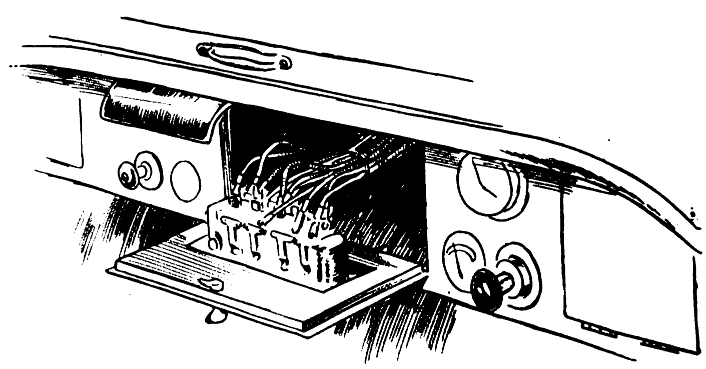
In bringing out the new chassis the most important change outside of the entirely new bodies is the adoption of the Remy lighting, starting and ignition system. The mounting has necessitated some small changes in the motor exterior although all the principal dimensions remain unaltered. The oiling pump is now a horizontal instead of a vertical design and an oil pressure chamber is integral with the pump in order to maintain a steady flow to each of the leads. A priming cup has been mounted on the oil pressure chamber so that in case the car has not been used for some time the proper working of the pump will be insured. Formerly the clutch adjustment was held by a number of steel plungers, but now it is permanently secured by bolts.

The new lighting, starting and ignition system is of special interest in that it is the latest Remy product and is a motor-generator outfit with battery ignition. The cylindrical motor-generator is carried on the forward end of the motor at the right. Its single armature with a compound winding operates 12 volts and performs the functions of the cranking motor and generator. The generator commences to charge at an engine speed of 350 r.p.m. and carries the lamp load at any speed above this with an output of 6 amperes.

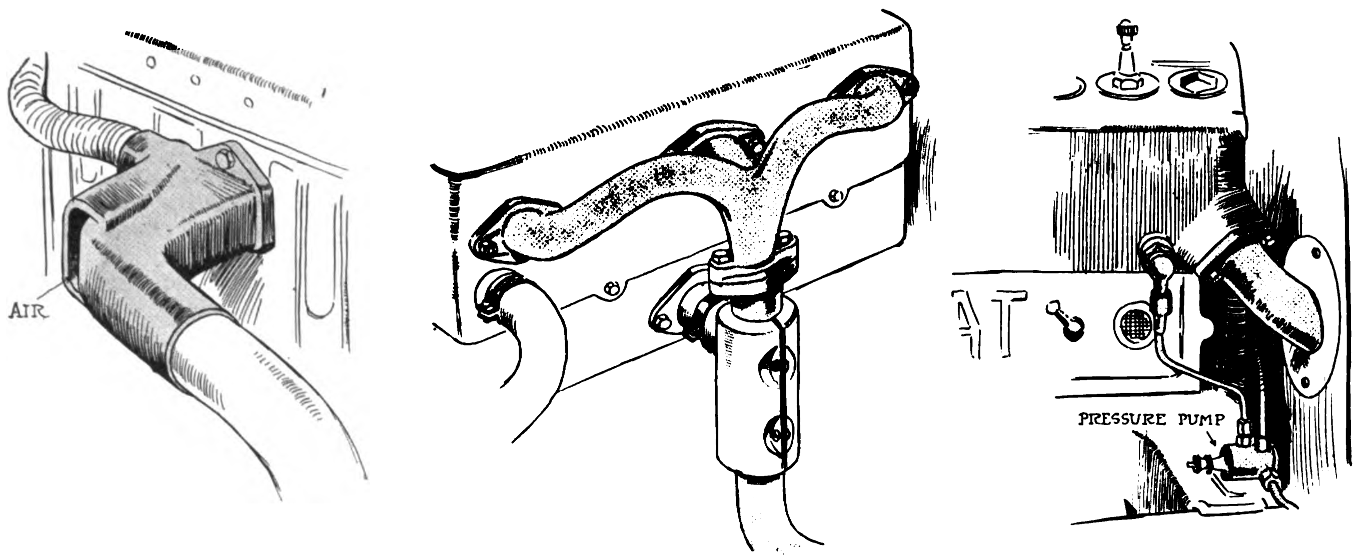
A choice of the touring car which was sold last year, equipped with acetylene lighting, and the new touring car with electric lighting and the streamline roadster is offered. The 3.75 by 4.5 power plants are used on all cars.—Empire Automobile Co., Indianapolis, Ind.

Enger a Unit Power Plant

A six-cylinder chassis with 124-inch wheelbase is the offering of the Enger Motor Car Co. On this is fitted a streamline body with a six- or seven-passenger capacity and clean cut exterior without any luggage being carried upon the running board.



Hinged switchboard on dash of Locomobile Small Four, which exposes all connections in accessible position



Left—Hot-air intake cast integral with exhaust elbow on Chevrolet. Center—Special shaped exhaust manifold on new Hupmobile, showing hot-air stove on exhaust pipe. Right—Short exhaust elbow and location of pressure pump on Fiat

The Continental L-head block power plant is used. The valves are on the right, together with the pump and generator shaft from which the Atwater-Kent distributer is driven by a bevel gear. On the right side of the motor is the carbureter and cranking motor which engages with teeth on the flywheel. The carbureter is fitted with a dash adjustment for easy starting and is water-jacketed. The oil breather and filler opening is also on this side of the motor, and there is also a gauge for determining the oil level.

Connection between the motor and gearset is made through a multiple disk clutch housed in the flywheel which is inclosed in a bell-shaped extension of the crankcase to which is bolted the gearbox. Three speeds are provided by the gearset, the lever being mounted directly on the top of the housing in accordance with general practice for central control. Two universal joints are used in the drive and no torque or radius rods are provided, the functions of these being performed by the spring. In order to stiffen the springs sufficiently for their dual service in suspension and torque transmission the main leaves are constructed from vanadium steel.

In body work the streamline form has been adhered to. The seating arrangement is provided by the ordinary front and tonneau seats with two auxiliary seats which fold in the rear. The slope of the cowl is unbroken as the side lights are not used. A dimming arrangement in the head lamps provides signal lights.—Enger Motor Car Co., Cincinnati, Ohio.

Fiat Alters Bodies Only

The only changes made in the Fiat car are those affecting the body style. The cowl will have a greater curvature making a small dash which harmonizes with the general lines of the car. Multiple bulb headlamps will be used, eliminating the side lamps.

There are three models of Fiat known respectively as 54, 55, 56. The first two of these are four-cylinder types and the third is a six. The Fiat design is distinguished by the fact that the motors are all of the block type, even the six having a very short overall length. The Fiat company manufactures on the metric system and consequently the bore and strokes of their motors are in millimeters but translated to inches are 4.4 by 6 and 5.12 by 6.75 for the fours and the six has the same bore and stroke as the smaller four.

The cylinders are all L-head carrying the valves on the left side. The manifolds are cast integrally with the cylinders, the result being a motor of small dimensions and clean exterior appearance. Helical gears are used on all the models to drive the camshaft while the magneto, water pump, etc., are operated from a transverse shaft.

Pressure feed lubrication is used, the oil being circulated by a gear pump. Water circulation is maintanied by a centrifugal pump, the remaining part of the cooling system being made up by ample waterjackets in connection with a honeycomb radiator. The fan is formed by the pitched blades of the flywheel.

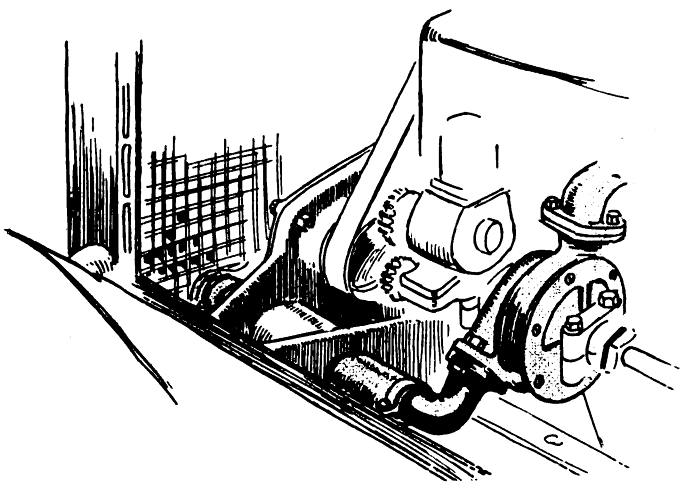
Ignition is accomplished by the Bosch dual system and starting and lighting by Westinghouse in connection with a Willard storage battery. In transmitting the drive disk-in-oil clutches are used, the friction faces being steel to steel and the housing being within the flywheel. All models have four-speed gearboxes with direct on fourth and all have a rather high gear ratio, the lowest being in the six, where a ratio of 3.06 to 1 is used. A feature of Fiat construction is the pressed steel rear axle housing which eliminates both radius and torque rods, being continuous to a forked yoke which connects with the gearbox.—Fiat Automobile Co., Poughkeepsie, N. Y.

Firestone-Columbus Drops Four

One four and one six are listed by Firestone-Columbus this season. The larger four of last year, which was only fitted on a raceabout body, has been discontinued. The bore and stroke of the four and six which are made for this season are the same, being 4.125 by 5.25. The four-cylinder motor has the cylinders cast in a single block while on the six they are in two groups of threes. Both have L-heads with the valves on the left side.

Last season, only the six-cylinder model was equipped with the Gray & Davis lighting and starting system but this year the four has also been fitted with it. A difference in the electrical equipment, however, which has been maintained, is in the ignition. On the four, the Splitdorf Dual system is employed, while on the six, the Connecticut outfit forms a part of the double system. The carbureter on the four is a Schebler while on the six it is a Rayfield. The Schebler carbureter is not equipped with hot-air pipe while on the Rayfield this equipment is used. The feed of gasoline is accomplished by gravity on both models.

Differences between the construction of the four and six are noticeable also throughout the drive, while the four has a cone clutch, amidship gearbox, without the unit power plant feature, the six has a disk clutch and a unit power plant in which the three-speed gearbox is incorporated in the same housing as the clutch. This being a bell-shaped casing



The rubber connection between the pump and the radiator on the National six passes through a hole cast in the crankcase arm

which is a continuation of the crankcase. Both the six and four have bevel final drive to a floating axle. The wheelbases of the two cars are respectively 116 and 132 for the four and six and the tires 34 by 4 and 36 by 4.5. The six-cylinder car has smaller tires in the front than in the rear, 36 by 4 serving for this purose.

In body work the four is made up in a roadster and touring while the six can be had in either five-passenger touring or seven-passenger touring.—Columbus Buggy Co., Columbus, O.

Ford Adds Two New Bodies

Ford continues the familiar model T chassis, although bodies have been redesigned. Last October, two new body types were added, a coupélet and a sedan, swelling the line to five types. The others are the roadster, touring car and the town car.

The coupélet may have the top folded back when weather permits, but it may also be closed so that no water or snow can get in. It is then virtually a coupé. The upholstering is deep and windows wide in sliding sash. The sedan has two wide doors, and provides seating for five, three in the rear seat and two in front on individual chair type seats. The right hand seat is on a pivot and folds back out of the way. Wide window panels make for clear vision in all directions.

The model T chassis with 100-inch wheelbase carries a 3 3-4 by 4, block, L-head motor cooled by thermo-syphon. This engine is three-point suspended in the frame, and a feature is the flywheel magneto, which provides the ignition current. Planetary transmission is employed which gives two forward speeds and reverse. The drive shaft is enclosed with a torsion tube which is a unit with the rear axle housing. The clutch is a steel disk design, brakes are on transmission and rear wheels, the former being the service set. Semi-elliptic cross springs are used front and rear, shackling at their ends to the axles. The front tires are 30 by 3, and the rear 30 by 3 1-2.—Ford Motor Co., Detroit, Mich.

Franklin Adopts Spiral Bevel

Franklin prices are reduced. On the touring car at $2,150, $150 has been taken off and a similar amount from that of the roadster, while on the closed cars a still greater reduction has been made, $200 in the Berlin and Sedan and $350 on the coupé.

Mechanically only one change is made on the motor and that in the fitting of the oil adjustment on the cowl board instead of under the hood. In the starting and lighting system better accessibility is obtained and by an improvement in the Dyneto commutator and brushes; this system weighs 40 pounds less than formerly. In the rear axle spiral bevel gears have been adopted in place of the straight bevel. A number of small details such as the spring pivot bolts, the front springs, magneto attachment, etc., have been revamped. The magneto is now attached by two dowel pins, and a divided metal strap over the top in place of the bolted-on brackets. In the front spring the deflection was 1 inch to 180 pounds, it is now 1 inch to 200 pounds. In the spring pivot bolts a new bushing has been employed which incorporates a felt washer intended to keep the dirt out and the oil in.

Better equipment at the lower price is the result of increased production efficiency in the Franklin plant. This season either the Goodrich Silvertown cord tires, or the Goodyear Power-Saver cord type are offered as regular equipment. The Hartford single-cylinder tire pump is fitted. This, together with the bracket which supports it, weighs 6.5 pounds. By the use of this pump the Franklin company claims to have removed the reason for the heavier type of demountable rim and now substitutes the Q. D. type.

In body work the front doors are wider and set back a little to permit of easier entrance. Mud guards are wider and the rivets are invisible. Side lights have been eliminated. The Franklin is one of the few cars which fits a luggage carrier as regular equipment.—H. H. Franklin Mfg. Co., Syracuse, N. Y.

F. R. P. a High-Speed Design

A new speed creation has been brought out under the name of F. R. P., by Finley R. Porter, ex-chief engineer, of the Mercer company. It is made up only in chassis form and without a body sells for $5,000. The chassis is a study in the use of alloy steel. The 4.6 by 6.75 I-head motor is fitted with camshafts, crankshafts and connecting rods of hollow chrome vanadium steel and throughout the car this alloy has been employed to give the utmost lightness with the greatest possible srength. Magnalium, an aluminum-magnesium alloy has been employed for housings.

The motor is a different design from any heretofore employed in American practice. It has its four cylinders cast in a block and is provided with an overhead camshaft which is driven by a worm and vertical shaft at the front end of the motor. The valves are the 45-degree poppet type, but are so formed that when they are closed the combustion chamber is practically a hemisphere. In every other particular, with the exception of double, 80-pound valve spring, the design does not depart from ordinary valve-in-head practice to any marked degree.

An unusual oil pump which has a capacity of 30 pounds at 1,500 r.p.m. and which has an ultimate capacity of 600 pounds is used. The pump is a rotary piston design operated by two cams located at the bottom end of the vertical shaft which drives the camshaft.

The clutch is a cone housed within the flywheel. The latter is 21 inches in diameter and is a steel forging providing a clutch surface 19 inches in diameter and 2.5 inches face width. There is a compensating joint between the clutch and the gearbox which provides four speeds. The shaft is a hollow member and takes the drive through two universal joints to a bevel gear differential. Chrome vanadium gears are used here and the driving stress is transmitted through the springs.

For service purposes there is a brake on the shaft and the emergency is carried on the rear wheels. The steering gear is a worm and full gear with a magnalium housing a 2-inch post. The complete electric equipment is made by Bosch and the wheelbase is optional to suit the style of body ordered.—Finley Robinson Porter Co., Port Jefferson, L. I.

Glide Has Dash Control

The four-cylinder Glide has received changes affecting the body, carbureter, clutch, brakes, windshield and carbureter air control. The tonneau seat has been made wider and the braking system entirely redesigned. It now consists of a two-piece, brake-operating shaft extending from one drum to the other and being split near the middle, the abutting ends each having an operating lever. The two levers are clamped together and one of them is connected by a rod to the brake pedal. This system is said to give the advantages of brake equalizers and preventing one brake from refusing to work at the same time giving simultaneous adjustment.

A knurled button in the center of the steering wheel forms the carbureter air control, and another feature of this control is that when pressed it operates an electric horn. The windshield brackets are built into the body. The most important chassis change is the substitution of a disk clutch for the cone formerly used. The motor is a four-cylinder 3 1-2 by 5, block thermo-syphon cooled and fitted with Westinghouse ignition, cranking and lighting system. The wheelbase is 114 inches.

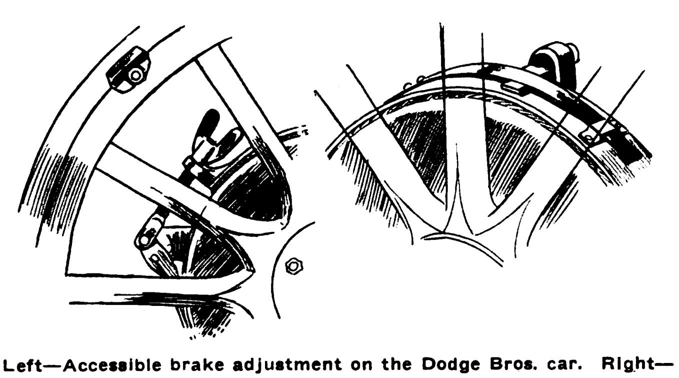
Top side sway has been banished by the new windshield mounting the brackets of which are built into the body. These brackets have attached to them arms which in turn carry conical supporting lugs, which form the connection to the windshield metal frame. The top brackets are attached to eyes on the side arms.—Bartholomew Co., Peoria, Ill.

Grant Adds a Six

A six at $795 is the offering of the Grant company for this season. In addition to this the four-cylinder model has been improved and continued.

The six which will be the leader has a 106-inch wheelbase, standard tread and is equipped with a 2.875 by 4.25 inch block motor. Other specifications are a three-speed gearset, floating rear axle, left drive, center control, cone clutch, cantilever rear spring suspension, unit electric motor generator for lighting and cranking and cowl gasoline tank. The price mentioned is inclusive, but if it is desired a car can be had for $45 less without electric cranking and lighting. In this case acetylene lamps are fitted. The body is a five-passenger touring type with boat lines, having a sheered gunwale. The power plant of the six is a unit and the valves are in the heads of the cylinders. The motor is cooled by the thermo-syphon system and lubricated by a combination splash and pressure system in which the oil is circulated by a gear pump. Ignition is accomplished by means of current taken from the storage battery and distributed by the Atwater-Kent system with automatic advance.

The four has a 2.75 by 4 L-head block power plant with the valves on the left. It is also cooled by the thermo-syphon system and oiled by splash with a vacuum feed. A single ignition system is used in which the current is furnished by a Swiss magneto with hand spark control. The carbureter is a Mayer fed by gravity. The electric lighting and starting system is the Allis-Chalmers. A cone clutch is used in connection with a progressive two-speed gearbox on the rear axle. The axle itself is three-quarter floating and the drive is taken through a torsion tube and radius rod. The wheelbase is 90 inches, the wheels wire and the tires 28 by 3 clinchers. This model is only made up in a roadster body.—Grant Motor Co., Detroit, Mich.



Left—Accessible brake adjustment on the Dodge Bros. car. Right—Light spring to hold brake band off brake drum on the Chevrolet

Great Eagle to Order

The Great Eagle six-cylinder cars are made-to-order propositions, most of the inclosed cars being of large carrying capacity. A ten-passenger limousine is a feature of the line.—United States Carriage Co., Columbus, O.

Haynes Has New Six

There is a new Haynes six with 121-inch wheelbase for three smaller bodies and a 127-inch wheelbase for the seven-passenger body. There is also a larger six and a four which are continued models.

The new six is quite different from other Haynes cars. The electric method of gear shifting used in 1914 is not employed. The vacuum feed for gasoline is used. A motor-driven tire pump has been added and in body work there has been considerable change to conform to the latest dictates of streamline fashion. The radiator has rounded edges and the hood tapers slightly to the cowl. The lines of the body are horizontal from the center of the front door to the rear with no upholstery visible above the top line, but instead the body sides are topped with strips of polished wood. The long straight body lines give a racy appearance, which is assisted by underslinging the springs and lowering the car.

The motor, a block casting 3.5 by 5, is a part of a unit power plant, with the valves inclosed and clean exterior appearace a feature. Hot air intake is fitted to the Rayfield carbureter and the Stewart vacuum tank is mounted on the dash with the gasoline tank carried on the rear between the frame members.

The big six 4.25 by 5.5 with L-head cylinders cast in pairs, has the motor supported at four points and lubricated by a circulating splash system using a plunger pump in the lower part of the crankcase. Ignition is by a Simms high-tension, dual system and starting and lighting are provided by a Leece-Neville system in connection with a Willard battery. The contracting band clutch and three-speed gearset are used in conjunction with a floating axle.

The four, similar in dimensions and detail to the big six, has a 4.25 by 5.5 L-head motor, with cylinders in pairs, and uses the same lubrication, ignition and carburetion system as the larger car. The clutch and running gear are also the same. The wheelbase is 118 inches as compared with 130 inches on the big six.—Haynes Automobile Co., Kokomo, Ind.

Herff-Brooks New Bodies

The Herff-Brooks company is turning out two models, a four and a six, both with new streamline bodies, folding down steering wheel hinged so that the driver may enter or leave the car without wheel interference, Stromberg carbureter, right drive and center control instead of left and center. Bosch ignition instead of magneto and dry cells. Apelco cranking and lighting is new and a one-man top is substituted for the regular type. The five-passenger models now have an extra folding seat for a sixth person, which, when not used is placed in a tool box under the front seat.

Aside from these changes the four has had the wheelbase increased from 116 to 118 inches and the motor bore 3-8 inch to 4 1-2.

The six motor is an L-head with separately cast cylinders 4 by 4 1-2. This method of casting calls for a rather long crankshaft and hence more than the usual number of supports. In this engine seven bearings are used. Power transmission is through an inverted-cone clutch equipped with a brake to a three-speed gearset redesigned slightly to care for the central control.

The four-cylinder car has a larger motor and the cylinders are block cast, L-head design and equipped with same accessories as the six.—Herff-Brooks Corp., Indianapolis, Ind.

Herreshoff Narrow Tread

The Herreshoff of this season is an entirely new product and put out by an entirely different concern than the Herreshoff of last year. Although the Herreshoff Light Car Co., the maker, is an outgrowth of the former Herreshoff Motor Co., the two cars are entirely distinct. The Herreshoff for this season is built only in a roadster form on a 94-inch wheelbase with a 44-inch tread. It has a four-cylinder block power plant with 2.375 by 3.25 cylinders. The valves are on the right side of the cylinder casting and are inclosed by side plates.

Everything about the car corresponds to the practice used in the manufacture of larger cars and the equipment is complete in every respect. Cooling is taken care of by a thermosyphon system without a fan. Lubrication is by combination pressure feed and splash and ignition by the Atwater Kent system with automatic distributer.

Gasoline is fed by gravity from the four-gallon tank located beneath the cowl to a Carter carbureter. A complete Entz-Dyneto starting and lighting system in connection with a Willard 80-ampere-hour battery is part of the standard equipment.

The three-speed gearbox is located amidship and the drive is taken through a semi-floating axle. The wheels are wire, with clincher rims and quarter elliptic springs are used all around.—Herreshoff Light Car Co., Troy, N. Y.

Hudson Stiffens Crankshaft

Hudson has two sixes, the leader designated as model six-40, having a number of refinements principally in motor and chassis and being reduced in price from $1,750 to $1,550, and the larger model six-54, which is but little changed.

The general mechanical layout of the six-40 and the outward appearance are practically the same as last season, although several detail changes have been effected, such as the use of a single casting for the six cylinders, instead of their being cast in groups of three. This makes it possible to eliminate an external intake manifold, the gas distribution from the carbureter being by cored passages in the cylinder casting. Due to finer balance of reciprocating parts and to an increase of 1-8 inch to the crankshaft diameter, the horsepower has been augmented, it ranging from 40 to 47, this attained by the resultant smoother running action.

The dimensions of the motor are of the popular 3 1-2 by 5 size, and L-head construction with gearset in unit is used. In the cooling system a more efficient type of radiator is employed, while automatic spark advance has been added to the hand lever advance. This is an improvement which is made in the combination Delco unit which supplies current for lights, and takes care of cranking as well as ignition.

In the six-40 chassis, the principal refinements are the replacing of a solid tapered driveshaft by a tubular type of uniform cross section throughout; by the use of self-lubricating bushings in the steering connections, brake shafts and steering column tube, making attention to them practically unnecessary; and by the lightening of the weight of the cowl gasoline tank by making the fittings of pressed steel instead of cast iron.

Other chassis features of the six-40 are the Hotchkiss drive through the rear springs, the tapered frame, which gives good body support and the speedometer drive from the propeller shaft. The car has 123-inch wheelbase with left drive and center control.

The six-54 has much the same appearance as the smaller six, though on a somewhat larger scale. The motor is a 4 1-8 by 5 1-4, of L-head type, with cylinders in threes. Delco combination electrical system is also used, while a four-speed gearset with direct on third still features the car. The drive shaft is of the double universal type, but a torsion arm takes drive and torque. The frame tapers as does the six-40, and left drive with center control are provided. The cowl gasoline tank is also used. Wheelbase is 135 inches.

An attractive line of closed bodies is supplied for either chassis.—Hudson Motor Car Co., Detroit, Mich.

Hupmobile Changes Design

An entirely new car is now being marketed by the Hupp Motor Car Co. The design of 1914 has been entirely displaced by it. The new model is a larger and more powerful design embodying among other features new to the Hupp company left drive and center control. The wheelbase is 13 inches longer than the previous one, being 119 inches. The bore is 1-8 inch larger giving a 3.375 by 5.5 power plant with larger water jackets, valves, connecting rods, bearings, ports and manifolds. The Zenith carbureter is still used but instead of the vertical type a horizontal design, 1-4 inch larger is fitted. The carbureter size is now 1.25 inches.

While the Westinghouse outfit is still used it is a single unit instead of a double unit system. The magneto has been dropped and in its place the Atwater Kent distributer substituted. With the fitting of the new distributer many exterior features of the motor have been altered. A new fan bracket with a tension coil spring is an example.

In rearranging the motor the drive of the camshaft has been moved back to accommodate the new position of the carbureter and while the oiling system has not been altered so far as the motor is concerned it is now arranged so that it does not feed to the gearbox, the object being to use a heavier lubricant at this point.

The clutch is the same in principle as in the last model but has been completely reversed, the purpose being to put the thrust drag on the gearbox rather than on the motor when slipping the clutch. The diameter of the clutch remains the same at 13 inches, but the number of plates has been increased by four. There are now 13. Just back of the clutch is a new chassis frame member which acts as stiffener and carries the pedal shaft. The entire rear axle is new and the body larger with streamline form. The spring suspension is now semi-elliptic all around instead of the cross rear spring.—Hupp Motor Car Co., Detroit, Mich.

Imperial Uses Cowl Tank

The Imperials are three in number—two sixes and a four. The four has a 115-inch wheelbase and 3 3-4 by 5 Continental, L-head block motor rated at 22.5 S. A. E. horsepower. Gray & Davis cranking and lighting, thermo-syphon cooling, cowl fuel tank and streamline body with sloping bonnet and rounded-top radiator are other features. The cowl fuel tank is new to Imperial practice. Ignition is by Atwater-Kent Unisparker. The gearset forms a unit with the engine, and drive is through multiple steel-disk clutch and uninclosed driveshaft with two universals. This latter is a departure from preceding Imperial four-cylinder practice, the shafts being heretofore in torsion tubes. The rear axle is floating and 12-inch brake drums are a part of the unit.

In the new six, Imperial has brought out a car of exceedingly trim lines. Mounted on a 130-inch wheelbase, the car is driven by a 3 3-4 by 5 1-4 Continental unit power plant, with cylinders in threes, and valves on the right. Centrifugal pump cooling, North-East cranking and lighting are used. The clutch is a disk type and drive is through a shaft enclosed within a torsion tube. The rear axle is floating, its brake diameter 16 inches and the drive ratio 3 7-8 to 1. The fittings include 36 by 4 1-2 tires, and Stewart vacuum fuel feed from 20-gallon rear tank.

The other six, model 44, carries the same motor and has practically the same drive features. Its wheelbase is 126 inches, and the five-passenger body is somewhat similar to that mounted on the other six chassis. This car also has North-East cranking and lighting, carries complete equipment and uses 36 by 4 1-2 tires.—Imperial Automobile Co., Jackson, Mich.

Inter-State Builds a Four

Inter-State is marketing a four-cylinder chassis with a touring body. This is one of the concerns which has turned its attention to touring bodies alone and makes roadsters only in sufficient quantities to meet orders. This is an entirely new model for this season. It has its 3.5 by 5 cylinders cast in single block and in place of the L-head design used on the six, marketed last year, now has the valve in the head.

Last year's six had 3 by 5 cylinders, but this concern is among those who have pinned their faith to the smaller fours this season. In fact the motor has a number of tendencies toward what is becoming average American practice. The bore and stroke are almost identical with the average of the dimensions of all American cars. Thermo-syphon cooling is used. This is another change from the methods used on the six, as this had pump circulation.

Another change is in the ignition system, which is now single instead of the double type used previously. Lighting and starting is by electricity, but the manufacturer of this has not as yet been announced.

While a disk clutch was used for the six, a cone clutch delivers the power to the gearset in the four. A complete change in the rear construction and transmission system has been made. While in the six a unit power plant was employed, and the gearbox four forward speeds, a cone clutch is used in the four and the three-speed gearbox is incorporated with the rear axle. Instead of the drive being taken through the springs it is now through a torque tube. The rear axle is three-quarter floating whereas in the six it was floating. The wheelbase of the new car is 110 inches and is fitted with 33 by 4 tires. The six had a wheelbase of 132 inches with 36 by 4.5 tires.—Inter-State Automobile Co., Muncie, Ind.

Jackson Drops a Four

The three-model policy which the Jackson company adhered to in 1914 has given way to greater concentration, in that there are now only two models, a four and a six. The new cars cannot be regarded as continuations of any older models, so different are they mechanically.

As compared with the Olympic of 1914, the new car bearing that name has a 2-inch longer wheelbase, 117 inches. Its motor is also larger, being a 4 1-2 by 5 1-4, whereas the old one was 4 1-8 by 4 3-4. The L-head cylinders are in pairs and gearbox is in unit. Instead of having gearshift and control levers on the left, as in the older model, the center position has been adopted, drive being still on the left. Another change is the use of the Stewart vacuum system of fuel feed, replacing a cowl tank type. The reservoir is now at the rear.

The new four has Auto-Lite starting and lighting, the cranking motor being mounted same as last year—vertically at the front of the engine, driving through an enclosed chain and ratchet construction. Final drive is through a propeller shaft of enclosed type to a floating axle, and the distinctive Jackson spring suspension using elliptics all around is still adhered to.

The six has a 3 1-2 by 5 Northway motor. The engine details are principally L-head and block-cast cylinders with upper half of crankcase in unit. Three detachable cylinder heads are used, each covering two cylinders. The gearbox is in unit with the engine. Delco combination, ignition, lighting and cranking is used, and other specifications include cone clutch, open drive shaft fitted with two universals, floating axle. Unlike the four, the gasoline tank is in the cowl and feeds by gravity.—Jackson Automobile Co., Jackson, Mich.

Jeffery Adds Light Six

With last year's four and six practically unaltered, the Jeffery company has added to its line a new $1,650 six, the Chesterfield, which incorporates worm-drive axle, Stewart vacuum fuel feed, Empico speedometer drive, cantilever rear springs, three-plate, dry-disk clutch in place of the cone which the concern has used in past models and a Daimler type of leather universal joint between clutch and four-speed gearbox. The use of such a joint is new in this country but has met with success abroad. The joint is restricted to use on cars with straight line drive or in those where the shaft angularity is only slight.

The use of a three-plate disk clutch is the only change of importance made in the six formerly called model 96. The four still uses the cone clutch.

The new Chesterfield six uses a small high-speed motor, 3 by 5, with cylinders and the top of the crankcase a single casting. The cranking and lighting system is Bijur and consists of generator and cranking motor assisted by a Willard battery. The cranker, mounted on the left of the engine, has a square-end armature shaft upon which is a sliding pinion. This pinion meshes with teeth on the flywheel when the starting pedal is depressed. The lighting generator driven through the timing gears is mounted on the left of the motor with the regulator set on top of the generator housing. The regulator cuts in at between 7 and 8 miles per hour car speed.

Between the motor and the four-speed gearbox is a new three-plate, dry-disk clutch. From the gearset transmission is by spicer-joint shaft to an over-type worm gear driving a floating axle. It has 122-inch wheelbase and 34 by 4 tires.—Thomas B. Jeffery Co., Kenosha, Wis.

Kearns Tread Now Standard

The Kearns Motor Truck Co. remain in the passenger car field with a light four-cylinder car. This model which was brought out late last season has been lengthened from 90 to 105 inches and instead of offering an option of 44 or 56 inches tread, only the standard is now manufactured. To take care of the heavier body and chassis necessitated by the longer wheelbase, the motor has been increased from 2.75 by 4 to 2.875 by 4.5. Unit power plant scheme, however, with three-point suspension is continued.

In general this car might be said to be typical of the light car design which has become popular in the last season. In line with general practice on cars of this size, single magneto ignition is used, thermo-syphon cooling and gravity fuel feed. Head and tail lamps are electric and there are no side lamps. Fuel is fed to the carbureter by gravity from a 7-gallon gasoline tank. The disk clutch transmits the drive through a three-speed sliding gearset to a three-quarter floating rear axle mounted on ball bearings. The brakes are on the rear wheel and steering and control is optional. The wheel being placed on either the left or right side. Either a two- or four-passenger body, both of roadster lines are placed on this chassis.—Kearns Motor Truck Co., Beavertown, Pa.

King Has a V-Eight

An eight-cylinder, V-type, 2 3-4 by 5 motor installed in a chassis which is similar in design to that used for the four-cylinder model features the line of the King Motor Car Co., Detroit, for 1915. The four-cylinder model brought out in July of last year is a much refined car as compared with the previous year's model, though with full electric equipment it is offered for $30 less than the 1914 price, $1,195.

This eight-cylinder engine is the second to be installed as standard equipment in an American car, and it is commendably designed for lightness, compactness and accessibility. All valve tappets are readily reached for adjustment which is accomplished by eliminating nearly everything from the space between the two four-cylinder blocks, the centerlines of which are at 90 degrees to each other. The crankshaft is the same in design as that used in a four-cylinder motor, this being possible due to the coupling of two connecting rods to each throw bearing. One rod has a yoked end which grips the outer ends of the bushing, while a small end rod goes between the two parts of the yoke. The bushing is pinned to the yoke rod with which it oscillates with the shaft as its bearing. The inner rod is free to move on the outer surface of the bushing.

The camshaft is directly above the crankshaft and driven by silent chain. Each cam operates two opposite valves through rocker arms with rollers bearing against the cams. These rockers are pivoted to the crankcase. The crankcase, being common to both sets of cylinders, is not much heavier than that of a four, while reciprocating parts have been made as light as possible so as to allow for moderately high speed operation. A spiral gear drive from the camshaft operates the ignition distributer set at the front end of the space between the cylinder blocks. Cooling is of thermo-syphon type and lubrication by force feed from the oil base to the main crankshaft bearings, and thence through drilled holes in the shaft arms to the rod bearings. The oil thrown from these lubricates the camshaft and other parts. The oil pump is driven by the same silent chain which runs from the crankshaft to the camshaft.

The four-cylinder motor is slightly increased in bore from 3⅞ to 3 15-16 inches, the stroke remaining at 5 inches. The general construction of the engine has not been altered however. It is a block-cast, L-head design.

Both power plants incorporate the gearset in unit and are supported at three points. Ward-Leonard lighting and starting by two units is used with both engines.

The wheelbase of the King chassis, which is much the same for both cars, is 113 inches and the rear spring suspension is of the characteristic cantilever construction which was first used in this country on King cars. The clutch is a multiple disk running in oil. The drive is through an enclosed propeller shaft to a floating rear axle, the housing of which is of pressed steel. Left drive and center control are employed, and tires are 33 by 4.—King Motor Car Co., Detroit, Mich.

Kissel Adopts Block

A new six shown as the 42-six has been added to the line of the Kissel company. Of the two other cars in the line, the 36 four and six 48, the former has been reduced in price from $1,850 to $1,450 but the six-48 price is unchanged at $2,350. Two-door touring bodies are being fitted to all the chassis which in the case of the improved models show some mechanical changes.

The model 36 now has a block-cast 4 1-2 by 5 1-2 motor instead of 4 1-2 by 5 1-4 pair-cast engine. Magneto ignition has been dropped and the combination Westinghouse cranking, lighting and ignition adopted, Stewart vacuum fuel feed is used instead of pressure, the tire size reduced from 35 by 4 to 34 by 4, the gear ratios have been altered and the camshaft drives by helical gears instead of silent chain.

The new six-42 has a 126-inch wheelbase and is fitted with a block-case, L-head 3 5-8 by 5 1-2 motor, cone clutch, three-speed gearset and 35 by 4 1-2 tires.

The unique feature of the Kisselkars is the employment of a two-door single-compartment body as standard. The arrangement is made possible by using individual chairs in the driver's compartment, which permits the use of a single door 26 inches wide, on each side of the body, giving entrance to both front and rear seats. The streamline idea is worked out to a nicety in this body job and an uninterrupted surface obtained from the radiator top to the center of the car. In order to make access to the front seats from the rear easy, an aisle 8 inches wide is placed between the forward chairs. Side lamps are dispensed with. The design of the body is used on the four and five-passenger cars and to those preferring the conventional fore-door type, a five and seven-passenger also are offered.

The six 48 power plant consists of a 4 by 5 1-2 block motor, cone clutch and four-speed gearset with direct on third. Unusually large valves are used and the push rods clamped inside the valve inclosures. Instead of being pressed into the cylinders, the guide and rod can be removed easily without lifting the cylinders. Lubrication is by force feed through a drilled crankshaft, the oil being supplied from a self-contained reservoir and is drained back from the pistons to prevent smoking. This engine is built entirely in the Kissel shops.

A feature of the clutch is that it may be adjusted without disturbing any other part.

Centralization of all electric wires on a control panel fastened to the front of the dash is another decided feature and through this arrangement the wiring may be repaired or inspected without disturbing parts foreign to the system. The system makes body removal possible without cutting a wire.

The four-cylinder Kisselkar, the principal data of which were given previously, has a 121 inch wheelbase and is fitted with the two-door bodies described. The clutch is a cone and the gearset, a three-speed selective, the power plant being lighter than that of the model 40 of last season.—Kissel Motor Car Co., Hartford, Wis.

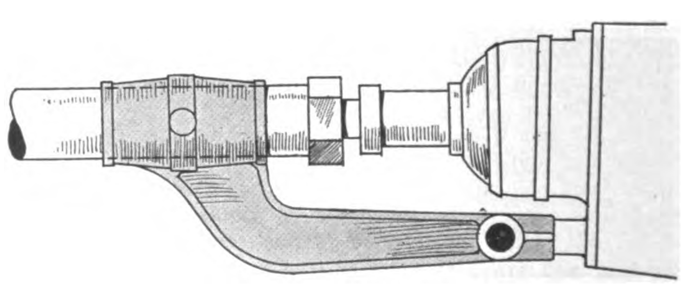
Kline Changes Pivot Point

Two sixes mounted on chassis which are the same in every detail with the exception of the wheelbase will make up the Kline line. These chassis are known respectively as 6-42 and 6-42-A. On the former there are mounted a touring, toy tonneau and roadsted bodies, and on the latter a seven-passenger touring and a seven-passenger limousine. The wheelbases are respectively 123 and 127 inches.

The new six motor is an L-head. The three-point suspension scheme heretofore employed by the Kline company has been changed. The pivot point was formerly at the flywheel but has now been changed to the front on account of the change to the unit power plant. The radiator suspension has also been changed from the main side members to studs placed in the bottom of the radiator. This was done to relieve the strain due to the twisting of the side members.

A four-speed gearset was formerly used but now a three-speed takes its place. The reason advanced for this is that the new motor is more flexible and more powerful and the direct drive is quieter than the over-geared drive.

The electric starting motor has been changed to the left side of the engine and an enclosed Bendix gear fitted. The lighting generator is now on the right side and is driven by the pump shaft at 1.5 crankshaft speed instead of 3 to 1. The Stewart-Warner vacuum feed has replaced gravity feed for



King uses a bracket shaft support which allows for flexure in the cantilever rear springs the gasoline and in body work a streamline design of rounded radiator and hood is another innovation. The entire electric equipment is taken care of by Westinghouse, in conjunction with a Willard battery. The cars on the 127-inch chassis have 35 by 4.5 tires and on the 123-inch chassis 34 by 4.—Kline Motor Car Corp., Richmond, Va.

Krit Uses Bigger Motor

Along with reductions in price, Krit models have larger and more roomy bodies, a more powerful motor and better equipment. All body types are fitted to the one standard chassis of 108-inch wheelbase. The price of the roadster and touring car models corresponding to those of last season is $995 as compared with the old figure of $1,050, this being with North East electrical equipment, one-man top, non-skid tires and additional instrument board units. A cabriolet has been added. In addition, another model with lower-priced equipment is offered on the same chassis for $850.

While all bodies are streamline in design, a new feature on the higher-priced models only is the doing away with all moldings along the top edges, the metal of the sides rounding over the top edges in a smooth curve.

The Krit motor is an L-head block type, 3 3-4 by 4 and about 25 per cent. has been added to its power by increasing the valve diameter from 1 1-4 to 1 3-8 and by lightening the reciprocating parts and by redesigning the cams for wider valve opening and closer tappet adjustment. A new oiling system combines the flywheel pump system (heretofore used) with pump circulation, making it more positive and efficient.

Three chassis changes are of special note. First is the shifting to center from left control; second is the adoption of fore-and-aft steering mechanism to replace the cross type, this relieving the frame of the steering side thrust and therefore making steering easier; and third is the center frame cross member which now houses the brake cross rods and levers, relieving them of twisting strains.

In either roadster or touring form, the special sells for $1,070 with such extra equipment as leather faced seat covers, five wire wheels, and option of color. Still another model is that which sells for $850. This has less of the *de luxe* about its equipment and appearance though from the standpoint of service it is equal to any of the other models. It has Disco electric equipment, and all necessary features for service, but in order to bring the price down, such things as crowned fenders, one-man top, gasoline gauge and so on, which are fitted to the other models, are not included.

The gearbox is in unit with the engine, the propeller shaft is enclosed in a torsion tube, and the axle is semi-floating.—Krit Motor Car Co., Detroit, Mich.

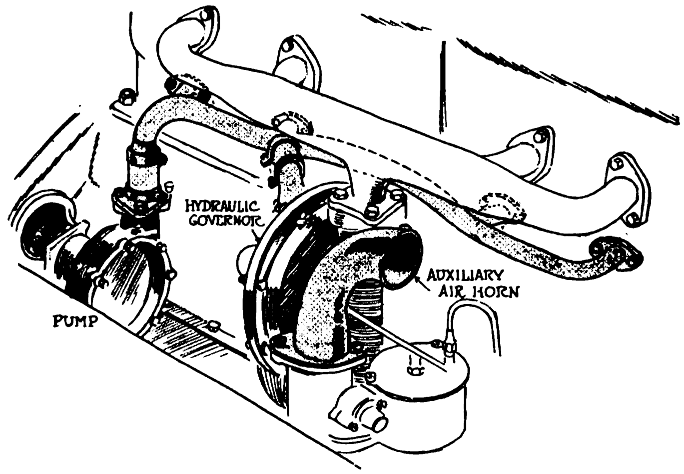
Lambert Alters Jackshaft

Two four-cylinder chassis, one with a 117-inch wheelbase and the other with 112, equipped with either Continental or Rutenber motors, are being continued by the Buckeye company, with a number of changes. These cars are similar in design and while retaining the friction drive which the Lambert has used for many years, the suspension of the jackshaft has been changed slightly so as to make a more accessible construction.

Bodies are entirely new, being of the streamline type with higher sides than formerly and a much wider rear seat. Attention has been paid to the upholstery to obtain more comfortable riding. Instead of using dash lights as heretofore, a small lamp is incorporated in the headlights.

Battery ignition, using the accumulator of the lighting system and a distributer, supplants a magneto. The entire electrical system still is of Briggs make and shows no important changes in the cranking and lighting units.

The cowl gasoline tank has been made larger and the filler neck placed inside the cowl instead of on top outside. Other changes in Lambert cars include the fitting of a ball on the



Packard hydraulic governor for keeping the speed of the motor constant. It is operated by a diaphragm

shifter lever to make speed changes easier and the adoption of a steering post, which, in the course of construction can be varied in length to suit the requirements of the purchaser. The radiator has been improved by giving it a more shapely appearance to conform with the lines of the rest of the car.

The large Lambert chassis is fitted with either Continental or Rutenberg motor, 4 1-8 by 5 1-4 and sells for $1,565 with roadster or touring body. The drive is by friction set and single silent chain to a semi-floating type rear axle.

The 112-inch wheelbase model is fitted with optional motor type as mentioned, but the size is 3 3-4 by 4 and the price $1,200 in five-passenger form.—Buckeye Mfg. Co., Anderson, Ind.

Lexington Has New Six

Three Lexington models are marketed for this season; the leader is a new light six known as the Thoroughbred. In addition there is a larger six and a four.

With the exception of the motor the design of the new six is similar to that of the four. The engine is an L-head block 3.5 by 5 fitted with the Moore multiple exhaust system as are the other motors used in Lexington cars. In this system the exhaust manifold is cast so that the exhaust from each cylinder has an independent passage giving a gain in power through the elimination of the entrance of dead gases into the cylinders. Westinghouse cranking, lighting and ignition is used on this model. Its wheelbase is 128 inches and the transmission system consists of a disk clutch, three-speed gearset having the gearbox bolted to the crankcase and a three-quarter floating rear axle with a ratio of 41. Cantilever springs are used.

The four-cylinder is now equipped with a Teetor T-head power plant whose dimensions are 3.875 by 5.375. Last season the four had an I-head motor with 4 by 5 cylinders. Cantilever rear springs supplant the three-quarter elliptic and another change has been made in the introduction of the Westinghouse cranking, lighting and ignition apparatus. In conjunction with the introduction of the Stewart vacuum gasoline feed the gasoline tank has been moved from under the front seat to the rear of the chassis. Improvements in the form of body work and equipment are notably in the adoption of streamlines and the fitting of a one-person top and a power tire pump.

The large six-cylinder model has not received many mechanical changes as compared to the four. In common with the latter, however, the gasoline feed is now by the Stewart vacuum system and the tank is at the rear instead of under the seat. A power tire pump has also been added to this model and the body lines have been improved so that the hood now slopes from the radiator to the cowl and the instruments are now on a cowl board. Otherwise the six remains the same as for last season.—The Lexington-Howard Co., Connersville, Ind.

Lewis Smacks of Foreign Design

The Lewis six shows no radical changes, but alterations have been made in the adoption of the Stewart vacuum gasoline feed and the Remy electric cranker. The radiator has been rounded slightly.

This car sells at $1,600. The motor shows marked tendencies toward foreign design. Its dimensions are 3 1-2 by 6 and the crankcase and cylinders are cast as a unit. Two other units form the principle motor parts, the cylinder head which is bolted on and the crankcase cover plate. The assembled job gives a decidedly neat appearance, clean, accessible and shows forethought in the positioning of the fittings. The magneto is set transversely on the left in front of the breaker box and distributer facing the outside so that adjustments can be made easily. The carbureter is rather high and about clears the frame. It feeds from a short straight manifold to a passage in the cylinder casting and across the motor to the valves on the opposite side. On the same side is the vacuum feed gasoline tank.

In the motor lubrication combination splash and force feed is employed and not only is the motor properly supplied but the reservoir takes care of the clutch and gearset as well, replenishment being by a flywheel which acts in the capacity of a pump. The lubrication has been carried a step farther and the entire valve mechanism including springs, guides, etc., is housed within the crankcase walls so as to receive proper oil supply by splash, so reducing wear on these parts considerably.

The clutch is a running in oil disk, the gearset a three-speed selective.

The wheelbase is 135 inches and the tires are 36 by 4.—L. P. C. Motor Co., Racine, Wis.

Locomobile Left Drive Only

Two sixes comprise the Locomobile line. They are continuations of the 38 L-D and the 48 L-D of last season with refinements which are principally found in the body and equipment. The two right drive cars built last season have been discontinued, leaving only left drive cars for the 1915 season.

The adoption of the single wiring Westinghouse Electric Light and Starting system with a special push-button control switch designed by the Locomobile engineers is the chief refinement. With this control starting has been reduced to the pressing of a button, the shifting of the starting gear being accomplished electrically through a solenoid instead of manually. All the electrical push-buttons are now placed in a vertical row in the instrument board and the starter button being at the bottom may be operated by the foot. Other refinements include the use of drop forging for many of the small parts such as windshield brackets, bonnet clips, throttle levers, etc. The top is provided with a lining concealing the bows, and in the interior work the decorative scheme has been considerably improved. The fenders are more heavily crowned and are made in one piece, the brakes are 2 inches larger in diameter and the tread has been widened to the standard 56 instead of 54.5.

The two motors for the 38 and 48 are similar in design and do not depart from Locomobile practice of the last two years except that when the company changed to left drive last season the alterations necessary in putting the steering column on the other side of the motor had to be made. Both motors have T-head cylinders cast in pairs. The sizes are respectively 4.25 by 5 and 4.5 by 5.5. The makers claim horsepower output of 63 and 82 at 1,800 r.p.m. In the body work luxury has been the keynote of design and the roadster is featured by a rear deck with a folding compartment containing extra seats for two passengers.—Locomobile Co. of America, Bridgeport, Conn.

Lyons-Knight Uses Worm Drive

No changes of importance have been made in the four-cylinder Lyons-Knight model K.

Aside from its sleeve-valve engine the feature of this car is the worm-drive axle incorporating the gearset, the only American car on the market using this combination. The worm is mounted above the worm wheel and gives an axle clearance of 10 inches.

The motor, 4.5 by 5.5 with pair-cast cylinders, uses aluminum for the cylinder head covers and chain case. The covering for the cylinder heads is designed to keep out dirt and moisture and protect the spark plugs, this being exclusive with the Lyons motor. Force feed lubrication is used for the sleeves, all bearings and the pistons. A plunger pump, controlled by one of the eccentric rods, takes oil from a reservoir in a sump in the crankcase, and forces it under pressure to the crankshaft and eccentric shaft bearings, the eccentric rod bearings and then through a duct in the crankshaft center to the connecting-rods. These rods are hollow and the oil is forced upward in them to the top rod bearings, thence to hollow piston pins to the piston exterior and through holes in the sleeves to the cylinder walls. The oil pressure is in proportion to motor speed.

A single-unit North East cranking and lighting device drives by silent chain from the front end of the crankshaft. A three-plate dry-disk clutch and three-speed selective gearset take the motor drive.—Lyons Atlas Co., Indianapolis, Ind.

Marmon Refines Small Six

As heretofore, Marmon has two sixes, the larger continued without change, and the smaller model 41 a refined edition of the former small six. The most radical change is in the equipment, namely the full Bosch outfit, including, magneto, starter and generator all in separate units and in addition all the switches, wiring, lamps, bulbs, etc. Marmon was the first company to adopt the system.

The smaller model is a more attractive job than its predecessor, in that the body lines have been considerably beautified, with the sides higher, together with a sloping hood and rounded radiator. The fenders have a different camber and the luggage carrier and battery box have been removed from the running boards, leaving these free and clear.

A few motor changes have been made, due to the new lighting, starting and ignition system. In order to avoid running the magneto shaft through the pumps the latter has been moved forward. Pistons are longer with three rings above the wrist pin. The upper two are concentric packing rings and the lower a concentric oil ring with nine .125-inch holes drilled around the circumference at an angle of 45 degrees to the axis of the cylinder.

The starting motor engages with a gear connected with the flywheel, whereas in previous models the starter insulation was by chain drive in a separate housing in the rear of the motor. A new design of cone clutch faced with thermoid is used. The Stromberg carbureter, Silvertown cord tires, one-man top, and larger brake cams are features. The 4.25 by 5.5, L-head power plant with cylinders cast in threes is continued. On this chassis there is a five-passenger body at $3,250. Roadster and speedster at the same price, and in the more expensive bodies there is a seven-passenger touring design at $3,350.—Nordyke & Marmon Co., Indianapolis, Ind.

Maxwell Revises Exterior

The 1915 Maxwell 25, the only chassis model which the Maxwell Co. is making, is much altered in outward appearance from its predecessor, largely due to the sloping body and hood, and the crowned fenders. With these new clothes and several mechanical changes, there is a uniform reduction of $55 throughout the line of body types. However, if starting and lighting by electricity are required instead of the gas and oil lighting furnished at the above prices, $55 must be added to the price of any model. Thus, the price of the electrified car is the same as that of last season's car without such advantages.

Besides the new form of bodies, the gasoline tank has been shifted from under the seat to the cowl position, while another important change is the replacement of the semi-elliptic rear springs, which are connected to spring horns at their rear ends, by three-quarter rear springs having scroll ends. On the motor, the carbureter has been shifted from the left of the engine to the right to make room for the electrical units when supplied. A new radiator construction is also used in which the shell is separate from the core, and any jar which the former receives is not transferred to the delicate core, thus making less the possibility of springing leaks.

The Maxwell chassis is of 103-inch wheelbase and has a 3 5-8 by 4 1-2 block, L-head motor, with the three-speed gearbox in unit. The drive features include cone clutch, enclosed propeller shaft and three-quarter floating rear axle. Left drive and center control are used, and the tire equipment is 30 by 3 1-2 all around.

The body is entirely smooth, and door latches and hinges are concealed. One other improvement is the addition of an instrument board which carries the usual array of control devices as well as the filler cap for the gasoline tank.—Maxwell Motor Co., Detroit, Mich.

McFarlan Adopts Cone Clutch

Five changes of importance show in the McFarlan the six. These changes are: The adoption of a cone instead of a disk clutch, Stewart vacuum gasoline feed in place of pressure, increase in the wheelbase 4 inches to 132, option of electric in place of a pneumatic cranking system, and the fitting of a new body. The single chassis is fitted with either a 4 by 6 or 4 1-3 by 6 motor.

The motor, a T-head block design, is regularly fitted with Westinghouse lighting and ignition system, but the Westinghouse cranking unit is optional, as stated. In the generating system the current output increases when the load on the battery increases, which is effective in keeping the battery charged at all times. There is not an exposed wire, flexible conduits being used for housing them and the conductors.

The new clutch is a 16-inch cone, with twelve flat adjustable springs under the leather. The entire unit is comparatively light, peripheral weight reduction resulting in the stoppage of clutch spinning and hence making gearshifting easier. The gearbox still has three speeds and is unit with the floating axle.

The body is lower and the lines have been improved upon. There is a small cowl over the back of the front seat which serves not only to show fashion advancement, but also is practical for the carrying of parcels, gloves, hand bags, etc. The upholstery does not extend over the body edge at any point.—McFarlan Motors Co., Connersville, Ind.

McIntyre Imp Drops Air Cooling

While the McIntyre company is manufacturing three models, one of them, the four-cylinder model 25, is taking almost the entire energy of the plant. This model, in five-passenger form, is the best appearing job which has up to this time been marketed by the company. The others are model 6-40 Hoosier, and the Imp the second, the reconstructed cyclecar, which, however, shows little of the original car's design. The 6-40 Hoosier was called the 6-40 Limited in 1914 and mechanically there has been but one important change made, that of transferring the steering post from right to left side. The price has been reduced from $1,685 to $1,275, and a one-man top added. The Imp model now has a four-cylinder water-cooled motor and a side-by-side body instead of two-cylinder air-cooled engine and tandem seating.

On the new model 25 a slope from windshield to a V-shaped radiator which is longer than is usually seen is used. The wheelbase is 106 inches.

A Golden, Belknap and Swartz motor, 3 3-4 by 4 1-4 with L-head, block-cast cylinders is used. Cooling is by the thermo-syphon system and oiling by force feed and splash in which a plunger pump takes oil from the crankcase and forces it through a dash sight feed from whence it travels to the crankshaft bearings, overflowing and dropping again to the reservoir. The clutch is a three-plate running-in-oil type and drives by shaft to a three-speed gearbox. Rear spring suspension is by cantilevers.—W. H. McIntyre Co., Auburn, Ind.

Meteor Has Four and Six

Two models, a four and a six, make up the Meteor line. Both these models with the exception of the power plants and wheelbases are constructed along the same lines. Both are provided with L-head power plants with the cylinders cast in pairs and valves on the left side. The dimensions of the four are 4 by 5 and of the six, 3.75 by 5, the six, although of smaller dimensions, having a higher power rating than the four, the actual figures, being 25.6 and 33.6 by the S. A. E. formula. The piston displacements of these two models are respectively 251.3 and 331.4 inches. The wheelbases are respectively 114 and 126 inches.

Pump water circulation is used in both these cars and lubrication is by a combined pressure and splash feed in which the oil is carried from the reservoir in the crankcase by direct leads to each of the main bearings. The oil which flows from these bearings supplies the splash troughs which are located beneath each connecting rod throw.

Electrical equipment for both cars is furnished by the Splitdorf-Apple apparatus for starting and lighting and the Atwater Kent system for ignition. The battery is the sole scurce of ignition current and the control of the spark advance is either hand or automatic as suits the driver. That is, should the spark lever not be used the automatic advance would take care of the spark position but if desired a change in advance can be made by using the hand lever.

Both models use disk clutches and three speed gearboxes, both clutches and gearboxes being combined with the motor to form a unit power plant. The final drive is by bevel gear, torque and drive being taken through the springs. Both cars have the same reduction gears in the rear axles, the final ratio being 3.7 to 1. The tires on the four are 34 by 4, and on the six, 35 by 4. The wheels are wood. The steering wheels are located on the left with the control levers in the center. The four is fitted with only one type of body, this being a five-passenger touring at $1,075.—Meteor Motor Car Co., Shelbyville, Ind.

Metz Adds Larger Model

The introduction of an entirely new chassis upon which a touring body is mounted is a radical departure from previous Metz practice which has confined itself thus far to roadster and raceabout constructions. While the new chassis is larger throughout than the one on which the roadster continued to be mounted the principles of construction are the same. The motor has .125-inch more bore than that used on the roadster but the stroke is the same, the dimensions being 3.875 by 4.

Other than the dimensions of the motor and the necessity for making the parts larger throughout a description of the smaller Metz will serve for the larger. The tires on the touring car, however, are 32 by 3.5 inches, the wheels are wire and the wheelbase 105 inches. The new car is fitted with Bosch magneto and a Gray & Davis 6-volt electric starting and lighting system. Left drive and center control are used. The friction drive which has characterized Metz cars in the past remains the same.

Improving the appearance and bettering the equipment has been the extent of the changes made in the Metz roadster. As far as mechanical changes are concerned there are none except those necessitated by a 6-inch increase in the wheelbase and the fitting of the gasoline tank in the cowl.

The L-head 3.75 by 4-inch motor is cast in block with enclosed valves. The crankshaft and camshaft are steel forgings ground to a finish fit and carried in white metal bearings. The motor is lubricated by constant-level splash with pump circulation. Cooling is by thermo-syphon and ignition by a Single Bosch high-tension system.

There is no clutch on the Metz car, speed changes being effected by sliding the friction wheel along the face of its driving disk. When the drive is arranged to take its lowest reduction, or, in other words, on direct a ratio of 3 to 1 is provided. The frame is of pressed steel and the springs are full elliptic. The tires are 30 by 3 inches.—The Metz Co., Waltham, Mass.

Mitchell Adds Two Models

Two new cars, a four and a six of design practically the same throughout, are featured by the Mitchell-Lewis company for 1915. The four-cylinder model which sold for $1,585 has been discontinued.

The motor size of the new four and six is the same and the design of the other chassis parts also, hence a description of the four will do for the six.

The new four and six are the only 1915 Mitchells with a motor using L-head cylinders and these are 4 by 5 1-2, cast in pairs. Light reciprocating parts and balance of parts has been given special attention so as to reduce vibration. The oiling system makes use of a plunger pump which forces oil from a reservoir in the crankcase to troughs under the connecting rods, to the timing gears, to the silent chain at the front of the engine and to the dash sight feed which has two outlets, one leading to the clutch bearing through a flexible tube and the other to the rear crankshaft bearing. A breather arrangement from the crankcase to the valve chambers offers a means of valve mechanism lubrication by oil vapor from within.

Simplicity is seen in the fan and water pump assembly. A centrifugal pump operating at unusually high speed is mounted upon the front end of the fan shaft where it is accessible, close to the radiator, driven without extra mechanism and should the water within become frozen, and injure the pump, the outlets are large enough to cool the engine by the syphonic system.

The exhaust manifold instead of discharging at the rear does so at the front, which lessens the heat under the driver's seat and provides a cooling means for the exhaust pipe, it being in range of the cooling fan draught.

The drive from this motor is by a cone clutch of new design using a light, stamped-steel member with three steel coil springs under the leather to make engagement smooth. A three-speed gearset is bolted to the front end of a torque tube which incloses the drive shaft. Bevel final drive in a floating axle is used as in past Mitchell practice.

The wheelbase of the car is 116 inches, tires 34 by 4 and the equipment includes an Apelco cranking and lighting system of the unit type, the motor-generator being driven by silent chain and geared 2.6 to 1 with the motor. Control is such that at 8 miles per hour the generator is delivering 6 amperes to the storage battery which is located on the running board.

Insofar as design is concerned the special six and de luxe six, the three continued cars, are practically the same. The principal dimension differences lie in the wheelbase. The special four is 120 inches from wheel to wheel, the special six 132 and the de Luxe six, 144. The motors in all are 4 1-4 by 7, T-head jobs cast in pairs and using Remy ignition and Rayfield carbureter. The drive in all is like that of the new four which adheres to Mitchell past design.—Mitchell-Lewis Motor Co., Racine, Wis.

Moline-Knight Four Speeds

The Moline-Knight made in one model, sells at $2,500 or $100 more than last season. The increase is due to many changes, chief among which is the adoption of a four-speed gearset. This gearset is used only on the open cars and has been separated from the motor, thus abandoning unit power plant construction and using four- instead of three-point motor suspension. The separation of the units was necessary because of the new gearset and brought with it the desired result of eliminating the gear noises magnified by the sounding-board characteristics of the large aluminum housing previously used. The new gearset has made it necessary also to use a sub-frame with the result that gear shift lever and hand brake lever are nearer the front seat and more accessible to the driver.

The next important place of reconstruction is in the rear axle which now employs spiral-bevel gears. A third change is in the motor where the exhaust manifold, formerly waterjacketed and cast with the cylinders, now is bolted on and not waterjacketed, thus effecting better cooling of the cylinders themselves. Other slight changes are the substitution of a screw-and-nut steering post for the worm-and-sector; the fitting of a single-cylinder motor-driven tire pump instead of the two-cylinder pump and the use of Whitney chains for driving the motor shafting.

The Moline-Knight engine, 4 by 6, is the first block cast Knight to be announced in America and one of two offered this year. Thermo-syphon cooling is another departure from conventional Knight practice and this is the only motor so cooled. The water travels from the radiator through a two-arm manifold, the arms attaching to the lowermost portion of the cylinder casting. The water circulates the entire length of the cylinder barrel through the intake manifold around the cylinder head and tops of the sleeves and goes so far as to cool the portion around the spark plugs.

The oiling system through a gear pump forces oil, at pressures up to 40 pounds, to every part requiring lubrication. The first passage to receive oil from the pump is a duct which extends the entire length of the crankshaft bearing plate and is tapped at three places where leads go to the main bearings. At the main bearing wrist holes are drilled in the crankshaft, the holes communicating with the connecting rod bearings. The rod bearing hole registers once each revolution with a hole in the upper portion of the rod bearing. This hole communicates with the hollow rod which receives oil to feed to the wristpin. An automatic governor connected with the throttle regulates the oil pressure in proportion to the speed.

The motor uses Bosch duplex ignition, Schebler carbureter and the drive from it is by cone clutch and new gearbox to a floating axle. Cranking and lighting is by the Wagner 12-volt, two-unit system.—Moline Automobile Co., East Moline, Ill.

Monarch Makes a Six

Monarch is offering a six this season. This machine, with 3 1-2 by 5 Continental motor and wheelbase of 125 inches, is the only model now made by the concern, which last year marketed two fours and a six.

The block type, L-head engine has the gearset in unit, and the whole assembly is three-point suspended. Cooling is by centrifugal pump, and ignition is by Atwater Kent with lighting and cranking by Ward Leonard equipment. The cranking function is worked out through application of the turning effort to the flywheel through the Bendix drive mechanism.

Other design features include left drive and center control, Hartford cone clutch having springs under the leather, 13-gallon cowl gasoline tank, Salisbury three-quarter floating axle, wood wheels carrying 33 by 4 tires on demountable rims and elliptic rear springs.

The body has no exposed door hinges or latches, and running boards are also clear. The front seat is divided, and Turkish upholstery makes comfortable riding. The price of $1,250 is with five-passenger body, although it is plenty roomy for two extra seats, these being obtainable to fit the car at an extra cost of $25.—Monarch Motor Car Co., Detroit, Mich.

Monroe Has Block I-Head

A new roadster has been announced by the Monroe company which, while a new concern to the industry, is closely related to the Chevrolet company through the possession of common stockholders. The car is in the low-priced class, selling for $460. It has a block motor with valve-in-head and in general lines resembles very much the Little car formerly produced by the Chevrolet company. The 3 by 3.75 power plant delivers the power through a 10.5-inch clutch to a three-speed gearset.

In spite of the low price of the car it is thoroughly up-to-date with its electric equipment, being fitted with electric lighting and for $35 extra with electric starting. The generator is on the right side of the motor and is at the forward end, being driven from the timing gears. When the starting motor is fitted it is on the same side of the engine and engages with the flywheel by means of spur teeth. The engagement of the driving pinion of the starting motor is controlled by a Bendix gear.

Thermo-syphon cooling is used and the radiator is supplied with an auxiliary tank at the top. A belt-driven fan also aids in the cooling.

A combination splash and pressure system takes care of lubrication. The pump delivers the oil to the connecting rods, bearings and timing gears, and the cylinders receive their lubrication through the splash.

The gears used in the gearbox are nickel steel and they are carried on ball bearings throughout. The shifting lever is mounted directly at the rear of the gearbox and provides a direct control of the gearbox without intermediate levers. The rear axle is semi-floating and torque is taken through a tube connected to the rear end of the gearbox by a forked yoke. Steering is by a worm and gear with spark and throttle lever mounted under the wheel. The control instruments such as the ignition switch, dimming switch and ammeter are on the cowl board.—Monroe Motor Co., Flint, Mich.

Moon with Hotchkiss Drive

Two sixes have been added to the Moon line. The new cars show evidence of past Moon practice and the departures are in the nature of weight-reduction, the obtaining of better riding, new bodies, a new type of disk clutch, Hotchkiss drive, Stewart vacuum fuel feed and a new rounded radiator.

The model 6-50 has a 130-inch wheelbase instead of 129-inch, the doors have been widened 1 inch to 22 inches and the upholstery is deeper. There is more legroom. In reconstructing the clutch the wear on the plates has been reduced, due to a new manner of holding them. In the rear axle, a crucible steel housing takes the place of malleable iron, which reduces the weight about 100 pounds. Two inches greater diameter brings the drums to 16 inches, and a new brake-equalizing system has been installed. The Delco distributer is operated by silent chains instead of gears, and the equipment has been broadened so as to include Stewart vacuum fuel feed and Klaxon horn. The price still is $2,250.

The two new cars are similar in construction and general appearance and should be admired chiefly for the body design.

The chassis features of both the 6-40 and the 4-38 are the same but the former has slightly heavier parts. The motor dimensions of the four are 3 3-4 by 5 and the six 3 1-2 by 5. An improved one-wire Delco system is used and Stewart vacuum feed added. As a unit with the motor is a dry-disk clutch and a three-speed gearset, products of the Warner Gear Co.

Propulsion is through the springs constituting the Hotchkiss drive which eliminates the torque rod and makes the springs take most of the driving strains. A new braking system is used and the number of brake-system parts is reduced from 50 to 22. In the new system a more direct action from pedal to bands is obtained with a smaller equalizing beam at the rear almost above the axle housing. Last season a long beam was used in the center of the chassis. Both cars have 122-inch wheelbase and 34 by 4 tires, underslung rear springs and dimmers in the headlights.

The 6-50 has a 3 3-4 by 5 1-4 motor, new disk clutch, four-speed gearset, floating axle and new braking system.—Moon Motor Car Co., St. Louis, Mo.

National Stiffens Crankcase

The National line is the same six and four as in 1914. Mechanically the cars are practically unchanged except that in the six several refinements have been made. The chief change is the fitting of an entirely new electrical outfit comprising the Eisemann magneto which serves as the sole source of ignition current, and the Westinghouse starting and lighting outfit which replaces that formerly used. In refining the motor, 25 per cent. has been cut off the weight of the reciprocating parts. The crankcase is heavier and more rigid and an improved type of oil screen is fitted. In the gearbox the travel of the sliding pinion is increased .25 inch. Silico-manganese steel replaces carbon steel in the springs. Larger wheel bearings are used. Wheelbase is 134 inches.

The power plant of the six is a 3.75 by 5.5, L-head, block design with waterjacketed intake manifold and with the valve mechanism inclosed. The newest Rayfield carbureter has been fitted in connection wtih a pressure feed gasoline system. The four, a 4.875 by 6, T-head design has its cylinders in pairs.

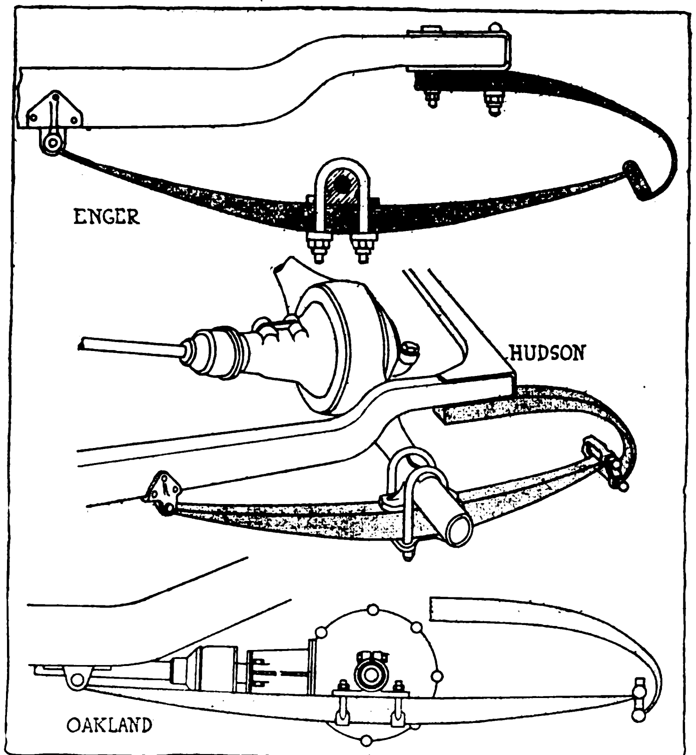
In body work the National company is featuring a four-passenger boat design with four individual seats mounted on tracks so that they can be placed about the body in nearly any desired position. There is a fifth additional seat which folds into the rear of the body. It is invisible except when in use. The entire body follows boat practice with a curved gunwale line and moulded fore and aft curvature. The other standard bodies have been brought thoroughly up to date and follow streamline practice. The six sells for $2,375 and the price of the four is $2,750.—National Motor Vehicle Co., Indianapolis, Ind.

Norwalk Adopts Monoblock

Norwalk has dropped one model and added another for this season. Last year two sixes were marketed, known as C and D. The model which has been dropped is the D, which leaves the larger six continued and the new model F is a distinct departure from previous Norwalk practice. It is also a six but instead of having the cylinders cast in threes, it has a mono-block construction. In all other respects the chassis itself is practically the same as the model D but in the matter of outfitting, the single wire system is used instead of the double wire; double bulb headlights are used instead of side lights and control is by hand instead of electric.

The body styles marketed for this season are for the model C, a six-passenger touring, an open and a closed limousine. For model F, there is a two-passenger roadster, six-passenger touring, two-passenger coupé, four-passenger sedan and six-passenger limousine.

The model F which will be the leader for this season has



Upper—Rear spring suspension on the Enger. Middle—Rear construction employed on the Hudson, showing springs slung under the rear axle. Lower—Oakland rear construction, showing method of carrying springs under axle

its six 3.5 by 5.125 L-head cylinders cast in a single block with the crankcase continued back to include the clutch and four-speed gearbox forming a unit power plant. This plant is suspended at three points. The valves are all on the left side and are driven from a unit camshaft which is operated by helical gears. The intake manifold is a unit with the cylinder casting and the exhaust separate.

Cooling is effected by a centrifugal pump through a cellular radiator. Lubrication is taken care of by a splash pressure system in which a gear pump takes the oil from a crankcase, sends it to the main bearings under pressure and from there it flows to the splash troughs beneath the connecting-rods. Ignition is accomplished by a single high-tension system in which the battery is the current source and an Atwater Kent distributer and coil form the balance of the system. Gasoline feed is by the new vacuum system, Gray & Davis starting and lighting are used and the transmission system is comprised of a disk clutch selective gearset and semi-floating rear axle which has a double gear reduction. The drive is taken through the springs. The wheelbase is 131 inches and the tires 37 by 4.—Norwalk Motor Car Co., Martinsburg, W. Va.

Oakland Multiple Piston Rings

With a very attractive design of bodies that are a modification of the boat body lines which have appeared in Europe, the Oaklands of 1915 are mounted on either a four- or a six-cylinder chassis. The four, model 37, is a much-altered continuation of model 35 of last season, and the six-49 is the successor of the 1914 model 48. The six is reduced $100 to $1,685. Although the last named has not come in for much mechanical change, the model 37 is practically a new job throughout its mechanical features.

The motor operates at speeds up to 2,500 or 2,600 r.p.m., and is a 3 1-2 by 5 block type with detachable heads and gearbox in unit, and suspended at three points in the frame. Pistons have been crowned to make them stronger, multiple thin steel piston rings have been fitted and the throttle axis of the carbureter has been arranged parallel to the centerline of the motor so as to make less restriction to gas passage and valve diameter and lift have been increased. These things have contributed to the increased power of the engine.

Delco ignition, lighting and cranking are employed, as is the Stewart vacuum fuel feed with tank at the rear. A unique feature of the four chassis is the elimination of bearings on emergency brake lever, gearshifting lever, brake rods, clutch shifter, clutch link, and so on. This is done by the use of springs and wedges, the former holding trunnions or other projections on the parts down against fixed supports and allowing them to move back and forth due to the compressibility of the spring. Thus they are prevented from vibrating, do not require oiling, and the like. Similar wedges connect brake rods to their levers, these allowing the necessary movement without bearings.

A tubular propeller shaft replaces a solid one; the three-quarter floating axle has given way to a floating construction; and the frame has been re-shaped so as to follow the body line and thus give substantial support. Underslung springs at the rear help the low-hung appearance. The wheelbase is 112 inches and tires are 33 by 4 on demountable rims.

The six-49 is fitted with either roadster or seven-passenger touring body. The motor has the same improvements as the four, and is a 3 1-2 by 5, with cylinders in block and heads detachable. Equipped with a three-speed gearset, cone clutch, uninclosed drive shaft, underslung front and rear springs, Delco combination electrical unit and Stewart vacuum fuel feed.—Oakland Motor Car Co., Pontiac, Mich.

Oldsmobile Advances Front Axle

With very little change of any kind, the Oldsmobile four and six are combined, the former having made its appearance early last year as the consort of the well-known big six. This four-cylinder car, however, has been reduced from $1,350 to $1,285, and besides the touring body, a roadster has been added at the same figure.

The greatest change in the big car is in the outward appearance, which has been enhanced by sloping the cowl to meet the sloping bonnet. The price has been reduced $175 to $2,975. This is with seven-passenger body, the five-passenger having been dropped.

Since it was first brought out, the four has had only one mechanical change, that being the shifting of the front axle 2 inches forward, making the wheelbase 112 instead of 110 inches. This brings the axle in line with the radiator instead of back of it, though it has no effect upon the body dimensions. The front spring length has been affected by the change also, these springs now being 35 1-2 inches long, 1 1-2 inches greater.

There is no alteration in the distinctive valve-in-head, block unit power plant which is 3 1-2 by 5. The most unusual feature of this engine is that all parts of valve mechanism are inclosed. An aluminum plate goes over the rockers in the detachable head, and the long rods extending up from the camshaft are in a housing integral with the cylinder casting. The Delco system, which gears to the flywheel for starting and is driven from a shaft when operating as a generator, is employed.

The clutch is a cone type, a torsion tube encloses the propeller shaft, and the axle is floating. The most striking part of the smaller Oldsmobile is the excellent finish which has been given it. The appointments and equipment leave nothing to be desired. Circassian walnut is used for the cowl dash and for the steering wheel, for example.

The big car has a 139-inch wheelbase, and the chassis has been hung 2 1-2 inches lower, which adds to appearance. The cooling system has been augmented by a larger radiator and bigger waterjackets. The motor is 4 1-4 by 5 1-4, with cylinders in threes and gearbox in unit. The Delco electrical combination is used, as are cone clutch, open drive shaft fitted with two universals, floating axle and 36 by 5 tires.—Olds Motor Works, Lansing, Mich.

Overland Adopts Left Drive

The production policy of Willys-Overland has been broadened this year to take in three models, two fours and a six. The smaller four and the six are new.

All models have much the same general outward appearance, the bodies being of the present-day sloping hood type with cowls rounding down to the point where the bonnet begins. Although the six does not conform to the general design features of the four-cylinder engines, the final drive system is characteristically and uniformly Overland in all three. The three-speed gearbox is mounted in unit with the axle, and the propeller shaft is enclosed with a torsion tube having a yoked front end. The 1915 models are also the first to have left drive, though center control has been fitted on previous models.

One feature of the larger four and the six is the centralization of the electrical control switches in a box attached to the right of the steering column, 2 inches below the wheel. This carries the switches for all lights, for the starting current and also for the magneto. All models have electric cranking and lighting this year at the prices given, while their equipment is unusually complete.

Referring to the new six, the motor is a 3 1-2 by 5 1-4, L-head, block type, new to Overland design. Valves are on the right, compactly housed, and the cylinder head is removable allowing for ready inspection of valves and pistons. This car utilizes the Stewart vacuum fuel feed system, the tank being placed on the front of the dash and making more positive the flow from the main tank which is under the front seat. Wheelbase is 125 inches, tread 56, and rear spring suspension is three-quarter elliptic with the springs underslung from the floating axle.

The smaller four carries a characteristically-designed Overland motor with cylinders cast separately of L-head design and 4 by 4 1-2 size. It develops 30 horsepower, and is suspended at three points. Its clutch is a cone, the rear axle floating and the rear three-quarter elliptic springs underslung from it. Wheelbase is 106 inches and tires 33 by 4.

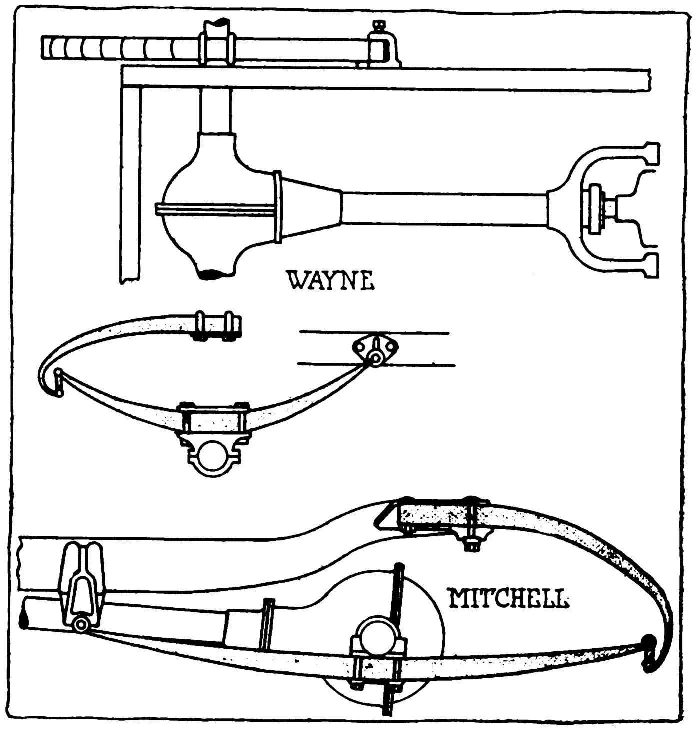
The larger four, with a similarly designed engine of 4 1-8 by 4 1-2 size, has a greatly enlarged body as compared with model 79 which it succeeds, though the wheelbase is the same, 114 inches. This greater roominess of body has resulted in larger seats, the rear now being 49 inches wide inside, and the front measures 40 inches across, and has a division.

The starting and lighting system has been remounted so that instead of driving the engine through silent chain, the starter gears to the flywheel. By underslinging the rear springs and redesigning the front axle, the body of model 80 is 3 1-4 inches lower than model 79. This model also has cone clutch and floating rear axle.

Although only a touring body is at present offered on the six, the model 80 four has roadster and coupé bodies as well as the five-passenger, while a roadster is also fitted to the smaller four. Delivery bodies may also be purchased for these four-cylinder chassis.—Willys-Overland Co., Toledo, O.

Owen Uses Entz System

R. M. Owen has incorporated the Entz electric transmission in a six-cylinder chassis which he is marketing for $3,750 in seven-passenger touring and three-passenger roadster design. The feature of this car is the use of the electric drive which replaces the clutch and gearbox. In the Entz system of electrical transmission, the patents for which are owned by the R. M. Owen company, a generator and a motor are combined in an unusual manner. The casing of the generator which carries the fields of whole pieces is bolted to the crankshaft replacing the flywheel. The armatures of the two machines are coupled together and their connecting shaft is permanently fastened to the drive shaft of the entire chassis.



Upper—Plan view of rear construction on Wayne. Middle—Side elevation of Wayne rear spring suspension. Lower—Rear suspension employed on the Mitchell

The speed of the car is regulated by the throttle in the customary manner but the torque for different loads is varied by changing the field strength of the generator and on lower speeds, by sending the generated current to the motor. When the car is running along under conditions similar to high gear, for a mechanically driven car, the generator winding is short-circuited on itself and therefore, with a slight amount of slipping the heavy current is generated. This current is of sufficient strength to create a magnetic attraction between the field and the armature equal to the torque required to propel the car at that speed.

The slippage varies with the torque so that if a slight grade is encountered the difference will become slightly greater, thus increasing the voltage of the generator, which will in turn produce a stronger magnetic attraction and the torque will become greater. Seven speeds are provided.

The motor fitted to the new car is a six-cylinder Weidely 3.75 by 5.5 I-head block. It is cooled by pump water circulation, oiled by pressure and has a dynamo-battery ignition system. The electric transmission is located amidship and final drive is obtained by spiral-bevel gear to a floating rear axle.—R. M. Owen Co., N. Y. City.

Packard Alters Carbureter

Packard has the same two sixes which have been sold since last July, namely the 3-38 and the 5-48. They are very much alike in appearance and in mechanical construction, although the latter is more powerful. Both conform consistently to the general Packard outlines with the distinctive radiator and sloping bonnet meeting a cowl construction which unites body and hood. There is a long list of bodies fitted to either chassis, and they do credit to the extensive body shops of the plant.

The general chassis construction is still characteristically Packard, the design being on the two-unit principle. The main unit is the motor and clutch, and the other the rear axle assembly, comprising gearset, final drive and differential gears.

Motors are practically identical with those used in previous cars, and are L-head types with cylinders in blocks of three. The 3-38, a 4 by 5 1-2, has an S. A. E. rating of 38 horsepower, and the 5-48 with the same stroke, has a 4 1-2-inch bore, and is rated at 10 horsepower more by the same formula.

Though of the same operative design, the carbureter body has been changed to give a housing for the auxiliary air valve, and the opening in the housing is turned to the rear to reduce the possibility of dirt entering.

A minor change which is distinctive is the use of headlamps of double design. Below the main headlight and integral with it is a smaller auxiliary headlight. This is useful for city driving or for meeting cars on the road, and is also advantageous for illuminating the road close to the car, since it is lower to the ground than the searchlights, which are better for distance. A refinement to be appreciated is the tool compartment in the left front door, which has a place for each tool. A leather flap goes over the kit.

Going into details of the 3-38, minor changes are the increasing the radiator capacity, enlarging the gearset proportions though the design is unchanged, and the increasing of the valve diameter from 2 to 2 1-8 inches.

The 3-38 wheelbase is 140 inches, and the overall length of the seven-passenger car is 187.5 inches. In the motor, the double exhaust system is retained, wherein each three cylinders gets rid of its burned gases through a separate passage, though the two passages are integral.

The Packard-Bijur system of cranking and lighting is employed and is of two-unit type, both being located on the right. The cranking motor gears 19.5 to 1 to the flywheel, and the generator, driven by shaft at 1 1-2 times engine speed, charges at 10 miles per hour, reaching its maximum at 15.

The drive is through a dry-plate clutch, then an open propeller shaft fitted with two universals to the gearbox which gives three forward speeds progressively. The axle has the new type of worm-bevel gears which give a rolling contact that practically eliminates noise. Rear three-quarter elliptic springs are underslung from the axle.

The 4-48 has a 144-inch wheelbase and incorporates practically the same design throughout as the 3-38 with the advantage of greater power. Tires are 37 by 5 all around; cooling water capacity is slightly greater, and front springs a trifle longer.—Packard Motor Car Co., Detroit, Mich.

Paige Has Cantilever Spring

The Paige-Detroit has been one of the later concerns to bring out a six, its model of this type coming to the front late last year. The entire line is made up of the six and a four.

Mounted on a 124-inch wheelbase chassis, the new six has capacity for seven in a body of advanced streamline type and is really designed along the lines of some of the European cars, its cowl having an almost flat slope to the bonnet which also slopes very slightly to the radiator. The body edges are rounded over and the upholstery is entirely inside, none protruding over the edges. The motor is a 3 1-2 by 5 1-4 unit power plant type of compact design.

Mechanical features include cantilever rear spring suspension, the spring having a 48-inch length. Drive is through multiple-disk clutch to three-speed gearset carried on a yoke which spreads around the flywheel. The propeller shaft is open, has two universals, drive being through springs and torque arm. The axle is floating and its ratio 4.07 to 1. Other features include Gray & Davis lighting and cranking, Bosch magneto, centrifugal pump cooling, left drive, center control, 15-gallon cowl gasoline tank and 34 by 4 tires on demountable rims.

The four-cylinder 36 is equipped with a 4 by 5 L-head motor of block type, with valves on the left. The gearbox bolts to a form of yoke which passes around the open flywheel similarly to the six-cylinder design in this respect. Other motor details are positive water circulation by centrifugal pump, Bosch ignition and Gray & Davis two-unit lighting and cranking, the latter function being accomplished through gear connection to the flywheel.

A Paige distinguishing feature is the use of elliptic rear springs which make for great resiliency. The axle is three-quarter floating and its housing is of malleable construction. A gear ratio of 3.79 to 1 is used.

The cowl gasoline tank fuel system has been a Paige feature for several years, and on the later 36's the filler has been placed on the cowl board.—Paige-Detroit Motor Car Co., Detroit, Mich.

Partin-Palmer Without Change

Two models known as the 38 and 20, both of which are fours, are continued by the Partin-Palmer company. The smaller model 20 listing at $495 with its four-cylinder L-head block motor, 2.75 by 4 inches, is a typical small car. It is mounted on a chassis of 96 inches wheelbase and standard tread with left drive and center control. The price quoted includes electric lighting with double bulb headlights and electric cranking is supplied for an additional $75.

Ignition is by the Atwater Kent distributer in connection with current either from the generator or storage battery. Automatic spark advance is supplied in the Atwater Kent distributer. The remaining features of the car are all of standard construction. The drive is taken by a leather-faced cone clutch through a three-speed gearbox and a floating axle. Liberal use has been made of nickel steel in the gearset, differential and axle shafts. The gears are of chrome-nickel steel.

The Partin-Palmer 38 is designed along the same line as the smaller model having a 3.75 by 4.5 motor and mounted on a 115-inch wheelbase chassis. Like the smaller car it has Atwater Kent ignition, a Stromberg carbureter, and at $1,100 is supplied with Gray & Davis lighting and starting. Without the starter the price is $125 less. The clutch is a cone and the gearbox provides three speeds. The tires are 33 by 4. This car is made only in a six-passenger touring body, while the smaller car is made in touring and roadster form. The small roadster incorporates a rear deck which serves as a tire support.—Partin Mfg. Co., Chicago, Ill.

Paterson Increases Valve Size

A six-cylinder touring car, the first of this type to bear the Paterson name, and the four-cylinder model, reduced from $1,197 to $1,095, are listed. The four, which was the only chassis made last year, has the motor redesigned for greater power, though its cylinder dimensions are unchanged. In addition, it has a floating axle instead of a semi-floating type and appears with a streamline body.

Both models are sold in one touring car body type, and this is much the same in line for four and six, the latter being somewhat larger. The running boards are clear, and in the front left door there has been placed a compactly-arranged tool compartment, with a special place for each tool.

The new cars are much the same in mechanical design and are fitted with 3 1-2 by 5 Northway unit power plants which are L-heads and block cast. The cylinder heads are detachable, and the upper half of the crankcase is cast integrally with the cylinder block. They have combination Delco electrical units for lighting, cranking and ignition, are fitted with cone clutches, left drive, center control, floating axles and drive through torsion tubes which surround the propeller shafts.

Valve diameter is increased from 1 9-16 to 1 5-8 inches, and better reciprocating parts balance and lighter weight make possible the greater operative speed, which goes as high as 2,500 r.p.m. The pistons have been crowned to give them greater strength with lightness and multiple thin steel piston rings, three to each groove, have been added as a factor for reducing to a minimum gas leakage past the pistons.

The Stewart vacuum fuel feed system is fitted to the six only. The vacuum tank is placed on the end of the exhaust manifold so as to give good gravity feed almost straight downward to the carbureter.—W. A. Paterson Co., Flint, Mich.

Pathfinder Refines Bodies

Few changes of a mechanical nature are to be found on the two sixes which will make up the 1915 Pathfinder line. They are the same two sixes as were marketed last season with a number of body refinements. These changes are principally to be noted in the roadster, which is a new streamline design having a covered rear compartment fitted with a little door through which packages may be inserted. The rear compartment also contains folding seats for two extra passengers. The larger goes under the name of Leatherstocking, while the smaller is known as Daniel Boone. The Leatherstocking is made only as a seven-passenger, and the Daniel Boone in seven-passenger and roadster style. For this season Westinghouse lighting and starting is used.

These cars carry the Continental six-cylinder power plants of 3.75 by 5.25 and 4.125 by 5.25 inches respectively. The design of the two models is similar, both being L-heads with the cylinders cast in threes. They both have inclosed valve mechanism and three-point suspension. No changes in prices have been made, although both cars have been considerably refined as regards their bodies and equipment. The five-passenger touring Leatherstocking sells for $2,750; the Daniel Boone $2,222.—Motor Car Mfg. Co., Indianapolis, Ind.

Peerless Lightens Chassis

In addition to the continuation of its big model 48-six, the Peerless company has brought out a much lighter four and six, calling them all-purpose cars. These new cars present attractive outward appearances, being of the streamline form. Practically the same design holds for the four and the six, though the latter has certain larger dimensions, naturally. One body feature which is new is the dividing of the front seats into individual armchair types, a passage running between them, giving access to the tonneau.

The motors conform to the same general design throughout. They are of the L-head, unit power plant construction, carried at three points. In both cases the cylinders are in block form, and dimensions are nearly the same. The six has a 3 1-2-inch bore and the four is 3 3-4, but the stroke is uniform at 5 inches. Ratings are 29.4 and 22.5 horsepower, respectively, by the S. A. E. formula, but the engines are said to attain 2,000 r.p.m. when the developed power is 38 and 50.

Stromberg carbureters are fitted, and ignition is by Atwater-Kent Unisparker system. The motors carry Kellogg single-cylinder tire pumps, driven from the generator shaft, as well as Stewart vacuum fuel feed tanks. Gray & Davis cranking and lighting are also used, there being separate cranking motor and generator, the latter being driven by a shaft from the front gears, and the former drives the engine through gear connection to the flywheel. An 80-ampere Willard battery is a part of the system.

Throughout the drive, modern features are in evidence, such as open drive shaft of two-universal type which is of tubular form in the center. Its power comes through a multiple-disk clutch, and it delivers it to a semi-floating axle, the main housing of which is reinforced pressed steel. Platform rear spring suspension which has always characterized Peerless cars is in evidence on the new pair. Tires of both cars are 34 by 4, and the six wheelbase is 121 and the four 113 inches.

The big six, model 48, carries a 4 1-2 by 6, T-head engine with cylinders in pairs, has Bosch ignition, Peerless carbureter, Gray & Davis cranking and lighting, and splash lubrication. Its wheelbase is 137 inches, driveshaft fitted with two universals, and floating axle. The rear spring suspension is of the platform type. Tires are 37 by 5, and options of right drive and control, or left drive with center control are allowed. The prices remain $5,000 for touring car, and $4,900 for roadster with all equipment and up-to-date bodies.—Peerless Motor Car Co., Cleveland, O.

Peter Pan Has Cantilevers

Peter Pan is the name given to the new car put out by the Randall company. It is made in four-passenger touring and two-passenger runabout bodies on the same chassis. The wheelbase is 110 inches and although this length is as great as in some of the heavier cars, everything about this new product has been made along light lines.

The four-cylinder power plant has its 2.75 by 4.5 cylinders cast in a single block with the valves in the head. Cooling is thermo-syphon through a tubular radiator. A Berling magneto is the sole source of current for ignition and for starting a mechanical device is relied upon.

A multiple disk clutch transmits the drive through a three-speed selective sliding gearset. Control is in the center and the steering wheel on the left. The springs are floating cantilevers and the brakes, as regards the service set mounted on the transmission shaft, with the emergency brakes on the rear wheel. The bodies are streamline adaptations and carry out the up-to-date scheme of deep upholstery and full equipment.—Randall Co., Norfolk Downs, Mass.

Pierce Drops Chassis Frame

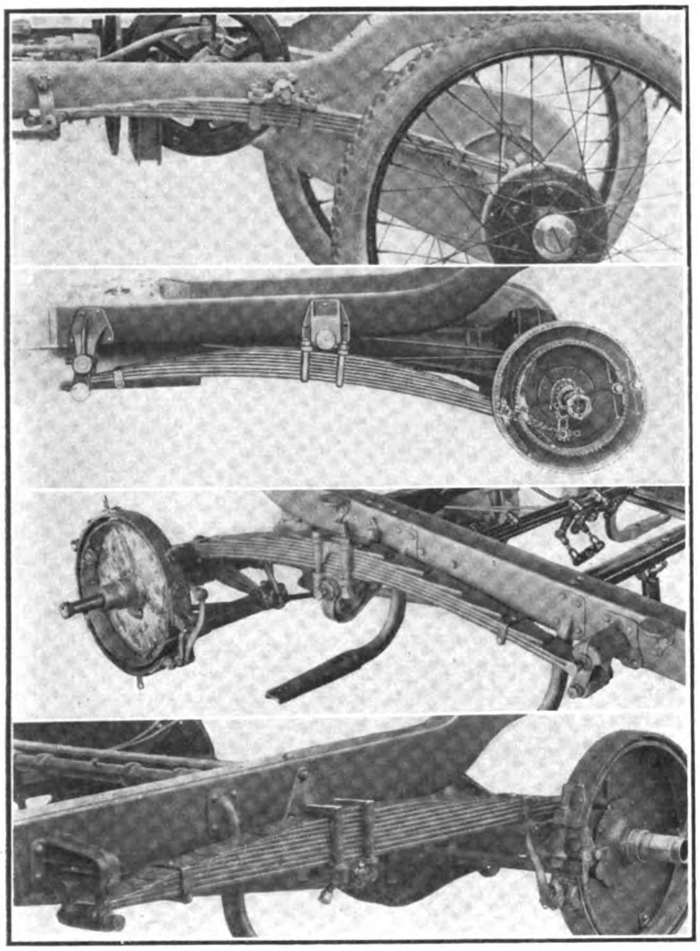
Only one change of any importance has been made in the primary design of Pierce-Arrow cars. This has been a drop in the central portion of the frame. With this single change the entire appearance of the new line has been altered and in connection with its adoption it has been necessary to make one or two other minor alterations. The first of the latter is the abandonment of the gravity gasoline feed and the substitution of a pressure system with the tank at the rear of the chassis. In turn the adoption of pressure has rendered possible the raising of the carbureter with a consequent shorter intake manifold.

With but one exception no change has been made in the prices. The largest limousine on the 66 chassis, which is the largest of the three sixes which compose the Pierce line, has been reduced from $7,100 to $7,000. On account of the drop of the frame which has been made on all three models it has been found possible to lower the bodies and running board without reducing the road clearance.

There are also a number of other minor changes for the convenience of the driver. The control members, including the excellerator, throttle and spark control, have been simplified. The engine cannot be started if the bonnet is locked and the key removed from the ignition switch.

Fifty-four body types and an unlimited number of color schemes is the Pierce offering in the way of carriage work. In addition to the different body designs and the general improvement in appearance because of the drop frame the Pierce company states that the new models have more power, better pick-up and higher speed because of the pressure feed gasoline system. The new fenders are wider, a one-man top has been fitted and individual front seats are provided on the regulation touring cars.

All three Pierce-Arrows are built along similar lines. The chassis are known as 65 A-3, 48 B-3 and 38 C-3. The power plants are 5 by 7, 4.5 by 5.5 and 4 by 5.5 inches. All have their cylinders cast in pairs and the T-head design has been maintained to provide for the large valve area with the shortest possible over-head length. Seven bearing crankshafts are used and on the camshafts the cams are pinned



Top—Side view of rear of McIntyre Imp chassis, showing friction drive and cantilever rear spring
Upper Middle—Cantilever spring suspension used on rear of Pathfinder
Lower Middle—Type of Cantilever employed for rear suspension on the Paige-Detroit
Bottom—Cantilever rear spring on the National

to the shafts. The electrical equipment is provided by Westinghouse.—Pierce Motor Car Co., Buffalo, N. Y.

Pilot Adds a Six

Three sixes are made by the Pilot Motor Car Co. One of these, the 55 is an entirely new addition to the line and takes the place of the four manufactured for the 1914 season. The other two, known as the 75 and 60 are continuations.

The new six is the Pilot leader for this season. It is built on a chassis of 126-inch wheelbase and is provided with either two or five-passenger body and at an additional price a seven-passenger. It has a 3.5 by 5.25 T-head power plant and is fitted with the popular cantilever springs. The 75 has a 4.5 by 6 and the 60, a 4 by 6 T-head motor. The wheelbases of these two are 132 inches.

Chrome nickel steel piston pins secured in the upper ends of the connecting-rods, are used. The bosses in the pistons provide the bearing surface and the makers claim that by so doing they have gained a higher percentage of bearing surface as compared with the practice of fixing the pins in the piston boss. Drop forge carbon steel connecting-rods and crankshafts are used and the bolts holding the connecting-rod caps in place are nickel steel. The aluminum crankcase carries the main bearings on bridges allowing bearings adjustment to be made by dropping the bottom pan of the motor. The bearing material is die-cast nickel babbitt.

A patented lubrication system is used on all Teetor motors, the Pilot being fitted power plants of this make. There are two overflow oil basins into which the connecting-rods dip, these being fastened in the lower half of the crankcase. In the bottom of these two oil troughs there are drilled oil holes which are of just sufficient size to admit a definite quantity of lubricant. As the oil is circulated by the connecting-rods it is replaced by the oil supplied through these holes giving a system which is claimed to feed in a direct ratio with the motor speed. The reservoir is in the bottom of the crankcase.

The clutch and gearbox are Warner products. The clutch is a cone and the gearbox provides three speeds. They are contained in a unit housing forming a unit power plant. The drive shaft has two universals and the axle is floating.—Pilot Motor Car Co., Richmond, Ind.

Pratt Concentrates on a Six

The Elkhart company, makers of the Pratt automobile, are concentrating on a new six which they have just brought out. This is the sole model made by this concern for 1915. This chassis will be equipped with five different body designs, a two-passenger, four-passenger, five-passenger and seven-passenger. It has a 3.75 by 5.25 Continental motor in a unit power-plant with three-point suspension. The gearbox provides four speeds and is of Brown-Lipe manufacture. The carbureter is the latest Rayfield.

The drive is taken from the gearbox by a horizontal shaft with a Spicer universal joint at either end. The rear axle is a Timken and full Timken equipment is also provided in the front axle. The electrical equipment of the car consists of a Gray & Davis starting and lighting system with battery ignition through an Atwater Kent distributer.

Left drive is used and center control, the gearshifter lever being mounted directly on the cover of the gearbox. The equipment of the car is complete, non-skid tires being furnished for the rear and a one-man top, keyless clock, bumper rail, power tire pump are also included. The body is of streamline characteristics provided with wide doors.—Elkhart Carriage & Harness Mfg. Co., Elkhart, Ind.

Premier Continues Weidely

The six-cylinder overhead-valve Weidely motor still is featured by the Premier Motor Mfg. Co., Indianapolis, Ind., while a second car in the line is the model 6-49 equipped with a T-head engine. The substitution of long semi-elliptic rear springs for three-quarter elliptic is the only change made for the year.

In the Weidely motor the valves are set directly in the cylinder head, getting away from valve cage construction. No rocker arms are used but instead a single camshaft is mounted above the valves and the shaft operated by worm gearing. The worm gear is attached to the center of the camshaft and another gear in mesh with it is fastened to a vertical shaft which is driven directly from the crankshaft.

The valve stems are not touched directly by the cams, but what are called fingers are placed between the two. These fingers merely are levers pivoted at one end and move up and down with the movement of the valves.

The wheelbase of the Premier-Weidely is 132 inches, the clutch a disk, and the gearset a three-speed selective driving an open shaft to a floating axle. Remy cranking and lighting is used but ignition is by an Eisemann instrument. Three body styles are offered, a roadster, and a five-passenger at $2,700 and a seven-passenger at $2,750.

The 6-49 Premier has a T-head, 4 by 5 1-2 motor which develops unusual power, the figure being 70 horsepower maximum, it is claimed.

Triplet casting of the cylinders is used and the blocks are set close to one another so as to decrease the crankshaft length and hence the distance between bearings for the sake of rigidity. In the top of the castings there is the camshaft chamber which is completely covered by an aluminum plate which seals the upper ends of cylinder water jackets.

The drive is similar in design to that of the Weidely chassis. In five-passenger form this car sells for $2,385.—Premier Motor Mfg. Co., Indianapolis, Ind.

Pullman 4 Inches Longer

Two models, a six and a four will compose the Pullman line for this season. The six, is the 6-48 in practically the same form as was introduced at the 1914 New York show. The four, is an entirely new model and will be known as the junior.

Some refinements have taken place on the six, the main one being the increase in wheelbase of 4 inches, bringing it to 134. This of course has necessitated a larger body and a strengthening of the spring suspension although in general the car is of lighter structure than for last season. The larger body has been utilized to provide 2 inches more in the driver's compartment and 6 inches more in the tonneau. The seats have been widened and deepened and the rear doors carried back further. The dash is now covered with leather and the instrument for the 12-volt electric system mounted on the cowl board. The radiator is lighter but has a larger cooling capacity and the price remains the same with Vulcan electric gear shifting at $150 extra.

The new Junior model has been made to meet the demands for a light four-cylinder vehicle selling at a low price. The price in either touring or roadster design being $740. The motor is an L-head block with 3.75 by 4.25 cylinder with the valves on the left side. The crankshaft is carried on three plain bearings and the camshaft driven by silent chain. The motor clutch and gearbox are included in a unit housing and suspended at three points. Cooling is by thermo-syphon.

The gearbox provides three speeds with a ratio of 4 to 1 on direct. The steering wheel is on the left side and the control in the center. The rear spring is a cantilever, the wheelbase 110 inches and tires, 33 by 3.5.

The power plant of the six has its cylinders cast in threes. It is an L-head 3.75 by 5.25 design of which the makers claim 38 horsepower at approximately 1,500 r.p.m. on the block. The clutch is a multiple disk and is a part of the unit power plant. Lighting and starting is taken care of by the Westinghouse system and the dash equipment is carried on a cowl board. The 20-gallon gasoline tank is mounted beneath the cowl.—Pullman Motor Co., York, Pa.

R. C. H. Improves Equipment

A five-passenger touring car of streamline appearance represents the R. C. H. for 1915. The body lines are unaltered, but the front seat has been moved 1 inch further back, so as to give more leg room. In the equipment, a one-man top supplants the older style with forward and rear supports. Mechanically, the car is unchanged.

The R. C. H. has a 3 1-4 by 5 block-cast L-head engine. The cone clutch is provided with a brake that applies automatically when the pedal is pressed, thus stopping it from spinning, facilitating gear changes without clashing. The gearset is of the three-speed type, and delivers its power to a rear axle having a reduction of 4 1-4 to 1. The wheelbase is 110 inches and this allows room for a comfortable five-passenger body. The running boards are clear, door hinges and handles are concealed and the equipment adds to the whole. Among this may be mentioned rain-vision ventilating windshield, 32 by 3 1-2-inch tires on demountable rims and speedometer.—R. C. H. Corp., Detroit, Mich.

Regal Drops Underslinging

Concentration upon the construction of one overslung chassis is the 1915 policy of the Regal company, this being a new model. The underslung model sold in 1914 has been dropped. Thus the new chassis marks the passage of the underslung construction from the Regal shops, the same low center of gravity now being obtained by springs hung from the under side of the axle. The new Regals are fitted to a 112-inch wheelbase, and bodies are of the sloping hood and cowl type, fenders being domed and running boards clear. Wide doors with concealed hinges and latches do their part in appearance.

The motor, 3 3-4 by 5, is a block type L-head form with cylinder head detachable and exhaust manifold cast integrally with the main casting. This engine is 150 pounds lighter than that of last year's underslung car. Better balanced and lighter reciprocating parts are one factor, and the use of a steel stamped lower crankcase portion in place of a cast iron type is another. The use of multiple thin steel piston rings is a new feature.

Spark and throttle levers have been replaced on the steering wheel. Atwater Kent ignition of automatic advance type makes a spark lever unnecessary, and control of the carbureter is mainly by the accelerator. However, a hand lever control is placed on the cowl dash so that the engine may be set at any desired minimum speed.

An innovation is the placing of the radiator filler cap under the hood; it now being a part of the outlet connection from the waterjacket. This prevents spoiling the hood and radiator finish by spilling water on it.

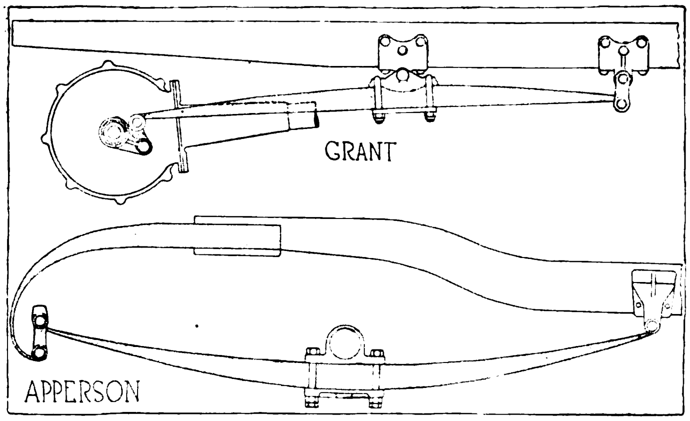
A Bosch-Rushmore two-unit system of cranking and lighting is employed, the cranking motor gearing to the flywheel, whereas the generator is carried on the right forward side of the engine and has a unique belt drive. A pulley on the end of the crankshaft runs over both the fan pulley and generator pulley and provision is made for adjusting its tension.

A three-quarter floating axle with 4 to 1 ratio replaces a heavier half-floating type used on former Regals, the front axle being also lighter. Tires are 32 by 4.—Regal Motor Car Co., Detroit, Mich.

Remington a New Light Four

The Remington four-cylinder chassis makes its appearance this season in roadster and touring bodies. The chassis upon which both cars are mounted is the same with the exception that 30 by 3.5 tires and demountable rims are used on the touring, while the roadster has 30 by 3 tires with clincher rims.

The motor is a four-cylinder block-cast 3.125 by 4 unit power plant with three-point suspension. All the valves are on the right side and are enclosed by a detachable cover plate. The valve diameter is 1.5 inches in the clear with a 3-16-inch lift. The piston length is 4.5 inches, connecting-rods 10.5 inches, with a .875-inch piston ring of 1.75 inches length. The crankshaft is carried on two main bearings and has a diameter of 1.75 inch. The camshaft is also carried on two bearings and has a 1.25-inch diameter.



Upper—Diagram of cantilever spring suspension employed on the Grant. Lower—Similar illustration of the Apperson rear suspension

Lubrication is accomplished by splash, ignition by the Atwater Kent distributer system and starting and lighting by Ward Leonard installation. The clutch is a cone and the gearbox provides three speeds operated by an automatic gearshifter. The spark control is also automatic having the centrifugal arrangement in the distributer.

The rear axle is a three-quarter floating type with bevel gear differential made of nickel steel. The bearings in the rear axle are Hyatt high-duty type while in the front wheels the Bower rollers are used. The front axle is an I-beam drop-forged. The wheelbase for both cars is 106 inches.

Both the touring and roadster bodies are fully equipped. The dash is of Circassian walnut with all the instruments mounted upon it. A long cowl is used and advantage is taken of its length to house the gasoline tank which has a capacity of 12 gallons. In the touring body a robe rail formed by an adjustable strap is used.—Remington Motor Co., New York City.

Reo Adds a Six

The Reo Motor Car Co., Lansing, Mich., which has always been regarded as a one-model concern with its four-cylinder Reo the Fifth as its sole representative, has this year placed upon the market a six, in addition to continuing the four in improved form. In general, the new Reo adheres to the same design as that of the four, and is characteristically a Reo throughout.

Some of the special constructional features of this new six, which has 122-inch wheelbase, are the spiral-bevel gears used in the floating rear axle and the cantilever rear springs which are attached to the frame and axle housing in the regular way. In addition to body improvements in the Reo the Fifth which make for better upholstering and more roominess, there are such important alterations as the increase of the wheelbase from 112 to 115 inches, the use of a new cylinder design with independent exhaust ports, the addition of friction surface to the disk clutch, the non-rattling support of the brake mechanism and the improved starting mechanism doing away with shifting of gears.

The motors of both Reos adhere to the distinctive construction characteristic of these engines wherein the inlet valves are placed in the head and the exhausts on the side. The six is a 3 9-16 by 5 1-8 engine with 40 to 45 horsepower rating and cylinders in threes. The four has 30 to 35 horsepower with 4 1-8 by 4 1-2-inch cylinders in pairs. Crankcases are of the barrel form of aluminum, and helical timing gears are employed as well as exhaust manifolds of the ejector type which reduce the back pressure. Crankshafts and camshafts are supported on three bearings.

Ignition, cranking and lighting for the two models is uniform, the ignition distributer being combined with the generator with the storage battery as its source of current. The starting motor connects in the gearset to the mainshaft through worm gear construction.

The clutch used is a dry disk type which is changed from that formerly used by giving it more friction surface, and by a new operating mechanism which requires less foot pressure.

Streamline hub caps, so called are fitted on the new Reos. These are simply smooth, domed housings for the spindle nuts which are held in place by a set screw to coincide with the lines of the body.

The drive construction of the six terminates in a floating rear axle, while that of the four is semi-floating. The brake rods and parts are fitted with anti-rattlers which aid in silencing the cars. Gearsets are of the three-speed, selective design and gasoline tanks are carried under the front seat, feeding by gravity.

In addition to standard equipment, the six carries a motor-driven tire pump driven from the clutch shaft with the hose permanently connected to the pump and placed in a special compartment in the body.—The Reo Motor Car Co., Lansing, Mich.

Republic Adopts Vacuum Feed

The Republic line of one model is continued without change as far as the makeup of the output is concerned. Several detail changes are worthy of note, particularly in the employment of the new vacuum feed system for gasoline and in the adoption of the Rayfield carbureter as standard equipment.

The power plant remains the same in every respect, the six T-head cylinders being cast in pairs. The dimensions of the cylinders are 4.25 by 5. The water is circulated by a pump, oiling is by a pressure system in which a gear pump takes the oil from the crank case and forces it under pressure to the main bearing. From these points it is carried through the drilled crankshaft to the lower connecting rod bearings.

The entire electrical equipment is furnished by Delco. This is a dual system and not only takes care of ignition but also of lighting and cranking. The wiring is double and the voltage of the system, 7.

The clutch is a leather cone in the flywheel and the gearset is a four-speed selective located amidships. Final drive is by shaft to a bevel gear, floating rear axle which delivers the propulsive thrusts through radius rods. The wheelbase remains the same as last year at 133 inches.—Republic Motor Car Co., Hamilton, O.

Saxon Six Introduced

From the enlarged factory of the Saxon company, a six-cylinder machine is now coming forth which sells at $785, this in addition to the four-cylinder roadster in improved form at $395. The six is seen for the first time at the show, and is said to be the lowest priced six in the field. Factory expansion has resulted in the plans of the company to double its output of the four, in addition to building 25,000 of the sixes, on which the price is based.

The two Saxons adhere to the same general construction throughout, though the six has larger proportions and certain differences incident to its greater power and weight. The motors are L-heads, cast in block with multiple, dry disk clutch in unit. The six has a 30 to 35 horsepower motor, 2.875 by 4.5, and the four-cylinder is a 2.625 by 4 size. They have Atwater-Kent ignition, thermo-syphon cooling and fuel feed by gravity from gasoline tank carried in the cowl.

Other features include gearset in unit with the rear axle and cantilever springs all around. The six is provided with three forward speeds, while the four has two, and another difference is in the type of rear axle, that of the little car being a semi-floating construction whereas its bigger brother is fitted with a three-quarter floating design.

Brakes are on the rear wheels, operating in the usual way through pedal and lever. Steering is on the left and control in the center. Hyatt bearings play an important part in the rear construction of both cars.

The six has an unusually long wheelbase for a car of its price, the figure being 112 inches. The four is of 96-inch wheelbase. Tires are 28 by 3 on the four, and 32 by 3 1-2 on the six.

The six, which comes in five-passenger touring car form only, is well equipped. It has Gray & Davis electric lighting and cranking equipment, demountable rims, top, windshield, electric horn, speedometer, one extra rim, tools and tire irons at the price. To give some idea of the roominess of the body, the front seat is 41 inches wide; the rear seat 47 inches; and the distance from the heel board to the dash is 28 inches.

The four-cylinder car, which is a roadster only, is fitted with electric lighting and cranking at $70 additional. This is a refined car as compared with the original Saxon brought out about a year ago, and appeared in its present form the latter part of last July. Larger body of streamline form, which is roomier and better-looking, and full running boards now grace this Saxon. Small changes include the placing of the gasoline filled plug on the dash instead of under the bonnet where it was inconvenient to get at, and the fitting of a three-hinged hood in place of the single-piece design. Headlights have been moved from the sides to the front of the car.

As compared with the original car, there is refinement in the rear axle also. Felt washers have been provided which prevent the oil from working out onto the brakes, and an oil filler in the differential carries the lubricant direct to the bearings. A through pin for locking the differential pinion carrier replaces a set screw.

The equipment takes in top, windshield, acetylene headlights, oil tail lamp, gas generator and horn.—Saxon Motor Co., Detroit, Mich.

Scripps-Booth Drops Cyclecar

To succeed the cyclecar which it brought out about a year ago, the Scripps-Booth Co., Detroit, has designed what may be regarded as one of the most luxurious types of automobiles in its class. This car as a roadster sells at $775 and is fitted with a four-cylinder 2 7-8 by 4 motor, has 110-inch wheelbase and is mounted on 30 by 3 1-2 tires.

Its equipment is of the most modern type, including motor-generator for lighting and cranking, Houk wire wheels with one extra carried on the rear deck, electric door openers, electric horn, 9-inch Turkish upholstery, attractive windshield, silk-mohair top and curtains.

Made with an option of three treads, 40, 56 and 60 inches, the chassis make-up takes in a cone clutch, three-speed gearset in unit with the motor, double rear wheel brakes, floating rear axle, tubular drive shaft, semi-elliptic front and cantilever rear springs and a frame which narrows to both front and rear in order to follow the curve of the body and thus give rigid support to it.

The S. A. E. rating of the engine is 13.25, but 19 horsepower is claimed for it. It is a high-speed type of power plant, running as high as 2,750 r.p.m. without much drop in the power curve. Silent operation has been attained by special cam design which allows the valves to drop within 1-1,000 inch of their seats and then slowly lets them down the remaining minute distance. The cylinders and crankcase are cast in one piece, and the head is detachable. It carries the valves and their rockers together with the passages to the intake ports. Two main bearings support the crankshaft, and three carry the camshaft.

Lubrication is of the circulating splash type, ignition is cared for by Atwater Kent distributer and cooling is by thermo-syphon. The motor-generator for lighting and starting is hung from an integral bracket on the right side of the crankcase. It connects to the crankshaft through silent chain, the sprocket for which is just ahead of the flywheel.

The car has a leather-faced cone clutch from which the power goes to the rear through a three-speed gearset in which unusually large gears with a 5-8-inch face width are employed. The tubular propeller shaft is 1 1-4 inch in diameter, and the drive is taken through the springs, a torque arm taking the torque.

Unusual features are the use of pedals for operating both sets of brakes, the clutch pedal taking care of the service set in addition to performing its clutch function. Steel cables take the place of rods for working both sets of brakes.

Push buttons placed close to the doors operate the latches magnetically, which is a point new to motor car body building. Throughout the car the aim of the designer has been to show that luxury may be had in the small car as well as in the more expensive. The idea is to make a car that will be approved by the fastidious.

Drive is on the left by a 16-inch walnut wheel, and control in the center. Besides the roadster body, a cabriolet and a coupé are fitted to the same chassis.—Scripps-Booth Co., Detroit, Mich.

S. G. V. Has Larger Chassis

One chassis upon which all types of bodies are mounted is made by the S. G. V. company. This is an entirely new model and has a 3.875 by 4.325 motor as compared with the 3.75 by 5 motor introduced last season. The new car has its four L-head cylinders cast in a single block with the valves on the right side. The single integral camshaft is driven by a silent chain and the valves are inclosed, giving a clean exterior appearance. Both the intake and exhaust manifolds are cast separately from the cylinder, the exhaust being ribbed according to the European practice which this car closely follows. The motor is supported at 4 points.

A centrifugal water pump in connection with a cellular radiator cools the motor and the fan is formed by the spokes of the flywheel. Another point at which European practice has been followed is in the pressure feed lubricating system in which a gear pump forces oil to every bearing even to the piston pins. Ignition is by a single system, a Bosch insulation with one set of plugs taking care of this function. The carbureter is 1.25-inch Zenith fitted with hot-air pipe and taking its feed by pressure from the 20-gallon gasoline tank located at the rear of the chassis. The Ward Leonard system is provided for lighting and starting.

The transmission system is made up of a disk clutch selective sliding gearbox providing four-speeds and a semi-floating rear axle with a bevel gear differential. The drive is taken through the spring. The wheelbase on the new model is 118 inches, the tires 34 by 4 and the tread standard. The body work is of European style especially insofar as the closed cars, namely, Limousine, brougham, landaulet and landau are concerned.—S. G. V. Co., Reading, Pa.

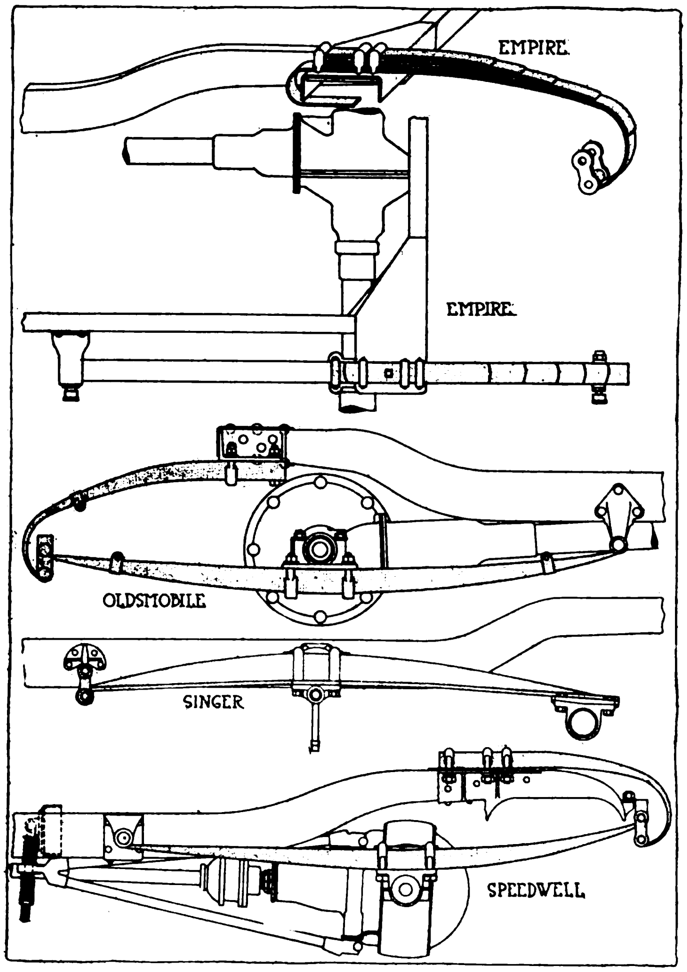
Simplex Has Three T-Heads

Simplex cars continue to be made in three chassis; a 38 shaft drive, a 50 inclosed chain or shaft drive and a 75 inclosed chain or shaft. The numbers serve to indicate the maker's horsepower rating as well as the model. The Simplex company manufactures only the chassis, the bodies being subject to order.

All three Simplex models have T-head motors supported at four points, dry disk clutches located in the flywheel and four-speed gearboxes mounted amidship and supported at four points. The 38 is a 4.875 by 6.5 with its cylinders cast in pairs, the manifolds are cast separate with the intake on the right and the exhaust on the left. The motor is water-cooled, a honeycomb radiator being used in connection with a centrifugal pump. Dual ignition is used. A Bosch high tension magneto being used as the current source. The balance of the electric equipment is a Bosch Rushmore outfit of the six-volt type operating with a single wire installation. The 28-gallon gasoline tank is operated by a pressure system and a Simplex carbureter is used as the vaporizing medium. A shaft with bevel gear reduction of 2.75 to 1 on fourth speed is used and the drive is taken through a torsion tube. The wheelbase of this chassis is 137 inches.

The 50-horsepower model which was new last year has been continued without change. It has a bore of 5.375 and a stroke of 6.5 inches. In general design it is similar to the smaller model described. The only difference is that if desired, a chain drive will be fitted. When the latter is the case, the propulsion is taken through radius rods while as with shaft a torsion tube serves this purpose.

The 75-horsepower model has the same sized cylinders as the 50 and in fact is the same throughout as the latter except tuned up for racing. The valves are larger. A steeper set of cams is used and a dual-double ignition system with two sets of spark-plugs are provided. Chain drive was of-



Top—Side view of novel method of securing rear spring through the main leaf, as used on the Empire. Upper Middle—Plan view of the same construction. Middle—Side elevation of Oldsmobile rear spring arrangement, showing method of bolting to frame. Lower Middle—Cantilever spring used on the Singer. Bottom—Rear construction of the Speedwell, showing ingenious utilization of frame end for supporting spring shackle

fered in 124-inch wheelbase and chain or shaft in 137.—Simplex Automobile Co., New Brunswick, N. J.

Singer Has Cross-Head Piston

The Singer Motor Co. which has recently been formed has brought out a six-cylinder car fitted with a 4 by 5.5-unit power plant suspended at three points, dry-plate clutch and four-speed gearset with direct on fourth. The wheelbase is 135 inches and the tires are 36 by 4 5. A feature of note is the unusual method of marketing the car which will be directly from the factory to the consumer.

The large power plant which is a T-head design is stated to show 100 horsepower at 2,000 r.p.m. on the dynamometer; an advantage has been taken of this high power by gearing the direct drive 3.66 to 1. In the actual construction of the motor the cross-head pistons are the only departure from standard practice as far as the internal structure is concerned. On the exterior of the motor the novel design of the intake manifold will be immediately noted. Both the carbureter and the manifold are water-jacketed but the latter is especially notable for the large radius of its turns and the diameter of the pipe, which takes a 1.75-inch C. R. G. carbureter.

The exhaust manifold is designed with interior walls to avoid in any way difficulties which might be experienced by two cylinders exhausting at the same time.

The method of fastening the steering drop arm is a departure from standard practice, the hub being pierced with triangular slots corresponding to a similar opening in the shaft to which it fits. The shaft is then tapered so that adjustments for wear may be made by tightening the nut holding the arm in place. This is a patent of the Jacox company. The gear itself is a worm and nut having a 2-inch column and a 19-inch wheel.

A distinctive type of streamline body having unbroken lines from the pointed radiator to the moulded surface at the rear of the tonneau is fitted to the chassis. Left drive with center control is used and the one-piece design is carried out in such parts as the windshield, which is built into the cowl. The various instruments are carried on a cowl board and a fire extinguisher is an unusual addition to the equipment.—Singer Motor Co., Long Island City, N. Y.

Spaulding Underslung Rear

The single four-cylinder model H Spaulding chassis is continued with a number of improvements chief among which are the placing of the rear springs underneath instead of over the axle and the fitting of a body with more graceful lines. Aside from these changes the car is practically the same as before being fitted with a touring body which can be converted into one with sleeping quarters sufficient for five persons. This is done in a few minute's time by dropping the hinged back of the front seat. An electric reading lamp is provided in the compartment so as to make the improvised hotel room comfortable.

The chassis has a 120-inch wheelbase and is fitted with a Buda motor, 4 1-4 by 5 1-2. Ignition is by Simms magneto and cranking and lighting by the Entz system. The gasoline feed used is a pressure gravity system in which fuel is forced from a container at the rear to an auxiliary tank on the dash and thence to the carbureter by gravity.—Spaulding Mfg. Co., Grinnell, Ia.

Speedwell Has Rotary Valve

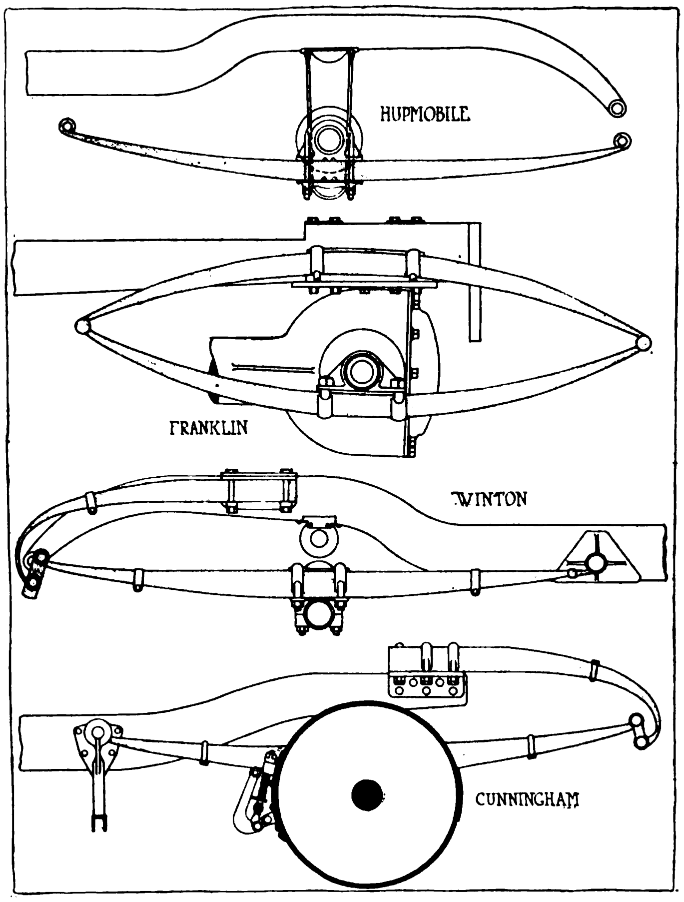
The Speedwell is continuing a single six-cylinder chassis fitted with a Mead rotary-valve motor, with only slight changes over the former model. The changes are, the adoption of the Westinghouse cranking, lighting and ignition system instead of that used previously, a Stewart vacuum gasoline system and changing the position of the instruments from the floorboards to a cowl dash.

The Speedwell is fitted with a Mead-type rotary-valve motor in which there are two valves for the six cylinders one on each side of the cylinder block. Each valve contains six slots and these register with slots which communicate with the inlet and exhaust manifolds. In order to assist in the lubrication of these valves they are grooved longitudinally and between adjacent cylinders the valve is fitted with a ring so that there will be no leaks from one cylinder to the other. The valves are made of gray iron and the cylinders of semi-steel so that wear will be reduced. Aside from the valve arrangement and the necessary changes in cylinder design, the motor shows no radical construction. Its dimensions are 4 1-8 by 5 1-4 and it drives through a disk clutch and three-speed gearset, a unit with it, to a Timken floating axle.

The Speedwell rotary is made with three body types, a four-passenger at $2,850, a five-passenger at the same price and a seven at $2,950. A six-passenger also is made by adding two auxiliary seats to the four. The chassis has a 135-inch wheelbase and tire sizes are 37 by 5 for the six and seven-passenger and 36 by 4 1-2 for the others.—Speedwell Motor Car Co., Dayton, O.

Sphinx Makes Light Four

A newcomer for this season is the Sphinx, a light four-cylinder car with a five-passenger streamline body mounted on a 112-inch wheelbase and having a four-cylinder monoblock power plant, three-speed gearbox and a roller bearing



Top—Diagram cf spring suspension used on the Hupmobile. Upper Middle—Full elliptic spring construction used on the Franklin. Lower Middle—Winton's method of attaching spring to side member of frame, showing use of frame end for shackle support. Bottom—Cunningham rear suspension

rear axle. It is thoroughly equipped with electric lighting and starting, and wire wheels may be had for $25 extra.

The motor has its 3.375 by 5 L-head cylinders cast with a detachable head. The power plant is featured by lightweight reciprocating parts and throughout is of high-speed design. The valves are of the orthodox 45-degree poppet type, having a diameter in the clear of 1.375 inches. The crankshaft is a 0.40-carbon steel alloy carried on two main bearings. The diameter of the crankshaft is 1.75 inches.

In connection with the generator a battery system of ignition is used, the high-tension distributor being operated from a vertical worm-driven shaft. Lighting and starting are accomplished by a single-unit motor-generator.

The lubricating system is a circulating splash, the pump being driven from a cam off the camshaft. A 1-inch carbureter fitted with hot-air intake and a shut-off valve for starting, is fed by gravity from a 25-gallon gasoline tank.

A 12.5-degree cone clutch, having a chrome leather facing with spring and plunger inserts for gradual engagement, transmits the power to a three-speed Covert gearbox located on the rear axle. The drive shaft, countershaft, and dog clutch of this gearbox are carried on roller bearings. The rear axle is a Weston-Mott carried on Hyatt bearings and the front axle is tubular with cup and cone ball bearings in the hubs. Control is central with the steering wheel on the left. The clutch and service brake are both operated from the left pedal. The emergency brake by the right pedal thereby eliminating all but the gearshifter lever.—Sphinx Motor Car Co., York, Pa.

Stearns Has Small Knight

The new four-cylinder Stearns-Knight type at $1,750 is one of the more interesting cars because this is a price almost $1,000 under any previous Stearns-Knight type and also the low mark for a Knight sleeve-vaive motor in this country. While the trend was toward sixes Stearns has been one of the several to bring out a small four in preference to a small six. This new model with 3.75 by 5.625 block cast cylinders incorporates many new, yet tried, features in motordom, including the crankshaft with counter balance weights to overcome centrifugal force, a specially light cylinder block embracing the intake and exhaust manifolds, and a light construction in the crankcase, the timing chain cover and other car parts by the use of stamping in such places where strength is not a primary consideration. In addition to the balanced crankshaft, designed to prevent appreciable wear on the crankshaft bushings, tubular connecting rods are used, these also being specially balanced at the lower ends by a short extension of the tubular shaft from the connecting rod cap.

The lubrication throughout is by pressure to the main bearings rather than by the rough system earlier in vogue in Knight motors. With the pressure system their is a flow in proportion to motor speed from 15 to 60 pounds pressure, the latter mark representing the high mark of pressure. The high-speed, high-efficiency motor has a three-part electric system including an Eisemann magneto constituting the only ignition system, a Gray and Davis cranking motor and also a Gray and Davis lighting generator.

The chassis possesses not a few improvements in spite of its price. First comes the use of spiral bevels in the rear axle, and also the use of a pressed steel axle housing taking the place of the forging type. The service brake is moved from the rear wheels to back of the gearbox; cantilever rear springs are introduced and the gasoline tank is placed in the cowl.

Besides being manufactured as a touring car it is marketed as a cabriolet and also a limousine.

Stearns is listing two other models, one known as the big four, 4.25 by 5.5 cylinders, and the other the six, 4.25 by 5.75. These are continued practically as during last year.—F. B. Stearns Co., Cleveland, O.

Stevens-Duryea Increases Bore

A 1-16-inch increase in bore in the larger motor, a shift from right to left drive and the fitting of electric starting and lighting as stock equipment are the three changes in Stevens-Duryea cars. While the roadster and touring cars are made under the same model number, they are really two different chasses, as the wheelbase for the roadster is 131 inches and for the touring car is 138 inches, the same as for 1914.

The feature of the new line is the roadster with a 4.325 by 5.5 power plant. Besides the novel adaptation of the streamline effect, a sloping deck has been provided which incloses a compartment for carrying two spare tires mounted on their rims, or one wire wheel mounted and an extra tire. When the top is down it disappears completely inside the body and it is supported by mechanical means by neat rigid joints which cause it always to follow a certain path when folding into and being withdrawn from the body. It is self-supporting and when up requires no braces, being rigidly fastened to the windshield support. When the top is folded, the concealing compartment is completely covered by the upholstery and when up the opening is also covered.

Except for the change in bore, the power plant for the touring cars remains the same. It is 4 7-16 by 5.5 suspended at three points. Like other Stevens cars this has a disk clutch, progressive three-speed gearset, floating axle and 37 by 4.5 tires.

A new type of auxiliary seat is used in the seven-passenger touring cars. Each seat has one upholstered arm on the inner side and the upholstered arm rail provides the rest on that side. The construction allows for folding backward and sidewise against the side of the tonneau, or it can be tipped forward in front of the entrance allowing plenty of room in the tonneau and concealing the extra seats from view An addition to the line is made in the form of a seven-passenger landaulet on a 139-inch wheelbase chassis.—Stevens-Duryea Co., Chicopee Falls, Mass.

Studebaker Alters Manifold

The two 1914 Studebaker chasses are continued with the same elemental features of design, but many alterations have been made, with the result that the cars are larger, although selling at $65 less for the four and $190 less for the six, making the present prices $1,385 for the five-passenger car and $1,450 for the seven-passenger six.

In both motors an increase of 15 per cent. has been made possible in the maximum power by reducing the weights of the reciprocating parts and altering the manifold design. Four ounces have been cut from the piston assembly and although the valve sizes remain the same, greater efficiency has been obtained by increasing the port sizes. The lubrication system has been maintained, but the scoop has been changed in shape and the splash troughs altered to give greater oil economy.

While the Schebler Model R carbureter is used this year, a water jacket and a means of pre-heating the intake gases from the exhaust are also included. In the four the carbureter bolts against the integral cylinder casting without any exterior intake manifold.

The same clutch has been maintained, but the leverage on the operating members on the six is altered to give an easier throw. Instead of the exterior flange connected with the wheel on the rear axle drive shaft there is now a tapered-fitting connection with the driving flange and in place of the flat plate the wheel now carries a hub cap.

By improvements in the body work and equipment much weight has been cut from these models. This has been effected by substituting pressed steel for wood and by the use of a new top. The instrument board is now a stamping and is free from the instruments. Side lamps are discontinued and the bodies are full molded stream effects.—Studebaker Corp., Detroit, Mich.

Stutz Has New Small Four

Two new Stutz cars have appeared for the 1915 season. One is a four-cylinder roadster on a smaller chassis than any yet put out by this concern and the other is a four-passenger speed body mounted on the same chassis as the roadster which has been marketed during the past year. This brings the line to ten cars, six fours and four sixes. Of the four-cylinder models the touring and sedan have a wheelbase of 130 inches and sell respectively at $2,275 and $3,675; the Bulldog roadster and Bearcat have a wheelbase of 120 inches and are listed respectively at $2,250 and $2,000.

The H. C. S. four, which is a new model and lists at $1,475, has a wheelbase of only 108 inches. Of the four sixes the touring and sedan, which have a wheelbase of 130 inches, cost respectively $2,400 and $3,800, while the roadster and Bearcat, which both have a wheelbase of 120 inches, are listed at $2,125 each.

The smaller car is a typical Stutz design except that an L-head motor is used, whereas former motors have all been T-heads. Another departure is the casting of the cylinders in blocks instead of pairs. The use of block cylinders and the connection of the forward end of the torque tube to the clutch housing instead of to a cross frame member has rendered possible a wheelbase of 108 inches, whereas the larger roadster has 120 inches.

The new four-passenger speedster is styled the Bulldog. It is mounted on a chassis of 120-inch wheelbase, this being the same chassis in every particular as that manufactured for the 1914 season.

The characteristics of Stutz design which are common to all the cars are the leather-faced cone clutch and the Stutz rear system with its three-speed gearbox mounted just forward of the differential housing in unit with the axle. Wire wheels are furnished at $100 additional and a wide range of body colors is optional.—Stutz Motor Car Co., Indianapolis, Ind.

Touraine Has a Six

Two Touraine cars, one a touring and the other a limousine, both of seven-passenger capacity are put out on the 134-inch wheelbase. The six-cylinder power plant has its 4 by 5.5 cylinders cast in threes. They are of T-head shape. The maker's rating of this motor is 61 horsepower at 2,220 r.p.m. The intake valves are located on the right and the exhaust valves on the left. Both camshafts are driven by spiral gears. The lubricating system is a circulating splash operated by a gear pump and the water cooling system has a centrifugal pump which forces the water through a honeycomb radiator.

For ignition a Bosch dual system is provided. The gasoline system is a pressure feed with the gasoline tank swung on the rear. The capacity of the tank is 23 gallons, and is used in connection with a 1.5-inch Zenith carbureter. Starting and lighting is by the Westinghouse 6-volt system with single wiring. The storage battery is a 150-ampere-hour Exide.

The clutch is a multiple disk carried in the flywheel having steel against raybestos friction surfaces. The gearbox provides four speeds and the rear axle is a floating design with the propulsion taken through the torsion tubes. Control is in the center with the steering wheel on the left. Full equipment is sold with the car, the tires being 34 by 4.5 with Q. D. demountable rims.—Touraine Motor Car Co., Philadelphia, Pa.

Trumbull Drops Friction Drive

The most radical change in the Trumbull car is in the transmission. The friction and chain drive has been eliminated, substituting in its place a selective, sliding gearset having three speeds. This is in unit with the differential on the semi-floating rear axle. A cone clutch is also used in connection with center control and the car has been equipped with both internal and external brakes operating on the rear hubs. The motor has been remodeled to some extent, principally in the shortening of the intake manifold which has resulted in the raising of the carbureter. A newly designed camshaft with cams which have been laid out along the line of quietness are also innovations.

The Trumbull is a miniature automobile. It is built along standard lines and has all the up-to-date equipment and luxuries of larger cars except the size. The wheelbase is 80 inches and the tread 44 inches. It is claimed that a fuel consumption of 35 miles per gallon of gasoline can be obtained with this little car. It is made in two styles for passengers, that is, a roadster and a coupé. Electric lighting and starting is extra but all the ordinary equipment is standard.

The four-cylinder motor has its 2.875 by 4 cylinders cast in a single block. It is lubricated by a combination pressure and splash system in which a pump delivers oil to all the main bearings and timing gears and the rest of the motor is lubricated by the splash. The two-passenger body which is regularly fitted is of the sociable roadster-type having the seat continuous without subdivision between the driver and passenger.—Trumbull Motor Car Co., Bridgeport, Conn.

Twombly Has Narrow Tread

Two-passenger bodies, a town car which serves as a taxicab and a roadster of two-passenger capacity are mounted by the Twombly company on their 100-inch wheelbase chassis with 44-inch tread.

The power plant is a four-cylinder 3.125 by 4 with L-head cylinders cast in a single block. The cylinder heads are removable which is unusual in the L-head type of construction. Both intake and exhaust valves are on the left and are driven from a single camshaft through a helical timing gearset. The intake and exhaust manifolds are cast together and are unjacketed. The motor is supported at three points.

Cooling is effected by a thermo-syphon system, lubrication by circulating splash and ignition by the Splitdorf single high tension system with hand control. The carbureter is optional, being either a Holly or Zephyr 1-inch, fed by gravity from the 8-gallon gasoline tank located in the cowl.

A cone clutch transmits the drive to a three-speed selective gearset located on the rear axle. From this point the transmission consists of a worm beneath the wheel mounted just to the rear of the gearbox and a semi-floating rear axle. The wheels are of wire and are undemountable. The tires are 30 by 3.5 and the rear spring is a compound cantilever. This spring, contrary to general light car practice, does not transmit the drive as this is taken through a torsion tube. Two sets of brakes are fitted, both on the rear wheels. The bodies though small, as is natural with the short wheelbase and narrow tread, are fitted with up-to-date equipment and deep upholstery.—Twombly Motors Co., New York City.

Velie Adds a Six

A new six named the Biltwel model at $1,595, is the leader of the Velie line. Besides this car two of last season's models, a four and a six, are continued. The six sells for $2,015 instead of $2,350 and the four at $1,750 instead of $2,000. Better bodies are used on these two cars, but no mechanical changes have been made.

The new six incorporates among its noteworthy features a spiral-bevel rear axle, Hotchkiss drive, Atwater Kent ignition with automatic spark advance and Stewart vacuum feed. The motor, a Continental 3 1-2 by 5, forms a unit power plant with a cone clutch and a four-speed gearset. The chassis frame has an unusual taper, the distance between front spring centers being 27 1-4 inches, allowing a very short turning radius. The equipment includes Gray & Davis cranking and lighting, power tire pump, auxiliary emergency battery for ignition, double headlights, inspection lamp, etc.

The four has a Velie-made motor 4 5-8 by 5 1-4 and two of the features are the transverse drive of the magneto, and the feed from the carbureter through a pipe passing over the cylinders to the other side of the motor. The drive system includes a disk clutch, four-speed gearset and Timken floating axle. The larger six is Continental equipped, the cylinders being 3 3-4 by 5 1-4, and in general design is the same as the new six.—Velie Motor Vehicle Co., Moline, Ill.

Vixen Has Friction Drive

A small 36-inch tread vehicle with a 106-inch wheelbase and fitted with a three-passenger tandem-seating body is being marketed by the Davis Co., under the name of the Vixen. It is fitted with a four-cylinder, block motor, 2 3-4 by 4, using Atwater Kent ignition and thermo-syphon cooling. The drive incorporates a friction set located under the rear seat there being one friction driving wheel for each rear wheel. The disks are fiber against iron and the final propulsion is by side chains to the wheels. The latter are wire 28 by 3.—Davis Mfg. Co., Milwaukee, Wis.

Vulcan a New Block Four

The Vulcan company has brought out a new car for this season. It is fitted with a Buda four-cylinder 3.5 by 5.125 power plant, multiple disk clutch, Fuller three-speed gearbox, three-quarter floating rear axle and is mounted on a wheelbase of 120 inches. This chassis is provided with a five-passenger touring body of streamline design.

The L-head cylinders are cast in a block and are provided with integral water jackets which are so baffled that the water is discharged directly beneath the valves and circulates entirely around these cylinders. The top of the cylinders is provided with a cover which can be removed allowing access to the water jackets. The base flange of the cylinder casting is continued horizontally to form a housing for the valve lifter guides.

The crankshaft is carried on three main bearings and is of open-hearth steel having a tensile strength of 120,000 pounds to the square inch and an elastic limit of 85,000 pounds to the square inch. The bearings are lined with die cast nickel babbitt and the camshaft bearings which are also three in number are lined with phosphor bronze.

A combination splash and pressure system takes care of the oiling. A gear pump takes the oil from the lower half of the crankcase to the tops of the main bearings and the lubricant flows from these to the splash trough.

In the clutch there are eight plates lined with raybestos. These deliver the power to the three-speed gearbox which is mounted on imported ball bearings transmitting the power to a Salisbury three-quarter floating rear axle. The springs are cantilever design 48 inches in length. Steering is by worm and wheel.

The body lines are continuous, following the dictates of streamline fashion, and provide 24.5 inches leg room in the rear and 33 inches leg room in the front. The fenders are crowned and made from 22-gauge fender steel.—Vulcan Mfg. Co., Painesville, O.

Westcott a Four and Six

Two cars, a four and a six, of the same principle specifications throughout except in regard to the number of cylinders and the rear axle, make up the Westcott line. Both motors are L-head blocks with 3.5 by 5-inch cylinders giving S. A. E. horsepower rating of 19.6 and 29.4 for the four and six respectively. The valves of the motors are on the left, both operated by camshafts with the cams cut integrally. The camshafts are driven by helical gears and the valve adjustments are accessible by means of removable cover plates.

Pump water circulation is used for cooling, and oiling is by splash with the lubricant circulated by means of a plunger pump driven off the camshaft. Delco dual ignition starting and lighting is standard equipment on both models. The ignition system is provided with automatic spark advance.

On both models the clutch housings and gearboxes are part of the unit power plant suspended at three points. The power is delivered by cone clutches to three-speed selective gearboxes. The final drive is accomplished by bevel gears. The thrust of propulsion is taken through the springs. The rear axle on the model O which is the four-cylinder car is a three-quarter floating while that on the model U, the six, is a floating design. A difference in final gear reduction will be noted on the two cars. That of the four is 4 to 1 and on the U it is 3.77 to 1. The wheelbases are respectively 113 and 125 inches for the four and six. The smaller car uses 33 by 4 tires and the six 35 by 4.5. Both cars have wood wheels and left drive with center control. The springing differs materially, however, as cantilevers are used on the six and three-quarter elliptics on the four.—Westcott Motor Car Co., Richmond, Ind.

White Makes Six to Order

Listing only two four-cylinder models and building the six to custom order is one example of the practical discontinuance of the six. This is the White policy, the fours being generally improved, fitted with an entire line of new bodies and slightly increased in price. One dominant factor in the new Whites is the lower bodies, the frames now being but 25 inches from the ground yet allowing for a clearance of 10 inches under the apron. In the large four this lowering is accomplished first by underslinging the three-quarter rear spring, second by dropping the frame side members and lastly by dropping the front axle.

The chassis has been altered in many respects notwithstanding the continuation of block type cylinders with integral manifolds, four-speed gearsets and disk clutches. The Entz motor generator, heretofore under the hood, is now located at the right rear of the chassis, approximately under the tonneau floor, and in this new position is driven by a forward shaft and sprocket and silent chain from the flywheel. The new position is more accessible and the drive is not through the timing gears as formerly. A great improvement has been made in the wiring, all of which is brought to a junction box on the front of the dash immediately over the steering column.

Gasoline feed is now by the Stewart vacuum system, which permits the carbureter being carried much higher, being directly bolted to the side of the casting, and also allows of a rear gasoline tank on all models. All motor and lighting controls are mounted on the forward side of the steering column below the wheel, the control box being a cylinder shape placed transversely on the column. A new form of clutch brake is intended to stop spinning in gearshifting; and there is now an equalizer in the service brake as well as in the emergency one. All lights take 21-volt bulbs. The oil reservoir is removed from the side of the motor and placed on the forward side of the dash; Silverton cord tires are stock.

Bodies are new streamline creations with a flaring hood which leads into a heavy cowl with a backward curve directing the eye to the seat line. Back of the front seat is a center cowl, which aids in carrying out the streamline design. The bodies are widest in rear of the front seats. Auxiliary tonneau seats are sunk 2.75 inches into the floor so that the passengers do not sit higher than those on the rear seats. Crowned fenders are used; the windshield is very low and tilts back; upholstery is tufted vertically rather than in diamond pattern; and a one-man top is standard. Compartments in rear of the front seat are fitted in some models.—White Company, Cleveland, O.

Willys-Knight Heavier Axle Housing

The new Willys-Knight, model K-19, is practically the same mechanically as its predecessor, model K-17, but it has a new streamline body and sells for $275 less, or $2,475. The body changes are radical, the hood being sloped and a rounded cowl uniting it with the body. The older car had a straight hood, and there was a decided break between bonnet and body. A slight change is found in the floating axle, which has a new design of housing stronger and lighter than the old. The gearbox is somewhat different in design.

The motor, a Knight type with sliding-sleeve valves, has cylinders 4 by 5 1-2 cast in pairs and with removable heads. The engine uses a five-bearing crankshaft, and is a standard Knight design.

Ignition is by a high-tension magneto which is independent of the cranking and lighting system, the latter being of the combination type with the motor-generator in the flywheel. Force feed oiling is used, and cooling is by a centrifugal pump.

The rear axle, with its new and lighter housing, is still a worm drive type, with the worm carried under the worm wheel, and running continually in a bath of oil. The ratio is 4.83 to 1. Drive comes back to it through a cone clutch and open drive shaft with two universals. The four-speed gearset is located in the center of the chassis.

The rear spring suspension is the Lanchester cantilever form, with these springs measuring 52 by 2 1-4 inches. They attach at two points outside the side frame rails and at their rear end to the axle tubes.

Center control with left steering are employed. Tires are 36 by 4 1-2 on demountable rims.

The standard body finish is a dark blue with ivory striping, and a feature of the front seat is the adjustable cushion to accommodate the driver in reaching the control pedals.—Willys-Overland Co., Elyria, O.

Winton Announces Smaller Six

Winton has entered the lists of those who are making two models, having just announced an additional car known as 21-A which is a smaller six than the model 21. In general design the new car is similar to the larger model but is smaller throughout. While the model 21 has a 4.5 by 5.5 power plant the 21-A dimensions are 3.625 by 5.25. The wheelbases of the two cars are respectively 130 and 128 inches and the tire sizes 37 by 5 and 36 by 4.5.

The only change made in the large car is in the refinement of the bodies and the increased radiator size. The small car is a new job throughout. Like its older brother the power plant has its six cylinders cast in an L-head with the valves on the left. The valve action is inclosed and the crankcase is extended back to include the flywheel. In the former model the flywheel was not inclosed.

The valves are tungsten steel on the exhaust side and carbon steel with nickel steel heads on the intake. The valve springs, plungers and adjustment nuts are covered by steel plates which are detachable by removing hand screws.

The crankshaft is of chrome vanadium steel carried on four plain bearings lined with white brass. All the bearings are carried in the upper half of the crankcase. A point in which the new model differs from the old is in the mounting of the carbureter and other auxiliaries. The carbureter is carried quite high and is bolted by means of a short elbow against the balanced intake manifold. The carbureter and magneto on the new model in connection with the generator and water pump are all on one side of the motor, leaving the left side absolutely clear except for the Bijur cranking motor which is on a bracket in connection with the left rear foot of the crankcase.

Pressure feed lubrication is used and ignition is by the Bosch dual system. The cooling water is circulated by gear-driven centrifugal pump which forces the water through jackets which are lined with an anti-corroding surface. The radiator is a honeycomb and it is bolted to the drop frame. Lighting and starting is by the Bijur two-unit system.

The drive is transmitted through an eleven-disk dry plate clutch, a four-speed gearbox and a driveshaft which has a universal joint at each end. Spiral bevel drive is used and the rear axle is floating. The Winton company offers five gear reductions running from 3 1-16 to 1 to 4 1-12 to 1. All types of body are mounted on the new car.—Winton Motor Car Co., Cleveland, Ohio.

Zimmerman Continues Its Six

The six-cylinder car rated at 55 horsepower which was marketed by the Zimmerman company for the 1914 season will be continued for 1915. The two-cylinder models which were known as D & E and which could be secured last season have now been discontinued in line with the policy of American manufacturers to eliminate the two-cylinder car. Zimmerman last season was among the few that remained for 1914 who continued to market the two-cylinder car. This year there are but .5 per cent. who still continue the two-cylinder policy.

The six-cylinder car is an up-to-date design in every particular. The body work has been improved this season and the side lamps have been eliminated, leaving the running lights contained in the headlamps. The dimensions of the motor are the same as for 1914, being 4 by 5, with L-head cylinders cast in pairs. The chassis is provided with a disk-in-oil clutch and three-speed gearset. Ignition is by the Remy dual system and electric starting is used. For 1914 Zimmerman offered an option of compressed air or electric starting. The car is sold fully equipped and is mounted on a 132-inch wheelbase.—Zimmerman Mfg. Co., Auburn, Ind.

Events Scheduled for Show Week

The Show

Fifteenth Annual National Automobile Show, Grand Central Palace, January 2-9, Beginning at 2 p.m. on Saturday, January 2. Other Days Show Opens at 10 a.m. and Closes at 10.30 p.m. Admission 50 Cents. Except Society Day, Wednesday, January 6, When It Is $1.

No Commercial Cars Shown—Special Information Bureau for Commercial Vehicle Manufacturers.

Motor Truck Club of America's Offices Will Be Open Evenings for Convenience of Truck Representatives. The Club Will Make Arrangements for the Rental of Additional Office Space at 1790 Broadway, for Use of Visiting Truck Manufacturers and in Conjunction with the Activity of the National Automobile Chamber of Commerce Along Similar Lines.

Exhibitors Will Be Obliged to Get Their Displays in Building and Completely in Place Before 12.30 p.m. of Opening Day. After That Hour No Goods Will Be Admitted.

Social and Business

Jan. 4—Chalmers Motor Co.—Dealers' Meeting at Healy's, 66th street and Columbus avenue.

Jan. 4—Motor Dealers' Contest Assn.—Board of Directors' Meeting, 222 West 59th street, 1 p.m.

Jan. 5—National Automobile Chamber of Commerce—Patents Committee Meeting, 7 East 42nd street, 3 p. m.

Jan. 5—Studebaker Corp.—Dealers' Meeting, Manhattan Hotel.

Jan. 5—Society Automobile Engineers—Meeting Standards Committee, Society Headquarters, 1790 Broadway.

Jan. 5—National Automobile Chamber of Commerce—Banquet at Waldorf-Astoria, 7 p.m.

Jan. 6—Motor and Accessory Manufacturers, 33 West 42nd street.
Executive Committee Meeting, 9.30 a.m.
Finance Committee Meeting, 10 a.m.
Board of Directors' Meeting, 11 a.m.
Twelfth Annual Meeting, Waldorf-Astoria, 3 p.m.
Annual Banquet, Waldorf-Astoria, 7.30 p.m.

Jan. 7—Motor and Accessory Manufacturers—Board of Directors' Meeting at 33 West 42nd street, 2.30 p.m.

Jan. 6—National Automobile Chamber of Commerce Meeting, 7 East 42nd street, 10 a.m.

Jan. 6—Cycle Parts and Accessories Assn.—Annual Meeting, Hotel Astor, 10 p.m.

Jan. 6.—Briggs-Detroiter Co.—Meeting of Eastern Dealers, Vanderbilt Hotel.

Jan. 7—Briggs-Detroiter Co.—Meeting of District Sales Managers, Vanderbilt Hotel.

Jan. 7—Franklin Automobile Co.—Dealers' Get-together Dinner, McAlpin Hotel, evening.

Jan. 7—Chas. E. Riess & Co.—Dinner at Vanderbilt Hotel.

Jan. 7—Willys-Overland Co.—Banquet at Biltmore Hotel, evening.

Jan. 7—Paige-Detroit Motor Car Co.—Dealers' Dinner at Riesenweber's, 58th street and 8th avenue, 7 p.m.

Jan. 7—Saxon Motor Co.—Dealers' Luncheon, Knickerbocker Hotel, 1 p.m.

Jan. 7—A. J. Picard & Co.—Dealers' Dinner at Cafe Des Beaux Arts; Trip to General Electric Plant, Lynn, Mass., by special train.

Jan. 9—Chandler Motor Car Co.—Dealers' Dinner at Manhattan Hotel, 11 p.m.

Jan. 9—American Automobile Assn.—Executive Board Meeting, 437 Fifth avenue, 10 a.m.

S. A. E. Program

Tuesday, January 5, at 1790 Broadway

Standards Committee, 9 a.m.
Governing Committee of the Sections, 8 p.m.
Council Meeting, 8 p.m.

Wednesday, January 6, at Engineering Societies Bldg.

Business Session, 10 a.m.

President's Address.
Treasurer's Report.
Report of Tellers of Election of Officers.
Report of Membership Committee.
New Business.
Report of Ball and Roller Bearings Division—F. G. Hughes, Acting Chairman.
Report of Carbureter Fittings Division—J. J. Aull, Acting Chairman.

Professional Session, 1 p.m.

Automobile Bodies—H. J. Hayes.
Report of Commercial Car Wheels Division—Wm. P. Kennedy, Chairman.
Report of Electric Vehicle Division—A. J. Slade, Chairman.

Continuation of Professional Session, 8 p.m.

Pros and Cons of Correct Tire Inflation—C. B. Whittelsey.
Report of Pleasure Car Wheels Division—Henry Souther, Chairman.
Wire Wheels versus Wood Wheels—R. B. Mudge.
Wire Wheels versus Wood Wheels—Geo. W. Houk.
Report of Lock Washer Division—C. E. Davis, Acting Chairman.
Report of Miscellaneous Division—J. G. Utz, Chairman.

Thursday, January 7, at Engineering Societies Bldg.

10 a.m.

Report of Electrical Equipment Division—A. L. Riker, Chairman.
Railway Gasoline Locomotives—A. B. Ehle.
An Eight-Cylinder Motor—H. G. Chatain.
Report of Research Division—David L. Gallup, Chairman.
Universal Joint Efficiency—C. W. Spicer.

1 p.m.

Malleable Iron Castings—Dr. Richard Moldenke.
Report of Frame Sections Division—J. G. Perrin, Chairman.
Report of Iron and Steel Division—Henry Souther, Chairman.
Nomenclature of Car Parts.
Allowances for Piston Fits—E. W. Weaver.
Worm Gearing by a New Process—C. T. Myers.
Discussion of Time and Place of 1915 Summer Meeting.

8 p.m.

Automobile Engineering Curricula—Prof. W. T. Fishleigh.
Motor Car Testing—A. B. Browne and E. H. Lockwood.
Warning Signals—Alden L. McMurtry.
Report of Springs Division—C. W. McKinley, Chairman.
Cantilever Springs—J. G. Utz.
Report of Standards Exchange Division—K. W. Zimmerschied, Chairman.
The European Situation as Affecting America—A. Ludlow Clayden.

Informal Dinners at Bustanoby's Restaurant, 110 West 39th Street

Wednesday, January 6, 6.30 p.m. Thursday, January 7, 6.30 p.m.

Official Headquarters of Some Automobile and Accessory Makers

Make	Hotel
Allen	Claridge
Apperson	Astor
Cadillac	Astor
Cartercar	Manhattan
Case	Woodward
Chalmers	Biltmore
Chandler	Manhattan
Chevrolet	Woodstock
Cole	Biltmore
Crawford	McAlpin
Cunningham	McAlpin
Detroiter	Vanderbilt
Franklin	McAlpin
Grant	Astor
Herff-Brooks	Astor
Hupmobile	Vanderbilt
Inter-State	Astor
King	Vanderbilt
Krit	Biltmore
Lewis	Manhattan
Lyons-Knight	Astor
McFarlan	Wallacks
National	Vanderbilt
Nordyke & Marmon	Vanderbilt
Oakland	Vanderbilt
Oldsmobile	Astor
Packard	Astor
Paige-Detroit	Vanderbilt
Pathfinder	Astor
Peerless	Astor
Pierce-Arrow	Biltmore
Pilot	Claridge
Remington	Astor
Saxon	Knickerbocker
Scripps-Booth	Biltmore
Studebaker	Biltmore
Stutz	Woodward
Winton	Astor
Westcott	Biltmore

Company	Headquarters
Adams & Co., Henry T.	Astor
American Bronze Co	Biltmore
American Die & Tool Co	Grand
Armstrong Cork Co	Manhattan
Arnold, N. B	Wallacks
Asch & Co	Office
Auto Air Appliance Co	Woodstock
Badger Brass Mfg. Co	Belmont
Baum's Castorine Co	Manhattan
Blackledge Mfg. Co	McAlpin
Bosch Magneto Co	Office
Braender Rubber & Tire Co	Office
Brown-Lipe-Chapin Co.	Waldorf-Astoria
Brown-Lipe Gear Co	Waldorf-Astoria
Carr Co., F. & S.	Biltmore
Cleveland Hardware Co	Biltmore
Champion Spark Plug Co	Belmont and Wallacks
Cleveland Hdwre. Co	Biltmore
Continental Motor Mfg. Co	Biltmore
Cowles & Co., C	Belmont
Cramp & Sons Co	Belmont
Dann Oil Cushion Spring Insert Co	Knickerbocker
Detroit Steel Products Co	Astor
Double Fabric Tire Co	McAlpin
Findeisen & Kropf Mfg. Co	Astor
Forest City Electric Co	Vanderbilt
Fulton-McCutcheon Co.	Astor
Garage Equipment Mfg. Co	Biltmore
Globe Machine & Stamping Co	Astor
Garford Mfg. Co	Cumberland
Gray & Davis	Manhattan
Hampton Kerosene Carbureter Co	Office
Hartford Suspension Co	Office
Kellogg Mfg. Co	Biltmore
Kokomo Electric Co	Martinique
Lane Bros. Co	San Rafael
Marvel Auto Supply Co	McAlpin
Mayo Mfg. Co	Astor
Massnick-Phipps Mfg. Co	Cumberland
Max Machine Co	Belmont
McQuay Norris Mfg. Co	McAlpin
Mossberg Co., Frank	Manhattan
National Screw & Tack Co	Belmont
New Era Spring & Specialty Co	Park Avenue
Perkins-Campbell Co.	Manhattan
Remy Electric Co	Waldorf
Platt & Washburn Refining Co	Manhattan
Positive Supply Co	Knickerbocker
Sager Co., J. H	Park Avenue
Schwarz Wheel Co	Knickerbocker
Scoville Co., E. U	Broadway Central
Shaler Co., C. A	McAlpin
Silvex Co.	Park Avenue
Spitler, N. W	St. Denis
Standard Woven Fabric Co	Manhattan
Stewart Auto Accessories Co	Astor
Stewart-Warner Speedometer Corp	Astor
Stromberg Motor Devices Co	Astor
Van Sicklen Co.	Biltmore
Veeder Mfg. Co	Belmont and McAlpin
Voorhees Rubber Mfg. Co	Broadway Central
Willard Storage Battery Co	McAlpin
White & Bagley Co	Knickerbocker

A Directory of Automobile Makers

HEREWITH appears a tabulation of the 1915 lines of 117 automobile manufacturing companies, an analysis of which brings out the concentration of production gradually being adopted. That is, of the 117 companies, fifty-eight are making one chassis only; forty are building two chassis; fifteen have three chassis; and only two are manufacturing four and five chassis.

There are two eight-cylinder models listed for 1915, one maker dropping all other models and the other continuing a four. There are sixty-eight builders of sixes, thirty-one of whom make this type only. Eighty-four companies are listed as manufacturing four-cylinder cars, forty-six of them making fours only. Thirty-six concerns are including both four- and six-cylinder chassis in their lines. There is one two-cylinder.

Of the six-cylinder car builders, forty-five have one model only, nineteen have two, three have three chassis and only

Car Name	Name of Maker	Address	No. Chassis Models	Six-Cylinder	Four-Cylinder	Right Drive	Left Drive	Worm Drive	Wire Wheels	Electric Crankers	Air Crankers	Body Types and Seating Capacity						
												Roadsters, 2&3	Touring 4	Touring 5	Touring 6	Touring 7	Ccupes	Large Incl. Cars
A																		
Abbott-Detroit	Abbott Motor Car Co	Detroit, Mich	3	1	2	2	1			3		1		2		2		
Allen	Allen Motor Company	Fostoria, Ohio	1		1		1			1		1		1				
Apperson	Apperson Bros. Auto Co	Kokomo, Ind	5	4	1		5			5		1		2		2		
Arbenz	Arbenz Car Company	Chillicothe, Ohio	1		1	0				1		1		1				
Argo	Argo Motor Company	New York, N. Y	1		1		1		1			1						
Auburn	Auburn Automobile Co	Auburn, Ind	3	2	1		3			3		3		1	2			
Austin	Austin Automobile Co	Grand Rapids, Mich	1	1			1			1		1			1	1		3
B																		
Bauer	Bauer Machine Works Co	Kansas City, Mo	1		1		1			1		1		1				
Briscoe	Briscoe Motor Car Co	Jackson, Mich	1		1	0			0	1		1		1			1	
Buick	Buick Motor Company	Flint, Mich	3	1	2		3			3		3		2		1		
C																		
Cadillac	Cadillac Motor Car Co	Detroit, Mich	1		*		1			1		1		1		1	1	4
Cartercar	Cartercar Company	Pontiac, Mich	1		1	1				1		1		1				
Case	J. I. Case T. M. Co	Racine, Wis	3		3	1	2			3				3		1		
Chadwick	Chadwick Eng. Works	Pottstown, Pa	2	2		2				2		1		1		1		1
Chalmers	Chalmers Motor Company	Detroit, Mich	2	2			2			2				2		2	1	2
Chandler	Chandler Motor Company	Cleveland, Ohio	1	1			1			1				1				2
Chevrolet	Chevrolet Motor Company	Flint, Mich	2		2		2			2		1		1				
Cole	Cole Motor Car Company	Indianapolis, Ind	3	2	1		3			3		2	1			2	3	
Corbitt	Corbitt Automobile Co	Henderson, N. C	1		1	1				1			1	1				
Crawford	Crawford Automobile Co	Hagerstown, Md	1	1			1			1		1		1				
Crow-Elkhart	Crow Motor Car Company	Elkhart, Ind	3	1	2	3				3		3	2	3	2			
Cunningham	Jas. Cunningham Son & Co	Rochester, N. Y	1		1		1			1						1		2
Cycleplane	Cycleplane	Westerly, R. I	2	**	1	***	1		2			3						
D																		
Davis	Geo. W. Davis Carriage Co	Richmond, Ind	2	1	1		2			2		1		2	1			
Detroiter	Briggs-Detroiter Co	Detroit, Mich	1		1		1			1				1				
Dile	Dile Motor Car Co	Reading, Pa	1		1		1		1			1						
Dodge	Dodge Brothers	Detroit, Mich	1		1		1			1				1				
Dorris	Dorris Motor Car Co	St. Louis, Mo	1		1		1			1				1		1		2
E																		
Empire	Empire Automobile Co	Indianapolis, Ind	1		1	1				1		2		2				
Enger	Enger Motor Car Co	Cincinnati, Ohio	1	1			1			1		1				1		
F																		
Fiat	Fiat Automobile Co	Poughkeepsie, N. Y	2	1	1	2			0	2		4		2		2		6
Firestone-Columbus	New Columbus Buggy Co	Columbus, Ohio	2	1	1		2			2		1		2		1		
Ford	Ford Motor Company	Detroit, Mich	1		1		1					1		1			1	2
Franklin	H. H. Franklin Mfg. Co	Syracuse, N. Y	1	1			1			1		1		1			1	2
F. R. P	F. R. P. Motor Company	Port Jefferson, L. I	1		1	1			1	1								
G																		
Glide	Bartholomew Company	Peoria, Ill	1		1		1			1		1		1				
Grant	Grant Motor Company	Detroit, Mich	2	1	1		2		1	2		2		1				
Great Western	Great Western Auto Co	Peru, Ind	2		2	1	1			2		2	2	1	1		1	2
H																		
Haynes	Haynes Automobile Co	Kokomo, Ind	3	2	1		3			3		1	1	3			2	
Herff-Brooks	Herff-Brooks Company	Indianapolis, Ind	2	1	1		2			2		2		2				
Herreshoff	Herreshoff Light Car Co	Troy, N. Y	1		1		1		1	1		1						
Hudson	Hudson Motor Car Co	Detroit, Mich	2	2			2			2		1					1	7
Hupmobile	Hupp Motor Car Co	Detroit, Mich	2		2	1	1			2		2		2				
I																		
Imperial	Imperial Automobile Co	Jackson, Mich	2	1	1		2			2				1		1		
Inter-State	Inter-State Auto. Co	Muncie, Ind	1		1		1			1				1				
J																		
Jackson	Jackson Automobile Co	Jackson, Mich	2	1	1		2			2		1		2				
Jeffery	Thos. B. Jeffery Co	Kenosha, Wis	3	2	1		3	1		3		2		2		1		4
K																		
Kearns	Kearns Motor Truck Co	Beavertown, Pa	1		1	0				1		2						
King	King Motor Car Co	Detroit, Mich	2	*	1		2			2		1		2				1
Kissel	Kissel Motor Co	Milwaukee, Wis	4	3	1		4			4		3		5		3		5
Kline	Kline Motor Car Corp	Richmond, Va	2	2			2			2		1	1	1		1		
Krit	Krit Motor Car Co	Detroit, Mich	2		2		2			2		2		2				1
L																		
Lambert	Buckeye Mfg. Co	Anderson, Ind	2		2	1	1			2		1		2				
Lenox	Lenox Motor Company	Boston, Mass	2	1	1		2		0	2				2				
Lewis	L. P. C. Motor Co	Racine, Wis	1	1			1			1		1			1			
Lexington	Lexington-Howard Co	Connersville, Ind	2	2			2			2		2		1	1	1		2
Locomobile	Locomobile Co. of Amer	Bridgeport, Conn	2	2			2		0	2		2	1	1	1	1		6
Luverne	Luverne Automobile Co	Luverne, Minn	1	1			1			1						1		

*1 Eight-cylinder chassis. **1 Two-cylinder chassis. ***1 Center drive. O—Optional.

one has four. Among the four-cylinder makers, sixty-eight have but one chassis model, fourteen have two and two companies have three.

Eighteen concerns still make right-drive models, four of them having two models with this type of steering, while two have three chassis and one five. The remaining eleven have one chassis each with right drive. Left drive, on the other hand, is used by ninety-eight makers. Four concerns build cars with each type of drive. There is one car with center drive and with eight companies right or left drive is optional.

Three firms use worm drive and fourteen fit wire wheels, which are optional with seven. Electric crankers are used by 106, air by two, mechanical by one; with two the system is optional, and two have none.

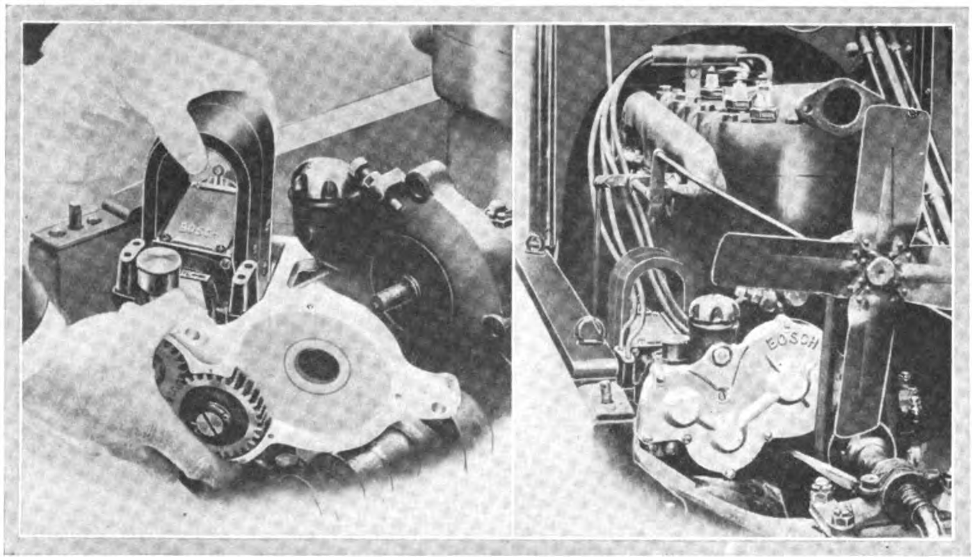
As regards bodies, there are ninety-two companies including two-passenger roadsters in their lines, twenty having two models of this type, nine having three and one each four and five. Fifteen of the companies make four-passenger touring cars, five having two models, one three and the rest but one. Eighty-five build five-passenger types, twenty-six making two models, seven listing three, one five and the other fifty-one making but one. Twenty firms include six passenger bodies. Seventeen are building coupés and thirty-nine are listing large inclosed models.

Car Name	Name of Maker	Address	No. Chassis Models	Six-Cylinder	Four Cylinder	Right Drive	Left Drive	Worm Drive	Wire Wheels	Electric Crankers	Air Crankers	Body Types and Seatinc Capacity						
												Roadsters, 2&3	Touring 4	Touring 5	Touring 6	Touring 7	Coupes	Large Incl. Cars
Lyons-Knight	Lyons-Atlas Company	Indianapolis, Ind.	1		1		1	1		1				1		1		2
M																		
Maxwell	Maxwell Motor Co.	Detroit, Mich.	1		1		1			1		1		1				
McFarlan	McFarlan Motor Co.	Connersville, Ind.	2	2			2			2	2	2	2	2	2	2		
McIntyre	W. H. McIntyre Co.	Auburn, Ind.	2	1	1	1	1			2				2				
Meteor	Meteor Motor Car Co.	Shelbyville, Ind.	2	1	1		2			2				2				
Metz	The Metz Company	Waltham, Mass.	1		1		1			1		1						
Mitchell-Lewis	Mitchell-Lewis M. C. Co.	Racine, Wis.	4	3	1		4			4		3		3	3	1		
Moline-Knight	Moline Automobile Co.	East Moline, Ill.	1		1		1		0	1		1				1		2
Marmon	Nordyke & Marmon Co.	Indianapolis, Ind.	2	2			2			2		1	1	1		2		3
Monarch	Monarch Motor Car Co.	Detroit, Mich.	1	1			1			1				1		1		
Moon	Moon Motor Car Co.	St. Louis, Mo.	2	1	1		2			2		2		1	1			
Morse	Morse Motor Car Co.	Brookline, Mass.	1		1	1				1		1		1		1		
N																		
National	National Motor Veh. Co.	Indianapolis, Ind.	1	1			1			1		1		1	1		1	3
Norwalk	Norwalk Motor Car Co.	Martinsburg, W. Va.	1	1			1			1		1	1		1			
O																		
Oakland	Oakland Motor Car Co.	Pontiac, Mich.	2	1	1		2			2		1		1		1		
Oldsmobile	Olds Motor Works	Lansing, Mich.	2	1	1		2			2		1		1		1		
Overland	Willys-Overland Co.	Toledo, Ohio	3	1	2		3			3		2		2		1	1	
Owen	R. M. Owen & Co.	Toledo, Ohio	1	1			1		0	1		1				1		
P																		
Packard	Packard Motor Car Co.	Detroit, Mich.	2	2			2			2		2			2	2	2	14
Paige-Detroit	Paige-Detroit M. C. Co.	Detroit, Mich.	1	1			1			1		1				1		
Partin-Palmer	Partin Mfg. Company	Chicago, Ill.	2		2		2			2		1			1			
Paterson	W. A. Paterson Co.	Flint, Mich.	2	1	1		2			2				2				
Pathfinder	Motor Car Mfg. Co.	Indianapolis, Ind.	1	1			1			1		1				1		
Peerless	Peerless Motor Car Co.	Cleveland, Ohio	3	2	1	0	2			3		3		2		1		10
Peter Pan	Randall Company	Norfolk Downs, Mass.	1		1		1			M		1	1					
Pierce-Arrow	Pierce-Arrow Motor Car Co.	Buffalo, N. Y.	3	3		3				3		3	3	3		2	3	4
Pilot	Pilot Motor Car Co.	Richmond, Ind.	2	2		0	1			2		2		2		2		1
Pratt	Elkhart Car. & Harn. Mfg. Co.	Elkhart, Ind.	2	1	1		2			2		2	2	2		1		
Premier-Weidely	Premier Motor Mfg. Co.	Indianapolis, Ind.	1	1			1			1		1		1		1		
Pullman	Pullman Motor Car Co.	York, Pa.	2	1	1		2		1	2		2		2		1		3
R																		
Rayfield	Rayfield Motor Co.	Chrisman, Ill.	1		1		1		1	N		1						
R-C-H	R-C-H Corporation	Detroit, Mich.	1		1	0				1				1				
Regal	Regal Motor Car Co.	Detroit, Mich.	1		1	0				1		1		1				
Remington	Remington Motor Co.	New York, N. Y.	1		1		1			1		1		1				
Reo	Reo Motor Car Co.	Lansing, Mich.	3	1	2		3			3	1							
Republic	Republic Motor Car Co.	Hamilton, Ohio	1	1			1			1				1		1	1	
S																		
Saxon	Saxon Motor Company	Detroit, Mich.	2	1	1		2		1			1		1				
Scripps-Booth	Scripps-Booth Company	Detroit, Mich.	1		1		1		1	1		1					1	1
S. G. V.	S. G. V. Company	Reading, Pa.	1		1		1			1		1		1				5
Simplex	Simplex Automobile Co.	New Brunswick, N. J.	2		2	2				2								
Singer	Singer Motor Company	Long Island City	1	1			1		0	1		1		1				
Spaulding	Spaulding Mfg. Company	Grinnell, Iowa	1		1		1			1				1				1
Speedwell	Speedwell Motor Car Co.	Dayton, Ohio	1	1			1			1						1		
Sphinx	Sphinx Motor Company	York, Pa.	1		1		1			1				1				
Stearns	F. B. Stearns Company	Cleveland, Ohio	3	1	2		3			3		2	2	3	2	2		6
Stevens-Duryea	Stevens-Duryea Company	Chicopee Falls, Mass.	2	2			2			2		1		1		1		7
Studebaker	Studebaker Corporation	Detroit, Mich.	2	1	1		2			2		1		2		1		
Stutz	Stutz Motor Car Co.	Indianapolis, Ind.	5	2	3	5				5		5			2			3
T																		
Touraine	Touraine Company	Philadelphia, Pa.	2	2			2			2		1		1		1	1	1
Trumbull	American Cyclecar Co.	Bridgeport, Conn.	1		1	0			1	1		1					1	
Twombly	Twombly Car Corp.	New York, N. Y.	1		1		1	1	1	0	0	1						1
V																		
Velie	Velie Motor Vehicle Co.	Moline, Ill.	3	2	1		3			3			1	3	1			4
Vixen	Davis Mfg. Company	Milwaukee, Wis.	1		1		1			N		1						
Vulcan	Vulcan Mfg. Company	Painesville, Ohio	1		1	1			1	1				1				
W																		
Westcott	Westcott Motor Car Co.	Richmond, Ind.	2	1	1		2			2		2		1	1			1
White	White Company	Cleveland, Ohio	3	1	2		3			3				1		3		4
Willys-Knight	Garford Company	Elyria, Ohio	1		1		1		1	1		1		1				
Winton	Winton Motor Car Co.	Cleveland, O.	1	1			1			0		1		1	1	1		5
Z																		
Zimmerman	Zimmerman Mfg. Co.	Auburn, Ind.	1	1												1		

M—Mechanical. N—None. O—Optional.

Gear-Driven Bosch Magneto for Ford

NU4 Magneto Used—Placed on Right—Price Lower



Left—Bosch outfit in process of installation on Ford. Right—Bosch outfit in place

A NEW magneto attachment for Ford cars has been brought out by the Bosch Magneto Co., 223 West Forty-sixth street, New York City. It is gear driven, is placed on the right side, incorporates an NU4 magneto, and the price is $48 in contrast with the older Ford ignition system in which chain drive is used, the magneto is situated on the left side, the instrument is a DU4 and the price is $58. The development of the new outfit was in response to a demand for a gear-driven instrument which might be placed on the right side of the motor.

The magneto which is supplied with the attachment was described in the September 24, 1914, issue of THE AUTOMOBILE and is the same as that fitted to the new model 80 Overland cars. It differs from the usual Bosch high-tension machine, in that it has no distributer, properly speaking, the high and low-tension windings being entirely insulated from each other. The breaker box mechanism is similar to other Bosch machines, however. The two ends of the secondary winding are connected to the two metal segments located on the double slip ring mounted on the armature.

Bearing against the double slip ring are two pairs of brushes, each brush being connected to a spark plug wire. As the armature shaft rotates the segments form a contact in turn with each of the four brushes sending the spark to each plug in turn.

In making the installation the first procedure is to drain the cooling system and remove the radiator. Then the timer case is discarded. The driving gear is attached to the crankshaft and the new timing gearcase which carries the magneto is put in place.

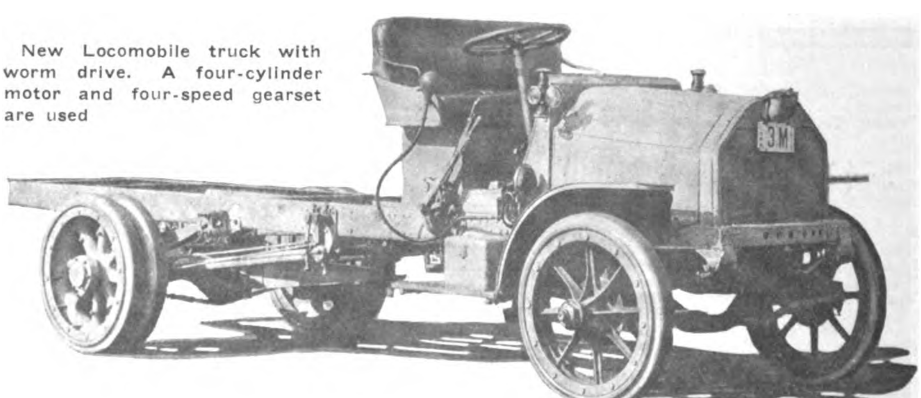
Worm Drive on New Locomobile 3 and 4-Tonners

BRIDGEPORT, CONN., Dec. 29—The Locomobile Co., of this city, has added to its line of chain-driven trucks two new models, a 3-ton and a 4-ton, both worm-driven types, these models marking the entry of this company into the worm drive field. Both models are practically alike in every respect excepting that in the 4-ton heavier rear tires and heavier rear springs are used. The designs have been on the road undergoing tests for practically 2 years and at the present time the company is working full capacity on a production of 1,200 for next year. The first lot of 500 is at present going through the factory, and by March 1 it is estimated that production will be thirty to thirty-five vehicles a week.

Both of these new worm-driven types differ from the previous 5 and 6-ton chain-driven types in that the worm drive models have the motor under a hood with the driver's seat in rear, as compared with the motor being located under the seat in the larger chain-driven types. Throughout the new models the same grade of material is used as employed in the Locomobile passenger cars, nickel and chrome nickel steel finding places in many parts of the trucks, including alloy steel springs.

Both models use a four-cylinder motor 4 1-4 by 6, and drive through a four-speed gearset with 1 1-4 inch gears.

The new axle design has a housing made up of steel casting housing the differential and worm and worm wheel. The worm is mounted above the wheel and is a quadruple, straight-thread type. On each model, two reductions are given, one 8 3-4 to 1, the other 10 to 1, and the engine governor is set so that using the 8 3-4 to 1 ratio the truck speed is 14 miles. There are two wheelbase lengths, 150 and 186 inches. On the 3-ton tires are 36 by 5 with rear duals. On the 4-ton fronts are 36 by 5 and the rears 36 by 6 duals.



New Locomobile truck with worm drive. A four-cylinder motor and four-speed gearset are used

Friction Disks in New Hartford Absorber

Frictional Resistance Proportional to the Severity of the Shock—Adjustable to Different Cars

THE distinguishing feature of the new shock absorber that has just been put on the market by the Hartford Suspension Co., Jersey City, N. J., is that it automatically proportions its own frictional resistance to the severity of the road shocks. In one respect it resembles a multiple-disk clutch in that the friction element consists of five steel disks and six brass disks, alternately placed, the whole being held under spring compression in a housing which carries the two arms which connect with the frame and axle of the car. One of these arms is fastened to the brass disks and the other to the steel ones.

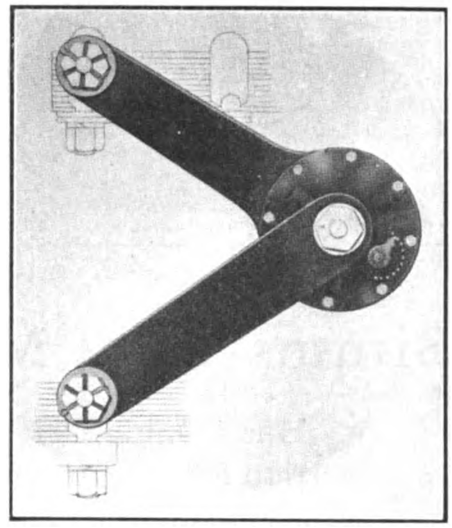
The progressive action, which is the feature of the new device, is obtained by so designing the device that a small movement causes only two brass disks and a steel disk in between to offer frictional resistance. A further movement brings in two more disks, and so on until the maximum movement brings all disks into play.

Referring to the accompanying illustration showing the shock absorber disassembled, it will be noted that the brass disks are bolted to the cover plates and the arm A.

The steel disks have internal lugs which engage corresponding flutes on the body of the center hub, the latter being rigidly attached to the arm, which is fastened to the car spring or axle, as the case may be.

However, the flutes on these disks are not all the same size, and this is how the progressive movement is obtained. There is only one steel disk that fits tight on the center hub. On the second steel disk the flutes are further apart and there is considerable play between the disk and the hub; on the next steel disk there is still more play, and so on, the fifth disk having the most play.

When the springs of the car are compressed only slightly, due to a minor road shock, the two arms of the shock absorber are brought closer together and this causes a partial revolution of the first steel disk between the brass ones on each side of it—the other steel disks are not brought into action because of the lost motion in the flutes. The friction due to the rotation of this steel disk between the two brass ones opposes the spring movement, absorbing the shock and preventing a quick rebound.

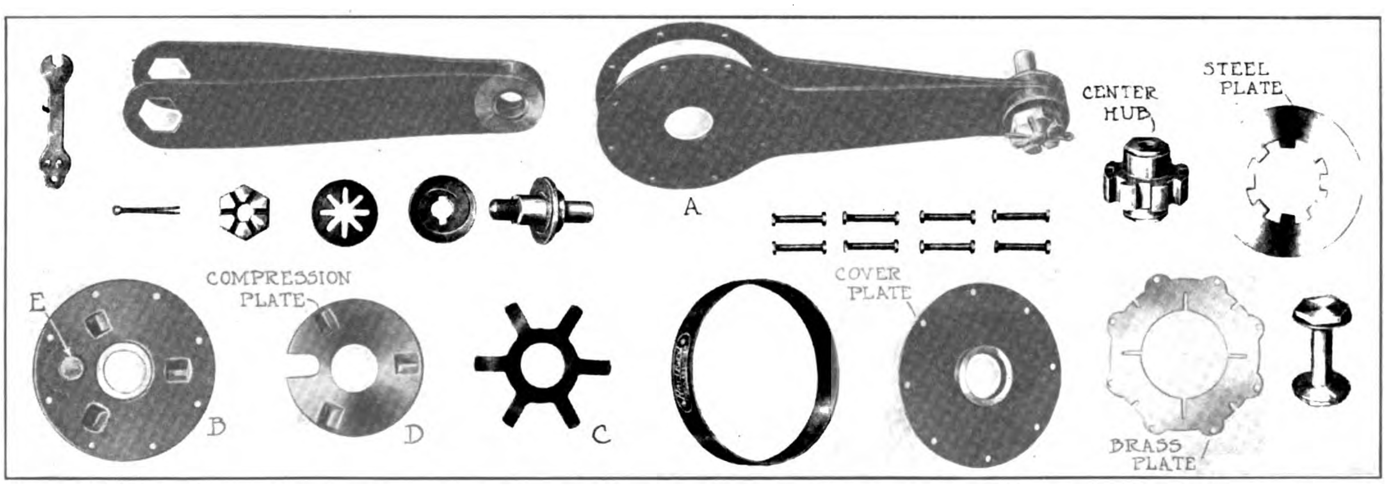


New Hartford shock absorber mounted on car

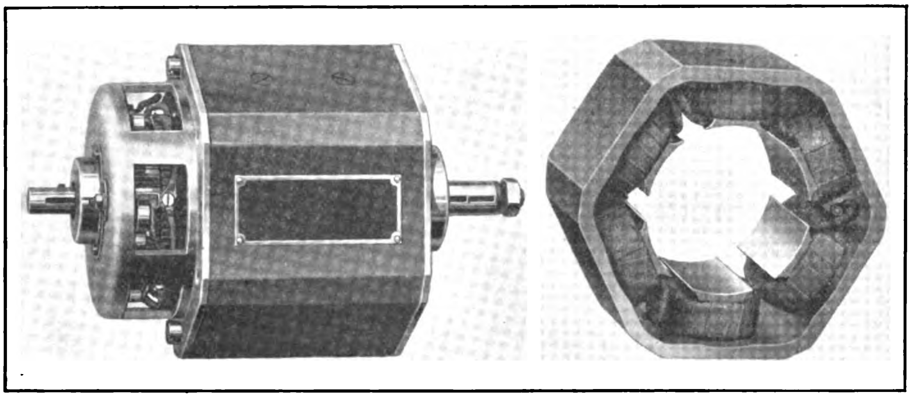
Under a heavier road shock, the first steel disk rotates between the brass ones on each side, but soon the movement is sufficient to take up the lost motion in the second steel disk and it rotates with the first one, thus there are now two steel disks and three brass ones in action. A shock which is still more severe will take up the lost motion in the third steel disk and then there will be three steel disks and four brass ones opposing their frictional resistance to the movement of the spring. Fourth and fifth disks operate similarly.

Progressively then with the increasing spring movements due to increasingly severe shocks the impact is taken up, first in three disks, then in five, then in seven, then in nine and finally in the full set, the frictional resistance automatically increasing with the magnitude of the spring movement as the varying clearances of the lugs on the steel disks are taken up by the flutes in the center hub. Progressively in the same way the rebound of the spring is opposed.

The frictional resistance between the disks may be adjusted to the peculiarities of the car or to meet the owner's preference. Between the cover plate B and the spring spider C is the compression plate D bearing on its exterior, three wedge-shaped elevations. On the interior of the cover plate B are three corresponding wedge-shaped depressions. The eccentric button E on the interior of B engages the slot seen in D. The adjusting wrench F fits over the indicator arm mounted on the stem of the eccentric E. By turning the eccentric the compression plate D is forced inward, thus compressing the spring and increasing the friction.



Hartford shock absorber showing different parts used in its makeup. Six brass disks are bolted to one arm and five steel ones are keyed to a hub attached to the other arm

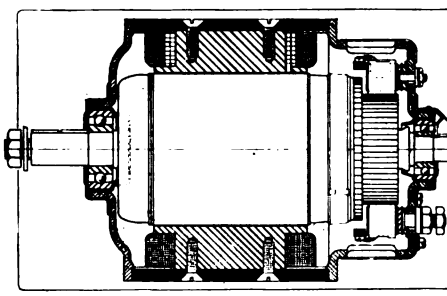


Left—Complete machine. Right—End covers removed showing six poles

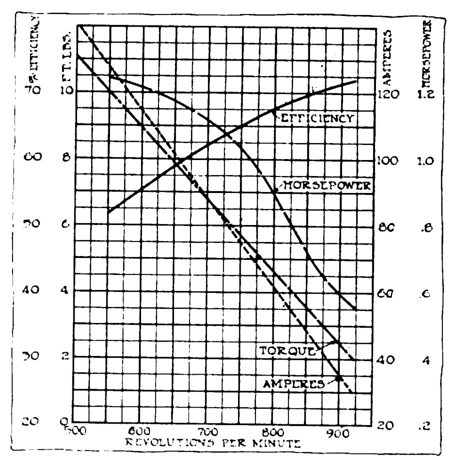
Simms-Huff Motor-Generator

Has Double Drive—Positive Connection for Starting and Belt for Lighting

A MOTOR-GENERATOR, known as the Simms-Huff, has been added to the line of the Simms Magneto Co., East Orange, N. J. The feature of the device is the use of a belt drive when the machine is operating as a generator, the slippage of the belt being used to adjust the output to the desired amount at any given speed. Voltage regulation is inherent and is obtained by opposing the series and shunt fields. Starter drive is optional. It may be through the flywheel or by chain to the crankshaft or through the timing gears. In any case an over-running clutch must be used. As a starting motor the device operates at 12 volts and as a generator at 6 volts. By the use of a 12-volt starting current the lock torque is stated to be 24 pounds although the complete instrument weighs but 30 pounds.



Pole and commutator construction



Performance curve showing efficiency, horsepower, torque and amperes plotted against revolutions per minute when the machine is operating as a motor

The features of the instrument include light weight, hexagonal shape to facilitate mounting, an unusual method of disposing of the armature windings and a unique type of brush holder which eliminates all but one wire. The unit is exceptionally compact yet accessibility has in no wise been sacrificed. All the mechanism that requires inspection: brushes, brush holders and commutator, may be exposed by the removal of a single metal casing which slips over the end.

In starting, all the cells in the battery are in series to give the required 12 volts but when the engine is running, the unit automatically becomes a generator and delivers 10 to 15 amperes to the battery at 6 volts pressure.

Series and Shunt Fields

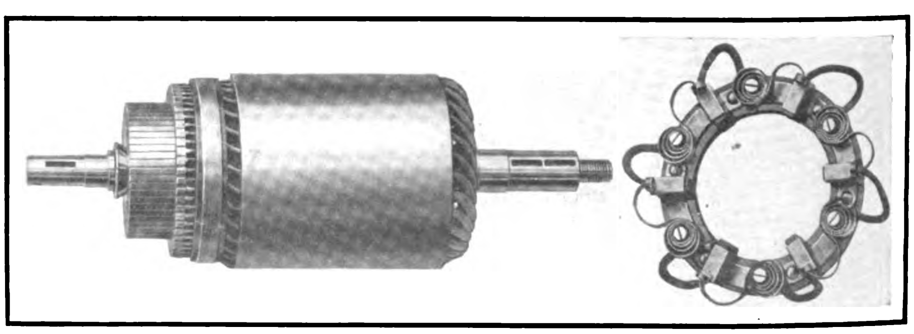
As previously noted, there are two windings, a series and a shunt, which add their magnetic strength when the machine is operating as a motor, but when the device operates as a generator the net field strength is the difference of the two fields and in this way the field strength is kept from rising with the speed, with the result that the voltage is maintained nearly constant. A charging rate of from 8 to 15 amperes at from 12 to 18 miles per hour may be obtained by simply varying the belt tension and allowing the armature to slip. If the ammeter registers less than 8 amperes at 12 miles per hour for instance it indicates that the belt should be tightened, a means for this process being provided in a slotted segment and set bolt on the fan support. It is pointed out that by this method of regulation the charging rate can be altered at will to correspond to changes in temperature and lighting load.

The starting switch is arranged to automatically make the necessary series connections at the battery for the starter and parallel connection for lighting. In addition there are two terminals which may be used for a battery circuit in the event of dual ignition being used.

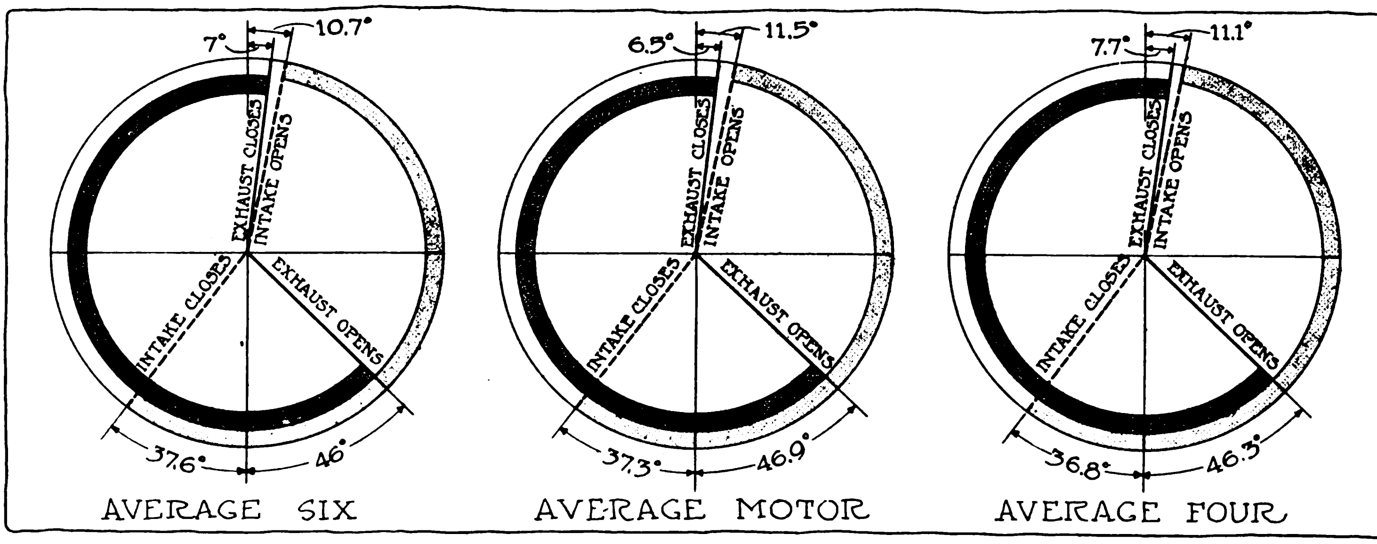
The cutout, which may be mounted on the dash, is of the usual reverse current relay type. It automatically connects the generator and battery when the charging current builds up to the proper strength. The brush holding mechanism is unusual in that all the wires with the exception of one have been eliminated by connecting each set of three brushes to a metallic ring, one of which is a permanent ground and the other, which is a single wire connection, going to the field winding. Thus six wires are done away with.

Holes Instead of Slots

The winding of the armature is another feature that is different from usual practice. Though it is of the drum wound type, the winding is passed through circular holes punched in the core laminations. The result is that the wires are thoroughly protected and cannot be thrown out by centrifugal force should the starting gear stick and cause the armature to rotate at excessive speed and additional surface is exposed to the action of the field. The system, which is at present used only by the Maxwell company, may be readily adapted to almost any other car.



Left—Armature showing how windings are passed through holes in the core instead of slots, thus giving a smooth exterior to the armature. Right—Simple brush construction



Left—Diagram of valve timing on the average six-cylinder motor. Center—Timing on the average motor, taking into consideration two-, four-, six- and eight-cylinder types. Right—Timing on the average four cylinder

Negative Lap Gains in Valve Timing

The Average Intake Remains Open Through 205.8 Degrees, While the Exhaust Is Open Through 233.4

VALVE timing has not under gone any radical revision since the models for 1914 were announced. Taking all the motors on the market and striking a general average of the timing the inlet valve would open at 11.5 degrees upper dead center and would close at 37.3 degrees past lower center. The exhaust valve would open at 46.9 degrees before lower center and would close at 6.5 degrees past upper center.

This average timing does not differ materially from the average timing for the 1914 motors when the intake opened at 11.2 degrees past upper center and closed at 35 degrees past lower center, and the exhaust valve opened at 50 degrees before lower center and closed at 9.3 degrees past upper center. A study of these two timings reveals that the intake on the 1915 motor opens at practically the same time as on the 1914 motor. There is a difference of .3 degree which, when considered in piston travel is so small as to be negligible. The inlet closes 2.3 degrees later. This is also a small difference and probably could not be detected on a testing dynamometer.

Exhaust Opens 3.1 Degrees Earlier

In exhaust valve timing practice the time of opening on the average motor is 3.1 degrees later on the 1915 motor than on the 1914. This is more significant as with the increase in the high-speed design it would be thought that there would be a trend in the opposite direction and that the designer would endeavor, in the light of the higher piston speeds, to let the gases out of the cylinder earlier, to be sure that the pressure in the cylinder would have fallen to atmospheric by the time that the piston reached the bottom of the stroke. The longer stroke is no doubt responsible.

Exhaust valve closing is earlier in 1915 motors than it was in 1914, by nearly 3 degrees. This is also a significant fact as the relation of the inlet opening to the exhaust closing, in other words the lap is considered the most important feature in laying out the valve timing. The negative valve lap has increased on the average motor from —1.9 degrees in 1914 to —5 degrees in 1915.

There are three conditions of valve lap used in timing practice: negative, zero and positive. The decided trend is towards the use of a negative lap, that is one in which the closing of the exhaust does not lap over the opening of the intake. In 1914, 66.6 per cent. of the motors had negative lap. For 1915, 69 per cent. are using the negative lap. Zero lap, in which the inlet valve opens at the same time that the exhaust valve closes was used on 11.9 per cent. in 1914, it is used on 19.3 per cent. in 1915. Positive lap where intake and exhaust valves remain open together during the year has fallen off from 21.5 per cent. to 11.7 per cent.

The three conditions of negative zero and positive lap in valve timing give rise to definite sets of conditions in the cylinder. With negative lap, which is the general condition, the exhaust valve closes an appreciable period before the inlet opens. This permits the piston to descend slightly on the suction stroke before the inlet valve opens, thus creating a vacuum in the combustion space. When the inlet valve opens the rush of gases into the cylinders is accentuated by the fact that they are entering a partial vacuum.

With zero lap there is no vacuum in the cylinder at the time of the inlet valve opening, theoretically speaking. The inlet gases are drawn directly by the piston which has generally started on its downward stroke, except in such cases where the position of zero lap is on upper dead center.

With positive lap, both exhaust and inlet are open together for the period of the lap. The theory of this timing arrangement is that the inertia of the exhaust gases passing through the exhaust port is sufficiently great to create a partial vacuum in the combustion space. This aids the intake in the same manner as the negative lap would do. Owing to the condition that the exhaust and inlet gases should not conflict in their direction with positive lap, it is generally used on T-head motors. The falling off in percentage of T-heads is doubtless in some degrees responsible for the falling off in the percentage of those using positive lap.

The motors using zero lap are Abbott, Buda, Cadillac eight, Case, Chalmers, King eight, Continental, Herschell-Spillman, Kline, Lexington, Lyons-Knight, McFarlan, Maxwell, Metz, National, Pratt, Premier, Saxon, Teetor and Vulcan. The point of inlet valve opening and exhaust valve closing on cars using the zero lap varies through a wide range. Cadillac, King and Case are examples of where makers have found it wise to open the inlet and close the exhaust on upper dead center. The latest timing for the zero lap is on the Saxon where the coinciding valve time falls at 12 degrees past upper center. The use of the upper dead center on the Cadillac is interesting as it is the first clue as to the timing requirements of an eight.

Those who still adhere to the positive lap are Auburn, Briscoe, Coey, Cunningham, Dorris, Franklin, Herff-Brooks, Locomobile, Paige, Simplex and Overland. It is interesting to note that three of these, Cunningham, Dorris and Franklin are overhead motors.

The greatest positive lap used on any car is in the Locomobile. This concern keeps both the exhaust and intake open during a period of 16 degrees and 27 minutes. Closely following this is Simplex which has an overlapping period of 16 degrees and 26 minutes. The smallest overlap is 5 degrees which is used on Briscoe, Dorris and Herff-Brooks motors.

The question as to whether the average timing for the four would vary much from that of the six can be answered in the negative. The timing diagrams at the head of page — bring out the small difference very clearly. On the six the inlet opens at 10.7 degrees past upper center and closes at 35.6 degrees past lower center. On the four it opens at 11.1 degrees before upper center and closes at 36.8 degrees past lower center. The difference of .4-degree on inlet opening and 1.2-degree on inlet closing would never be noticed in piston travel and would hardly make the difference of the thickness of a center-punch mark on the flywheel.

In exhaust valve practice the difference is also too small to be noticed. The exhaust on the average six opens at 46 degrees before lower center and on the average four is within .3 degree at 46.3. The difference in the points of exhaust closing is also less than a degree, being 7 degrees after top center on the six and 7.7 on the four.

Valve Timing of American Motors

Name	Model	Cyls.	Bore	Stroke	Inlet Ops. Deg. Past Top Center	Inlet Cls. Deg. Past Bot. Center	Exh. Op. Deg. Bef. Bottom Center	Exh. Clos. Deg. Aft. Top Center
Abbott	F-P	6	3¾	5¼	10	28	40	2.5
	L	4	4½	5½	17	29	42	8
	K	4	4⅛	5¼	11	44	45	11
Allen	33	4	3⅝	5	15	40	45	10
	34	4	3⅝	5	15	40	45	10
	35	4	3⅝	5	15	40	45	10
	40	4	4⅛	5	15	40	45	10
Alter Car	BB-31	4	3¾	4¼	10	40	50	6
Argo		4	2 5/16	4	26	4	40	5
Auburn	36	4	3¾	5	21	30	44	10
	6-40	6	3½	5	21	39	43	12
	6-47	6	3¾	5¼	17	47	50	13
	43	4	4½	5	5–30	36	71	15
Beaver	K	4	2¾	4	10	35	55	5
	ML	4	3½	5	10	30	45	5
	6A	6	3¾	5	10	25	38	8
	6B	6	4	5	10	25	38	8
	4A	4	3¾	5	10	25	38	8
	4B	4	4	5	10	25	38	8
	E	4	4¾	5½	10	35	42	8
	N	6	3½	5	10	30	45	5
Briggs	C	4	3½	5	5	25	25	2.5
Briscoe	A	4	3⅛	5⅛	0	45	47	5
Buda	M	4	3¾	4½	15	33	53	12½
	O	4	4⅛	5½	5	45	55	5
	T	4	4¼	5½	5	45	55	5
	Q	4	3¾	5½	5	45	55	5
	OM-3	4	4⅛	5½	5	45	55	5
	TM-3	4	4¼	5½	5	45	55	5
	QM-3	4	3¾	5½	5	45	55	5
	OU	4	4⅛	5½	5	45	55	5
	TU	4	4¼	5½	5	45	55	5
	QU	4	3¾	5½	5	45	55	5
	R	4	3½	5⅛	5	45	55	5
	RU	4	3½	5⅛	5	45	55	5
	V	4	3⅛	5⅛	5	45	55	5
	VU	4	3⅛	5⅛	5	45	55	5
	SS	6	3¾	5½	5	45	55	5
	SSU-3	6	3¾	5½	5	45	55	5
	SSU-4	6	3¾	5½	5	45	55	5
	LS	6	3½	5⅛	5	45	55	5
	LSU	6	3½	5⅛	5	45	55	5
Buick	C-24, C-25	4	3¾	3¾	16–11′	35–41′	56–19′	13–11′
	C-36, C-37, C-54, C-55	4–6	3¾	5	14–5′	36–25′	56–51′	11–29′
Cadillac	8	8	3⅛	5⅛	0	46–40′	46–40′	0
Cartercar	9	4	3½	5	15	38	45	10
Case	40	4	4½	5¼	13	30	50	13
	35	4	4¼	5½	0	30	45	0
	25	4	3¾	4¼	10	30	40	5
Chadwick	19	6	5	6	18	85	75	0
Chalmers	26B	6	3½	5½	12	33	55	12
	29	6	4	5½	12	33	55	12
Coey	A	4	2¾	4	6	38	44	10
Cole	Stand. Four	4	4¼	5¼	15	38	45	10
	Light Six	6	3½	5	15	38	45	10
	Big Six	6	4¼	5¼	15	38	45	10
Continental	6F, 6A, 6-C, 6-N, 6-P	6	....	....	10	28	40	2-30′
	C-R	4	....	....	11–30	44–12′	45–48′	11–30
	E.J.N.T.	4	....	....	17–53′	29–25′	42–36′	8–20′
Corbitt	F	4	3¾	5¼	12–42′	44–12′	45–48′	11-30′
Crescent		4	4	6	12	35	50	5
		6	4	6	12	35	50	5
Cunningham	R	4	4¾	5¼	10	50	50	20
Cycleplane	Tourist	4	2½	4	Hermann Motor			
	Roadster	4	2½	4	Hermann Motor			
	Traveler	2			Spacke Motor in 14, but not as yet decided for 15.			
Davis	SB	4	2¾	4	10	35	55	5
	MB	2	5¼	4	10	27	47	5
	FA	4	4⅝	6¾	10	30	47	5
	Y	4	5	6½	10	30	47	5
Dayton	....	....	....	....	10	24	45	5
De Luxe	V	2	3.50	3.67	6	32	42	6
Dile	A	4	2⅝	4	15	37	60	On center
Dispatch	Roadster D	4	3¾	5	15	55	45	10
	Touring G	4	3¾	5	15	55	45	10
	Coupe H	4	3¾	5	15	55	45	10
	Convertible N	4	3¾	5	15	55	45	10
	Express L	4	3¾	5	15	55	45	10
Dorris	1-A-4	4	4⅜	5	10	30	45	15
Empire	31-40	4	3¾	4½	15½	35	38	12
Falls	B	4	4½	5	20	30	40	12
	C	4	4 1/16	4½	15	33	53½	12
	F-1	4	3¾	5	15	33	53½	12
	F-2	4	4	5	15	33	53½	12
Farmer	A	4	3¾	4	12	38	44	6
	B	6	3¼	4½	15	30	38	3
Ford	T	4	3¾	4	12	50	37	Closes on top
Franklin	6-30	6	3⅝	4	8	33	51½	17
Glide	30	4	3.5	5	15	38	45	10
Golden-Belknap & Swartz Co.	A	4	3⅛	3⅜	10	40	50	6
	B-25	4	3½	4¼	10	40	50	6
	B-31	4	3¾	4¼	10	40	50	6
	C	4	3¼	3¾	10	40	50	6
	D	4	3¼	4¼	10	40	50	6
	E	4	3¾	4¼	10	40	50	6
	F	4	3¾	4¼	10	40	50	6
Grant	M	4	2¾	4	15	40	45	10

Timing of American Motors—Continued

Name	Mode	Cyls.	Bore	Stroke	Inlet Ops. Deg. Past Top Center	Inlet Cls. Deg. Past Bot. Center	Exh. Op. Deg. Bef. Bottom Center	Exh. Clos. Deg. Aft. Top Center
Gt. West	50	4	4¼	5¼	10	25	45	5
	Carter	4	3¾	5¾	42	46	50	Dead center
Haynes	30	4	3¾	5	5	35	47	2
	31	4	4¼	5¼	5	35	48	3
	32	4	4½	5½	5	35	48	3
Hazard	C	4	3¾	4¼	11	35	45	3
	CX	4	4	4½	11	35	45	3
	D	4	4¼	6	14	30	44	8
Herff-Brooks	4-40	4	4½	5	On top cent.	34	50	5
	6-50	6	4	4½	"	34	50	5
Herschell	4404-A	4	3¾	4⅝	14½	40	44½	10
	4402-J	4	4½	5½	2	40	45	On center
	4403-N	4	4½	5½	8	Before 45	45	8
	4401-J	4	4⅞	5¼	2	40	45	Center
	4301-E	6	4⅞	5½	2	40	45	Center
	4001-M	6	4	5	8	40	45	Center
	4101-S	6	4	5½	8	Before 45	45	8
	4405-C	4	5¾	6	2	40	45	Center
	4201-B	6	5¾	6½	2	40	45	Center
	6201	4	6¼	8	2	40	45	Center
	6301	6	6½	8	2	40	45	Center
Hupmobile	K	4	3¾	5¼	11	43	38	6
	H	4	3¼	5½	25	35	40	20
Jackson	Olympic, 46	4	4¼	5¼	15	38	45	10
	48-Six	6	3½	5	15	38	45	10
Jeffery	93-2	4	3¾	5¼	18	46	47	15
	104	6	3	5	15	50	45	10
	106	6	3¾	5¼	18	46	47	15
King	C	4	3 15/16		9-43′-40″	30-38′-20″	32-10′-20″	5
Kline	6-42, 5-pass.	6	3¼	5¼	5	45	55	5
	6-42 A, 7-pass	6	3½	5⅛	5	45	55	5
Krit	O	4	3¾	4	8	31½	39	2
	M	4	3¾	4	8	31½	39	2
L.P.C. Lewis	Six	6	3½	6	15	32	39	10
Lex.-Howard	6M	6	4¼	5¼	10	28	40	2½
	6L	6	3¼	5	10	28	40	2½
	4K	4	3⅞	5¼	10	20	44	10
Locomobile	R-4, 38 H.P.	6	4¼	5	Top cent.	46-22	50-52′	16-27′ Aft. bot. cent.
	M-5, 48 H.P.	6	4½	5½	Top cent.	48-30′	56-10′	15-39′
Lyons-Atlas	K-4	4	4½	5½	5	36	63	5
McFarlan	T	6	4	6	10	32	47	10
	X	6	4½	6	10	32	47	10
Marmon	41	6	4¼	5½	19	40	56	12
	48	6	4½	6	16	40	56	12
Mason	Z	4	4	5	15	35	45	11
Maxwell	25	4	3⅝	4½	6	32	43	6
Metz	22	4	3¾	4	7	40	44	7
Moline	New Series	4	4	6	20	50	50	5
Morse	B	4	4¾	5	12	35	70	10
	C	4	4⅝	5	12	35	70	10
	D	4	4⅝	5	12	35	70	10
Moyer	B & E	4	4¼	5	1 7/32*	6 1/16*	6⅞*	1 17/32*
	G & H	6	4½	5	1 7/32	6 1/16	6⅞	1 17/32
National	AA	6	3¾	5¼	5	45	55	5
Northway	39	4	4¼	5½	15	38	45	10
	40	6	4¼	5½	15	38	45	10
	47	4	3½	5	15	38	45	10
	49	6	3½	5	15	38	45	10
	30	4	3	4½	15	38	45	10
Oakland	37	4	3½	5	15	38	45	10
	49	6	3½	5	15	38	45	10
Oldsmobile	42	4	3½	5	15	38	45	10
	55	6	4¼	5¼	15	38	45	10

Name	Model	Cyls.	Bore	Stroke	Inlet Ops. Deg. Past Top Center	Inlet Cls. Deg. Past Bot. Center	Exh. Op. Deg. Bef. Bottom Center	Exh. Clos. Deg. Aft. Top Center
Paige-Detroit	6-46	6	3½	5¼	10	28	40	2½
	4-36	4	4	5	11-20′	40-26′	51-18′	11-40′
Partin	20	4	3⅛	4	18-14′	52-28′	56-43′	12-55′
Paterson	4-32	4	3½	5	15	38	45	10
	6-48	6	3½	5	15	38	45	10
Peerless	48-6	6	4½	6	8-40′	30-21′	43-53′	3-55′
	54	4	3¾	5	17-53′	29-25′	42-36′	8-20′
	55	6	3½	5	17-53′	29-25′	42-36′	8-20′
Pittsfield		4	4¼	5¼	20	30	50	10
		4	2¾	4½	5	30	50	5
		6	3	5	10	30	50	5
Pratt	Six-cyl	6	3¾	5¼	10	28	45-48′	2¼
	50	4	4⅛	5¼	11-30′	44-12′	49	11-30′
Premier	A	6	3⅝	5½	10	40	40	10
Pullman	6-48	6	3¾	5¼	10	28	40	2½
R.C.H	K	4	3¼	5⅛	18-12′	52	35	11-30′
Regal	D	4	3¾	5	10	38¾	46¼	5
	D-1915	4	3¾	5	10	38¾	46¼	5
Remington	R	4	2¾	4½	10	7	22	3
Reo	R & S	4	4⅛	4½	17-46′	36-25′	53-18′	14-13′
Republic	F R	6	4½	5	15	30	45	10
	B	4	4¼	5	15	45	45	10
Rutenber	38	4	4⅛	5¼	15	50	50	10
	28	6	3¾	5¼	18	46	47	15
	27	4	3¾	5¼	18	46	47	15
	22	6	3	5	15	50	45	10
Saxon	B	4	2¾	4	12	45	55	12
Scripps	8	4	2⅞	4	18-53′	47-31′	43-25′	15-45′
Simplex	30 H.P.	4	4⅞	6½	10-59′	33-12′	56-52′	8-13′
	50 H.P.	4	5⅜	6½	13-40′	36- 4′	60	16-26′
	75 H.P.	4	5⅜	6½	On dead center	41-51′	66-24′	16-26′
Spaulding	H	4	4¼	5½	5	45	48	4½
Speedwell	Rotary	6	4⅛	5½	10 Before up dead center	30	46	1.6
Sphinx	A-15	4	3¼	5	3	35	45	5
Stearns	SK-4	4	4¼	5½	4	40	60	At center
	SK-6	6	4¼	5¾	4	40	60	At center
	SK-L4	4	3¾	5⅝	8	40	60	4
Studebaker	Six	6	3½	5	12-30′	32-30′	45	7-30′
	Four	4	3½	5	12-30′	32-30′	45	7-30′
	EC	6	3½	5	12-30′	32-30′	45	7-30′
	SD	4	3½	5	12-30′	32-30′	45	7-30′
Teetor-Hartly	AA	4	3.75	5.00	10	20	44	10
	BB	6	3.50	5.25	10	20	44	10
	C	4	3.875	5.375	10	20	44	10
	T	6	4.5	6.00	10	35	44	10
Trumbull	15-B	4	2⅞	4	10	24	45	5
Twombly	Town Car E.	4	2¾	4	....	....	....	....
Velie	15	6	3½	5	10	28	40	2½
	14	6	3¾	5¼	10	28	40	2½
	12	4	4⅛	5¼	7 Ahead	36	43	12
Vulcan	35	4	3½	5⅛	5	45	55	5
Westcott	0-30	4	3.5	5	15	38	45	10
Willys-Overland	80	4	4.125	4.500	8	38	46	15
	81	4	4.000	4.500	8	38	46	15
	82	6	3.500	5.250	10	28	40	2½
Winton	21	6	4½	5½	20-45′	35-30′	54-40′	15-30′
Wisconsin	A	4	4¼	5½	15	45	45	10
	B	4	4¼	5	15	45	45	10
	C	4	3¾	5	15	55	45	10
	D	4	5¼	7	15	45	45	10
	E	4	4	5	15	55	45	10
	F	6	4¼	5	15	30	45	10
	H	6	3¾	5½	15	35	55	5
	K	6	5¼	7	15	30	45	10
	M	4	5¾	7	15	45	45	10
	P	6	5¾	7	15	30	45	10

*Inches on flywheel.

1915—A 7-League Stride in Car Design

(*Continued from page* 1193)

per cent., use cantilever springs, and 45 per cent. of those using cantilevers drive through the spring. In plain figures, ten manufacturers out of 119 drive their cars through cantilever springs.

Analyzing first the method of taking the drive through the springs, there are two classes: those who employ the Hotchkiss drive, and those who do not. The Hotchkiss drive is that in which not only the forward propulsive thrusts are taken but in which the torque is also absorbed by the springs. Some of the cars which use the pure Hotchkiss drive are the Oakland, Imperial, Stearns, Apperson, Hudson, Haynes, Westcott, Empire, Cadillac and Mitchell. Those who use it favor it for its flexibility, primarily, and second for the saving in weight. This drive is not altogether new. Apperson had a car in the Savannah race of 1908 with this type of drive in connection with semi-elliptic springs. The way the springs are generally mounted on the Hotchkiss drive is to rigidly attach them to the rear axle with the front end secured by an unusually large bolt, through which the drive is transmitted. This bolt is of course securely anchored in a bracket, which is in turn riveted to the frame.

Spring Drive Flexible

There are advantages gained by the absence of several joints and shackles which are necessary with other types of drives. It is stated that it is bound to be quieter because it is more flexible and also that the car holds the road better with this drive. All companies using the drive advance practically the same reasons for its use, especially emphasizing the fact that the road shocks which would sometimes be communicated from the axle to the frame through stiff torque members are eliminated.

The amount of weight saved by using the Hotchkiss drive is estimated variously by different concerns. Oakland says 20 pounds, Imperial, on the other extreme, says 200 pounds. Between these figures there are Hudson, 50 pounds, and Haynes, from 25 to 50 pounds. Cadillac believes that the weight saved is the lower limit of 20 pounds. As regards the efficiency of the drive concerning slippage of the wheels, the general opinion is that there is no difference, although others believe differently, advancing as a reason that the taking up of the flexure in the springs eliminates slippage in starting and braking.

Cars which take the drive through the springs but the torque through other members state that they gain the advantage for flexibility in drive with the elimination of side sway and other strains. The big objection that those using the drive through the springs advance against the radius rods is the argument that these are apt to rattle. The fact that radius rods are used on 20 per cent. of the makes, however, would indicate that there are two well developed sides to this question which is still in the argumentive stage.

Many Using Cantilevers

The concerns which have adopted cantilever springs are Grant, Jeffery, King, Lexington, McIntyre, National, Paige, Pathfinder, Pilot, Pullman, Scripps-Booth, Singer, Sphinx, Stearns, Trumbull, Twombly, Westcott and Willys-Knight. Its chief advantage as a means of suspension is the lack of sharp rebounds. Beyond this, the other advantages are reduction of unsprung weight, a greater deflection for pound load, greater flexibility and the elimination of the cut in the body necessary with the three-quarter elliptic.

Whether the cantilever spring is used in connection with some sort of driving or radius rods to take the thrust of propulsion from the rear axle to the frame, or whether the cantilever is used as a drive member has much to do with its construction. When used for the drive, as for suspension, it is customary to stiffen the main leaf of the spring. When a torque tube or torque rods are used to take the starting and braking torque the main leaf is lighter.

The reasons for using the cantilever form of support are various. The cantilever springs allow a great range of action for a given length of spring, are more resilient, have more internal friction and hence show less need for shock absorbers. They are especially adapted for taking thrusts but not torque. The reason is that in comparison with other springs there is more metal in the line of thrust than in any other type. This allows for greater beam strength and a greater possibility of eliminating side sway. It is of course recognized that the amount of strength of the units taking the drive varies directly with the modulus of the section of the material in the line of drive.

As compared with the semi-elliptic the comparison is made that almost the entire spring weight of the semi-elliptic is unsprung, whereas in the cantilever it is practically all sprung weight, tending to make riding easier.

Wire Wheels Gain Slowly

While there is a slow increase in wire wheels, there is nothing like the deluge that was predicted a year ago. Only 7 per cent. are equipped with them regularly and 4.5 per cent. may offer them as an option. Some of those who fit them regularly are: F. R. P., Grant, Pullman, Scripps-Booth, Saxon, Twombly and Willys-Knight. Some who give them as an option are: Briscoe, Fiat, Lenox, Locomobile, Moline, Owen and Singer. This gives 11.5 per cent. as the maximum percentage of cars on which wire wheels can be secured at the regular purchase price. The wire wheels used are of the demountable and detachable types, and are distinguished by the fact that they are of lighter weight than the earlier wire wheels. The weight per wheel of a demountable 34 by 4 is 29.75 pounds for the light type and 31.25 pounds for the medium weights. For the heavy-weight rims, which are not as often used, the weight of the demountable wheel complete is given as 43.75 pounds. This is 203 pounds per set. These weights are for the number 3, 30 and 40 demountables manufactured by the Standard Welding Co. They may be taken for a fair sample of demountable wire wheel practice as it is at the present time.

More than half the chassis now have the gasoline tank at the rear. This is accounted for by the sudden growth of the vacuum feed system. In 1914 vacuum feed for gasoline was quite obscure, but this season more than 20 per cent. use it. The result in tank location has been the increase of rear tanks from 41 per cent. for 1914 to 51.1 per cent. for 1915. Cowl tanks have also increased from 13 per cent. for 1914 to 27.2 per cent. for 1915. Tanks under the seat are the losers. In 1914 46 per cent. had them in this location; in 1915 there are but 21.2 per cent. of underseat tanks. The vacuum feed means in reality a gravity feed to the carbureter, as the vacuum part of the system sucks the gasoline from the rear tank to a small tank on the dash or under the hood.

Pressure Feed Used Less

As would naturally be expected, from the shifting of tanks pressure feed has dropped, but reached its zenith in 1914, when 41 per cent. fed by pressure. In 1910 18 per cent. used the pressure feed system, and this grew to 19 in 1911, 25 in 1912, 35 in 1913 and 41 in 1914. In 1915 only 22 per cent. use the pressure feed. The Stewart-Warner vacuum feed is employed on 20.5 per cent., a position which it has gained within a year because in 1913 no cars were fed in this manner. The pressure-gravity fuel system, in which the fuel is fed by pressure to a gravity dash tank, has not taken a very strong root. Chalmers has it on one model, and this is about the extent of its use. The vacuum feed is used on all classes of cars, not merely on low-priced, high-priced or intermediate. It is used on all sizes of cars, and the number of manufacturers who have adopted it number more than 30, practically a quarter of the industry.

This method of feeding the carbureter has been adopted after experimenting to ascertain that the probability of mechanical troubles with the tank was very small. Its adoption generally eliminated a hand pump, a motor-driven air pump, two check valves and one line from the motor to the gasoline tanks. These parts, having to handle air at low pressures, are rather troublesome to keep tight and in good working order. The motor-driven air pump necessarily feeds a small quantity of engine oil through the pressure line to the tank, which makes trouble in cold weather by congealing. The vacuum feed furnished gasoline to the carbureter under a somewhat more uniform pressure than do the pressure feed systems.

Another advantage of the vacuum feed over the gravity with the tank in the cowl is due to the fact that the cowl tank must be soldered on account of its odd shape, with consequent danger of leak. It reduces the capacity of the gasoline supply, is noisy due to the splashing, is odorous, and it is inconvenient to fill. The vacuum feed retains the advantage of the gravity without these disadvantages.

Other reasons are on account of the low body lines necessary for an up-to-date car, and this necessarily cuts down the available space beneath the front seat. It has been mentioned in the motor review that one of the great advantages of the vacuum feed system is in the raising of the carbureter permitting greater accessibility.

Left Drive and Center Control

The movement towards left drive and center control which started in 1910 has continued without cessation. In 1910 but 2 per cent. used this combination; in 1915 79.5 per cent. are so driven and controlled. Right drive and right control have been traveling down the scale in about the same ratio as left drive and left control have been ascending. In 1910 93 per cent. had right drive and right control; in 1915 9.5 per cent. have remained faithful to their convictions in this respect. Right drive with central control went up the scale from 1910 to 1912 from 4 to 15 per cent. Since then it has fallen away until now but 3 per cent. use it. Makers who still maintain left control are 3.5 per cent. This has been almost constant since 1910. At that time it was 1 per cent., in 1911, and 1912 it was 2 per cent., in 1913 4 per cent. and 1914 2 per cent.

The high spots in starting and lighting systems, which will be fully treated later, are lighter weight, better electrical characteristics, better insulation, simpler meshing of starting motor to flywheel and quieter drive. Trends of design center around the simplifying of the electrical installation. An example of this is in the use of the single-wire system which is now on more than 70 per cent. of chassis using electric starting. The almost universal adoption of flywheel connection for the starter is another feature. In 1914 62 per cent. connected the starter to the flywheel. The percentage is now in excess of 85. The Bendix gear connection for the starting motor to the flywheel is another feature which is on the increase. Six-volt systems retain their supremacy. Those who are using the combined lighting, starting and ignition system are on the increase, and Delco has to its credit this season over twenty-five installations on different chassis. Over 110 chassis, however, still continue to use the magneto.

In body work the movement towards the moulded design has been practically universal. The sloping hood and flush-sided body, with its low lines, has won popular approval for the sake of appearance.

Bodies are larger for two reasons: the engine bonnets are shorter. The result has been that more space can be devoted to seating capacity. The car for 1915 has more leg room in the forward compartment than its immediate predecessor. The width of tonneau seats has been increased and the 48-inch seat is common even on cars of low and medium price.

The touring car, as usual, holds its own. Under $1,250 there are seven makers who specialize only on touring cars. These are Alger, Detroiter, Dodge, Interstate, R. C. H., Sphinx and Vixen. Among the $1,500 makes there is only one, Monarch. In the $2,500 class only three makers specialize on the touring car alone. These are Luverne, Lyons-Knight and Speedwell.

As would naturally be expected, a concern would specialize on a runabout only among the cheaper cars. These are Argo, Dile, Herreshoff and Rayfield. Metz was one of these until the middle of December, when they announced a touring car, which was the first they had ever built.

Four-passenger bodies are manufactured by a number of concerns, but in the low-priced class. In the $1,500 class, Cole, Corbitt, Crow, Great Western, Kline, Norwalk, Pratt and Velie make them. In the $2,500 class, Crow, Great Western, Haynes, McFarland and Pratt sell four-passenger cars. Above $3,000 there are Locomobile, Marmon, Pierce, Republic and Stearns. In the closed bodies Ford stands alone among those listing Sedans below $1,250. Kissel is the only name found among those listing Sedans between $1,250 and $1,999. The cheapest limousines are in the $2,500 class, which is represented in this respect by Hudson, Jeffery, Kline and Stearns.

Only two list landaulets below $3,000. These are Cadillac and Hudson. There are six concerns listing Berlins, namely: Cadillac, Fiat, Franklin, Locomobile, Peerless and Stevens.

Equipment is better and lighter than ever. The one-person top is the feature this year, neglecting starting and lighting for the moment, on the low-priced cars. Practically every car is sold fully equipped at the purchase price. More cars have speedometers and clocks than ever before. One of the big points in equipment on the higher-priced cars for this year is the cord tire. Among the concerns who are furnishing them are White, Franklin, Pierce, Marmon and Owen. The gain in efficiency has been variously estimated. Franklin puts it at 18 or 19 per cent. in hill-climbing ability and states that tire mileages are much higher. Goodrich tests on the Silvertown cord show a 23.6 per cent. gain in coasting efficiency. Lower air pressures and less heating are also advantages.

Control Features Improved

The mounting of control features has been improved. Adjustable pedals are used almost universally. The dash instruments are better placed. Overland, during the year has gone over to the method of mounting the lighting, starting and ignition switches on the steering column.

With all this increase in comfort, economy, appearance and durability, the price of the car has gone down. Last year an upward trend was noticeable in the selling price of cars, but a study of the price chart shows that that price went up from $2,214 for the average car in 1910 to $2,560 in 1911. In 1912 it went down to $2,508. In 1913 makers started to put on electric cranking and more equipment, so prices took a jump to $2,585 that year. This tendency was continued for 1914, when the price reached the high-water mark of $2,685. For 1915 it is about where it would have been if the downward trend of 1911 and 1912 had continued—$2,005.

Vulcan Gearshift Stronger and Lighter

Magnetic Pull for Gearshifting Increased—Current Consumption Reduced — Endurance Test Demonstrates Stability

THE Vulcan electric gearshifter introduced last year, and which has been taken over by the Cutler-Hammer Mfg. Co., Milwaukee, Wis., is now being manufactured in an entirely changed form, incorporating, however, the original principle of the Vulcan, namely, that of sliding the gears on the shafts of the gearset by electro-magnetic force, and also having the entire control of gearshifting centralized in the center of the steering wheel. The design has been changed, including the solenoids, the size of the coils and the plungers. Added to this, the neutralizing device is different as is the selector switch and the master switch mechanism, in fact, little of the old Vulcan remaining except the name, and the employment of the basic principles.

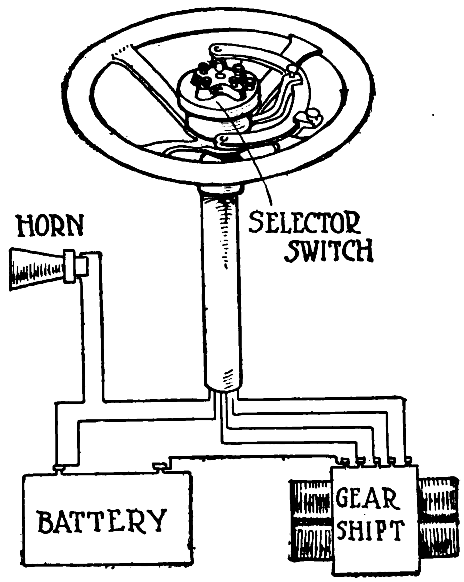


Fig. 1—Diagrammatic illustration of improved Vulcan electric gearshift, showing simplicity of wiring system

20 Pounds Added to Car

In its improved form, the Vulcan shifter adds a total of 36 pounds to the gearset, but when the weight of the control lever and its protection are taken into consideration, the added net weight is little over 20 pounds. In its new form it is a lighter and more compact mechanism than formerly. It is also much stronger, in fact, so great is the increase in the electro-magnetic pull that the inspection of the coils of the electro-magnet includes the lifting of a 90-pound weight vertically with a 7-8-inch airgap. Any coil cannot lift this weight is rejected.

Little Current Required

The question of the amount of electric current needed in this gearshift work is frequently raised, but it can be considered a negligible quantity. So slight is the current needed that no appreciable drain on the starting or lighting battery is noticed, in fact it is stated that the total current consumed in shifting gears does not exceed .005 ampere-hour per shift or sufficient to supply a set of lamps 4.5 seconds.

Tested for Endurance

The Cutler-Hammer Co. has tested their present design out to the fullest, by attaching to a gearset driven by an electric motor. The gearshift was operated 60 times per minute, the tester pressing the buttons on the selector switch alternately. The device was operated in this way 294,491 times after which it was examined for indications of mechanical or electrical defects, and the closest inspection failed to show any indications of weakness or deterioration.

To secure some definite conception of the current consumption and to determine the number of shifts that could be made using a 12-volt, 80-ampere-hour battery without recharging, the same method of test was followed and 134,490 gearshifts made. Calculating on a basis of 100 shifts per day, 365 days per year, and considering the total number of operations, this test equals 4 years of constant car service.

In describing the Vulcan gearshift it should be remembered that in making any gearshift by the conventional hand method the lever is used to slide a gear on one shaft into or out of mesh with a corresponding gear on a parallel shaft constituting a part of the gearset. With the Vulcan gearshifter these movements are accomplished by electro-magnetic force, there being a separate solenoid for each speed change. On the steering wheel is a series of buttons for selecting the gear desired.

Current is sent to the proper solenoid by a series of buttons in the center of the steering wheel, these buttons replacing the gearshift lever as the operating means. A master switch is interconnected with the clutch pedal in such a way that the solenoid is not energized until the clutch pedal is pressed clear out, a sufficient throw being allowed between the complete de-clutch position and the operation of the master switch, to permit throwing out the clutch without shifting gears. In this way a speed combination may be predetermined by setting a button on the steering wheel, but the actual shifting of the gears does not occur until the clutch is thrown off at some later time.

The gearshift consists of two units: the shifting assembly or group of magnets attached to the gearset case and the selector switch, or push button group, located on top of the steering column in the center of the steering wheel.

The selector switch, which is carried on the wheel, is made up of a number of buttons, one for each speed and one for neutral which has no electrical connection. There also is a button in the center for operating the horn. The top of the switch carries a locking plate for locking any button which may be depressed and also carries an interlock which makes it impossible to press down more than one button at a time.

Wiring System

The wiring is simple. There is one lead passing from each coil through a terminal block to its particular speed button on the selector switch, and the other lead from the coil is joined to a neutral wire directly through the terminal block to the battery, with the master switch intervening. Another wire from the battery passes through the terminal block to the contact of the selector switch which is common to all speeds. The current travels from one terminal of the battery, through the depressed push button, around the coil selected and back to the other terminal of the battery.

The terminal block mounted on the shifted case is introduced in order to make it easy to remove the gearset without disturbing the wires. It is made up of the required number of male and female terminals for each speed. These are insulated from each other by fiber blocks, but are securely fastened together so as to be a unit. These terminals are each of a different size so that should it be desired to pull out

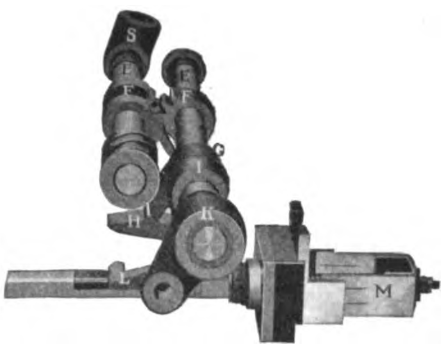


Fig. 2—End view of the shifting mechanism, including the neutralizing mechanism and the master switch

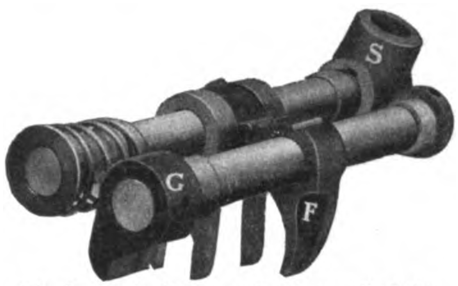


Fig. 3—Neutralizing mechanism unit of the Vulcan electric gearshift

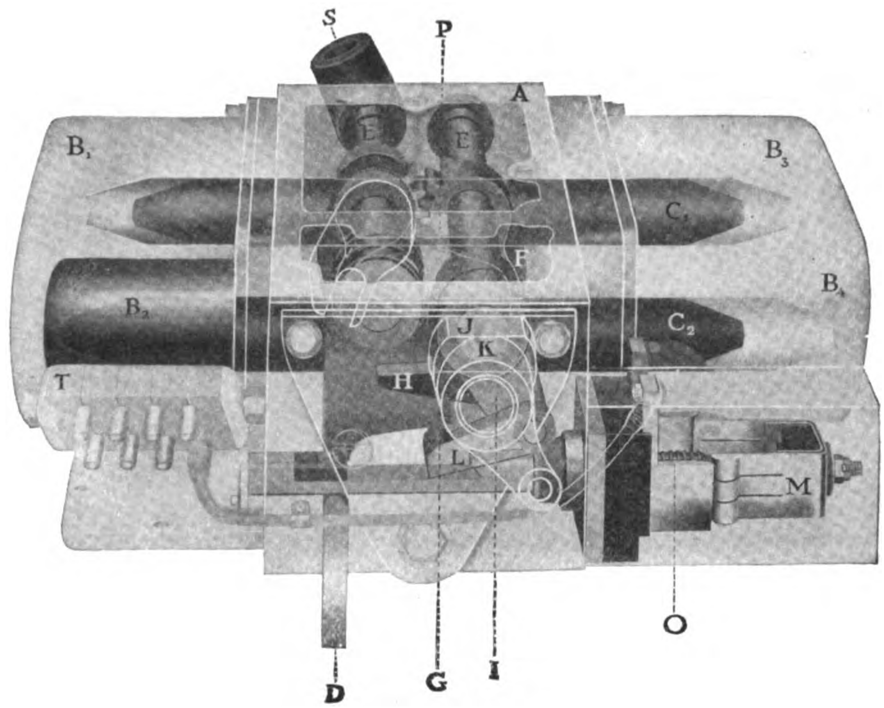


Fig. 4—Phantom view of the entire shifting mechanism used in the Vulcan electric system as it looks applied to a gearset

the wires there is no danger of getting them mixed up because no wire will go on any terminal except the right one.

Magnetic Pull Increased

It is pertinent here to point out some of the features wherein the Vulcan electric gearshift has been improved since its redesign by the Cutler-Hammer engineers. In the first place, the pull of the electric magnets has been greatly increased without increase of weight or size by a redesign of the housing of these magnets. Instead of having a separate case for each magnet, all the magnets on one side, two in the case of a three-speed gearset and three in the case of a four-speed gearset, have been covered by a common housing of cast iron which in addition to its protective function, forms a part of the magnetic field and thus increases the intensity of the magnetism and so increases the pull on the armatures. There are only two armatures or shifter rods for a three-speed gearset and each end is inclosed in a separate magnet winding. The pull has been further increased by a change in the shape of the ends of the pull rods or armatures. Formerly the ends of these armatures were flat, but they have been tapered off to a conical shape, so that the magnetic field becomes more intense as the armature nears the inner end of the coil or the end of its throw, this giving not only a stronger pull but a snappier one, the speed increasing as the motion proceeds.

Conserving the Current

Another improvement is in the interconnection of the master switch and the clutch pedal. In the early type the full battery current was flowing through the coils as long as the clutch pedal was completely depressed. This meant that sometimes the current was permitted to flow through the system after the gears had been shifted and the current thus wasted. In the new design the master switch is thrown out automatically when the action is completed, regardless of how long the clutch pedal might be depressed. This provides an additional saving of current. The whole equipment appears considerably more rugged and substantial than did the earlier type and probably offers less chance of disarrangement in service.

To take up the design and operation of the gearshift in detail reference is made to Figs. 2, 3 and 4, Fig. 2 being an end view of the shifting mechanism including the neutralizing mechanism and master switch. Fig. 3 is a view of the neutralizing mechanism alone and Fig. 4 is a phantom view of the entire shifting mechanism as applied to a gearset, the arrangement shown here being that for the gears in third speed, that is, direct drive. In all three figures the letters refer to identical parts.

The electric gearshift mechanism consists of a case *A* attached to the gearset housing. This case carries the magnets or solenoids *B*, these in turn surround the armatures *C* on which are mounted the shifting forks *D*, which move the sliding gears. In this case, also, is carried the operative mechanism by means of which the gears are mechanically drawn to their neutral positions through a connection with the clutch pedal. The case *A* is divided into two compartments, the smaller of which is a pocket in which the mechanism for neutralizing the gears and operating the master switch are carried.

The neutralizing mechanism consists of two operating shafts *E* on which the neutralizing cams *F* are mounted. One of these shafts carried the pawl *G* which in turn engages with a latch *H*. This latch is carried on the rocker arm *I* which is mounted on the shaft *J*. Upon the opposite end of this shaft is mounted the operating lever *K* through which the connection with the clutch pedal is made. The rocker arm *I* also carries the switch operating pawl *L* which engages with the stem of the master switch *M*.

How the Mechanism Works

Assuming that all gears are in a neutral position and it is desired to start, the first speed button on the selector switch in the center of the steering wheel is depressed, closing one break in the electric circuit. The operating lever *K* and the shaft on which it is mounted are rotated and the master switch *M* is pulled into engagement through its connection with the operating mechanism *L* which engages the switch stem. As the gear moves into mesh, and is within 1-8 inch from being home, the pawl *G* falls back, due to the pull of the magnets against the neutralizing cams *F*, causing it to strike against the trigger *N* which is attached to the switch operating pawl *L*. This action causes the pawl *L* to be raised out of engagement with the stem of the master switch and

(*Continued on page* 1276)

The Improvement of Spring Suspension-III

By M. C. K.

(Continued from issue of December 10)

As has been seen, the movements of a vehicle without springs or springy construction elements follow closely the inequalities of the road, and the objections to springless construction, which for thousands of years were obviated mainly by means of soft cushions and leather straps, lie in the severity of the shocks received and in the fact that the movements of the vehicle body and load are as large and as sudden as those of the running gear. The waste of driving power scarcely came under consideration till motor vehicles made their appearance. It is perhaps useful to notice that springs have not yet conquered universally in practice. They were not considered indispensable or even desirable for very smooth roads, such as railroads, until speeds became high and the wear and tear of rolling stock were systematically looked into, and for railroad practice their stroke is still sharply restricted, while devices for varying their flexibility according to the load are much more widely employed than is the case in other applications. On the other hand, practice has never fully ratified their use for speedy work on very rough roads, such as may be demanded of artillery. And they are considered superfluous if not harmful for very slow and heavy work on any kind of road. Their usefulness is in fact recognized mainly for medium speeds on roads of medium roughness, and the development now taking place is aimed at the expanding of their range of utility by changes in their construction.

Averages and Safety

These things are so perfectly well understood in a general way that they are seldom mentioned in detail, and their bearing upon the subject of improvement easily escapes attention. Especially, it seems to be overlooked sometimes that the springs, though intended to keep the load-level constant and to render all movements less abrupt, often cause the movements of the load to be, for a brief period, not only more numerous but also larger than they would be without the use of springs and, under certain less frequent combinations of road conditions and vehicle speed, even cause shocks more destructive and uncomfortable than those which would be received in a springless vehicle under the same road and speed conditions. While the beneficial average effects of springs make them indispensable, counting decisively when only comfort is considered, the exceptional effects can of course not be ignored when safety for structure, load and occupants is involved, as safety does not depend upon average effects but upon the extremes; not primarily upon wear or fatigue of metal, or other accumulative factors in deterioration, but upon accidental fractures.

Importance of Exceptions

As the advantages to be obtained by using springs are also invariably discounted in advance by building vehicles less robust than anybody would think of building them without springs, the extraordinary stresses which are produced exceptionally are eventually found to form a most important division of the subject, especially where utility vehicles are concerned, since in these the safety against fractures—of both vehicle and load—is the main object of spring suspension.

These rather obvious reflections drawn from well-known practice to assist in justifying a theoretical comparison of the things that take place under different conditions of vehicle construction, are suggested by the need of determining the shocks and retardations occurring in the case of a springless vehicle, when, under the influence of a road obstacle, it describes the movement illustrated in Fig. 5.

Fig. 6 shows this movement again, with additional indications of the factors in shock and retardation.

The simplest manner of figuring is based on considering the kinetic energy which is abstracted from the moving vehicle and the speed which can be produced with what is left.

Exactness Illusory

Two methods have been proposed for estimating this retardation, any exact calculation being complicated by the wheel action and the irregular shape of a four-wheeled vehicle. Both methods are presented, the first one in small type.

It was seen that the front portion of the vehicle would make a leap 3.18 feet high to clear the 3-inch high obstacle, if only the velocities were decisive and no energy lost in shock. The energy required for such a leap, though it remains imaginary for a springless vehicle acting against a ridge of the shape under consideration, is therefore approximately equivalent to the energy abstracted for the vertical component of the shock at the front axle, although this energy in the absence of all elasticity is spent mostly in shock and only to a small degree in load lift. This is clear, as the force of the blow against the ridge does not depend upon what happens afterwards but only upon the vehicle and the road condition.

In accepting this method of figuring it is necessary to consider that the nature of a wheel permits the vehicle to clear the obstacle by following the lines of smallest resistance. But in assuming that axle B moves in a straight line to C instead of being compelled by friction at A to follow curve BC, and figuring the height of the leap as it would be if the straight line were followed, the horizontal element in AB is not considered, and it must therefore be figured separately, and the retardation involved in it must be added to that caused by the leap.

A leap which is arrested by gravitation at a height of 3.18 feet and involves a weight of 1,000 pounds represents the work of 3,180 footpounds and is numerically identical with the force required for imparting to 1,000 pounds an initial velocity of 14.25 feet per second. (This force is conceived as developed in 0.01755 second, during the contact of the wheel with the ridge, as referred to before, and this time element, indicating the greater or lesser violence expressed in speed, may not have an influence on the retardation, but in practice it means everything, almost, with regard to destructiveness).

The total energy of the vehicle being $\frac{1}{2}\, mv^2 = (3{,}000 : 64) \times 50^2 = 117{,}187$ footpounds, from which there is to be deducted 3,180 of the same units, the remaining speed v_1 of the vehicle is determined by the equation:

$117{,}187 - 3{,}180 = 114{,}007 = \frac{1}{2}\, mv_1^2 = (3{,}000 : 64) \times v_1^2$,
so that $v_1^2 = 64 \times 114{,}007 : 3{,}000$ and $v_1 = 8 \times \sqrt{38{,}002} = 8 \times 6.16 = 49.28$ feet per second.

The speed reduction due to the vertical component of the blow is thus 0.72 feet per second, but the horizontal component must also be figured.

It is seen directly from the diagram that the two components are in the proportion of 17 inches for the vertical one to 10.53 inches for the horizontal one, and, the vertical one being equal to 3,180 footpounds, the horizontal one would at first glance seem to equal 1,969.73 footpounds. But the value of the vertical component is obtained by figuring from the movement imparted to a weight of 1,000 pounds, while the horizontal thrust is determined by a body weighing 3 times as much. As a corrective to the graphic proportions, 3,180 footpounds may therefore be multiplied by 3, making 9.540 footpounds, and from this value the proportion of the horizontal component may be taken, making the latter $9{,}540 \times 10.53 : 27.53 = 3{,}643$ footpounds.

In the previous equation it was therefore $3{,}180 + 3{,}643 = 7{,}823$ which should have been deducted from 117,187, making $v_1^2 = 64 \times 109{,}364 : 3{,}000$ and $v_1 = 8 \times \sqrt{36{,}451} = 8 \times 6.04 = 48.32$ feet per second, instead of 49.28, and the total speed reduction of the vehicle due to the passing of the front wheels over the obstacle 1.68 foot per second.

Out of the 7,823 footpounds of energy lost only 3" × 1,000 pounds = 1/4 × 1,000 pounds = 250 footpounds represent lift, while the rest, or 7,573 footpounds, represent shock, but no division in vertical and horizontal shocks can be figured from the data used.

The More Direct Way

The other and perhaps safer way of estimating the loss of kinetic energy, while also getting values for some other factors, is as follows:

If B were the center of gravity of the vehicle, the kinetic energy, 117,187 footpounds, would at the impact with A be resolved into two components, BA in the direction of resistance and another, BL, in the direction of possible movement. As the possible movement is an arc, BC, described with a 20 inch radius around A as the center, BL must be tangential to this arc and at a right angle with BA. As elasticity is supposed to be lacking, and no rebound therefore can take place from A, no other direction than BL is possible, and BL therefore would represent the energy remaining after the shock, turning with the wheel during the progress of the shock; and BA would represent the lost energy spent in shaking the earth and stressing the wheel and the rest of the vehicle. BA would have the value of $\frac{1}{2}mv^2 \times \cos \alpha$ and BL that of $\frac{1}{2}mv^2 \times \sin \alpha$, if the object were to determine forces equivalent to the original energy for driving the vehicle in the direction NB, but for the present purpose these values indicate only the proportions in which the total energy is divided.

It is also noticed that BL goes on increasing in value in the measure as the axle describes the arc BC, finally reaching the value of 117,187 minus x (x being the energy lost), and that BA goes on decreasing in value toward zero. It is therefore the mean values which must be used for an estimate.

A Student's Question

(And, seeing that the retardation must be strongest at the beginning of this movement, a question is suggested as to whether the speed of the vehicle can really be reduced most in the beginning of the shock and afterwards can pick up. The answer must be that the horizontal speed of B is reduced most in the beginning by reason of the arc-movement, the tangent BL giving the direction, which veers from BL to CM, but that the vehicle as a whole cannot be retarded one moment and pick up the next, except under the influence of its motive power or possibly by means of energy stored momentarily in springs or tires. The opposite view would mean the creation of energy from nothing, since $\frac{1}{2}mv^2$ at any moment measures this energy. A possible function of springs and tires is here at the same time brought into view).

It is not necessary to find α in degrees, as it is known that 20" $\sin \alpha$ = 17" and 20" . $\cos \alpha$ = 10.53", and the same proportion holds good for any other radius than 20 inches. Dividing in this proportion, one has BA = 117,187 × 10.53 : 27.53 = ∼ 44,750 footpounds, and the mean between this and zero is 22,325 footpounds.

This figure for the lost momentum is however not in accordance with the data, as B is not the center of gravity of the vehicle but only the point at which the weight of 1,000 pounds is supported. To simplify the estimates, the center of gravity is supposed to lie in the line NB, and while horizontal shocks can be resisted at B by the energy of the whole vehicle and a mass determined by 3,000 pounds of material, the vertical shocks can be delivered only against 1,000 pounds. As action and reaction must be equal, the value for BA = 22,325 footpounds may therefore be modified by resolving BA into its horizontal and vertical components and dividing the latter by 3,000: 1,000 = 3. (It would be more correct to figure with the velocity imparted to 1,000 pounds at rest, but this is handier and perhaps near enough.)

The Wheel Action

Moreover, the horizontal component is affected by the rotation, or capacity for rotation, of the wheel; the situation is not the same as if a wheel fixed upon its axle were shoved over the ground. (This element enters, for rear wheels, if the obstacle is met a moment after the wheel has been locked by the brake—a frequent occurrence, perhaps accountable for accidents to springs and spring shackles). For normal driving, the horizontal component AH can be again resolved into AJ, representing 17: 27.53 of its value, which is spent in overcoming friction at A, and another component running back in the direction of the wheelhub and equal to 10.53: 27.53 of the value of AH.

The modified value of BA is now obtained: The vertical component of BA is 22,325 × 17: 27.53 = ∼ 759,050: 55 = 13,801 footpounds, and this divided by 3 makes 4,450 footpounds of vertical shock.

The horizontal component of BA is similarly found to be 8,524 footpounds, making the total of abstracted energy 4,450 + 8,524 = 12,974 footpounds, and, on the same principle that was applied before, this gives the retardation from $v_1^2 = \frac{117,187-12,974}{3,000} \times 64$ and $v_1 = 8\sqrt{34,737} = 8 \times 5.89 = 47.20$ feet per second.

Chance for Critics

There is seen to be a considerable divergence in the results of the two estimates, and this illustrates the tricky lapses for

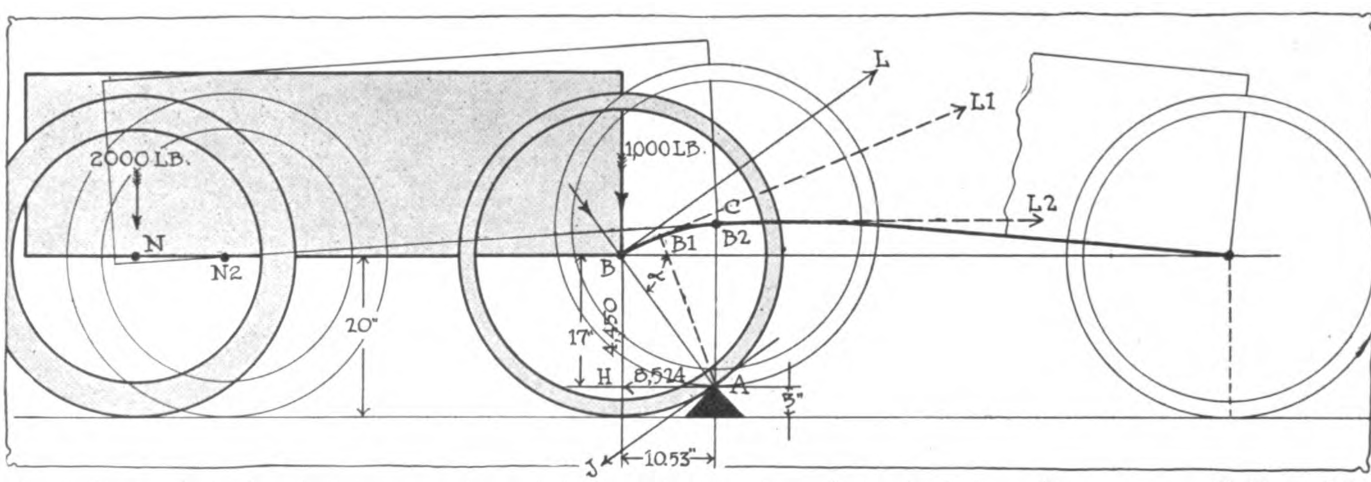


Fig. 6—Diagram indicating shock stresses and retardation occurring when front wheels of springless vehicle pass over a 3" ridge at 50 feet per second. Heavy curve shows course of axle before and after surmounting obstacle. Rear wheel curve similar but shorter

which stress sheets in automobile construction have become notorious, usually rendering several trials by different persons necessary before errors in the estimated or omitted factors are brought to a working basis. For present purposes the figures of the second estimate may perhaps be used, however, as its errors will probably appear in the same proportions whether it is applied to a springless or a spring-suspended vehicle. Still there is evidently room for corrective ideas to develop the handiest and best method; so much more useful as the estimation of stresses, wherever exact calculation is impracticable, enlists new thought for the neglected fundamentals of spring action and has a tendency to clear up details not otherwise thought of. Under all circumstances no better figures can probably be devised for measuring the action of springs and tires, their advantages and their shortcomings, than those pertaining to the action of springless vehicles.

The Destructiveness

According to the figures of the second estimate, the retardation becomes 2.80 feet per second as soon as B has reached to the position of B_2, which is the same as C, and BL has been turned to the position of BL_2. It now becomes possible to figure somewhat on the destructiveness of the blow. The entire force of it (= 12,974 footpounds) minus 17 : 27.53 of 8,524 (being the tangential portion of the horizontal component—that which tears pieces out of solid-rubber tires when a sharp rocky edge is struck, springs being rather ineffectively arranged to reduce it), in all 12,974 — 5,269 = 7,705, is delivered against axle B during the time when the vehicle presses against the ridge and turns the wheel around A. The horizontal average speed here ranges from 50 to 47.20 feet per second, a mean of 48.60. From this, the time occupied in passing from B to C, a horizontal distance of 10.53 inches, is figured to be 0.01805 second, and, if a blow sustained in this brief period works in practice as if it were instantaneous, the materials should be able to resist the whole force of it, the 7,705 footpounds. The blow may be examined with regard to the pressure on the axle and bearings by applying the formula

$$ks = \tfrac{1}{2}\,mv^2 \text{ or } k = \frac{m}{2s}\,v^2 \text{ or } s = \frac{m}{2k}\,v^2$$

in which k is pressure in pounds and s the space through which it is applied, this space being in the present instance the length of the arc BC, easily determined.

Considering the blow instantaneous and $s = 1$ foot, one has $k = 7{,}705$ pounds of pressure, directly on the bearings.

Slow Stress Transmission

But if the blow cannot be considered instantaneous, with reference to the nature of the material, especially the velocity in the molecular transmission of stresses, the pressure of 7,705 pounds must be considered as distributed decreasingly. If 4 periods make the action for each period equal to that of an instantaneous shock, in effect on the materials, the distribution would be somewhat like 5,000 pounds for the first fourth of curve BC, 2,000 for the second fourth, 600 for the third and 105 for the fourth. This means reducing maximum pressure on bearings nearly 50 per cent.

In the supposed case of an entirely unelastic vehicle, the question of the rapidity in transmission of stresses does of course not arise, but if wood is compared with steel as a wheel material—for heavy trucks, for example—and it is assumed that wood is the slower transmitter of stresses, it is evident that the subdivision of a shock stress extending over only such a short period as 0.01805 of a second may become of interest and may influence construction—as evidenced at present by the practically compulsory use of solid rubber tires with cast steel wheels.

(To be continued)

Vulcan Gearshift Stronger and Lighter

(Continued from page 1273)

the master switch snaps out instantly due to the action of the master switch spring *O*, thus breaking the electric circuit. The actual time of the engagement during which current is being drawn from the battery is less than 1-3 second.

Being in first speed, and desiring to proceed to another, another speed button upon the selector switch may be depressed at the convenience of the driver. Then, when it is desired to shift, the clutch is fully depressed as before, this action rotating the operating lever *K* and its shaft which carries the rocker arm *I* and its attached mechanism. As the first gear or whichever gear has been previously selected is in mesh the latch *H* is in engagement with the pawl *G* of the neutralizing mechanism, and as the operating lever and rocker arm *I* are rotated the latch *H* presses against the pawl *G*, causing both the neutralizing cams *F* to rotate toward the center, due to the fact that they are enmeshed through the teeth *P*.

On the central side of the shifter forks *D*, we have a boss and as the neutralizing cams *F* rotate toward the center, they press against the boss or whichever side the gear is in engagement. This mechanically pulls the shifter fork and the gear with which it is engaged back to neutral position—before the next shift can be made. As the gear reaches neutral position the end of the latch *H* strikes the knockout pin. This action releases the latch from engagement with the pawl *G* and as the operating lever *K* is moved ahead by the foot of the driver on the clutch pedal, the switch operating pawl *L* pulls against the switch stem, closing the circuit at the master switch, as before explained. The electric circuit is complete, the current flows from the battery through the solenoid selected and the proper gear immediately jumps into engagement. This action is the same for all speeds.

Should it be desired to stop, the neutral button in the selector switch is pressed. This action throws any other button which may have been depressed out of contact, that is, it automatically raises any other button which may have been depressed previously.

When it is desired to stop, the clutch pedal is fully depressed, as before explained, and the operating lever *K* moves ahead. The neutralizing cams *F* pull on the boss on the shifter forks, the same as if a shift were to be made. The master switch *M* also will come into engagement as before. However, as the pressing of the neutral button has broken all contacts in the selector switch, a circuit is not made and the electric current does not flow. Therefore, as none of the magnet coils are energized, the gears remain in a neutral position.

Made in U. S. A. Exhibition March 6-13

NEW YORK CITY, Dec. 29—A "Made In The U. S. A. Industrial Exposition" will be held at the Grand Central Palace, this city, March 6 to 13. This exposition is designed to show American made and grown products in practically all branches of business.

The exposition committee includes a number of prominent automobile men, including George Pope, president of the National Assn. of Manufacturers; C. B. Warren, president of the Board of Commerce, Detroit; Lee Anderson, president, "Made in the U. S. Committee," Board of Commerce, Detroit, and A. L. Riker, vice-president, the Locomobile Company of America, Bridgeport, Conn.

Glass Radiator Betrays Poor Circulation

Flow Often Up, Instead of Down, Is Brought Out at S. A. E. Discussion—Uneven Distribution of Air Through Radiator a Cause—Humidity Has Large Bearing on Cooling

NEW YORK CITY, Dec. 29—At the regular monthly meeting of the Metropolitan Section of the Society of Automobile Engineers held tonight, the paper presented was, Radiators and the Cooling of the Car, by Howard Greer, Jr., chief engineer, McCord Mfg. Co. This same paper was presented before the Indianapolis branch of the S. A. E. in November and was published in the December 10 issue of THE AUTOMOBILE.

There were many interesting points brought out by the discussion which followed the paper. Mr. Greer stated that an excellent scheme for determining the vagaries of water circulation in a radiator was to construct a radiator of glass and then place very fine boxwood sawdust in the cooling water, this particular sawdust being selected because its specific gravity is about that of water, and therefore it is held in suspension instead of floating as would most kinds of sawdust. It is found that in some tubes the circulation is up when it should be down and that all sorts of currents are set up which hinder the circulation. By properly distributing the flow of air through the radiator and at the same time using baffles to give an even flow of water through all parts these troubles can be avoided.

Not only does the water circulate through the radiator in unexpected ways but also the flow of air through different parts of the radiator is not uniform. In fact there are many examples where the movement of air at certain points in the radiator has been out towards the front of the car instead of in. The difficulty is to supply a fan which will suck just as much air at its center as it does at the blade tips, in other words, produce a uniform flow. Then there is also the disadvantage that the fan covers a circular area, and the radiator is generally rectangular in shape. Uniformity in flow can be produced, however, by the proper design of the fan and by shrouding it in a metal cover. In this way the corners of the radiator are subjected to almost the same suction as portions directly in front of the fan. An objection raised against the shrouding of the fan was that in case the fan belt broke and it was necessary to run without the fan, the cooling would not be as effective because the natural circulation due to the motion of the car would be hindered by the shroud.

Mr. Greer stated that in the average car when a speed of 25 miles per hour was reached, the flow of air due to the motion of the car was about equal to that caused by the fan and that above this speed the fan was a hindrance rather than a help. Ludlow Clayden, a British engineer, bore out this statement by saying that several owners of Daimler-Knight machines have found that more power could be obtained, except at low speeds, by disconnecting the fan, although the reason more power was obtained might have been due to the fact that the motors ordinarily ran too cool.

That it is folly to split hairs over the efficiency of a fan and then not apply it to the radiator so that full advantage of its efficiency can be taken was also shown. The fan should cover as large a part of the radiator as possible and if it does not there is no great advantage in high efficiency.

More uniform cooling is possible where the fan is placed several inches from the radiator but there is not room in the ordinary car for this to be done. Overheating troubles can be helped and sometimes overcome by fitting a shroud. In one case the transfer of B.t.u.s was raised from 700 to 1,100 by so doing.

Disposal of Air

Another important point related to fan efficiency is the disposal of the air after it passes through the fan. Many makers take careful steps to bring a large amount of air through the radiator and yet make no provision for its disposal. The flow of air is often hindered by starting and lighting units placed in close proximity, by horns and piping. The mud pan is a tight fit under the flywheel and the dash comes down close to the top of the flywheel so that it often happens that there is little room for the air to make its way out.

Slightly better efficiency in the hands of the average owner is obtained by the thermo-syphon system, due mainly to the avoidance of pump troubles. This system is heavier than the pump system and it is very necessary for uniform circulation that great care be taken in designing the water jackets, otherwise pockets will be formed in which water will stagnate until it becomes very hot or until a little steam is formed, when it will flow up to the radiator with a rush due to its much lower specific gravity.

Regarding the care of the radiator in Winter, it was stated that the best anti-freezing agents were denatured alcohol, glycerine or a mixture of the two; the plain alcohol is preferable. Acid-free glycerine is very expensive and hard to obtain.

Where too effective cooling for cold weather driving is obtained it is better to cover part of the radiator than remove the fan belt.

Humidity Important

An interesting fact was brought out regarding the overheating of some motor-driven sledges which were built for Antarctic exploration. It was found that they overheated badly when they were taken to their destination, although they ran cool during extensive tests in England. The explanation was that the Antarctic air lacked humidity, and that this factor must be taken into account in designing a cooling system. The addition of a small amount of moisture makes considerable difference in the specific heat of the atmosphere, and when this moisture is entirely absent, as it is near the Poles, the low temperature is not sufficient to offset the effect of the dry air. Similar experiences as to the effect of humidity have been found even in these latitudes.

The question of the practicability of a solderless radiator was brought up, the principle suggested being similar to that employed in steam boiler construction, but it was said that the objection was the cost—the public would not pay for such a radiator although successful experimental ones had been constructed both here and abroad.

In answer to the question as to the best way of mounting a radiator, Mr. Greer stated that the shell which houses the core should first be mounted in the chassis by the use of side brackets, trunnions or by bolting the bottom to a cross-member of the frame. Inside of this shell the core should be suspended by six or eight bolts held flexibly by spring washers.

Mr. Clayden brought up the question of mounting the radiator on the front of the crankcase and thus relieving it of the strains incident to chassis twisting and turning. Mr. Greer said that it is a question whether the motor vibrations, although smaller, were not worse than those due to the chassis, especially in view of the fact that the motor vibrations were regular. Unless the radiator is specially built to withstand these small strains it would soon be shaken to pieces. This method of suspension has found favor on two or three Italian cars.

In answer to the question as to the most desirable number of fan blades the speaker said that above 16 inches diameter six blades were as a rule best, but below this diameter four blades were preferable. However, one of the most efficient fans was a two-bladed French design.

NEW YORK CITY, Dec. 28—The Maxwell Motor Co., Detroit, Mich., recently issued a 416-page Master Price Book for the use of dealers and owners of all the old models. The book gives numbers, names and prices of parts, instructions on ordering, etc., for 164 different models. It is divided into sections, and each section covers all the models of one make of car. For example, the Stoddard-Dayton section is printed on yellow stock, the Brush models on pink paper and the Columbia section is made up of buff stock.

DETROIT, MICH., Dec. 28—Charles E. Van Horne has resigned his position of manager of the commercial car department with the Studebaker Corporation and has been succeeded by Henry Myers, manager of the Studebaker branch in Boston, Mass.; successor of Mr. Myers in Boston is George N. Jordan, traveling sales representative of the Studebaker Corporation in New England.

DETROIT, MICH., Dec. 29—Paul H. Bruske, who has been publicity manager of the Studebaker Corp., has resigned and will become manager of the racing team of the Maxwell Motor Co., beginning January 1.

DETROIT, MICH., Dec. 29—Claude A. George, for many years with the export department of the Willys-Overland Co., sailed last week for London as export sales manager of the Signal Motor Truck Co., and of the O. K. light delivery truck company.

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Little Truck Show

IT is now 2 years since we have had the motor trucks with us at an annual show, but the arranging for a "commercial vehicle division" in the present show, where truck makers can establish temporary headquarters and meet dealers, suggests how many truck makers have missed the annual show, and how meeting with out-of-town dealers has been practically cut off. The truck industry today needs more dealers in many quarters; and with not a few dealers there has been growing the feeling that the truck business is harder than the passenger car field, requires more financing and is more susceptible to ups and downs in close coincidence with business conditions, a situation which has never been so pronounced in the passenger car field.

This combination of influences has already impressed on many truck makers the necessity of keeping more in the public eye, and incidentally more in the dealers' eyes. Before another year it will be astonishing if truck makers do not unite in some form of national demonstration, which will serve to bring their wares into the public eye in a forceful manner. A huge national truck show, accompanied by some form of outside demonstration, would succeed in this work. If not this, then, a great national demonstration or trial of some nature would serve the same mission. One thing is certain, namely, that any growing industry, such as the motor truck one, cannot afford to keep its light under a bushel. There is too much missionary work to be done for that. There are too many doubting Thomases to be convinced. United effort is needed. Instead of too much internal rivalry among makers, which saps activity, a more concentrated attack is needed on horse transportation. The field of possibility of the motor truck is so extensive that individual effort is not enough; the united attack of the industry is needed.

The Eight

NEW YORK'S fifteenth annual automobile show, which opens Saturday of this week, will have more wonders for the automobilist than several of the recent shows, and instead of the show losing interest as years go by the interest is annually increasing. One year ago few even vaguely imagined that stock eight-cylinder cars would be on the market in 1915, but already we have three different makes, and by the opening of the Chicago show one or two more may be announced, if the present pace is kept up. The eight-cylinder has proven a very easy manufacturing job, in fact, it is very closely associated with the four-cylinder, so that beginning its manufacture is not accompanied with those problems that accompanied the development of stock six-cylinder motors.

Up to this time the eight has not been taken up so actively by those concerns that have been building sixes, all announcements to date coming from those who have marketed only fours heretofore. This aspect of the eight would seem to indicate a possible dropping off of fours, but the opposite may prove the rule, because it will not be a difficult manufacturing job to build an eight and use one of the cylinder blocks for a small four. Viewed in this light it will not be surprising to see renewed activity in the small four, a movement which would without doubt point to the overcrowding of this market, which during the past fall has been one of the most active in the automobile field.

Motor Values

THAT we spend our years as a tale that is told, is almost demonstrated in the return this season to valve-in-the-head motors, a type of construction which is rapidly gaining in four-cylinder and six-cylinder construction, but which is not particularly adaptable to eight-cylinder design in that it makes too wide a motor.

Years ago the valve-in-the-head design demonstrated its greater power efficiency due to smaller combustion space and lower heat losses through the combustion chamber walls. In those days the engineer had not mastered the art of reducing motor noises, and the valve mechanism being on the cylinder head close to the top of the bonnet these noises were accentuated, the bonnet became a sounding board, and with the advent of quieter motors the valve-in-the-head design lost prestige.

Its revival came with the greater use of it in racing cars in Europe during the past 5 years. Europe was constantly reducing piston displacement and the only available means of increasing power seemed to lie in increasing the thermal efficiencies made possible by the head valve location. Thanks to the development of racing the problem of practically enclosing the valve mechanism was soon mastered, so that noise was eliminated. The difficulties of lubricating parts that previously were exposed to the dust were overcome, and by eliminating dirt and insuring lubrication, the previous problem of keeping the valve adjustments constant and quiet were largely overcome. Each year now sees more valve-in-the-head motors, and this movement will unquestionably continue, if not quite side tracked by the eight-cylinder.

The 1915 Will

TODAY we stand face to face with the opening of another year, another cycle of existence. The new year will have many surprises for us. Try as we can to decipher its hidden secrets, our final efforts end in failure. Too often we live too much in the future, too often our vague interpretations of coming events lead us to largely nullify our present efforts.

"Act, act in the living present" is good advice.

The future can best be taken advantage of by a steady consistent performance each day. It is unwise to frame all our activities of today by our estimate of the future. Were this so not a few concerns might decide to close shop until the war clouds have rolled away, but what a disorganized condition would that house find itself in, if it followed such a policy!

"Seedtime and harvest, summer and winter" have been with us since that Divine promise of their continuance was given, and this is a message to all, that our cycles of activities must be kept up, and that while exigencies may temporarily stampede business, and while war may upset temporarily many financial arrangements, still we must go forth to the day's work, with a firm heart, believing that our duty is to will that matters improve. We must go forth into the new year, not weighed down with pessimism, but buoyed up with that promise of centuries ago that business will continue, and that we as individuals owe a duty in sowing optimism rather than doubt.

Accessories Active

EACH year sees the accessory maker expanding his field, and becoming more and more a dominating influence in a greater number of cars. Thus for 1915 we find more makes of cars using motors built by concerns that specialize in building motors. The same is true of gearsets, of axles, and of steering gears. The specialty maker has been doing valiant service in the development of his product, and that he is quite in advance in various lines is well demonstrated by the speed with which eight-cylinder motors have been developed and perfected for marketing to the trade.

Some of the most interesting features of the show will be found in the accessory department, where over 250 different makers will exhibit. Novelty will be found in the older lines as well as the new concern brought into existence because of some recently acquired patent. Our magneto makers have progressed very much during the year, and although the magneto was considered a well-perfected device, yet the work of the past year has been along lines of simplification and efficiency. With them there has not been a feeling that the product is good enough, but rather one of keeping steadily improving.

Carbureter activity has been greatly stimulated during the past fall by the resurrection of fuel tests, together with the influx of smaller motors and the very general discussion on greater efficiency. New models have been brought out by old makers and new principles incorporated in not a few of them. The general movement to block casting has stimulated the horizontal type, which bolts directly to the casting, eliminating the manifold, and this type is coming rapidly.

Cord tires have made very material progress, and today more of the manufacturers are convinced of the greater mileage of these, the greater speeds possible with them, the greater fuel economy that accompanies their use, and the better hold on the road that they possess. Next year will doubtless see a wide increase in their use.

The adoption of vacuum-gravity fuel feed has been one of the accessory activities of the year, and its quick adoption has in many instances been due to the public efficiency tests that have been carried out.

1915 Specifications

THE AUTOMOBILE presents in this issue its annual specification tables of the leading passenger cars for 1915, these containing the details of approximately 115 different makes of cars. All, unfortunately, are not included due to bringing out later models, some of which will not be announced before the opening of the show.

These specifications give the most accurate clue to trends in design, when compared with those appearing on previous years. The many facts regarding American cars have been collected annually for the past 5 years and in this issue it has been possible to give trends extending over that period of time. It is only when we glance over a period of years that the exact current of the industry can be seen. From year to year detail trends not infrequently zig-zag, but these minor fluctuations are lost sight of in the general direction of the chart curve covering 5 or more years. Thus we find that wheelbases may shorten a fraction of an inch one year, but this is immaterial when the general increase of 4 other years is noticed; and by comparing the advent of the six-cylinder movement with the trends in wheelbase it can be regularly noticed how the invasion of the six into each price classification has resulted in 5 or 6 inches being added to the wheelbase. Comparisons of this nature over 5 years have most valuable lessons; in short, in them lies the great clue to the possible paths of tomorrow.

Handley Forms $1,000,000 Company

Mutual Motors Co. Plans To Manufacture Complete Cars for Marion and Imperial

INDIANAPOLIS, IND., Dec. 30—By the incorporation of the Mutual Motors Co. with $1,000,000 capital J. I. Handley, president and owner of the Marion Motor Co., re-enters the automobile industry as president and general manager of the Mutual Motors Co., which will be devoted entirely to the manufacture of automobiles in Jackson, Mich., where complete cars will be built for the Marion Motors Co., of Indianapolis, and also for the Imperial Automobile Co., of Jackson, Mich. The Mutual Motors Co. is to be solely a manufacturing organization and will in no wise be interested in the sale and distribution of either the Marion or Imperial cars which it will manufacture, but rather the Marion and Imperial companies will remain independent and complete within themselves for the sale and distribution of their respective cars.

The Mutual Motors Co. has already secured a plant consisting of a two-story building, 900 by 440 feet.

Of the $1,000,000 authorized, Mr. Handley says that $600,000 has already been contracted for. The directors of the newly formed Mutual Motors Co. are: B. M. DeLamater, president of the People's National Bank of Jackson, also president of the Jackson Cushion Spring Co.; W. S. Kessler, president Albion Malleable Iron Co., Albion, Mich.; W. R. Smith, treasurer and general manager of the Jackson Cushion Spring Co.; T. A. Campbell, treasurer and general manager of the Imperial Automobile Co.; J. I. Handley, president and owner of the Marion Motor Co.

Other prominent men who have already procured a stock interest in the new company are: A. Hirscheimer, president of the LaCrosse Plow Co. and the Batavian National Bank of LaCrosse; H. J. Hirscheimer, vice-president LaCrosse Implement Co., Minneapolis; B. F. Hamey, general manager LaCrosse Implement Co.; Winthrop Withington, president Sparks-Withington Co., Jackson, vice-president and general manager American Fork & Hoe Co.; H. S. Reynolds, vice-president People's National Bank, Jackson; T. E. Barkworth, ex-president Michigan Bar Assn.; F. E. Davis, general manager automobile department LaCrosse Plow Co.; George Campbell, sales manager Imperial Automobile Co.

Allegan Gets Blood Bros. Plant

ALLEGAN, MICH., Dec. 26—Efforts to have the Blood Bros. Machine Co., remove from Kalamazoo where they are now located to this city have ended successfully and contracts were signed to that effect. The amount of $50,000 which the Blood company asked that be raised by Allegan people has been over-subscribed, it is said. Just when the concern will locate here has not been ascertained, but when located here the company will arrange to bring out a small four-cylinder roadster and touring car next June or July.

Krit Car and Sales Cos. File Petition

DETROIT, MICH., Dec. 28—A voluntary petition in bankruptcy was filed today by the Krit Motor Car Co. and by the Krit Sales Co. The action was agreed upon at a meeting of the board of directors, December 21, which stated that the company is unable to pay its debts in full.

The liabilities of the Krit Motor Car Co., total $881,088.47; the assets total $622,533.27. Liabilities of the Krit Sales Co. are $234,305.63; assets total $256,814.70. Among the liabilities is $28.657.13 in deposits from nearly 175 dealers.

The Krit Motor Car Co. was organized in September, 1909, with a capital stock of $100,000, which was later increased to $500,000. Two years ago the company was in financial trouble but was reorganized. Last February the Krit Sales Co. was organized with a capital of $100,000 for the purpose of enabling the Krit Motor Car Co. to obtain materials and parts for car manufacture as well as meet its pay-roll. Several officers of the car company are also among those of the sales organization. Referee in Bankruptcy, Joslyn, has called a meeting of the creditors for January 18, to appoint a trustee.

Automobile Securities Quotations

NEW YORK CITY, Dec. 29—The stock market showed a slightly weaker tone during the past week than was the case the week before, most of the securities experiencing declines of a point or so, though a few showed gains of about the same magnitude. The only large increase was that by Ajax-Grieb common, which gained 10 points. The preferred dropped 1 point. Firestone common lost 2 points, General Motors, Goodrich, Kelly-Springfield and Maxwell were slightly off, as were Studebaker and U. S. Rubber, as compared with last week's figures. Goodyear common and preferred were 2 points higher, while Willys-Overland gained 1 point on the common and 2 points on the preferred.

	1913		1914	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co. com	195	210	260	310
Ajax-Grieb Rubber Co. pfd	98	100	99	105
Aluminum Castings pfd	97	100	95	100
J. I. Case pfd	..	..	..	..
†Chalmers Motor Company com	..	91	..	88
†Chalmers Motor Company pfd	90	93	..	92½
Electric Storage Battery Co	..	..	..	..
Firestone Tire & Rubber Co. com	242	250	348	354
Firestone Tire & Rubber Co. pfd	103	104	110	112
Garford Company pfd	80	90	..	..
General Motors Company com	36½	38	76¼	77½
General Motors Company pfd	76	78	89	91
B. F. Goodrich Company com	22½	23½	23	25
B. F. Goodrich Company pfd	78	79	91	95
Goodyear Tire & Rubber Company com	190	195	190	192
Goodyear Tire & Rubber Company pfd	92	94	102	104
Gray & Davis, Inc., pfd	94	101	..	..
International Motor Co. com	..	5	..	..
International Motor Co. pfd	..	14	..	..
Kelly-Springfield Tire Company com	..	..	65	68
Kelly-Springfield Tire Company 1st pfd	..	..	75	79
Kelly-Springfield Tire Company 2d pfd	..	..	93	97
Maxwell Motor Company com	3	3¼	14	15
Maxwell Motor Company 1st pfd	21½	22	41½	43
Maxwell Motor Company 2d pfd	7	7½	16	17
Miller Rubber Company	115	120	160	..
New Departure Mfg. Company com	135	145	..	..
New Departure Mfg. Company pfd	101	102	..	..
Packard Motor Car Company com	..	..	..	100
Packard Motor Car Company pfd	91	95	90	..
Peerless Motor Car Company com	15	25	15	20
Peerless Motor Car Company pfd	75	80	..	55
Pope Manufacturing Company com	1	2	..	..
Pope Manufacturing Company pfd	7	12	..	..
Portage Rubber Company com	..	40	25	30
Portage Rubber Company pfd	..	90	80	85
*Reo Motor Truck Company	6½	..	10½	11½
*Reo Motor Car Company	14½	..	21½	23
Splitdorf Electric Company pfd	40	45	..	..
Stewart-Warner Speed. Corp. com	47	51	50	52
Stewart-Warner Speed. Corp. pfd	94	97	99	101
Studebaker Corporation com	18	18½	30¾	32½
Studebaker Corporation pfd	68½	70	85	87
Swinehart Tire & Rubber Company	68	71	69	70
Texas Company	..	..	122	129
U. S. Rubber Company com	56	57	51	53
U. S. Rubber Company pfd	100½	101	100	102
Vacuum Oil Company	195	198	199	202
White Company pfd	105	110	108	110
Willys-Overland Company com	59	62	84	85½
Willys-Overland Company pfd	80	85	92	94
Rubber Goods Mfg. Company pfd	104	112	..	..

*Par value $10; all others $100 par value. †Ex dividend.

Maxwell and Case Stocks Listed on Exchange

NEW YORK CITY, Dec. 24—The governing committee of the Stock Exchange has approved the listing applications of the following companies:

Maxwell Motor Co., Inc., $9,791,800 stock trust certificates for 7 per cent. cumulative first preferred stock, $7,457,900 stock trust certificates for 6 per cent. non-cumulative second preferred stock and $9,586,200 stock trust certificates for common stock.

The J. I. Case Threshing Machine Co., $6,816,700 extended stock trust certificates for preferred stock to 1918 "stamped."

Chandler Common Pays 17½% in 1914

CLEVELAND, O., Dec. 24—The Chandler Motor Car Co. has declared the regular quarterly dividend of 1 3-4 per cent. on its preferred and an extra dividend of 2 1-2 per cent. on its common stock. This makes 17 1-2 per cent. paid on the common stock in the calendar year 1914, and the company's surplus after the 1914 dividends is equivalent to more than the $225,000 par value of all common stock.

LONDON, ENGLAND, Dec. 26—Plans have been made for a limited reopening of the London stock exchange with no speculative business at the outset. A committee has been appointed to fix maximum prices in other securities outside the gilt-edge group, should occasion arise. Every one who wishes to be member of exchange must be a British subject.

Market Reports for the Week

NEW YORK CITY, Dec. 30—The usual changes occurred in the market reports this week. Electrolytic copper was lower, closing at $0.12 5-8 a pound. The tone of this market is weak. According to reports there will be a decrease of 10,000 tons in output in Russia and Spain in 1914. Tin fluctuated throughout the week and closed with no change. This metal was weaker this week with small sales. Lead was quiet and unchanged. Prices in the oils and lubricants markets continue steady with a fair demand. Trading in crude rubber continued quiet. Fine Up-River Para came down $0.01, closing at $0.75. The offerings in this rubber were light and the prices were in all instances apparently well maintained. Supplies of rubber in New York City continue light.

Material	Wed.	Thurs.	Sat.	Mon.	Tues.	Week's Change
Antimony	.12½	.12½	.12½	.12½	.12½	......
Beams & Channels, 100 lbs.	1.21	1.21	1.21	1.21	1.21	......
Bessemer Steel, ton	18.50	18.50	18.50	18.50	18.50	......
Copper, Elec., lb.	.13¼	.13¼	.12⅞	.12⅝	.12⅝	—.00⅝
Copper, Lake, lb.	.13	.13	.13⅛	.13⅛	.13⅛	+.00⅛
Cottonseed Oil, bbl	5.64	5.75	5.75	5.75	5.79	+.15
Cyanide Potash, lb.	.21	.21	.21	.21	.21	......
Fish Oil, Menhaden, Brown.	.38	.38	.38	.38	.38	......
Gasoline, Auto, bbl.	.13	.13	.13	.13	.13	......
Lard Oil, prime	.90	.90	.90	.90	..	......
Lead, 100 lbs	3.80	3.80	3.80	3.80	3.80	......
Linseed Oil	.50	..	.50	.50	.50	......
Open-Hearth Steel, ton	18.50	18.50	18.50	18.50	18.50	......
Petroleum, bbl., Kans., crude	.55	.55	.55	.55	.55	......
Petroleum, bbl., Pa., crude.	1.45	1.45	1.45	1.45	1.45	......
Rapeseed Oil, refined	.71	.71	.71	.71	.71	......
Rubber, Fine Up-River, Para	.76	.76	.76	.76	.75	—.01
Silk, raw, Ital	..	3.90	..	3.90	3.90	......
Silk, raw, Japan	..	3.28	..	3.32½	3.25	—.03
Sulphuric Acid, 60 Baume.	.90	.90	.90	.90	.90	......
Tin, 100 lb	33.25	33.50	33.63	33.50	33.25	......
Tire Scrap	.05	.04½	.05	.05	.05	......

To Sell Lozier Property February 1

DETROIT, MICH., Dec. 29—*Special Telegram*—At the first meeting of creditors of the Lozier Motor Co. since the concern was declared bankrupt, the Detroit Trust Co., which has been acting as receiver, was elected trustee. Referee in Bankruptcy Lee E. Joslyn ordered that the property of the Lozier company be offered for sale, either as a whole or parcel about February 1 subject to confirmation by the court. A deposit of 10 per cent. but not more than $25,000 must be made by a bidder, and the bids are subject to the acceptance or rejection of the court.

Bearings Co. of America Succeeds Bretz Interests

NEW YORK CITY, Dec. 29—The Bearings Co. of America has been formed to succeed the J. S. Bretz Co., the Fichtel & Sachs Co. and the Star Ball Retainer Co., both of Lancaster, Pa. All three of the old companies were dissolved during 1914, the idea being to concentrate the entire manufacturing, warehousing, the shipping and service departments at Lancaster, and the entire sales department at 250 West Fifty-fourth street, this city.

No change has been made in the personnel. The company will continue to sell, produce and import F. & S. annular ball bearings, ball thrust bearings, Star ball retainers, German steel balls and Bowden wire mechanism.

Profit-Sharing by Detroit Companies

DETROIT, Mich., Dec. 28—The King Motor Car Co. will distribute at least 10 per cent. of its total profits for the year 1914 among all its employees in January. About 200 men and women will share in the profits, as was the case in January, 1914, when 10 per cent. of the profits made in 1913 were given all those connected with the company but who are not stockholders. The share of each employee is determined according to his annual salary.

Following a custom which was inaugurated several years ago, the Ford Motor Co. has distributed a part of its annual profits in the way of a Christmas present among 200 to 300 heads of departments, general foremen, factory heads, old employees not only with the plant here in Detroit, but with the various assembling plants, branches and foreign branches all over the world. The total amount is not disclosed, but it represented the output of about one-half the number of cars made in one day at the Ford plant, which would be from 800 to 1,000 cars.

The Federal Motor Truck Co. gave all its employees, 150 to 200, a Christmas present in the shape of a deposit in a savings bank, representing 10 per cent. of their wages for the year. The idea was rather novel and seemed to have been more appreciated by the employees than if checks or currency would have been given. The reason of the Federal company in having the money placed to the credit of each employee was to instill further the saving habit among them.

Rubber Industry Protests Embargo

Daily Cost to Manufacturing Interests Totals $250,000—No Improvement in Situation

NEW YORK CITY, Dec. 26—Representatives of large rubber manufacturing interests who have been conferring with representatives of the State Department in Washington and of the British Embassy with regard to the embargo which the British government placed upon shipments of crude rubber coming from Ceylon and the Federated Malay States in November last, state that they are unable to report substantial progress. The matter has been in negotiation with the authorities in Washington, with the British Consul in this city and with the British government in London for more than a month, but the latter, while not willing to raise the embargo entirely, is ready to permit rubber from British colonies and London to be shipped to America if our manufacturers will give satisfactory guarantees that neither raw material nor manufactured articles will be sent to Germany or Austria.

F. A. Seiberling, president of the Goodyear Tire & Rubber Co., Akron, O., on December 28 visited Washington and made representations to the United States government and the British embassy regarding Great Britain's action in placing tires and other rubber products on the contraband list. Mr. Seiberling saw President Wilson, in company with Senator Pomerene and Ex-Senator Charles Dick, of Ohio. On the same date the U. S. government forwarded to the British government a memorandum which, while not so officially designated, is in the nature of a protest against Great Britain's embargo and other restrictions upon American commerce.

Mr. Seiberling and B. G. Work, president of the B. F. Goodrich Co., Akron, O., and representing the Rubber Club of America, will go to London to lay a protest before the British government.

According to certain authorities, this embargo is costing the rubber industry about $250,000 a day, and has sent the price of plantation up to 90 cents a pound, against the normal price of 45 to 55 cents. Roughly speaking, this means the cutting off of over 50 per cent. of the normal supplies of crude rubber required by the industry in this country. Fine, up-river Para went up from 60 cents to 76 cents.

As a result of the war German chemists have been confronted with a number of important technical problems, chief among which are those of furnishing suitable substitutes for gasoline and rubber. No trouble has been found in finding a suitable substitute for gasoline, as benzol and alcohol, the former being a by-product of the manufacture of coke, the production amounting to about 160,000 tons a year. About 100,000 tons are available for fuel purposes. There is no shortage of alcohol for motor purposes.

But the problems arising from the shortage of rubber are much more difficult than those arising from the fuel situation. The importation of caoutchouc, India rubber, has been interrupted, and the synthetic production of this material was neglected before the war. Several satisfactory substitutes have been evolved by combining acetone and benzol products with caoutchouc. A certain supply of caoutchouc can be maintained by the manufacture of regenerated caoutchouc from scrap rubber.

The rubber problem in the United States has caused a syndicate in Akron to enter into contract with a number of ranch owners of Texas for the right to grow and gather the guayule shrub upon their renting several million acres of land. It is said to be the purpose of the syndicate to ship the guayule shrub to Akron where it will be manufactured into crude rubber. Marathon, Tex., has the only factory making crude rubber in the United States.

McGraw Tire Co. Offers $500,000 Stock

EAST PALESTINE, O., Dec. 26—The McGraw Tire & Rubber Co., through the Maynard H. Murch Co., Cleveland, O., has offered $500,000 in 7 per cent. preferred stock.

Net earnings of the company for the fiscal year ended November 30, 1914, were $594,136. This is about seventeen times the preferred dividend charges. In 1913 net earnings amounted to $285,558. The company has net tangible assets, exclusive of good will, patents, etc., of $1,353,670. It is capitalized at $500,000 common and $500,000 preferred.

Show to Open with 360 Exhibits

50,000 Square Feet More Space—Additional Exhibits Expected—500 Cars and Chassis on Display

NEW YORK CITY, Dec. 28—The fifteenth annual automobile show will open on Saturday, January 2, at 2 o'clock in the Grand Central Palace, this city. There will be 360 exhibits of automobiles, motorcycles and accessories distributed on the four lower floors. The exhibition will last 1 week, opening each day at 10 a. m. and closing at 10.30 p. m.

The first two floors will hold the automobile exhibits, with the six electric car exhibitors grouped on the second floor. The accessory exhibitors will be on floors three and four exclusively.

The National Automobile Chamber of Commerce anticipated the largest automobile show this city has ever held by enlarging the exhibit space by 50,000 additional square feet, as compared with a year ago, making the grand total of 150,000 square feet. There are, approximately, seventy-six makers of gasoline cars, there may be two or three more by opening hour; six makes of electrics; thirteen motorcycle makers, and about 284 makers of accessories and component parts for cars. It is certain that the above number of exhibitors will be materially increased at the eleventh hour, so that the total of 352 exhibitors at the show in 1914 will be equalled if not eclipsed. Last year a total of 492 different cars and chassis were displayed and it is expected that this figure will be slightly exceeded. Perhaps more than 500 vehicles will be on display.

Of the seventy-six makes of cars, fifty-nine are members of the N. A. C. C., Inc., and seventeen are outsiders, these non-members to date including Crawford, Davis, Durant, Enger, Grant, Herff-Brooks, Lexington-Howard, L. P. C., Owen, Patterson, Pilot, Remington, Scripps-Booth, Twombly, Trumbull, Malcolm and Gadabout. Not all N. A. C. C. members are exhibiting, several familiar faces of past years being missing, among these being noted Abbott, Austin, Great Western, Lozier, Marion, Pope-Hartford, Pullman, S. G. V., Speedwell and Staver, some of which have ceased manufacturing operations during the past year and others who are simply not exhibiting.

It is estimated by Manager S. A. Miles of the show that $1,000,000 will be spent in this city by those attending the show. According to his estimates, over 20,000 out-of-town visitors will attend, 95 per cent. of whom will stop at hotels.

Axle Makers Unite Against Kardo Co.

BOSTON, MASS., Dec. 30—That a combination among axle makers to fight the suit recently started by the Kardo Co., against the Salisbury Wheel & Axle Co., Jamestown, N. Y., is in process of formation was practically verified today. Frederick P. Fish, of the law firm of Fish, Richardson, Herrick & Neave, of this city, are preparing the case and conducting the investigation at the present time. This is the same firm that has undertaken the case for the National Automobile Chamber of Commerce, which is handling the suit of the Studebaker Co., against the Kardo interests.

Word comes from Detroit that the majority of the large axle manufacturers will unite to protect one another in this patent litigation, and although details of the work are not available, it is understood H. W. Alden, engineer of the Timken-Detroit Axle Co., is the moving spirit of the enterprise and that the majority of the axle manufacturers have agreed to unite in fighting the patents.

The Kardo patents refer to floating axle constructions and also certain front axle constructions in which the vertical pivot in the axle ends bears a relationship with the point on the ground on which the tire rests.

C. of C. Named in Windshield Suit

CLEVELAND, O., Dec. 26—Action was brought in the United States District Court Thursday, December 24, making the National Automobile Chamber of Commerce co-defendant in the suit for infringement brought by William B. Hanlon, James R. Wardrop and the Anderson Electric Car Co. against the Rauch & Lang Carriage Co.

Legal notice is served against the National Automobile Chamber of Commerce, its patent committee, officers and directors, excepting the Anderson Electric Car Co. It names Windsor White, of the White company, as one of the vice-presidents.

The complaint alleges that on February 16, 1914, they filed action against the Rauch & Lang Carriage Co. for alleged infringement of patent on shields for car windows issued to William B. Hanlon December 2, 1913.

The feature of the patent in suit is that it uses two panes of glass, forming the upper part of the windshield, one pane being in front of the other. The outer one can be swung outward and forward, forming a protector against snow and rain and affording a clear vision, while the inner glass remains vertical, making a complete windshield in conjunction with the single pane which constitutes the lower half. Both the panes in the upper portion are movable.

Ford Wins Suit to Protect Name

CHICAGO, ILL., Dec. 29—A final injunction has been issued by Judge Landis against Fred Buck, in business as the Barry Sales Co., in the suit brought by the Ford Motor Co. restraining the defendants from using the Ford name and trade mark in any way and from representing that any relation exists between them and the Detroit factory. The Ford company complained that the defendants had a Ford sign and trade mark on their building when they had no right to do so, the company not being a Ford dealer but buying cars from other dealers. The case was in the U. S. district court for the Northern district of Illinois, Eastern section.

Preliminary Injunction Denied in Horn Suit

NEW YORK CITY, Dec. 29—Judge Hand has denied the motion for a preliminary injunction made by Gottfried Piel and the G. Piel Co. in the suit against the Stewart-Warner Speedometer Corp. of New York and the Stewart-Warner Speedometer Corp. of Virginia involving alleged infringement of the Long hand horn patent No. 1,090,080. Judge Hand states, in his opinion:

"Whatever may be said of the patentability of the device, as disclosed, clearly it cannot be thought to cover the defendant's device if the claims are to remain valid. * * *"

Ritz Cycle Car Co. Sues for $50,000

NEW YORK CITY Dec. 28—The Ritz Cycle Car Co., of this city, has filed suit for $50,000 damages against the Driggs-Seabury Ordnance Corp., Sharon, Pa., alleging failure to carry out its part in a contract calling for the manufacture and delivery of 500 small cars to be known as the Ritz at the rate of 100 cars per month during June, July, August, September and October of this year. The Ritz company, in its bill of complaint, charges that the contract was entered into on April 8 and alleges that it deposited with the Driggs-Seabury corporation $5,000 in cash and two promissory notes for $2,500 each, payable 3 and 4 months, respectively, after the date of the contract. This money, it states, was to cover the cost of dies, jigs, tools, fixtures, etc., required for the manufacture of the Ritz cars.

The Ritz company alleges that the Driggs-Seabury corporation has furnished and is about to furnish cars called the Ritz, and made from the drawings, plans, etc., prepared by the Ritz company, to persons with whom the latter had contracts, and, moreover, that the price of these cars is lower than that which the Ritz company intended to ask. The concern claims damages to the extent of $50,000 and requests an accounting. It also asks for both preliminary and final injunctions against the Driggs-Seabury corporation using the name Ritz or making cars from the drawings, plans, etc., the Ritz company claims to have prepared. The bill of complaint concludes with the request that the Driggs-Seabury corporation bear the costs of the suit, which is brought in the U. S. district court for the Southern district of New York.

Prest-O-Lite Co. Wins Patent Injunction

LANSING, MICH., Dec. 21—An injunction against Roy O. Perry, doing business under the name of Haight Auto-Lite Co., South Washington avenue, has been granted to the Prest-O-Lite Co., Indianapolis, Ind., by Judge Tuttle of the United States District Court of Detroit. It is held that the local company infringes the patents of the Indianapolis concern.

Canadian Ford Profits $2,022,496

Surplus of $1,804,846 and $1,257,032 in Cash on Hand and in Bank—25,000 Cars Made

DETROIT, MICH., Dec. 24—During the fiscal year ending October 31, 1914, the Ford Motor Co. of Canada, Ltd., made a total profit of $2,022,496.06, or over 200 per cent. on its capital stock, which is $1,000,000. At the same date the concern has $1,804,846.30 surplus to its credit, and its account of cash on hand and in the bank showed a total of $1,257,032.35.

Thus ended the most successful business year the Canadian Ford company has had since the plant was started in Ford City just 10 years ago last August. The prospects for 1915 are declared to be very good, notwithstanding the war and the fact that a large percentage of the annual output is shipped to foreign countries.

The balance sheet shows the total value of the assets at $5,603,618.41, consisting of the following items: Cash on hand and in bank, $1,257,032.35; due from customers, $347,149.17; prepaid expenses such as gasoline, oil, insurance, stationery, lumber, $127,707.69; plant account, $2,358,034.03; store accounts $1,513,695.17.

The liabilities which total $5,603,618.41 consist of these items: Accounts payable, $284,621; accrued pay rolls and miscellaneous expenses, $64,207; dealers' contract deposits and miscelalneous credits, $116,679; contract rebates, $34,603.41; reserves, $276,166—consisting of $140,934 for depreciation and $130,101 for unearned profits; loss and gain, $2,022,496; surplus, $1,804,846, and capital stock, $1,000,000.

The report of the year shows that investments in buildings and building fixtures total $641,595 or $73,710 more than in 1913; real estate holdings are recorded with a value of $183,544 or an increase of $22,500 over last year; the value of the machinery equipment is placed at $590,415, or an increase of $120,923 over 1913.

The real estate value of the company outside of the plant in Ford City is $214,354 for Montreal which is an increase of $141,645 over last year; $199,279 for Toronto, which means an increase of $148,278, as compared with 1913.

Like the parent company in Detroit, the growth of the Canadian Ford company has been one of the most remarkable in the history of industrial enterprises. Probably no other concern in the Dominion has grown so rapidly to such a prominent position and into such a financially strong manufacturing enterprise.

In August, 1904, the organization of the Ford Motor Co. of Canada, Ltd., was effected, the capital stock being $125,000. The first cars were shipped in February, 1905, and the total output for 1905 was 114 cars, while total values of sales effected during the year was $110,000.

In 1906 only 101 cars were made, of which seventy-six went to foreign countries and only twenty-five into Canada. Additional machinery was installed that year and in 1907 the production totalled 327 cars, of which 236 were disposed of in Canada and ninety-one shipped abroad. The output in 1908 was 324 and nearly one-third—114—went to foreign lands. In 1909 the first of the now famous Model T was made and that year 486 cars were built, of which 364 remained in the country.

Sales Total Over $12,000,000

Beginning 1910 production in large quantities started and at the end of that year 1,200 cars had been made. In 1911 the output was doubled, while in 1912 the cars made totaled 6,500. The record for 1913 was more than doubled and in 1914, it is stated, about 25,000 were made and shipped. For 1915 the output schedule calls for 35,000 cars.

In 1905 there were sixteen employes on the pay roll. In 1914 there were nearly 1,200. The value of the sales, which in 1905 was $110,000, totaled over $12,000,000 in 1914.

Reports from Receiverships

BOSTON, MASS., Dec. 28—Judge Aldrich of the United States District Court has authorized the Massachusetts receivers of the Pope Mfg. Co. to join with the Connecticut receiver of the company in granting to the Maxwell Motor Co. an assignment of the contract of October 5, 1906, between the Pope Mfg. Co. and the Rubber Goods Mfg. Co., which contract insured to the Pope companies on all purchases of tires the lowest market prices.

The maximum total rebate was fixed at $250,000 in the contract. There now remains an unexpired credit of between $140,000 to $150,000 to the Pope company.

NEW YORK CITY, Dec. 24—The Overman Tire Co., 1853 Broadway, has filed schedules showing liabilities $54,054 and nominal assets $1,434,187, consisting of manufacturing and selling rights, $1,300,000; stock, $27,367; machinery in Passaic, $29,961; accounts, $29,837; automobiles, $3,000; fixtures, $3,279; cash in bank, $9,645; cash on hand, $111; notes, $847, and insurance, $409. The largest creditor is the Manhattan Rubber Mfg. Co., with $44,306.

DETROIT, MICH., Dec. 26—Referee in Bankruptcy Lee E. Joslyn has ordered that the property of the bankrupt Detroit Electric Appliance Co., Fort and Fourth streets, is to be sold at public auction by the Detroit Trust Co., trustee. The property, which consists of machinery, materials, supplies, tools, office fixtures and furniture, will be disposed of either in one lot or in parcel. The bankrupt concern made the Deaco starters.

DETROIT, MICH., Dec. 28—A trustee has been appointed for the S. & M. Motor Car Co. by Referee in Bankruptcy Lee E. Joslyn. The trustee reports $2,433.87 on hand for distribution among the creditors of the company. The final meeting of the creditors will be held at Room 205, 58 Lafayette avenue, Detroit, on January 5, 1915, 9.30 a. m.

DETROIT, MICH., Dec. 26—The personal property of the bankrupt Wahl Motor Co. was sold yesterday for $2,100 to A. C. Barley, of Streator, Ill. Referee in Bankruptcy Lee E. Joslyn appointed Harry Moultrop trustee. A first dividend of 3 per cent. was ordered paid to the creditors.

Burman Beats Oldfield in 50-Mile Race

LOS ANGELES, CAL., Dec. 27—*Special Telegram*—Bob Burman defeated Barney Oldfield today in the first of their series of 50-mile match races and in doing so he came very close to the half-century record, his time being 45:54, whereas Disbrow holds the mark at 45:32. Barney was 4 seconds behind Burman.

Burman drove his French Peugeot and Oldfield started in his Fiat Cyclone. On the first lap, however, the timing gears on the Fiat were stripped. Barney shifted to Earl Cooper's Stutz and the race was started over. His skill on the turns enabled him to hold Burman but on the twenty-eighth lap Bob picked up a nail which made a tire change necessary, which cost 17 seconds in which time Barney gained 1-2 mile. Burman caught him on the forty-eighth lap.

There were almost 20,000 spectators and the managament was forced to close the gates. The track was dusty after ten laps. Burman carried no mechanic while George Hill rode with Oldfield. The race was from a standing start.

LOS ANGELES, CAL., Dec. 21—Arthur Klein announced today that he would have an eight-cylinder King racer at Indianapolis for the next 500-mile race. The eight-cylinder racer is to weigh 1,750 pounds and have a piston displacement of 270 inches, according to Klein.

Venice 300-Mile Race March 17

LOS ANGELES, CAL., Dec. 17—Another great road race is practically assured for Southern California during the early months of the 1915 racing season. The Venice road race date has been set and a committee appointed to apply for the A. A. A. sanction.

March 17 is the date chosen by the Venice race boosters for the 300-mile event. A purse of $8,000 has been subscribed and this amount is to be raised to $10,000, according to members of the race committee.

There was talk of a Santa Monica race, but there were certain citizens of the seaside city who were opposed to a 1915 race. Mayor Dudly of Santa Monica had been informed by property owners along the famous course that the city would be enjoined should any attempt be made to hold a race.

LOS ANGELES, CAL., Dec. 24—Barney Oldfield is to be president of a corporation which will build a 1 1-4-mile board motor speedway. The plans call for two 1-4-mile straightaways with triple-radius turns. The grandstand, which is to be completed for the opening meet, is to seat 50,000, and with the infield space 100,000 can easily be accommodated.

It is Oldfield's intention to have the first race after the San Francisco events and before the drivers have to appear at Indianapolis. Oldfield will handle the American drivers.

Chalmers Has Block Cast, Valve-in-Head Six

DETROIT, MICH., Dec. 28—Today the Chalmers Motor Co. has given out the details of its model 32 new six-cylinder car to sell at $1,400 which is to be seen for the first time at the New York show. The motor is the most unusual feature of the new Chalmers in that it is a block cast type with the camshaft overhead and operating the valves which are also in the head. The whole mechanism is completely inclosed.

The engine has a bore of 3 1-8 inches and a stroke of 5 inches and over 40 horsepower is claimed for it. Ignition is by Atwater Kent apparatus in connection with the Gray & Davis two-unit system of cranking and lighting. Other specifications include multiple dry disk clutch, cantilever rear springs underslung from the axle, three-speed gearset on the rear axle, 120-inch wheelbase, 34 by 4 tires and frame following the lines of the body so as to give good support.

In connection with the motor construction, the cylinder head unit includes the valves and their cages and the camshaft assembly. When the head bolts are removed the whole thing comes off and the pistons are exposed. The drive for the camshaft is by spiral gear. A shaft runs transversely from the crankshaft to the right side of the cylinder block, where it connects through spiral gears with a shaft running vertically upward to drive the camshaft. The shafting is all inclosed. The ignition distributor is located on the top of this vertical shaft, while the oil pump is at the bottom. Inlet valves are of nickel steel and exhausts of tungsten steel.

Other motor features are the use of Rayfield carbureter on the left side connecting it to the block by a two-branch manifeld and combination splash and pressure feed oiling. The camshaft is hollow and carries oil direct to the valve mechanism. Special sectional piston rings are used, the flywheel is uninclosed and the starting unit connects to its teeth.

Drive is through inclosed shaft with the torsion tube bolted to the housing of the gearset. The axle is floating and has Timken bearings in the differential with Hyatts in the wheels, a combination used throughout the running gear. The brakes are 14 by 2 inches on rear wheel drums. The rear cantilever springs are 52 inches long with the main leaf of vanadium steel. The car has left drive and center control and the fuel tank is in the cowl. Only the five-passenger streamline touring car is offered. It is fully equipped.

Princess Car $495 with Disco Starter

DETROIT, MICH., Dec. 26—Beginning January 1, 1915, the two-passenger Princess car, made by the Princess Motor Car Co., will be equipped with the Disco electric starter and lighting system and will be fitted with nickel-plated trimmings. The price of the car will be $495, or an increase of $20 over the present price, which is without the electric starter and lighting system.

The Princess is a small car having a wheelbase of 92 inches and 44 inches tread. It has a four-cylinder I head block motor, 2 3-4 by 4. The carbureter is a Holley. The transmission is a Warner selective sliding set. There are three speeds forward. The front axle is tubular and the rear axle of the semi-floating type. Hyatt roller bearings are used throughout. The front springs are semi-elliptic and the rear are cantilever. Artillery wheels are used, having 28 by 3-inch non-skid tires.

The body is made of sheet metal with a sloping French hood and a gunboat rear deck. The road clearance is 10 inches. The equipment includes top with hood and side curtains, adjustable windshield, two gas headlights with generator tank, one oil tail light, tire holder, number bracket, electric horn and tools.

Briggs-Detroiter Eight-Cylinder $1,295

DETROIT, MICH., Dec. 28—The Briggs-Detroiter Co. has brought out an eight-cylinder model with a 2 3-4 by 4.5-inch motor and 112-inch wheelbase at $1,295. The cylinders are cast in two blocks, starting and lighting is by the Remy two-unit system and a dry-plate multiple disk clutch is used. Left drive and center control are used and the wheels are wood fitted with 34 by 4-inch tires, the rear pair being non-skids. The front axle is an I-beam and the rear floating with semi-elliptic springs at the front and platform-construction at the rear. A touring body is fitted and a sedan may be added. The standard color is Brewster green. The company states that it will not discontinue the manufacture of four-cylinder cars.

To Make Crown Prince Steel Wheel

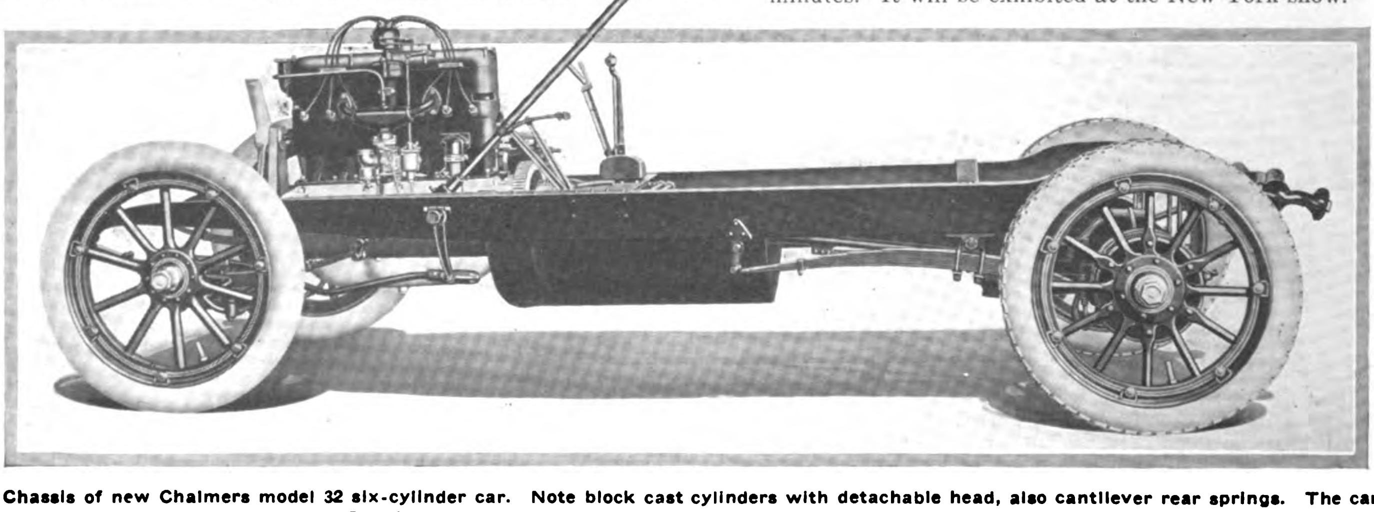
DETROIT, MICH., Dec. 28—The Crown Prince pressed steel wheel which is manufactured at Ohligs, Germany, and imported by Max Bachem, who introduced it to the American automobile trade at the New York show of a year ago, will be manufactured in this country under foreign patents by the Detroit Pressed Steel Co. The wheel is adaptable to both passenger cars and commercial vehicles.

Klaxon Announces New Price List

NEWARK, N. J., Dec. 28—On January 1 a new schedule of list prices will go into effect covering all models of Klaxon warning signals, manufactured by the Lovell-McConnell Mfg. Co., of this city. The Klaxon type L or S is now $20; the Klaxonet, $15; the Klaxet, $9; the Hand Klaxon, $7.50; the combination Klaxon with bulb horn, $30; the combination Klaxonet, $20.

Manzel Adds Ford Power Tire Pump

BUFFALO, N. Y., Dec. 29—The Manzel Bros. Co., this city, has brought out a new model engine-driven tire pump for Ford cars which sells for $7.50 complete with 12 feet of hose, pressure gauge and the necessary fittings. The pump is direct driven by gears from the crankshaft and is attached by removing the lower fan belt pulley and substituting for it a Manzel combination pulley and steel gear which are integral. The pump is attached to the side of the motor, the installation requiring about 45 minutes. No machine work is necessary. The pump will fully inflate a Ford tire in 1 1-2 minutes. It will be exhibited at the New York show.



Chassis of new Chalmers model 32 six-cylinder car. Note block cast cylinders with detachable head, also cantilever rear springs. The car has a 3 1-8 by 5-inch motor, two-unit electrical system, three-speed gearset and 34 by 4-inch tires

Factory Miscellany

MAXWELL Employing More Men—A report on business conditions from the Maxwell Motor Co., Detroit, Mich., shows that the company made big gains over last year and that its business and production has gained every month since the first of August. The company employed an average of 4,250 men daily for the months of August, September and October, 1913, with an average monthly payroll of $296,956.24. The recapitulation statement for the same months of this year shows a daily average of 5,818 men, with a monthly payroll of $427,-809.52, or an increased payroll of $130,-853.28 per month. The 30 days of November of this year make an interesting comparison, and shows that business conditions are actually better with the company since the war was declared in August. It employed 5,727 men daily during November of this year, as against 5,602 men in August of this year and 3,894 men in November of last year.

Piston Factory for Newark—The American Piston Ring Co., Newark, N. J., manufacturer of automobile pistons, will build a one-story, 75 by 150-foot plant at 378 Jelliff street.

Accessory Plant for Marion—E. C. Fox, of Marion, O., and J. W. Thomas, Cleveland, O., contemplate the construction of a factory in Marion for the manufacture of automobile accessories.

Federal Truck Gives Party—The Federal Motor Truck Co., Detroit, Mich., gave a Christmas party to all its factory and office employees, the feature of which was the presenting to each of them of 10 per cent. of his wages.

Federal Rubber's New Addition—The Federal Rubber Mfg. Co., Cudahy, Milwaukee County, Wis., is having plans prepared for a factory addition, to be 44 by 124 feet in size, 2 stories high, of fireproof construction. The addition is part of the $500,000 improvement scheme instituted about July 1 of this year. The capacity of the big tire works is to be more than doubled within a year's time.

Hastings Concern Making Shock Absorbers—The Bar-Bar Mfg. Co., Hastings, Mich., has begun the manufacture of shock absorbers and pilots for motor cars. The company has offices in Grand Rapids, Mich. Edward M. Barnes, of Hastings, is president of the company, and L. W. Barnhart, of Grand Rapids, is secretary and treasurer. Territory for the company's products is being taken rapidly.

Triple Action Spring Addition Built—The Triple Action Spring Co., Chicago, Ill., recently completed its new addition, 130 by 135 feet, devoted exclusively to the repair of automobile springs and the installation of Johnson shock absorbers. Forty-two men are employed in the shop and there is a payroll of seventy-five, which includes salesmen on the road. The company recently announced a special Johnson shock absorber for Dodge cars.

Peninsular Plant Sale Jan. 7—The plant and equipment of the bankrupt Peninsular Steel Castings Co., Iron and Wight streets, Detroit, Mich., will be offered for sale at public auction at 10 a. m. January 7, 1915. The property occupies a plot of ground 371 by 100 feet. The foundry building is 50 by 250 feet, and is equipped with machinery, tools and supplies, and could be well re-operated at once. The Security Trust Co., trustee, will furnish full particulars.

Goodyear Shows Sales Increases.—Figures showing the tire production of the Goodyear Tire and Rubber Co., Akron, O., for the last 6 years have recently been compiled, showing comparison of productions beginning with 1909. In that year Goodyear made and sold 102,669 tires; in 1910 the figures were 207,442; in 1911, 332,458; in 1913, 1,132,869, and in 1914 these figures were topped by a production of 1,478,396. This accounts only for the pneumatic tire produnction of the company.

24-Hour Schedule for Kissel—The truck shops of the Kissel Motor Car Co., Hartford, Wis., will maintain a 24-hour schedule for at least 30 days more to insure a quick production of the war orders placed recently. The company also has booked a large order for taxicabs from Los Angeles. Not before in the history of the Kissel shops has it been necessary to work on Christmas Day, or even during the holiday period. In former years the week has been used for inventory and overhauling, but this year operations are not only uninterrupted, but on a double-time schedule.

The Automobile Calendar

Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 2-9	New York City, Automobile Salon, Grand Ball Room of Astor Hotel, Automobile Importers' Alliance, E. Lascaris, Pres.
Jan. 3-10	Buenos-Aires, Argentina, Grand Prize of Argentina.
Jan. 5-7	New York City, Engineering Societies' Bldg., Winter Meeting Society of Automobile Engineers.
Jan. 7-9	Pasadena, Cal., Show, Hotel Maryland Amphitheater.
Jan. 8-14	Milwaukee, Wis., Show-Auditorium, Milwaukee Auto. Dealers' Assn.
Jan. 9	San Diego, Cal., Road Race.
Jan. 9-16	Philadelphia Show, Metropolitan Bldg., Philadelphia Auto. Trade Assn.
Jan. 16	Detroit, Mich., Show.
Jan. 16-23	Cleveland, O., Show., Cleveland Automobile Show Co., F. H. Caley, Mgr.
Jan. 20-28	Lancaster, Pa., Hiemenz Auditorium.
Jan. 23-30	Montreal, Que., Show, Allen Line Liverpool Bldgs., Montreal Automobile Trade Assn., T. C. Kirby, Mgr.
Jan. 23-30	Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 25-30	Fall River, Mass., Show.
Jan. 25-30	Buffalo, N. Y., Show, Broadway Auditorium, Buffalo Automobile Dealers' Assn.
Jan. 30-Feb. 6	Columbus, O., Show, Memorial Hall, Columbus Auto Club and Columbus Auto. Trades Assn.
Jan. 30-Feb. 6	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Automobile Trade Assn.
Feb	Portland, Ore., Show, Portland Auto Trade Assn.
Feb	Toledo, O., Show, Toledo Auto Show Co.
Feb. 1-6	Louisville, Ky., Show, Louisville Auto. Dealers' Assn., First Regiment Armory.
Feb. 2-7	Kalamazoo, Mich., Show, Armory.
Feb. 8-13	Toledo, O., Show, Terminal Bldg., Toledo Auto. Shows Co., H. W. Blevins.
Feb. 8-14	Kansas City, Mo., Show.
Feb. 9-12	Eau Claire, Wis., Eau Claire Auto. Dealers' Assn.
Feb. 15-20	Grand Rapids, Mich., Show, Klingman Furniture Exposition Bldg., Grand Rapids *Herald*; C. L. Merriman.
Feb. 15-20	Omaha, Neb., Show, Auditorium, C. G. Powell.
Feb. 15-20	Bridgeport, Conn., Show, State Armory; B. B. Sterber.
Feb. 22	San Francisco, Cal., Vanderbilt Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Feb. 23-27	Syracuse, N. Y., Show, Syracuse Auto Dealers' Assn.; H. T. Gardner, Mgr.
Feb. 23-27	Ft. Dodge, Ia., Show, Armory, C. W. Tremain, Sec.
Feb. 27	San Francisco, Cal., Panama-Pacific Exposition, Grand Prize Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 6-13	Boston, Mass., Show, Mechanics Bldg., Boston Auto Dealers Assn., Boston Commercial Motor Veh. Assn.
Mar. 8-13	Canton, O., Show, Auditorium, Stark Co. Auto. Show and Electrical Exposition.
Mar. 8-13	Des Moines, Ia., Show, C. G. Van Vliet.
Mar. 14	San Francisco, Cal., Panama-Pacific Cup Race, Panama-Pacific Exposition Grounds; Promoter, Panama-Pacific Exposition Co.
Mar. 17	Venice, Cal., 300-Mile Road Race.
April	Calumet, Mich., Show, Coliseum.
May 17-18	Boston, Mass., A. A. A. Annual Meeting.
May 29	Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 9	Galesburg, Ill., Two-mile Track Meet.
June 16	Chicago, Ill., Speedway, 500-Mile Race, Speedway Park Assn.
June 25	Sioux City, Ia., Track Meet.
July 4	Tacoma, Wash., Road Race.
Aug. 20-21	Elgin, Ill., Road Race.
Sept. 20-25	San Francisco, Cal., International Engineering Congress.

The Week in  the Industry

Motor Men in New Roles

Brown Bros. Manager Arrives in N. Y.—B. R. Banks, manager of the motor department of Brown Bros., Ltd., London, arrived in New York City on the Lusitania, December 22. His address will be at the Oliver Bros.' Purchasing Co., 71 Murray street, that city, where he will make appointments with manufacturers of American automobile accessories, with a view to their sale in Europe. Brown Bros., Ltd., is one of the largest jobbers in the United Kingdom, and already has the sole representation of the Raybestos brake lining, Gabriel horns and snubbers, Gleason Peters pumps, Edmunds & Jones lamps and New-Departure cycle sundries.

Donohue N. Y. Federation Secretary—G. C. Donohue has been named secretary of the New York State Motor Federation.

Lee Oldfield Heads Repair Dept.—Lee Oldfield, a race driver, has taken charge of the repair department of the Minnesota Automobile Laundry and Service Garage, Minneapolis.

Levey Joins Auto Parts Co.—Wm. B. Levey, formerly purchasing agent of the Borland-Grannis Co. and later of the American Electric Car Company is now purchasing agent of the Auto Parts Co., Chicago, Ill.

McNulty Saxon Representative — The Saxon Motor Co., Detroit, Mich., has appointed C. L. McNulty southern district representative. Mr. McNulty was for several years a district representative of the Studebaker Corporation.

New Oldsmobile Appointments—The Olds Motor Works, Lansing, Mich., recently appointed J. M. Otero as its representative for the island of Cuba, with a location on Paseo de Marti, at Havana. It also appointed Sojo & Co. agent for the Porto Rican territory.

Thompson Heads Morse Chain Branch—F. C. Thompson, formerly assistant chief engineer of the Lozier Motor Co., Detroit, Mich., has been appointed manager of the Detroit branch of the Morse Chain Co., Ithaca, N. Y., which has been opened in the Dime Savings Bank Building, Detroit.

Studebaker Promotions — Vice-President Benson, of The Studebaker Corp., Detroit, Mich., has appointed H. T. Myers manager of the department of delivery car sales. G. N. Jordon, traveling representative, succeeds Mr. Myers as manager of the corporation's Boston branch.

Finch Joins Standard Truck—E. B. Finch, who has been connected with the Packard Motor Car Co. and the Chalmers Motor Co., in their executive departments, has been appointed general sales manager of the Standard Motor Truck Co., Detroit, Mich. Mr. Finch will also be first assistant to President Albert Fisher.

Bayliss Cadillac Manager—J. E. Bayliss has been appointed Western district manager for the Cadillac Motor Car Co., Seattle, Wash., succeeding A. E. Landman, who resigned to join partnership with Don Lee, Cadillac distributor in California. Mr. Bayliss formerly was representative of the Packard Motor Car Co. and has been identified with the motor industry since its inception.

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Garage and Dealers' Field

Benz Opens N. Y. Service Dept.—The Benz Automobile Sales Corp., New York City, importer of Benz cars and local distributors of Kissel cars, has opened a complete service department on West 55th street.

Flanders Electric Opens in Detroit—Salesrooms have been opened at 270 East Jefferson avenue, Detroit, Mich., by the Flanders Electric, Inc., Pontiac, Mich., manufacturers of the Flanders electric cars.

K. P. Headquarters in N. Y. City—The K. P. Foot Rest Heater Co., which formerly had its headquarters in Boston, Mass., has established its main office and New York distributing station at 250 West 54th street, New York City.

J-M Factory Branch in N. Y. City—The J-M Shock Absorber Co. has opened a direct factory branch at 250 West 54th street, this city. Edward Knauss, who was formerly Boston distributor for the J-M company is in charge of the local factory branch.

Takes Minneapolis Gibney Agency—The Northwestern Tire Co., Minneapolis, F. J. Kerner, manager, has taken over the northwestern agency for the Gibney solid tire, made in Philadelphia. This is the first time the Gibney has ever been handled in the northwest.

New McGraw Factory Branch—The McGraw Tire & Rubber Co., of East Palestine, O., maker of the Imperial, Pullman and Congress tires, and the McGraw solid tires, has opened a branch in Boston, Mass., at 667 Boylston street, with W. G. Page as manager.

Handling Century Starter—G. M. Weatherbee and C. A. Orr, formerly of the Hollander Motor Car Co., Boston, Mass., agent for the Cartercar, have formed a company to handle the Century starter for Ford cars with salesrooms at 29 Cambria street. Their territory includes Maine, Massachusetts and Rhode Island.

New Electric Garage for Detroit—The Indian Village Garage has been opened at 1524 Jefferson avenue, Detroit, Mich., by A. H. Dorsey, until recently manager of the local branch of the Anderson Electric Car Co. The garage has been built to take care of seventy-five electric vehicles and a small number of gasoline cars. The entire floor of 75 by 200 feet is free from posts.

Studebaker Buyers Receive Long Trips—An automobile dealer in the State of Washington has offered to a club of five customers a free trip from the Northwest to Detroit. The maker of the offer is Henry J. Laymance, Studebaker dealer at Waterville, Wash., who has advertised publicly that within 60 days from date of his advertisement all persons purchasing Studebakers will be given the free trip.

Secure Philadelphia Disco Agency—Carlile and Doughty, electrical and mechanical engineers, formerly of 406 South 8th street, Philadelphia, Pa., are the newest acquisitions to Automobile Row, now occupying 846 North Broad street, and have secured the agency for the Disco electric starting and lighting system for Ford cars.

Purchases Property—The Seaman-Sivyer Co., Milwaukee, Wis., a large independent oil and grease interest, has purchased the Phelps property at 249-251 Lake street, part of which it has occupied since its organization in August, 1913, and will occupy the entire building. Charles H. Seaman is president and Howard M. Sivyer vice-president of the company.

Palmyra Agent to Enlarge—Otto E. Scherer, agent for the Buick at Palmyra, Wis., and owner of one of the largest garage businesses in southern Wisconsin, will expend from $15,000 to $20,000 during the first half of 1915 in enlarging his buildings. When the improvements are completed, Mr. Scherer will have a building devoted exclusively to display and repair space and another for dead and live storage, washing, etc.

Last of Vermont Toll Road—The famous Peru turnpike in Vermont, one of the very few remaining toll roads in the East, will soon be abolished as the state has decided to either take it over by purchase from its owners or by right of eminent domain. It lies in the towns of Windham, Londonderry and Peru. The agitation for abolishing it began with motorists, who did not like to be paying toll every time they happened to pass that way.

Buick's Big Pacific Coast Shipment—Seattle will be the terminus of the first trainload of automobiles to come to the Pacific Coast in 1915, orders having been placed with the Buick Motor Co. for 200 pleasure and commercial models by the Northwest Buick Co., Seattle. The machines will be shipped in forty freight cars, and left Flint, Mich., on Christmas Day. They are coming in a special train, and the freight charges alone amount to $18,000, while the entire shipment is valued at $250,000. The machines are for distribution in Washington and Oregon.

Wis. Farmers After Insurance Business—Wisconsin farmers' mutual insurance companies are out to capture a share of the motor car underwriting business now controlled by stock companies. In the calls for annual meetings of more than fifty of the leading farmers' mutuals, it is stated that the question of authorizing the boards of directors to insure motor cars will be the most important proposition for consideration. The proposition grows out of the enormous number of cars now in the hands of farmers, who demand the low rate of insurance on their machines that is provided by the mutuals on their other farm property, including machinery.

DECEMBER 24, 1914

10 CENTS A COPY

The AUTOMOBILE

BRISCOE

Today the Briscoe is the car of big demand, as we can readily prove to you.

The BRISCOE is the car that the medium sized car buyer looks up to with a hopeful prospect of possession.

Perhaps he is the owner of some good small car, but wants a more ambitious one for the coming season. For some time he has felt that he ought to be able to get a lot more value—more high grade features, more smartness, better riding quality; in a word, *more car* for his $1000 or less; in fact—a BRISCOE.

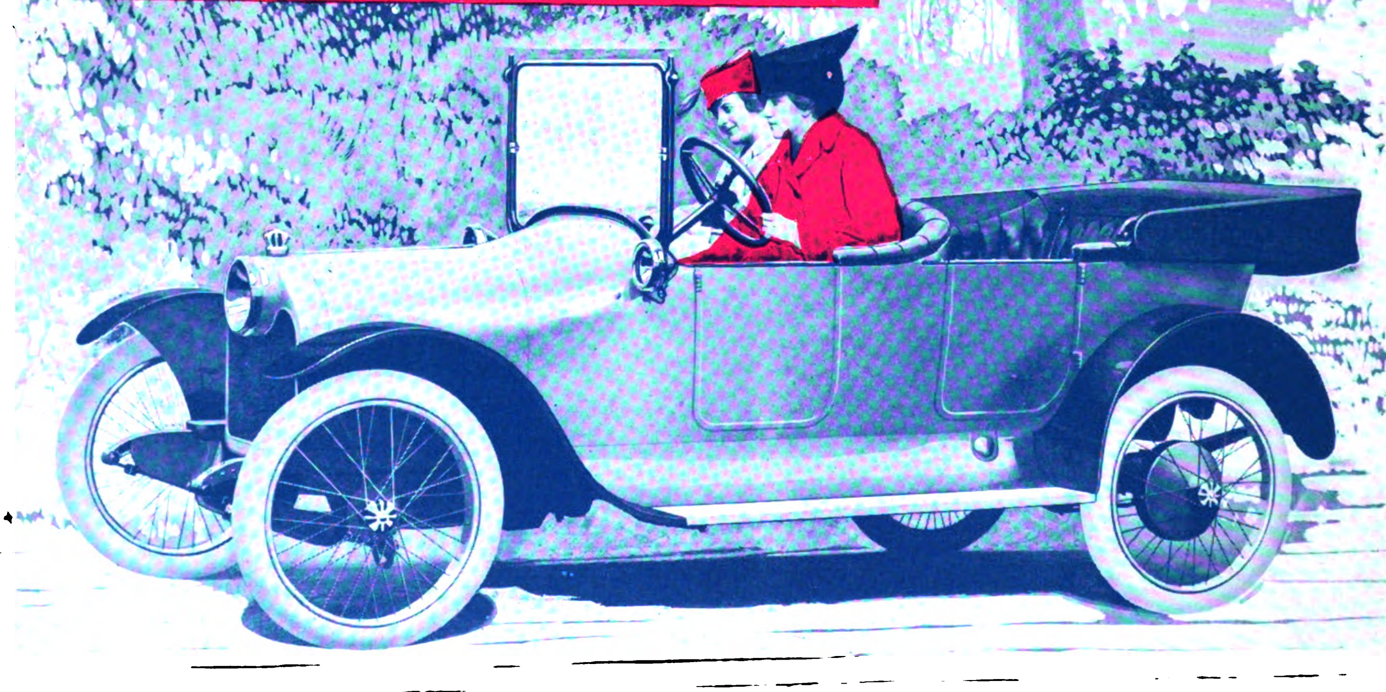
On the other hand, a BRISCOE is pre-eminently the car that is going to attract the buyer accustomed to a big and more expensive car. Such a man needs mighty little saleswork. He is motor-wise, used to quick decisions on important matters, and will sell himself—if given a chance to look a BRISCOE over.

It is the converging of these two different public demands that makes the BRISCOE, at $785, THE CAR OF BIG DEMAND—*the ideal car for every Owner-Driver.*

Are you likely to do better than by handling the car that pleases one large class by its supreme value, and another large class by the very moderate figure at which it is offered?

(Better get in touch with us AT ONCE.)

$785.00
COMPLETELY EQUIPPED



BRISCOE MOTOR COMPANY • JACKSON MICH

The AUTOMOBILE
THE CLASS JOURNAL COMPANY
231—241 W. 39th STREET NEW YORK CITY

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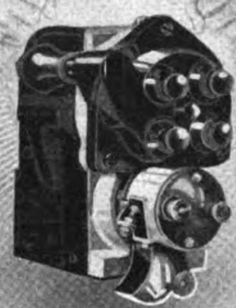
VOL. XXXI NEW YORK, DECEMBER 31, 1914 No. 27

NEW YORK SHOW ISSUE

SPLITDORF

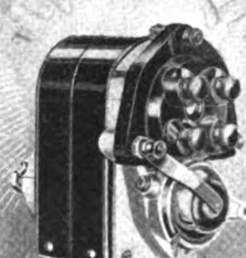
MODEL EU4-2
HIGH TENSION
MAGNETO



DIXIE
TYPE

SPLITDORF IGNITION devices for the 1915 season include several new types of magnetos of the high-tension variety. These have been designed to meet the clamor of automobile engineers for even more effective units for the popular demand.

Model EU4-2 is a big brother to the highly successful model EU4, being more powerful with its double magnets, and made for 4-cylinder motors developing as high as 40 horsepower. As standard equipment on 1915 *Overland* cars, among other makes of automobiles, the efficiency of the EU4-2 is "hall-marked" in view of the severe tests to which many thousands have been subjected.



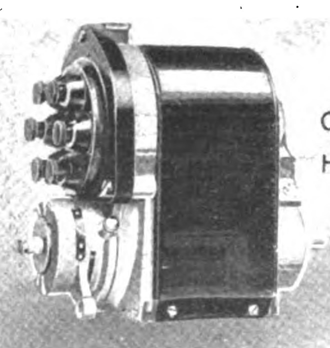
MODEL EU4
HIGH TENSION
MAGNETO

Two new types of high tension magnetos, constructed particularly for easy starting without the use of battery, auxiliary coils or any external devices, are the DIXIE and the CUNNINGHAM.

The DIXIE TYPE is distinctly *new* and contains many interesting and valuable features—platinum points external to the main breaker-box—no wire on any of the revolving parts—field coil housed in the arch of the magneto—with timing lever at retard or advance the spark is of the same strength for any given speed—minimum loss of energy, etc. In the construction of the CUNNINGHAM there is practically no difference in the strength of the spark when the break is in advanced or retarded position, the speed remaining the same. By its construction an advance of 70° is obtained which is essential for long-stroke slow-speed 6-cylinder engines.

Operating slower than any engine will turn over on its own power and well below the limit for cranking speed, **an equipment of either the DIXIE TYPE or the CUNNINGHAM overcomes every excuse for having batteries around the car for ignition purposes. All that is necessary with either, is a simple switch for shorting the magneto when stopping.**
Study our exhibits:

New York Show: Space C-47
Chicago Show: Spaces 58-71



CUNNINGHAM
HIGH TENSION
MAGNETO

SPLITDORF ELECTRICAL CO.
NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)

LBA Willard STORAGE BATTERY LBA

Anybody Can Make a Grid, but—

It takes experience and knowledge of a high order to make a thoroughly satisfactory storage battery plate.

With twenty kinds of lead oxides and twenty different ways of mixing them, there is an unlimited number of ways of going wrong.

Eternal vigilance is the prime factor—and every operation in the Willard plant is followed by inspection. Every pound of metallic lead has to be up to the Willard standard. Every grid is inspected when it comes from the mold. Samples of every keg of oxide go to the laboratory for inspection and testing. When the oxides are mixed they are tested. When the plate is pasted it is inspected, and again after it is dried. While the plates are "forming" the temperature and specific gravity of the electrolyte is under constant inspection and readings of the terminal voltage taken hourly.

Every batch of plates is subjected to laboratory test, and so is every lot of completed batteries.

Inspection is not the only reason that 85 per cent. of all makers of electrically equipped cars specify Willard Batteries, but is one of the big reasons for their uniformly good service and long life.

Willard Storage Battery Company
Cleveland, Ohio

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1931 BROADWAY, NEW YORK

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Tops for many other cars.

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American	34	21.00
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Perfectly balanced motors guaranteed with our regrinding and new pistons. Scored cylinders filled and reground. Welding repairs of all descriptions. "Send it to Oxy." **Oxy-Carbi Company**
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Have Your Cylinders Rebored and Reground

Fitted with my racing pistons and my new patent leakless rings. Guaranteed to give 35% higher speed, power and economy. Also make gears of all kinds and push rods and piston pins of chrome nickel steel, hardened, tempered and ground, superior to factory; also cranks, connecting rods, crank cases or any part, and make special motors; send parts to the shop of quality.

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furnish our heat-treated piston rings and pistons. First-class equipment; 15 years' experience. Write for our prices.
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AAA WELDING BY EXPERTS
Broken crankshaft, crankcases, cylinders, flywheels, gear teeth, pistons, perfectly welded and machined; ready to replace; scored cylinders made new; booklet. **Atlas Welding Co.,** 42 Elizabeth Avenue, Rahway, N. J.

IN ZERO WEATHER
Cylinders will freeze and crack
Bournonville
will make them as good as new
All broken auto parts welded and guaranteed
Eug. Bournonville Welding Co.,
Oxy-Acetylene Process
241 West 64th Street New York City

Send us your broken cylinders and crankcases to be welded at small fraction of replacement cost. Very prompt delivery. Quotations given if desired. Play safe—deal with an established and responsible firm like **The Waterbury Welding Company**, Waterbury, Conn.

THE NATIONAL WELDING CO.
Oxy-Acetylene Welding in all metals
We weld and absolutely guarantee all work. Expert workmanship. Send us a trial order **now**, we will do the rest.
326-328 Dixwell Ave., New Haven, Conn.

We Do Welding Others Cannot do on Parts of Aluminum or Cast Iron.
Expert Auto repairmen dismantle and reassemble jobs. Ship your worst smashed crank cases and cylinders to
Hobbie's Welding Plant, Hampton, Iowa.

The Clearing House—continued

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MAGNETOS REPAIRED
Bought, sold and exchanged. Bosch, Eisemann, Splitdorf, Mea. Expert Repair Work. Guaranteed
Magneto Sales Co.,
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MAGNETO EXPERTS.
We repair and remagnetize all makes of magnetos. Full line of repair parts in stock. Guaranteed workmanship and prompt shipment. Satisfaction assured. Try us NOW.
BINGHAMTON ELECTRICAL LABORATORIES,
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SEND FOR PRICE LIST
of new and used magnetos. We have repair parts and repair all systems.
Pellet's Magneto Exchange
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Lamps, Radiators and Windshields
of all kinds repaired and parts supplied.
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Guaranteed work and prompt shipment.
The Auto Lamp Repair Co.
80 John Street Bridgeport, Conn.

We Repair Auto Radiators, Lamps,
Fenders, Windshields, Tanks and Horns of all kinds. Bargains always on hand. Estimates given.
Hudson Auto Lamp Works, Inc.
1648-50 Broadway, N. Y.
Branch at 1054 Bedford Ave., Brooklyn, N. Y.
Tel. Decatur 1227.

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Auto Tires Re-covered With Firestone Non-Skid Treads

30 x 3	$ 6.50	33 x 4	$11.75
30 x 3½	7.75	34 x 4	12.25
32 x 3½	8.50	36 x 4	13.00
36 x 4½	15.00	37 x 4½	15.75

Workmanship and Material Guaranteed.
A Trial Will Convince. Repairing Tires Since 1896.
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AUTO TIRES—USED SLIGHTLY
300 34x4 tires, Q. D. Bought of manufacturer who used larger sizes for next year—$8 each. Tubes $2. Save $ $, one-third with order.
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DOUBLE TIRES
Positively Puncture-proof.
Send us your old tire in most any shape; We will reclaim it into a
DOUBLE TIRE
It will save you over half on your tire expense. A full stock of Double tires always on hand.
Write us for prices.
One trial will convince you.
Discounts to dealers and garage owners.
L. JAFFESS
252 W. 55th St. Tel. 3249 Col.
Day and Night Service.

Consult us before buying any puncture proof or double tires.
You will save money.
ANGLO TIRE CO., 235 W. 49th St., N.Y.C.

TIRES!
Extra heavy type tires. They average 5,000 miles service. 30x3, $6.75, tube, $2.25; 30x3½, $8.50—$2.75; 32x3½, $8.60—$3.00; 33x4, $12.40—$3.60; 34x4, $12.50—$3.75; 36x4, $13.75—$4.00. All other sizes. Skids, 10% additional.
Tire Sales Company, Buffalo, N. Y.

Double Tread Tires

Are Guaranteed to Give Satisfaction

Size	Plain	Non Skid	Pure Gum Tubes	Red Tubes
28x3	$4.00	$4.50	$1.94	$2.46
30x3	5.00	5.50	2.04	2.68
30x3½	6.00	7.00	2.55	3.20
32x3½	7.00	8.00	2.70	3.44
34x3½	8.00	9.00	2.88	3.68
30x4	7.50	8.50	3.14	4.10
32x4	8.00	9.00	3.35	4.14
33x4	9.00	10.00	3.46	4.14
34x4	9.00	10.00	3.58	4.36
35x4	9.00	10.00	3.68	4.56
32x4½	9.00	10.00	4.27	5.30
34x4½	10.00	11.00	4.48	5.44
34x5	11.00	12.00	5.25	6.08

1% Discount if full amount accompanies order.
These Tires are absolutely Punctureproof.
Be sure to state whether regular Q. D. or straight bead.

WHY PAY MORE?
Will outwear any make of tire at a saving of 75% of your tire bill.
Send us a trial order to-day.

The Double Tread Tire Co., Inc.
116 West 52d Street, New York City
'Phone, Col. 8681

TIRES! TIRES!

Double Tread Tires

Points the way to tire satisfaction and will surely save you 75% of your tire expense

Size	Plain	Non-Skid	Size	Plain	Non-Skid
28x3	$4.00	$4.50	36x4	$9.00	$10.00
30x3	5.00	5.50	32x4½	9.00	10.00
30x3½	6.00	6.50	34x4½	10.00	11.00
32x3½	6.50	7.00	35x4½	10.00	11.00
34x3½	7.50	8.00	36x4½	10.00	11.00
30x4	7.00	7.50	37x4½	11.00	12.00
32x4	8.00	8.50	34x5	10.00	11.00
33x4	8.00	9.00	35x5	12.00	13.00
34x4	8.00	9.00	36x5	12.00	13.00
35x4	9.00	10.00	37x5	12.50	13.50

Our tires are practically puncture-proofed. Terms C. O. D. 10% deposit.

B. LIBEN & CO.,
261 West 54th St., 112 East 110th St.
New York City
The Home of Double-Tread Tires

WHY NOT?

RECLAIM YOUR TIRES

From 1000 to 3000 more miles can be obtained for $2.50 to $4.50, according to size.
Also a stock of Double Tread tires kept on hand. Prices from $6.00 to $13.00. All this work is guaranteed.
Write for particulars.

COWANS BROS.,
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50 LINCOLN MILLING MACHINES
$50.00 EACH
Send for photo and description
LUCAS & SON, 5 Fox Street, Bridgeport, Conn.

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AUTOMOBILE TROUBLES
and How to Remedy Them
Send for Complete Circular.
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LIGHTING, STARTING, IGNITION
And Mechanical Repairs treated in principle and practice for the expert and layman. Send for sample pages of "The Modern Motor Car."
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THIS BOOK ANSWERS
1001 Motor Troubles
Contains Motor Laws of Every State. Valuable Lubricating and Oil Charts. It is called "The Motorist's First Aid Hand Book." It fits in your coat pocket. Is handy and compact.
Price, Only 75c.
Sent postpaid. Stamps accepted.
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AUTO MAILING LISTS

Ask for Special Price List
Auto owners, Ford owners, Ford dealers, all other dealers, Garages, Repairs, Supplies, Manufacturers, Jobbers, anything pertaining to the Auto Trade.
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Phone, Franklin 1182.

MAILING LISTS AND STATISTICS
Owners or dealers; any state, county, city; weekly and monthly supplements at lowest prices. Special lists of electrics, trucks, Fords, Studebaker, Overland, etc. **Motor List Co. of America.** 1105 Locust St., Des Moines, Ia.

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FUR LINED OVERCOATS
Limited quantity Manufacturers' samples. Black broadcloth outside, lined throughout with Mink dyed marmot. A beautiful Fur, like Mink. Large Persian lamb collar. Making a handsome coat, suitable for Dress wear or driving. All sizes. **$27.50**
Would retail for $60.
SENT ON APPROVAL
You take no risk. Examine and try on before paying. Write today, stating size, enclosing 50c for express charges only, and coat will be sent at once.
E. HART, Dept. M., 3405 Broadway, New York

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FREE BOOKLET
"How to Succeed in the Automobile Business," on application. A Greer diploma guarantees efficiency. Largest motor college in the world—1400 graduates—$40,000 in modern equipment—eight instructors—actual work, repairing and driving—Day and evening classes—many owners and dealers employ Greer graduates only.
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WE FURNISH POSITIONS
After we teach you the principle and construction of all cars; how to remedy all troubles and how to make all repairs.
Leitze Automobile Training School
"The School that Graduates Experts."
347 Franklin St. Buffalo, N. Y.

The Clearing House—continued

MOTORISTS' PROBLEMS SOLVED

In a technical and practical manner by instructors of high calibre. Owners, prospective owners and men wishing to become chauffeurs should not fail to take a course in our school. Day and Evening classes; also private instruction at hours to suit convenience. Call or write for Booklet.

STEWART AUTOMOBILE SCHOOL
Chartered by N. Y. State Board of Regents.
225 West 57th Street, New York
"Founded on Honesty"—"Prospers on Merit"

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Energetic, Successful Salesmen for 1915
desired by a new jobbing house in automobile supplies, conducting business along entirely new lines. To such high grade, experienced men we can offer a full line of goods, at low prices, which with our first class support and service to customers, should enable real salesmen to make good money next year. State in confidence territory covered, past record, amount of sales, etc.
Address **Box T 628, care The Automobile**

SALESMEN
Calling on supply houses to handle small line of accessories. Commission basis. Excellent side-line. Exclusive territory.
C. Spiro Mfg. Co.,
66 East 131st St., New York City.

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LARGE RETAIL AND WHOLESALE MOTOR CAR AND SUPPLY BUSINESS
Three fine contracts, good territory. Supply contracts and car contracts on jobbing basis, best location in city of 250,000. Other business only reason for selling. Will retain interest with high class man. About $15,000 required. Best opportunity today. Address Box T311, care The Automobile.

Manufacturers' Agent Wants Accounts from manufacturers of auto accessories, tires, tubes, etc. We cover Michigan every two weeks thoroughly. Must have base price and best terms, commission basis. We can get you the volume.
Auto Accessories Sales Co., Lansing, Mich.

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P. BRADY & SON CO.
Trucking and Storage. Automobiles and Bodies Stored. Automobiles boxed for Export.
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Patented Ideas Make Money. We Show You How. Send for Free Book
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HELP WANTED

WANTED
Names of FORD OWNERS. We pay $5.00 per 100. Send 25 cents for contract blanks, particulars, instructions and outfit.
UNIVERSAL SYNDICATE
1123 13th Ave., Moline, Ill.

WANTED APPLICATIONS
Experimental Engineers, Automobile work, Designers on Gasoline Engines, Electric Garage Men, Foreman Automobile Assembly.
The Toledo Engineering Agency,
Toledo, O.

CLASSIFIED ADVERTISING

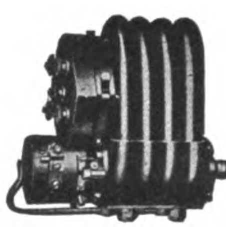
RATE 35 CENTS A LINE

Cars Wanted

WANTED—A THOMAS SURREY (TORpedo) Body, 1912 style, upholstered, second hand, cheap. Give description. Lock P. O. Box 822, Greenport, L. I., N. Y.

Help Wanted

EXPERT OVERLAND MACHINIST AND general repair man wanted. Married man, no booze artist. Must show good credentials. None other need apply. Position in country town in New York State. Address T 815, care of The Automobile.



HEINZE

HECO

The performance of HEINZE IGNITION APPARATUS for the past ten years justifies our claim that our product is superior in both points of construction and efficiency.

HEINZE ELECTRIC CO.
Sales Offices, Detroit, Michigan Factory, Lowell, Mass.
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For best results use

SEARCHLIGHT

Acetylene Service for Oxy-Acetylene Welding and Cutting.
The purest and dryest form of compressed acetylene, delivered to you in steel cylinders.
Open the valve and gas is ready.
Let us solve your acetylene problems.
WRITE FOR COMPLETE INFORMATION TO
THE SEARCHLIGHT COMPANY
1016 Karpen Building, Chicago, Ill.

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Sprockets and Differentials
In stock and to order. Send for Catalog.
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for the low—the medium and the high priced cars, motor driven and hand operated.
Price from $4.25 to $15.00
Write for dealer's proposition
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Jackson, Michigan

Get Expert Advice, Read
THE AUTOMOBILE
$3.00 a Year

NEW VULCAN "35"

"A Quality Car at a Quantity Price"

PRICES

TOURING CARS
5 Passenger
ROADSTERS
2 Passenger

$975.00

BUDA MOTOR $3\frac{1}{2}$"x$5\frac{1}{4}$" 120" WHEEL BASE

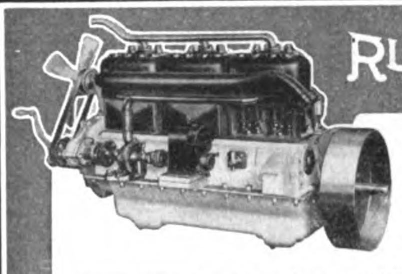
Completely and fully equipped, with Westinghouse starting, lighting and ignition system.

F.O.B. Painesville, Ohio

Manufactured by

VULCAN CAR COMPANY

PAINESVILLE OHIO



THE RUTENBER MOTOR

FOURTEEN Years on the same job! For fourteen consecutive years we have been making nothing but Rutenber Motors, putting into them the best that was in us and the best that money could buy in service, materials and engineering skill.

Our 1915 Model, a six cylinder motor of superb quality, is the fruition of these years of honest effort. Cars that carry Rutenber Motors can be depended on for fundamental excellence.

THE RUTENBER MOTOR CO.
MARION, INDIANA

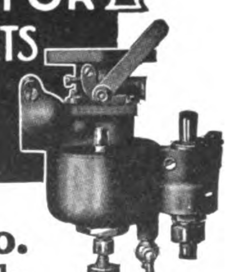
Tuthill *Titanic Unbreakable* Spring

—the only spring made that is guaranteed absolutely not to break at center—the very place where 75% of other springs snap.

TUTHILL SPRING COMPANY
772 Polk St. Chicago, Ill.

HOLLEY CARBURETOR

NO MOVING PARTS
ONLY ONE ADJUSTMENT
WRITE FOR PARTICULARS

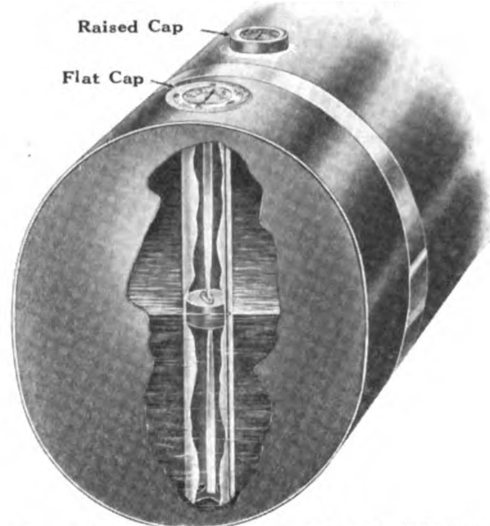


Holley Brothers Co.
Detroit Mich.

ATTENTION { ENGINEER PURCHASING AGENT

Let us quote you on your season's requirements for gasoline gauges. The following describes some of our types.

Pfahl Gauge
Style A

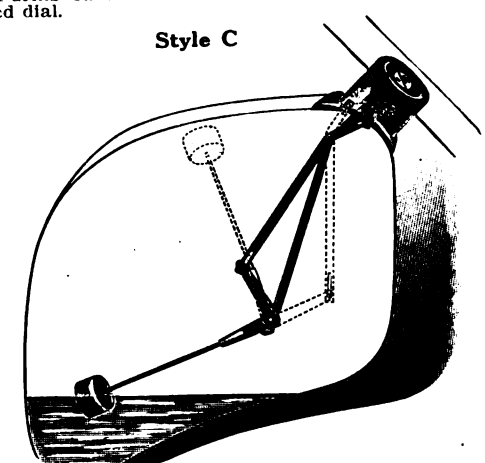


The style A Pfahl Gauge is made in different lengths, and can be used on any shape tank, round, oval or square, common gravity or where pressure is used.
Guaranteed pressure tight.
Easily attached.
Nothing to get out of order.
Can be installed on angle if desired.
Furnished with either silver plated or porcelain enameled dial.

Pfahl Filler Hole Gauge—Style F

Takes place of the filler cap.
Saves the cost of filler cap and flange.
Furnished with flange.
Knurled or octagon cap.
Built of heavy material that will stand the knocks
Furnished with either silver plated or porcelain enameled dial.

Style C



Made to fit any type of cowl tank.
Can be placed in many positions.
Held in position with cap and flange.
Can be removed from tank by removing cap.
Registers "Empty, ¼, ½, ¾, Full."

Pfahl Gauge—Style D

The style D Pfahl Gauge can be used on a round, oval, square or cowl tank, and can be attached in many positions.
Makes a very neat Indicator that will do the work.
Registers "Empty, ¼, ½, ¾, Full."
Write us for booklet and send blue print of Tank for quotations.

THE PFAHL GAUGE & MFG. CO.
AKRON, OHIO

THE BUCKEYE SAFETY GARAGE HEATER

Heats a two-car garage to 60° in a short time, and keeps the temperature uniform through all changes of weather. Protects radiator and water jacket. Preserves paint and varnish and prevents gumming of oils and grease.

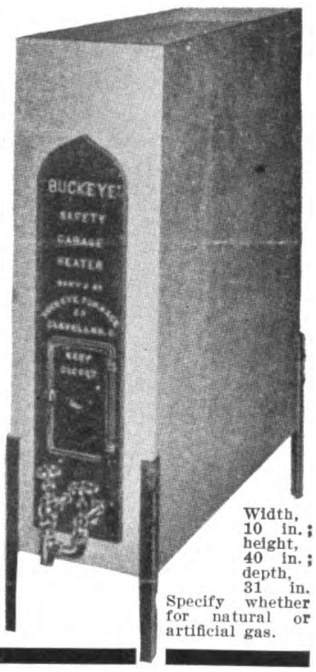
The "BUCKEYE" HEATER means greater comfort in car washing and repair work, easier starting, better results in charging of storage batteries.

In short: real economy for the car owner.

Not an experiment. Made and guaranteed by experienced manufacturers of gas heaters. Money refunded if not satisfactory after 30 days' trial. As easy to install as a gas stove. Cost to operate, a few cents a day.

PRICE $15

Dealers send for our attractive proposition.



Width, 10 in.; height, 40 in.; depth, 31 in. Specify whether for natural or artificial gas.

BUCKEYE Furnace Co.
7115 Lexington Avenue
Cleveland, Ohio

"COMRECO"

Platinum iridium contacts standard in all high-grade electrical equipment.

THE COMMERCIAL RESEARCH CO.
Tuckahoe, N. Y.

Our laboratories are equipped to make commercial analyses of platinum iridium.

Goodrich Safety Tread Tires

give you more miles for your money.

No Garage Can Do Without

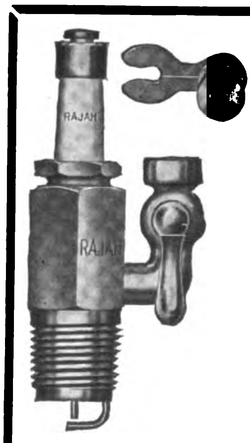
the means to determine promptly the exact condition of the electrical equipment of any automobile.

Weston

ELECTRICAL TESTING INSTRUMENTS

are absolutely dependable in locating trouble in starting and lighting systems, or proving its absence. Built to conform in every way with the exacting Weston standard, they are accurate, serviceable, reliable, yet inexpensive. Write for special booklet describing Model 280.

WESTON ELECTRICAL INSTRUMENT CO., NEWARK, N. J.



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PRIMING PLUG

Not an untried experiment but a PLUG that will give universal satisfaction. Made by a manufacturer whose product has been recognized as the standard for over ten years. Take advantage of this experience. Let us send you a catalog and give you further information.
Order from your dealer or remit direct to us.

$1.50 Postpaid with Terminal

RAJAH AUTO-SUPPLY COMPANY
Bloomfield, N. J.
John Millen & Son, Limited
Montreal. Toronto. Vancouver. Winnipeg

HY-FLEX-ROL

Hyatt Quiet Bearings

HYATT SERVICE STATIONS

Atlanta, Ga.	Detroit, Mich.
Boston, Mass.	Los Angeles, Cal.
Chicago, Ill.	New York, (Harrison, N. J.)

SERVICE AGENTS

High Wycombe, England — Broom & Wade
Minneapolis, Minn. — Pence Automobile Co.

Hyatt Quiet Bearings are used in the majority of American made Automobiles

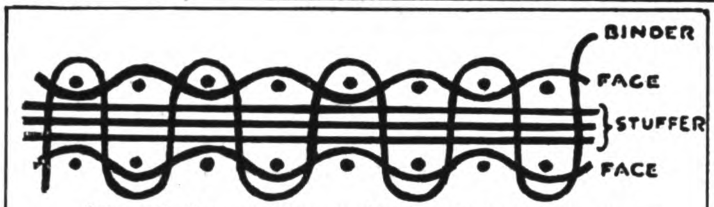
HYATT ROLLER BEARING CO.
DETROIT, CHICAGO
NEWARK, N.J.

HOUK Detachable WIRE WHEELS

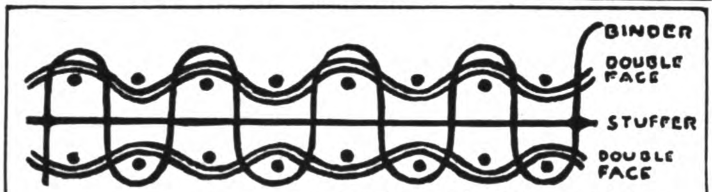
"The wheel that makes any car modern"

George W. Houk Company, 1701 Elmwood Ave. Buffalo, N. Y.
Also Broadway and 58th Street, New York City

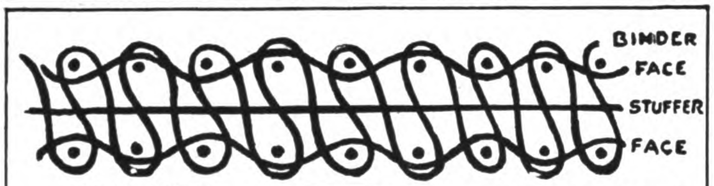
RAYBESTOS is—and always has been—made of the highest
uality of long fibre asbestos spun in the form of yarn around
vire.



One of the earlier methods of weaving brake lining.



A later stage in the development of brake lining fabric.



Illustrating the trend towards compact weaving.

The diagrams above show some of the methods used, since
scarded by us, in the development work of which RAY-
ESTOS is the result.

Special looms built to our own design now weave the fabric
e have trade-marked RAYBESTOS. So far competition has
en unable to copy it.

Ray

The PRODUCT of Bl

Sold by nearly every mobiles or automobile

You will know it by its silvered edge on every foot of it, distinguishes RAY

RAYBESTOS is the product of brake specialists

Our first activity as manufacturers was in the design, development and production of automobile brakes and brake mechanism.

During our whole business career we never have been guilty of producing a brake mechanism which our experience told us was not what it should be.

This same thoroughness is characteristic of our brake lining business. We never have taken a short cut to fortune if it involved the slightest chance of sacrificing the quality of our product.

No other concern in this country making brake linings has ever designed or produced brakes or brake mechanisms, and their knowledge of the problem they are undertaking to solve in the production of brake lining is not founded on nearly so practical a basis as that which underlies the design, development and manufacture of RAYBESTOS.

For this reason you should insist on RAYBESTOS.

Raybestos is the Pro

GUARANTEE

If from

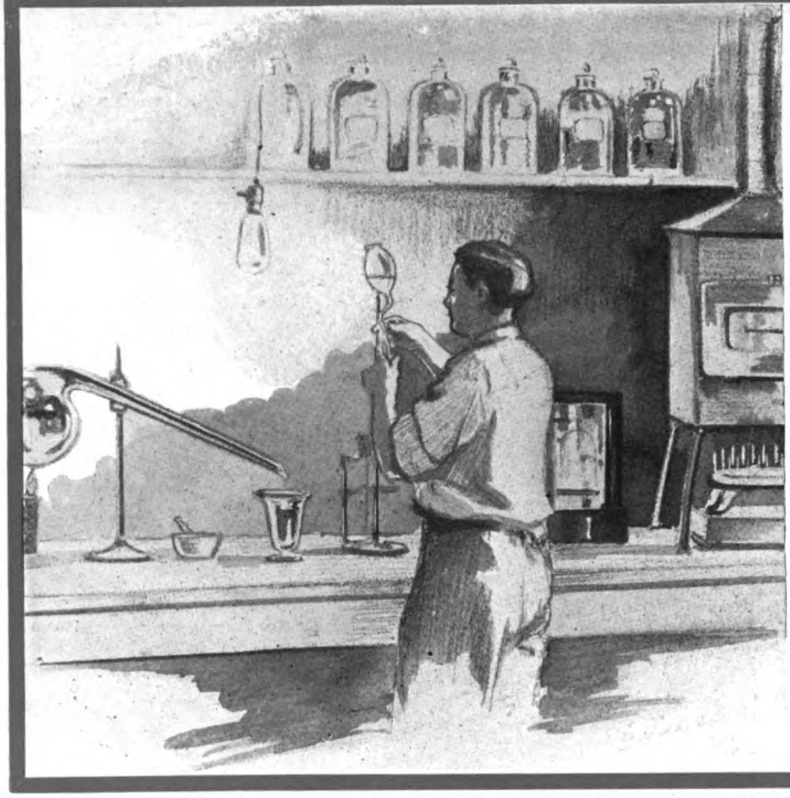
furnish new lining without charge. ::
weights of pleasure cars and to all light

estos

AKE SPECIALISTS

leading dealer in auto- supplies.

s. This, and our trade-mark stamped BESTOS from the ordinary kind

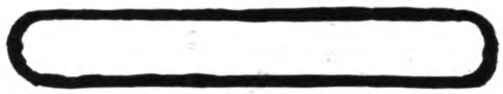


Successive stages of treatment which led up to the thorough impregnation of RAYBESTOS with our famous heat and wear resisting compound.

The efficiency of RAYBESTOS as a brake lining is beyond question

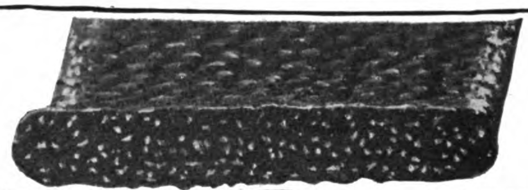
The most unfair competition cannot find a single weakness in it. Every strand in RAYBESTOS is woven and interlocked, one with another, into a homogeneous fabric of great tensile strength and solidity. With our improved machinery we attain a remarkably even thickness, which insures the uniformity of grip so necessary to the successful operation of automobile brake mechanism.

The most severe test any brake lining can get comes with its use on Motor Fire Apparatus. Fire Engines, Ladders, Chemicals, Hose Wagons, Patrols, etc., average in weight as much as the ordinary truck and far more than the heavy types of pleasure cars. They travel at a speed higher than ordinarily is attained by either trucks or pleasure cars. Fast runs with quick application of brakes for turning street corners and stopping are characteristic of their every-day usage. It is significant that nine out of ten motor fire vehicles of one kind or another in the United States are equipped with RAYBESTOS. This service is extraordinary, but there is no detail of an automobile which should be provided with any greater factor of safety than the brake mechanisms. No brake is any better than its lining.



First or surface treatment discarded by us years ago.

Partial impregnation—one stage in the effort to attain complete impregnation—discarded by us when the result shown below was accomplished.



Thorough impregnation photograph from the goods.

duct of Brake Specialists

RAYBESTOS fails to last one full year the time it is placed on the car, we will This Guarantee applies to all types and trucks.

The chemical treatment of RAYBESTOS is the really important factor which enables us to guarantee unqualified service from RAYBESTOS for one full year from the date it is put on the car.

How to Get the Bulk of the Brake Lining Business

To Dealers:

Sell the Brake Lining you would buy yourself.

If you follow this plan you will build up a better business and make more money in the end.

Look at it from your customers' standpoint. They know that the quality of RAYBESTOS is supreme. They know that its service is superior to that of any other brake lining. They know that it is backed by the most comprehensive guarantee ever given any brake lining.

These factors are more potent in swinging the bulk of the brake lining business to you than any other consideration.

Getting the benefit of the prestige, quality and service of RAYBESTOS to help build up your business is worth far more to you than a little longer discount on some other brand of brake lining. Longer discounts are aimed to attract you.

Your customers do not benefit.

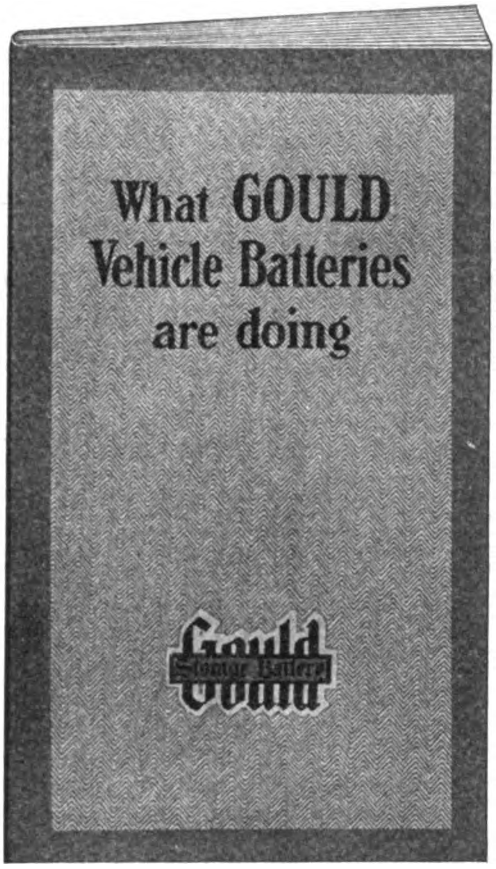
You cannot give them any better quality — nor more attractive prices. Service in a brake lining is what they want. Service and a cut price never yet went hand in hand. The quality—the prestige—and our business-like methods of distributing RAYBESTOS constitute too much of an asset to you for you to be tempted by smart selling methods.

RAYBESTOS discounts are fixed—the same to each and every dealer. We believe in a square deal for everybody and we treat everybody exactly alike.

Quality is put into RAYBESTOS to insure service. The service of RAYBESTOS is definitely guaranteed. In every big city in this country there is a good, reliable concern which carries a complete stock of RAYBESTOS, ready to supply your needs on telephoned, telegraphed or written order. Any one of these concerns will quote our standard discounts to the trade—their discounts are the same as we would quote you direct. Their nearness to you, and their ability to make immediate deliveries of either large or small quantities makes it unnecessary for you to carry more than an easily handled stock for your immediate requirements.

THE ROYAL EQUIPMENT COMPANY

1354 BOSTWICK AVENUE :: :: BRIDGEPORT, CONNECTICUT



GET THIS BOOKLET

The actual performance records cited therein form a good basis for judging whether a given battery is carrying as heavy loads, making as long runs and lasting as well as it should.

A careful reading should therefore prove instructive and probably of actual money value to all using or selling electric pleasure or commercial vehicle batteries.

Ask for your copy and if in the market for battery renewals, let us tell you exactly what service improvements a Gould Battery would accomplish in your own case.

Gould renewals fit any jars.

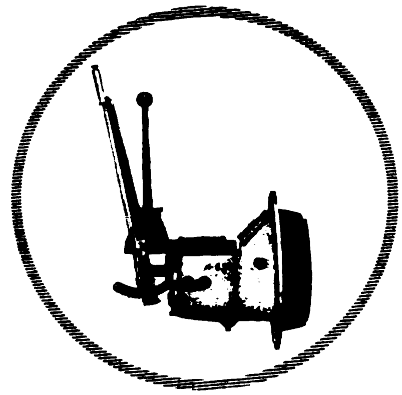
Gould Storage Battery Co.

General Offices: 30 East 42nd Street, New York City
WORKS: Depew, New York

Boston, 14-16 Cambria St. — Detroit, Kerr Bldg.
Philadelphia, 613 Betz Bldg. — Chicago, 225 E. 22nd St.
Cleveland, 1761-5 E. 18th St. — San Francisco, 1448 Van Ness Ave.
Los Angeles, 110 E. Pico St.

Agents in Washington, Rochester, Buffalo, Pittsburgh, Milwaukee, Minneapolis, St. Louis, Kansas City, Omaha, Denver, Topeka, Seattle. Canadian Representative: R. E. T. Pringle, Toronto, Montreal, Winnipeg and Vancouver. 118

"The Recognized Standard"



THE WARNER GEAR COMPANY WILL OCCUPY SPACE NUMBER C31 AT THE GRAND CENTRAL PALACE DURING THE NEW YORK SHOW. SOMETHING CAN BE LEARNED FROM EVERY ITEM IN THE EXHIBIT BY BOTH THE CAR MANUFACTURER AND THE PUBLIC.

LEADING MANUFACTURERS OF

TRANSMISSIONS
STEERING GEARS
DIFFERENTIALS
CLUTCHES

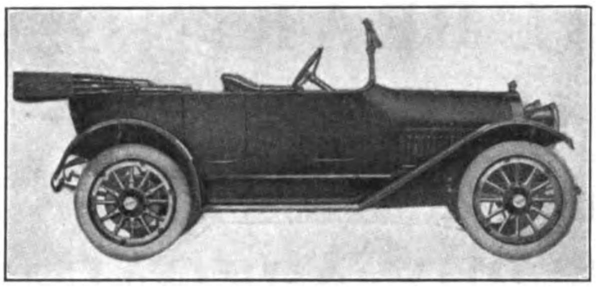
WARNER GEAR COMPANY

MUNCIE, IND.

EXTRA!

$1500 Brand New 1915

Touring Cars and Roadsters at $875



THIS IS THE CAR

If we could advertise the manufacturer's name we could demand a much higher price. The name plate of the manufacturer appears on the radiator.

CATALOG AND NAME GIVEN ON REQUEST

This car has never before been sold for less than list price. It is a well-known standard make. Thousands of these cars are now in use.

Electric Starter and Lights

Motor, 4-cylinder, $4\frac{1}{8}$-inch bore by $5\frac{1}{4}$ stroke, three-point suspension with power plant, ignition, magneto, dual system, carburetor, Stromberg, transmission 3 speeds, center control, right and left hand drive, full floating rear, 34x4-inch tires, demountable rims, Goodyear no-rim-cut tires, 114-inch wheel base.

Equipment

In addition to Electric Starter and Lights, each car is equipped with: Silk Mohair Top, with curtains and dust cover; Rain Vision, two-piece windshield; Speedometer; combined single and double Tire Holders; Electric Light Dimmer; Electric Horn; Robe Rail; Foot Rail; Tire Repair Outfit; Demountable Rims, with extra rim; Tool Outfit; Speedometer Light; Lock Switch; Nickel Finish.

These cars were ordered for export, but owing to demoralized transportation facilities could not be shipped, making it possible for us to buy the entire order for Spot Cash.

We Have Only a Limited Number, So Act Quick. Cars Now On Our Salesfloors.

The manufacturers of these cars are in a healthy financial condition and can furnish parts at any time. Every car sold with a guarantee.

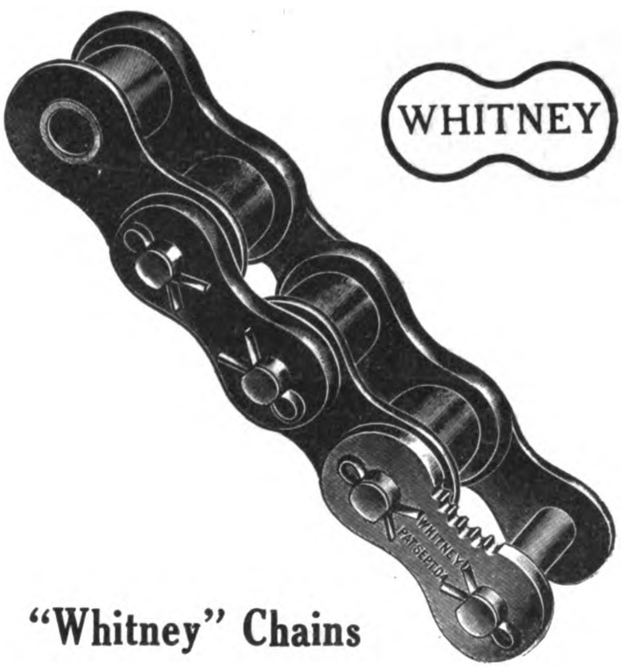
We Will Ship You This Car On Receipt of Deposit to Cover Freight Charges, with Privilege of Inspection.

GORSON'S AUTOMOBILE EXCHANGE

238-40 N. Broad Street Philadelphia, Pa.

AGENTS WANTED WRITE FOR CATALOG

WHITNEY



"Whitney" Chains

Made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of "Whitney" Chains by the leading motor truck makers of the country.

THE WHITNEY MFG. CO.

HARTFORD, CONN.

No War Prices

ON

GAULOIS TIRES

Shipments of **GAULOIS** Tires continue to arrive from Havre and Marseilles as in the past.

No fear as to deliveries need be felt.

We can supply you in all sizes and styles.

If you have never tried

GAULOIS TIRES

now is the time to do so.

THEY LOOK BETTER
THEY WEAR BETTER
THEY ARE BETTER

Gaulois Tire Corp.

49 West 64th St., New York

GAULOIS TIRES

"America's Quality Bearing"

FAFNIR
BALL BEARINGS

MADE IN AMERICA
SOLD DIRECT FROM FACTORY
DELIVERIES ASSURED

WHY BUY ABROAD?

ABSOLUTE INTERCHANGEABILITY

MORE SILENT than the "MOST SILENT"

CLOSEST POSSIBLE LIMITS MAINTAINED AND GUARANTEED

SUBMIT YOUR ENGINEERING PROBLEMS. WE ARE IN POSITION TO GIVE YOU ENTIRE SATISFACTION. NEW EDITION OF CATALOG READY FOR MAILING.

The FAFNIR BEARING COMPANY, New Britain, Conn.

BUDA MOTOR

"The part that sells the car"

has taken contracts away from competitors at higher prices, at lower prices, at equal prices.

Because, on scientific **laboratory** tests, on **factory** tests, on practical **road** tests, on the test of the **sales floor,** and on the greatest test of all — long years of **use** — BUDA Motor shows the good qualities that only the best can have.

See the Latest BUDAS at the Automobile Show

NEW YORK:
January 2—9, Space C-77
Third Floor
Grand Central Palace

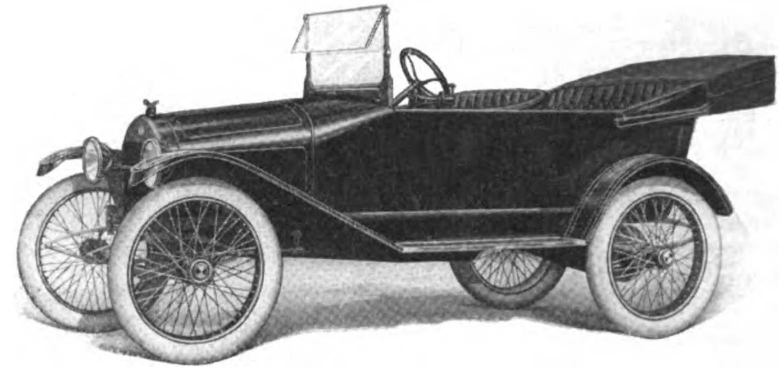
THE BUDA COMPANY
FACTORY, HARVEY, ILL., (Chicago Suburb)
Address all correspondence to our **FACTORY REPRESENTATIVES**
BRANDENBURG & COMPANY

CHICAGO:
January 23—30, Space 34
Gallery
Coliseum

1108 S. Michigan Ave., Chicago — 1311 Dime Bank Bldg., Detroit — 57th & Broadway, New York City

$600 Equipped Complete, including Gray & Davis Electric Starter and Electric Lights.

Plate glass rain-vision built-in wind shield.
Stream line body, instant "one man" top.
32-inch wire wheels.
32 x 3½-inch Goodrich clincher tires.
Tufted upholstery, deep cushions.
105-inch wheel base, standard tread.
Left-hand drive, center control, fibre grip gearless transmission, 25 h.p. water-cooled motor, Bosch magneto, Hyatt roller bearings, speedometer, built-in gasoline gauge, robe and foot rails, signal horn, jack, tools, etc.



METZ "25"

The Quality Car

This new METZ Touring Model is a winning proposition for enterprising dealers. It is a strictly high class car, deserving of your fullest confidence and recommendation, its attractive price being by no means its chief "talking point."

It is impressively complete and up-to-date, from its wire wheels and electric starter to its one-man top and electric lights. Wonderfully easy riding, clean-cut in design, luxuriously finished, and so simple in operation and reliable in performance that a woman can safely drive it.

We have planned and are developing an elaborate publicity campaign designed specially to help our dealers. We want representation in your territory. Write for particulars and new catalog "J."

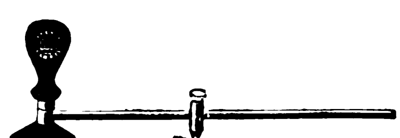
METZ COMPANY **WALTHAM, MASS.**

THIS "RED DEVIL" WILL CUT CIRCLES

It's the only practical glass cutter ever made for cutting full circles, half circles, or curves in any kind of glass—No. 263 "Red Devil" glass cutter. Useful for repairing headlights, etc. Has graduated rod marked to 16ths of an inch.

Sent postpaid for $1.25.

"RED DEVIL" CIRCULAR GLASS CUTTER No. 033



Cuts curves and circles with accuracy. To be had from your dealer or postpaid for 50 cents.

Send for booklet of Red Devil Tools.

Smith & Hemenway Co., Inc.
172 Chambers Street, New York City

Troy Trailers

Double the Value of Your Truck

Keep your expenses where they are, but double your deliveries by hitching a Troy Trailer to your motor truck. That divides your costs and multiplies your capacity. Stop carrying and start hauling. Capitalize the draw-bar pull of your truck. Make one truck do the work of two. Every truck can pull more than it can carry if it has the right type of Trailer. Troy Trailers are proved by performance. Write for new book 4A.

The Troy Wagon Works Company
Troy, Miami County, Ohio

New York 50 Church St. | Detroit 319 Hammond Bldg. | Washington, D. C. 505 Riggs Building

M. A. Newmark & Co., Los Angeles, Cal., made total deliveries of 20 to 25 tons a day with a five-ton truck. The use of a Troy Trailer raised their deliveries to 50 tons daily and divided the cost per ton.

Sells on Sight to Ford Owners

Simple, Permanent and Efficient

The Improved Colstad Power Ford Tire Pump is the result of over three years of experimental and development work.

The Colstad always has been the simplest and most reliable Ford Power Tire Pump ever produced and now with its positive silent chain drive it is absolutely efficient to inflate regular or oversize Ford tires to the desired pressure in two or three moments. The pump cannot slip or fail in operation.

The Colstad is the original Ford Power Tire Pump.

Made in a thoroughly workman like manner and fully guaranteed. : :

Complete and Easy to Install

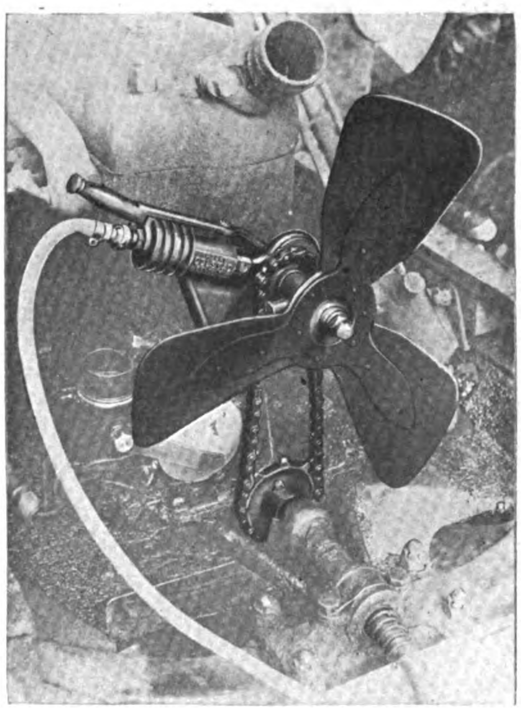
The Improved Colstad Power Ford Tire Pump Equipment consists of the Pump, Hose, Fan, Silent Chain Drive Mechanism—all for $10.

We furnish this equipment complete to insure easy installation. Hammer, screw driver and wrench are all the tools required to equip a Ford.

None but a chain drive is effective to drive a pump. We have experimented with and discarded belt and split gear drives.

Its installation is a benefit to the car as well as to its owners. : : : : :

COLSTAD



Write for Our Dealer Proposition

SPECIALTY SALES COMPANY, **Sole Distributors 2 PARK PLACE, BOSTON, MASS.**

$695.00 SPHINX

112-In. Wheelbase Electrically Started and Lighted

Lightness, with strength and dependability—this is the SPHINX Car, in a few words.

This 112-in. wheelbase car with 4-cylinder monobloc motor, delivering 28 H.P., and with full standard equipment, handsome streamline body of excellent design and finish and easy riding cantilever springs, is pre-eminently the up-to-date light car for the average American family. It represents the point of arrival—the latest and most satisfactory result—in the transition from the big-car type to the popular-price car of full equipment and fine appearance.

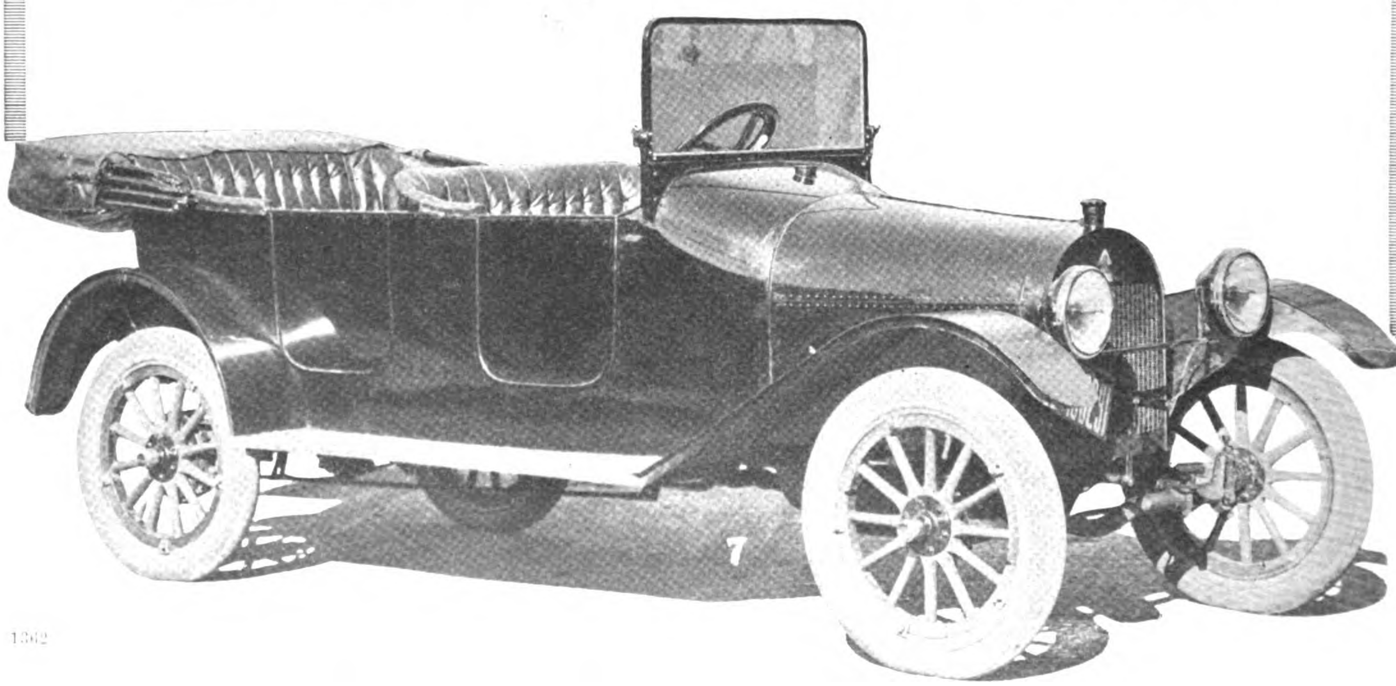
We say most emphatically and without equivocation that the SPHINX Light "Four" is the car with the largest selling possibilities to-day.

To clinch the matter and make it superlatively attractive to dealers we have a money-making proposition for SPHINX agents, carefully designed to move the cars into the possession of the great waiting public.

If you wish to embrace the opportunity of seeing this most remarkable car, if you want to secure your district rights, write or telegraph us immediately.

Will be on exhibition at 1692 Broadway, N. Y., from January 2d to 9th, 1915—and Greer Bldg., Chicago, January 23d to 30th, 1915.

SPHINX MOTOR CAR COMPANY, York, Pa., U. S. A.



OWEN

OM

MAGNETIC

"Thousand Speeds"

The Owen MAGNETIC

No other car on earth holds any comparison whatever with the OWEN MAGNETIC for supreme flexibility.

There are two things you should know about the wonderful OWEN MAGNETIC CAR—

FIRST:—The OWEN MAGNETIC comes from an experienced and authoritative source. This electric system was invented by Mr. J. B. Entz, whose inventive ability has placed his name in the list of America's greatest inventors. He made the first electric dynamos for the United States Navy and was Chief Electrical and Designing Engineer for the Edison Machine Company, afterwards the General Electric. He is also the inventor of the highly successful Entz Electric Starter. Mr. R. M. Owen of the OWEN MAGNETIC has for many years been well-known in the industry. Until recently he was Vice-President of the Reo Motor Car Company. So the men behind the OWEN MAGNETIC are practical, experienced and successful. When such men commit themselves to a device after years of tests, there can be no reasonable question about it.

SECOND:—The OWEN MAGNETIC is not an experiment, but is a public presentation of the success of this system throughout the past ten years. Many discriminating motorists are now driving these wonderful cars. One car alone has been operated for 150,000 miles. For years these cars equipped with this electric system have run side by side with similar cars with gear transmission through all conceivable driving conditions, over mountains, across states, over clay and through sand, and the OWEN MAGNETIC has proved itself victor every time. For economy this system has proved itself a little better than the gear set and for hill-climbing considerably better. So, the OWEN MAGNETIC comes in the form of a big public announcement of tremendous, all-important interest to those who keep abreast of motor car progress and who appreciate automobile evolution. This year the OWEN MAGNETIC will have a degree of exclusiveness. We shall build only a limited number of cars—practically custom made—of the highest quality throughout. But this Magnetic Transmission is bound to shortly become as common as self starters. Once its attractions become known, a high-grade car can't be marketed without it.

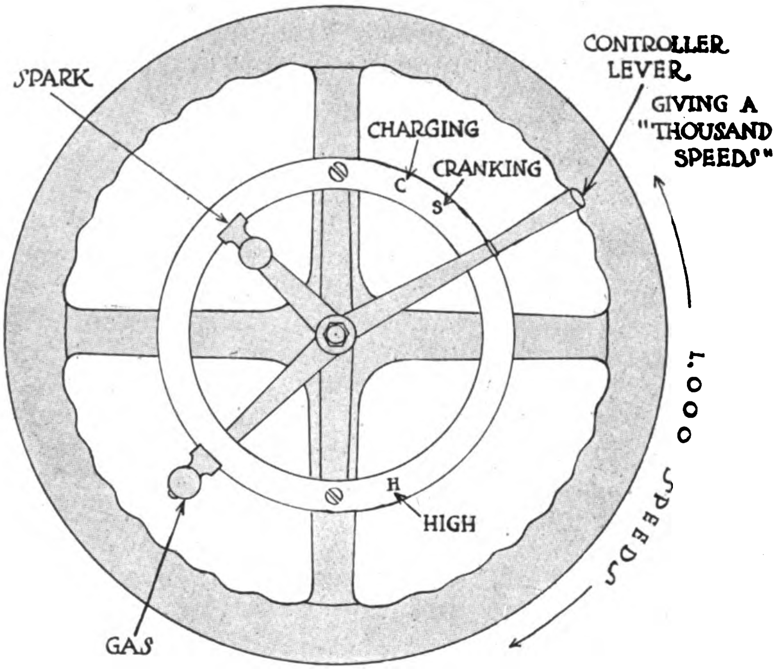
3-Passenger Roadster, $3750 } **F.O.B.**
7-Passenger Touring Car, $3750 } **New York**

The only American car with three individual brakes or brake-systems, which, if necessary can all be actuated at the SAME time.

The additional third brake is an electric-magnetic one, which is put into action, by simply moving the control lever on the steering wheel into neutral position, from any speed. This brake will hold the car at 10 miles an hour going down the steepest and longest hills, without the so common danger of overheating or burning the brake. IN THIS THIRD BRAKE THERE IS NO BRAKE LINING USED, in fact there are no parts in actual contact. The braking effect is produced by the magnetism of the motor-field PREVENTING the armature from revolving over a certain number of revolutions per minute. The faster you run, the more effective this brake will be.

We have an illustrated catalogue in preparation and will be glad to send you a copy on request.

See our exhibit, Grand Central Palace, C-3, Third Floor



No clutch. No gears to shift.
Electric transmission acts also as self-starter, generator, and electric brake.

R. M. OWEN & COMPANY, Inc.

NEW YORK, N. Y.

SALESROOM:	FACTORY:
7th Avenue and 49th Street	5th Avenue and 142nd Street

THE WORLD'S LARGEST EXCLUSIVELY WEARING APPAREL MAIL ORDER ESTABLISHMENT.

BELLAS HESS & CO

WASHINGTON, MORTON & BARROW STS.

NEW YORK CITY'S LATEST STYLES SENT TO YOU WITH OUR POSITIVE GUARANTEE OF PERFECT SATISFACTION OR MONEY BACK INCLUDING TRANSPORTATION CHARGES BOTH WAYS.

"WE TAKE ALL THE RISK OF PLEASING YOU"

WASHINGTON, MORTON & BARROW STS.

LONG DISTANCE PHONE
9630 SPRING

New York City, N.Y. Nov. 18, 1914

Mr. R. M. Owen
R. M. Owen & Co.
New York, N. Y.

Dear Sir:-Replying to your inquiry regarding my opinion of the Owen Magnetic Car which I bought from you, will say that I have now run this car about 2000 miles, and in every way it has been more than satisfactory, and has surpassed all claims that you have made for it, and my greatest expectations.

The ease with which I can operate this car in the crowded street traffic of New York City is marvelous. The fact of there being no gears whatsoever, allowing you to keep both hands at all times on the steering wheel, and that it is not necessary to be constantly changing one's gears by shifting the lever as every other make of car requires, is surely a tremendous advantage.

I have not had the slightest trouble of any sort, and as you know, I received practically no instructions as to how it should be operated.

Aside from this wonderful Electrical Transmission feature, the powerful self starting, and powerful electric lighting features, would in themselves recommend it to me over any other car, for while I have had nearly every other starting device and lighting device in the cars I have formerly operated, none of them has ever compared with this.

The entire driving and operating of this car is so unlike any other that it is hard to make a comparison. I have one objection, and only one to this car. It has absolutely spoiled me for driving any other. It now seems such an absolute waste of energy and trouble for me to operate a car, where the shifting of gears, etc., is necessary, that I am using the Electrical Transmission Car which you sold me exclusively.

You have my sincere congratulations on turning out an automobile, the principle of which I firmly believe will revolutionize the entire industry.

Yours truly,
H. Bellas Hess

CR-HBH

WE PAY ALL MAIL OR EXPRESS CHARGES TO YOUR TOWN.

Automobile Stampings, Drawn and Spun Metal Work of All Kinds

We can handle your sheet metal work, your stampings, your drawn and spun metal work at a much lower cost than you can handle them in your own sheet metal department. We have special equipment for quantity production.

We have 15 acres of floor space devoted to sheet metal work —we have had 33 years' experience in drawing, stamping and spinning of sheet aluminum, monel metal, brass, copper, tin plate and sheet steel—our machines and equipment are the very best obtainable—our men are *experts*.

We have no idle hours in our sheet metal department, no non-productive machines whose overhead is eating up our profits. By keeping our system at top speed all the time we are able to turn out work at lower cost.

15 Acre Plant and 33 Years' Experience at Your Service

We are specially equipped to handle automobile-part work. Our facilities enable us to meet the most difficult situations in light and heavy sheet metal stampings or drawings.

Send blue print or samples and let us estimate on Hoods, Clutch Cases, Covers, Joint Cases, Housings, Pans, Shells, Drums, Gasoline Tanks, Mufflers, Metal Instrument Boards, etc.

You are undoubtedly casting some part that could be turned out better and at a lower cost by stamping.

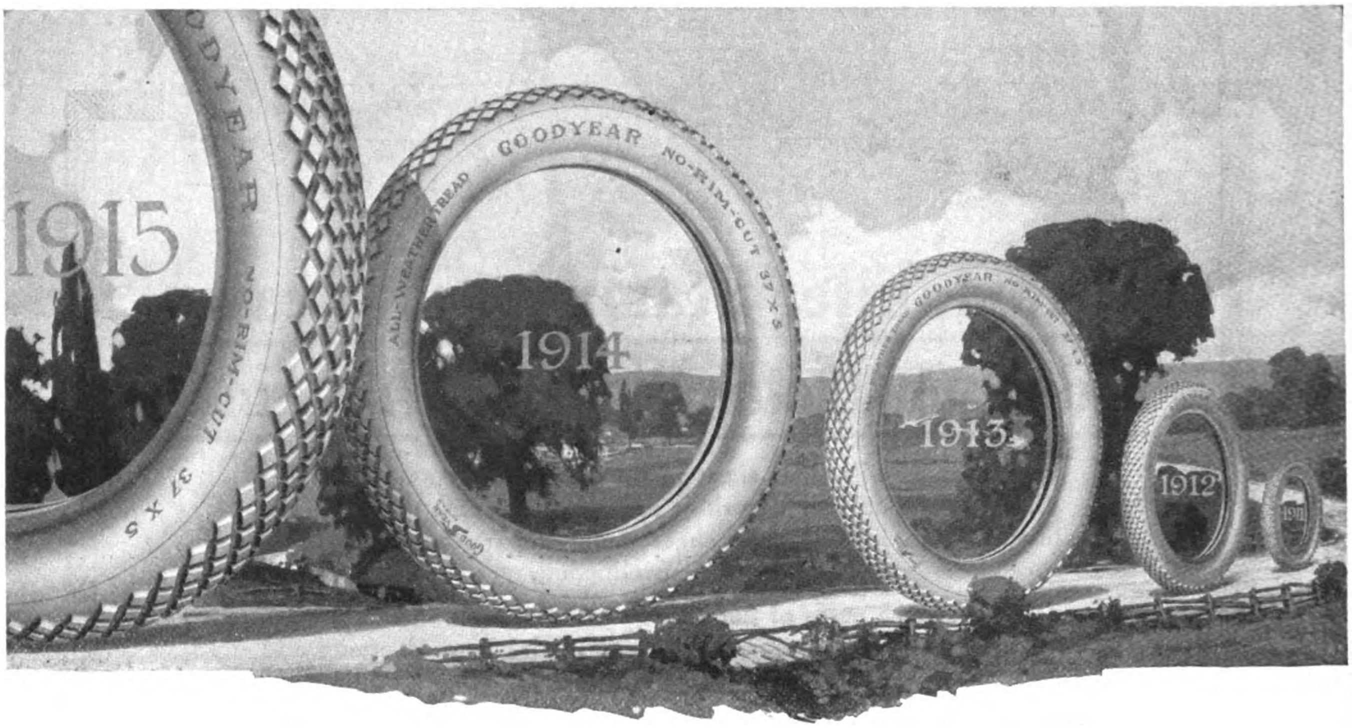
STAMPINGS **PORCELAIN ENAMELING**

GEUDER, PAESCHKE & FREY CO.

Canal and 15th Sts. Milwaukee, Wis.

G. P. & F. Service

"Knowing How Since '81"



Note How Goodyear Grows As the Years Roll By

1,479,883 Tires Last Year

In the fiscal year just ended we sold 1,479,883 Goodyear pneumatic automobile tires. That's about one tire for every car in use.

It was 26.6 per cent more tires than we sold the year before. It was half as many tires as we had sold in our previous 14 years combined.

It was more per month than we sold per year back in 1909.

It is more than were sold of any other tire that's built.

To Men Like You

We sold these tires to men like you—men who seek quality tires. To men who want safety, strength and endurance. To men who watch tires and compare them.

Some had accidents with tires. Some misused and wrecked them. And some, no doubt, got faulty Goodyear tires.

But there's the record after 15 years—after millions of tests and comparisons. The final verdict, as shown by sales, is that Goodyear tires are best.

Fortified Tires Five Exclusive Ways

Goodyear Fortified tires protect you in five exclusive ways.

One combats rim-cutting in the most efficient way that's known.

One means safety. These tires are held on by an unstretchable tire base, in which we vulcanize six flat bands of 126 braided wires.

One saves needless blow-outs. Our "On-Air" cure—which costs $1,500 daily—prevents the countless blowouts due to wrinkled fabric.

One—a patent method—reduces by 60 per cent the risk of tread separation.

And one combats punctures and skidding. That's our All-Weather tread—tough and double-thick, flat and smooth-running, sharp-edged and resistless.

All these features are in Goodyear Fortified tires. Not one of them is found in any other.

Let Them Prove

This isn't written to sell tires, for tires must sell themselves. We simply urge you to test the tires which won this matchless showing.

They outsell any other. They are gaining new users fast. They are fortified in exclusive ways against five major tire troubles.

You cannot, we argue, be fair to yourself without proving out these tires. And now, with the new year, is a good time to do it.

Any dealer will supply you if you say you want Goodyear tires.

GOODYEAR
AKRON, OHIO
No-Rim-Cut Tires
With All-Weather Treads or Smooth

THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

(2040)

HERZ PLUG

"Bougie Mercedes"

$1.50 postpaid, or from your dealer.

is the result of 20 years of study, experiment and improvement. Its marked superiority over ordinary Plugs is due to the distinctive features of its construction. The insulation is Unbreakable Double Stone (Blue Enameled); there are Four Sparking Points; the electrode of Platinum-Alloy will not burn away; and the Plug is self-cleaning. Every HERZ PLUG is guaranteed a year.

There are special HERZ PLUGS for the Amplex, White, Ford, Pierce-Arrow, Pullman and Overland. Write for the Plug that is best suited to the needs of your particular motor. For most motors, the standard HERZ PLUG is best adapted.

HERZ MAGNETO ensures a fat, hot spark even at a low speed. Compact, reliable, dust-proof, waterproof.

HERZ DISTRIBUTOR provides, with good single coil, an accurately timed and permanently reliable ignition outfit. Very small yet perfect in every detail.

HERZ PATENT DETACHABLE TERMINALS are ideal for convenience. Easy to attach, and they stay attached, making a perfect connection. Equally easy to detach.

HERZ MINIMAX GARAGE PUMP is as inexpensive as a thoroughly efficient Pump can be built. No leakage losses. Can be attached to any lamp socket. Height 30 in., length 35 in. Made for any kind of current. Pressure up to 200 lbs. Splash lubrication.

HERZ TIMER gives the most exact timing independent of the speed. It saves current

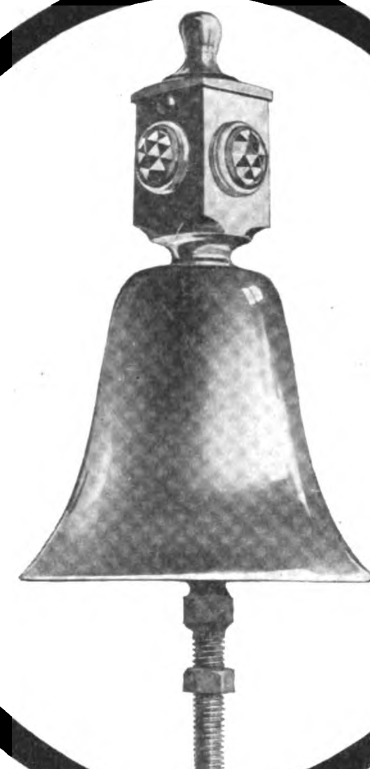
HERZ TAPE GRIP provides the perfect connection between metal pipe and rubber hose. Quick and easy to apply.

HERZ & CO., 245 W. 55th St., (near B'way) New York

THE TRINITY BELL

Warns Both Eye and Ear

The Signal That Never Offends



Made in three styles: Model A—3½ inches in diameter, with Red Light. Especially adapted to the smaller cars. Price, complete, $6.

Model B—5 inches in diameter, with Red Light. Most effective for Roadsters, Runabouts and Touring Cars. Price, complete, $10.

Model C—6 inches in diameter, with Red Light. Preferable for Limousines, Heavy Touring Cars and all trucks. Price, complete, $12.

Any of these bells may be secured with an ornament instead of the Red Light, at no advance in price.

All prices include complete equipment for installation, including 12 feet of best insulated wiring, choice of bracket (for running board, fender, cowl, dash or radiator cap), push button, bolts and washers.

An effective warning signal that sweeps the road clear, without giving offense, is essential to the equipment of every automobile. The clear note of a perfectly made bell—the best of all warning signals—seldom fails to secure the right-of-way, even in crowded streets.

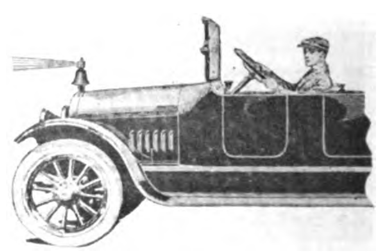
Such a motor vehicle warning signal is the decisive, convincing, effective, TRINITY BELL, a combined alarm and flash, that warns both eye and ear—and never offends.

The bell proper is surmounted by a small Tungsten light, with three red lenses that flash a warning the moment the signal is sounded. Kewpies, Billikens, Policemen, Red Cross or lodge emblems can be supplied in place of signal lamp, at same price.

The TRINITY BELL responds instantly to the touch of hand or foot, on the push button, and is so simple that it can't get out of order. Is impervious to dirt or water. Has water-proof enameled coil, and is cast from the finest bell metal, heavily nickeled. Beautiful in tone. Contact points of pure platinum. Solid as a rock—will not rattle.

Answers all requirements of law, and is absolutely guaranteed. Protected by patents. *Infringers will be prosecuted.*

Dealers and Jobbers:—This easy seller is having a big run. Write for our proposition today, and get your agency early.



See Us at the New York Show, Grand Central Palace, D 17 A.

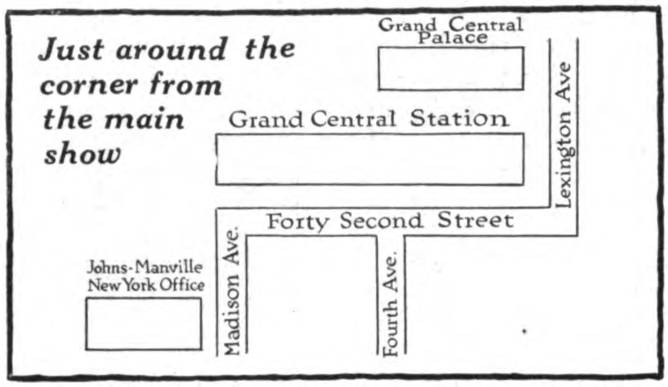
THE TRINITY BELL ELECTRICAL MFG. CO.

5108 Calumet Avenue Chicago

Branch Offices: Trinity Bell Sales Co., 11 N. Cascade Ave., Colorado Springs, Colo.; 2028 Farnam Ave., Omaha, Neb.; 519 Downing Bldg., Erie, Pa.

Johns-Manville Accessory Show

January 2nd to 9th Inclusive, Madison Ave. & 41st St. New York



Every Accessory Exhibited Here Holds a Personal Interest For Every Manufacturer, Dealer and Car Owner

DURING the week of New York's Automobile Show we shall devote the ground floor of our New York Building to an exhibition of J-M Automobile Accessories.

In whatever capacity you are interested in accessories your attendance at this exhibition will surely result to your profit.

Please note the convenience of our location to the Grand Central Palace, as shown by the map above.

J-M Accessories on Exhibition

Jones Speedometer

The standard speedometer of the standard type, Centrifugal. Absolutely and permanently accurate, unaffected by temperature, altitude or vibration. More Centrifugal Speedometers will be used on cars manufactured in 1915 than all other types.

Long Horn

The horn that insists. Powerful warning qualities, great reliability, and construction that lasts as long as the car. The horn you want if you're looking for signal safety and the horn you will buy if you compare values.

J-M (Mezger) Soot-Proof Spark Plug

Carefully designed and constructed, embodying the best skill and labor and giving the best service and satisfaction of any high-grade automobile plug. A guaranteed product of the most efficient manufacturing methods.

Carter Carburetor Multiple-Jet

A different principle but one of proven greater efficiency. Excels as a gasoline saver. Increases power and flexibility to a remarkable degree. Results unconditionally guaranteed.

Other J-M Accessories

J-M Non-Burn Brake Lining
Johns-Manville Shock Absorber
J-M Lens (Non-Blinding)
J-M Automobile Tape
J-M Tirenew
J-M Narco Tire and Top Savers
J-M Fire Extinguisher
J-M Automobile Clocks
J-M Dry Batteries
G-P Muffler Cut-Out
"Noark" Enclosed Fuses

2944

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

H.W. JOHNS-MANVILLE CO.

Madison Ave. & 41st Street New York

½ Ton Less Weight

The New Light Baker Electric Coupe weighs 2913 lbs.—*a full thousand pounds less* than any of the big heavy five-passenger electrics, and *from 400 to 500 pounds less* than ANY enclosed electric of high grade make. Mere reduction in weight is no advantage in an electric if secured at a loss of speed, mileage, power, strength or comfort. The achievement of the Baker is in its light weight

PLUS FULL SPEED
FULL MILEAGE
FULL POWER
FULL STRENGTH

The speed is 23 miles per hour—the highest ever built into an electric coupe. As for mileage, no electric made gives more per battery charge. In point of power, this light electric will negotiate any hill that *any* motor car can climb. And it will *stand up* through years of hard service, for it has the same structural strength which has characterized the Baker chassis and body for over fifteen years. (Baker Electrics have always been light weight cars.) And in addition, with so much less weight to carry,

The New Light Baker Electric Coupe

is *much easier to handle* on rough pavements or in congested traffic—it steers and turns with the least effort. There is *less wear and tear* on the car; tires last longer; *upkeep expense is reduced.* In short, this electric becomes more than ever a source of pleasure, because of its lighter weight.

In style and beauty the New Light Baker has set a new standard. Needless adornment has been supplanted by a rich, simple refinement. The color effects are attractive and novel. There is not a more luxurious automobile made.

In the face of these facts, is there any good reason why you or your wife should lug around from a quarter to a half-ton of extra dead weight in an electric?

The Baker Double Drive Brougham

is one of the most luxurious electrics of the larger type that has ever been built. It closely resembles the New Light Coupe in general design, the difference being in its larger proportions to accommodate five people instead of four, its double drive feature which enables operating from either front or rear seat, and its seating arrangement. For those who require a large five-passenger car this imposing brougham, equipped with every known motor car refinement, is an ideal model, *and for a car of its size it is lighter than any other electric made.*

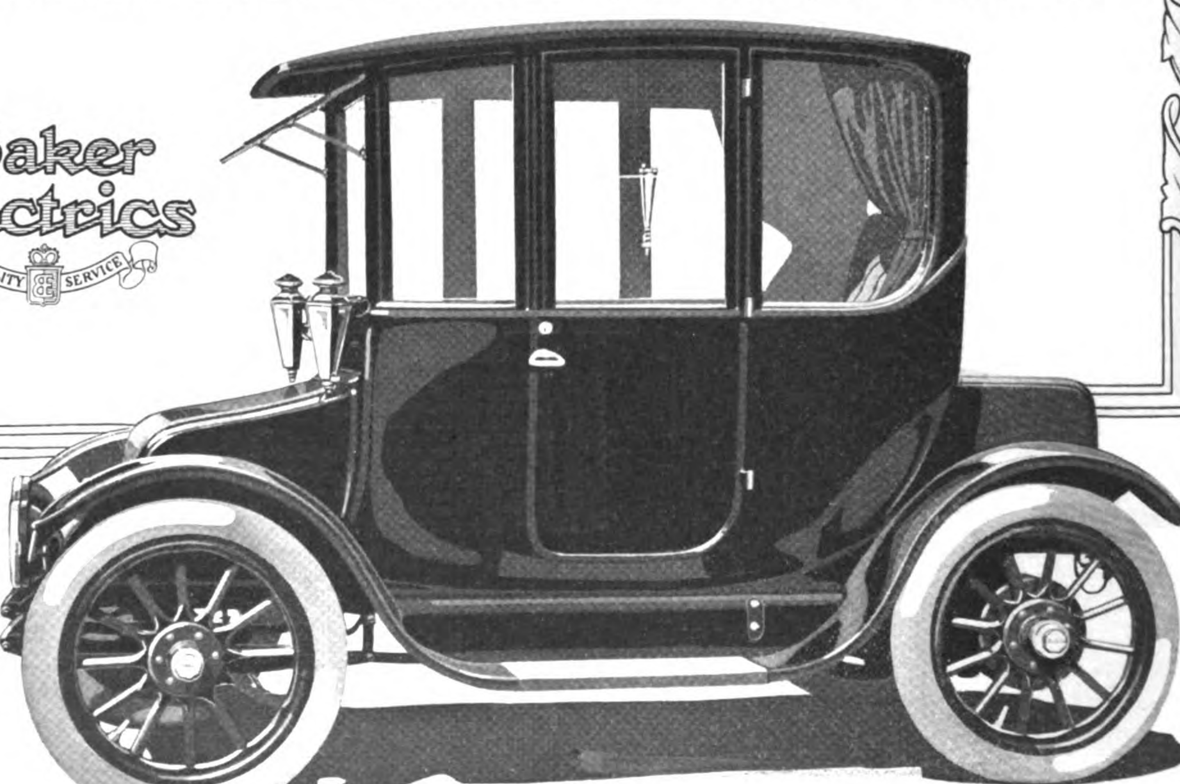
Before you buy an electric, read page seven of the new Baker catalog, mailed on request.

PRICES—BROUGHAMS: Worm gear, double drive or front wheel drive, $3250; COUPES: New Light Baker, worm gear, lever or wheel steer, $2800; BEVEL GEAR COUPE: $2600; ROADSTERS: Bevel gear, lever or wheel steer, $2300.

Also a complete line of commercial trucks from one to five tons.

THE BAKER MOTOR VEHICLE COMPANY, CLEVELAND

Baker Electrics
QUALITY SERVICE



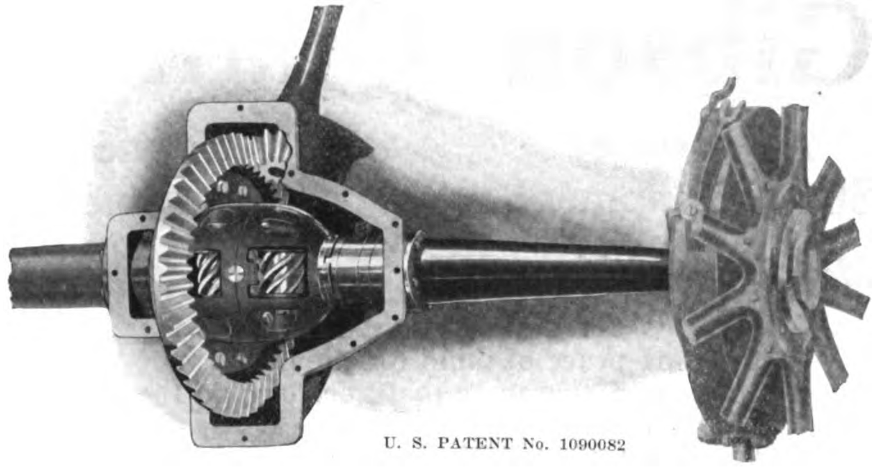
The New Light Baker Electric Coupe.

Price $2800.

America's Greatest Gear Factory Makes the "M & S" DIFFERENTIAL

STOPS THE SKID BEFORE IT STARTS.

INTRODUCES SAFETY TO THE AUTOMOBILE.



U. S. PATENT No. 1090082

Europe wanted trucks with a differential lock. The M & S does all that a lock will do, & a great deal more as well.

The Brown-Lipe-Chapin Co. of Syracuse, the largest makers of Differential Gears, have contracted for the American manufacturing rights of the M & S and can now supply sample gears to car manufacturers' own specifications.

Jeffery Adopts "M & S"

The "Jeffery Quad" used by the U. S. Army and selected for use in Europe is equipped with M & S Differentials. Eight big manufacturers are now making exhaustive tests with a view to equipping their cars with this new improved Differential which gives an entirely new conception of rear axle efficiency. Some car makers are already satisfied and have closed contracts for next year.

"M & S" Gives Equal Pull on Both Rear Wheels

This means that you can **make shorter turns**—that you **save wear on tires** and add from 500 to 1,500 miles to their life. That you **get more mileage** per gallon of gasoline—that **all the power** of your motor is used for driving the car instead of some of it being lost, as it is by the old style differential.

Your Rear Wheels Can't Spin

You can get out of mud holes, sand or snow if the wheel has even the slightest traction. Your engine can **pull greater loads** with less strain—your car **runs smoother** and more evenly and the **danger of skidding** on slippery streets or in mud is largely done away with.

See the "M & S" Differential at Shows—At the Exhibit of the Brown-Lipe-Chapin Co.

Learn the secret of the new mechanical principle demonstrated by the "M & S" which has caused engineers and manufacturers to marvel at the results given by this wonderful new differential. Absolute proof will be given that the "M & S" Differential will do even more than we claim.

A Special Type "M & S" for Ford Cars

In order to give Ford owners an opportunity to increase the efficiency of their cars and to provide for Ford differential replacements a special type M & S has been designed for the Ford Car.

Any mechanic can install it in a few hours. The cost is only a trifle more than the regular Ford bevel gear differential. But the advantages are so evident that no Ford owner will be satisfied with his present differential when once he has driven a Ford equipped with the M & S.

Dealers in Ford parts and accessories can get particulars regarding territory, prices and approximate delivery dates by writing the M & S Gear Co., 1528 Grand Avenue, Kansas City. Order for your Ford now.

If you don't go to New York write for further particulars and literature

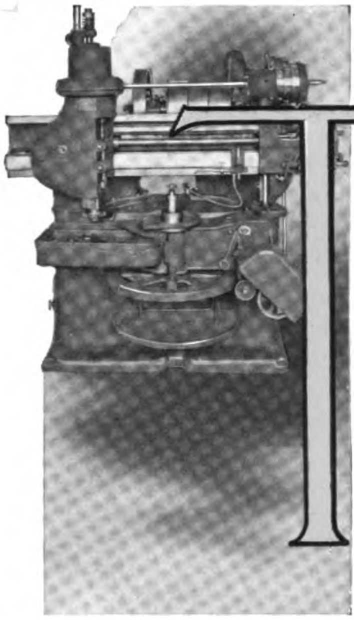
For particulars regarding the M & S as standard equipment for pleasure cars and trucks
BROWN-LIPE-CHAPIN COMPANY
SYRACUSE, NEW YORK

For Ford agency arrangements on the M & S replacement proposition write
THE M & S GEAR COMPANY
KANSAS CITY, MISSOURI

BROWN-LIPE GEAR C^o

SYRACUSE
N·Y· U·S·A·

BROWN-LIPE-CHAPIN C^o



THE Brown-Lipe Gear Company originally came into existence in the early days of the bicycle industry as manufacturers of sprockets and two speed gears for bicycles. From that humble start has grown two gigantic manufacturing institutions that supply today a big percentage of the automobile manufacturers of this country with their differentials, transmissions and control sets. In the plant of the Brown-Lipe-Chapin Company are produced the differentials, while the Brown-Lipe Gear Company confines its manufacturing facilities to the production of the various types and forms of transmissions and control sets. Although the holding interests of the two concerns are practically identical, each occupies its own manufacturing establishment, and each is operated just as separately and distinctly as though they were separately owned and geographically located a thousand miles apart.

As the demands of the automobile industry increased by leaps and bounds, and as the standing of the Brown-Lipe products grew more and more pronounced, it became an absolute necessity for greatly increased manufacturing facilities to supply the industry with Brown-Lipe products. So the single factory which had been enlarged time and again became so inadequate that the two specialized businesses must be separated.

New Company Formed

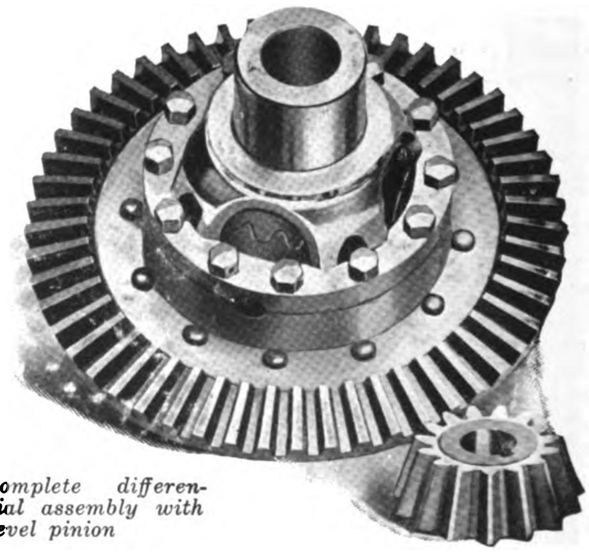
To accommodate this change a second company —the Brown-Lipe-Chapin Company — was organized and a mammoth new plant erected for the sole purpose of handling the differential end of the business. That these are incontrovertible facts may be well realized by the simple statement that in twelve recent consecutive months the output of Brown-Lipe products aggregated something around five millions of dollars, with a labor payroll in excess of a million—all for the production of these three component parts of a car.

The publication of this advertisement and the advertisements that are to follow, is based purely upon a desire to justify in the minds of dealers and consumers the wisdom of car and truck manufacturers in depending upon the Brown-Lipe organizations for such a vast percentage of these working parts.

When it is considered that the question of price has little or nothing to do with the sale of Brown-Lipe products, the simple fact of their dominating to such a marked degree, must evidence beyond contradiction the superiority of these Brown-Lipe products.

But we are not content to assume an air of independence and let our showing tell its own story, for we feel that around this enormous production can be built a story of modern manufacturing and merchandising that will give every user of Brown-Lipe products added confidence in his use of them, and which will give added emphasis to the sagacity and keen business judgment of the manufacturers who place their absolute dependence upon these products.

To the average car owner, as well, even, as to the ultra-intelligent car owner, and in many cases to the absolute trade itself, there is perhaps less known of the real problems and intricacies of gear manufacture than about most any other part of the car today. In the commonly accepted sense of the term, a differential is an unknown something that allows motor-driven apparatus to make a turn without breaking something, and the transmission is an unknown something that admits of various speeds of this motor-driven apparatus by the simple shifting of the lever. It is our purpose in this advertising campaign to set forth first in this announcement a general story of what these products are, and how they are made, and then in subsequent advertisements to show in detail the many and varied problems



Complete differential assembly with bevel pinion and methods necessary for the manufacture of these products.

It should be remembered first—that in the generally accepted sense of the term, all Brown-Lipe products are of special construction; true enough, differentials are standardized—true enough, transmissions are standardized. But each and every car presents its own peculiar characteristics which, in most cases, require special engineering thought in designing such products as lend themselves most admirably to the particular characteristics of the car in question.

To take care of this phase of the situation, separate and distinct corps of engineers are employed, whose constant labor is not only to keep pace with advancements in design, but constantly to co-operate with the manufacturers of the country in the special designing of these parts to meet the special requirements of the individual car itself. However, the question of manufacture is largely the same in the various designs, and in describing these products in the following pages we will take as our subject representative products that illustrate the general output of the factories.

DIFFERENTIALS

In ordinary language, a differential is an assembly of gears that enables the rear wheels to move at different speeds. Everybody knows that when an automobile turns a corner the inside wheel—that is, the wheel nearest the curb—revolves slower than the outside wheel.

A simile to this condition is that of a line of soldiers marching. They are all going forward at the same speed; a command is given for a turn to the right; the man on the extreme right of the line immediately begins to mark time—that is, he moves his feet in the same time as all the rest of his fellow marchers, but his steps are very, very short; in other words, he pivots—simply changes his position before the command, to a position at a right angle.

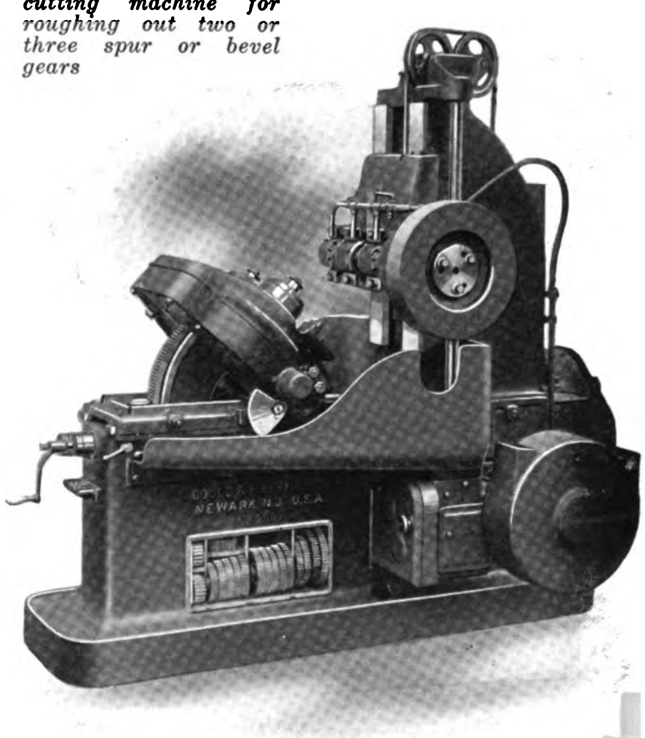
But the man on the extreme left lengthens his stride and increases his speed greatly in order to keep the line straight, each man from the left to the right going just a bit slower than his immediate companion on the left. This really is the action of the rear wheels when the car moves away from a straight line. If, as in the case of a buggy, or of the front wheels, each rear wheel were separate and detached from the other or from any common union, there would be no need of a compensating device.

But in the automobile an entirely different mechanical problem is encountered. The two rear wheels, which are the driving members, are locked to each other by the main axle shaft, when the car is proceeding in a straight line, and are both revolving at the same speed and in proportion to the speed of the engine. Provision, therefore, must be made for a breaking of this lock when the speed of the two wheels becomes different. And it is this function of permitting one wheel to go slow and the other to go fast that is performed by what is known as the differential gear.

The differential set as shown on the opposite page, consists of a pair of cases, a four armed spider, two side gears, four side pinion gears, twelve cap screws, one bevel drive gear, twelve rivets and one bevel drive pinion.

When your car is proceeding in a straight line your power is transmitted through the main driving shaft to the bevel pinion which is meshed with the bevel gear. As the shaft revolves this bevel pinion in turn revolves the bevel gear, which in turn revolves the main axle shaft and the entire differential assembly at right angles to the revolution of the main driving shaft of the engine. The main axle shaft is in two parts, each one attached firmly to its road wheel and differential side gear. This, of course, as you can see, simply makes the wheels revolve and propels the car forward.

Eberhardt vertical cutting type automatic multiple spindle gear cutting machine for roughing out two or three spur or bevel gears



Gleason gear planer. One of a battery of machines used in generating bevel gear teeth

Now then, when a turn is made, instead of the power revolving the entire differential as a unit, the two side gears and the four side pinions immediately begin to turn upon their bearings in the four arm spider. In this way the difference in speed between the two wheels is assimilated or compensated for within the differential itself, by the pinions and side gears.

Were it not for the use of this differential set, every time a car was turned from a straight path there would either be a slipping and tearing of the tires and wheels, or an absolute demoralization of the axle unit itself. The technical engineering data accounting for this really simple performance is extremely mathematical and complicated, and no attempt will be made here to go into a detailed explanation of just why and how these gears admit of these performances. But if anybody is interested enough to wish for the detailed engineering data connected with this operation, we will be glad to have our engineers furnish him with such detail.

As a typical illustration of the care and attention given to the production of a differential we will illustrate operation by operation, just what it means to produce a bevel gear. The same manufacturing conditions are encountered in making all of the gears, and the same care is taken in the handling of each and every part of the set; so that what is applicable to the bevel gear as shown by the following description, is applicable straight through the manufacturing operations of a differential set.

The gear blanks—which are drop forged rings of steel of approximately the shape of the finished bevel gear—are shipped from the forge plant to the differential factory.

The first operation is what is termed the rough forging inspection. These gear blanks are gone over carefully to see that there are no cracks or flaws apparent from an outside examination.

Then a certain fixed percentage of these blanks is drilled sufficiently to get samples of the steel, which samples are sent to the chemical laboratory for analysis. The entire shipment of rough forgings is held in the receiving stock-room until the samples have been thoroughly analyzed in the chemical laboratory to make sure that the chemical specifications of the steel in these forgings is in absolute accordance with the instructions contained in the ordering of the forgings themselves.

In other words, the Brown-Lipe Company knows, from years of study and experience, just what the chemical constituency of each piece of metal should be to give the best results in the performance of its work, and to avoid any possible errors in the manufacture of this steel this chemical analysis is most carefully made. After the chemical analysis the gear blanks are still further prepared for the first machine operation by going through a preliminary heat treating and annealing process. This makes the forgings uniform in constituency throughout and removes the forging strains or internal strains. If the forgings come up to specifications they are then started on the machining operations.

Machine Operations

The first operation in the machine department consists of boring out the center of the gear and facing the back so that it presents an absolute right angle surface to the bored center. This operation is then inspected with micrometers to insure absolute accuracy of size and also is tested on specially constructed jigs.

From this inspection the gear is sent to another machine which turns the face angle and the back angle surfaces. This operation is inspected with micrometers and special gauges to insure proper measurements. At this time the blank is also placed in what is called a running fixture and inspected while running, to insure the trueness of the running gear.

The blank is then placed in a jig, drilled and counterbored. This operation is inspected in a special jig equipped with pins that insures accuracy of boring and counterboring of all the holes. At this point the various surfaces of the blank have been machined to such points of accuracy that the blank itself can be held properly in a cutting machine which performs the next operation known as rough blocking or gashing the teeth.

Another inspection is made, and then the blank is sent to the gear generating department. It is at this point that perhaps the most unique operation in the entire manufacture of a gear takes place.

So remarkable is this process of generating a bevel gear that no attempt will be made to go into details at this time, but rather this matter will be left for treatment in an individual advertisement which will deal exclusively with this problem.

But some idea of the magnitude of the Brown-Lipe-Chapin Company may be gained from the statement at this time that the battery of Gleason gear generating machines installed in the Brown-Lipe-Chapin works is the largest battery of machines of this kind in the world.

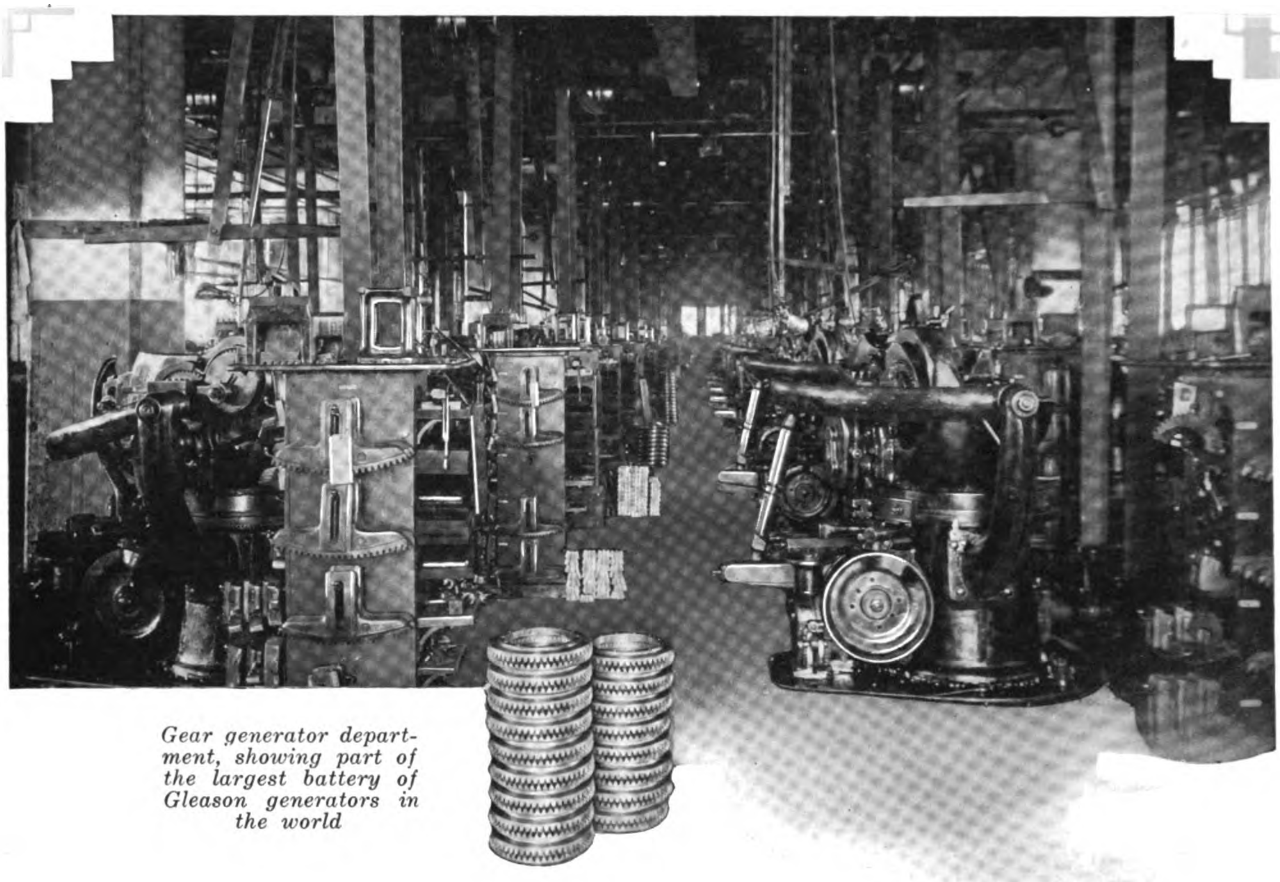
When the gear blank comes from this operation it is completely machined, and to all outward appearances, ready for work. To insure again positive accuracy in every way this gear, with all the machining operations completed, is sent to the inspection department where it is given a running test for sound, for the condition of tooth bearing and also for tooth measurements.

Then comes an operation which really calls for the most expert knowledge, and for the greatest amount of care and watchfulness in the entire manufacture of the product—the operation of hardening and heat treating. Up to this point we have been dealing with a piece of steel of such a carbon content as to admit readily of machining operations. It is obvious that if a piece of metal which is called upon to play as important a working part in the use of the automobile as a bevel gear, were to be assembled into that automobile in so soft a physical condition as to admit of easy cutting, it would be but a short time until that gear would wear appreciably. That would mean looseness of fit, noise and general all around dissatisfaction.

Hardening Problem

So the surface of this gear—that is, the surface of the teeth of the gear, which are the parts subjected to fric-

Grinding department, where side gears and pinions for the differentials are ground



Gear generator department, showing part of the largest battery of Gleason generators in the world

tion—must be so hard as to practically resist wear during the operation of the car. At the same time the body of the tooth as differentiating from the surface of the tooth, must be tough and strong.

As we have shown before, if the surface of the tooth is soft enough to possess features of toughness and strength it is not hard enough to resist wear when in mesh and running.

Inversely, if the whole tooth, that is, both body and surface be hard enough to resist wear on the surface, then the tooth will be brittle and not tough enough to keep from breaking off under the strain of driving.

So that in the hardening department these two contrasting conditions must be faced, namely: to so treat the finished machine blank as to present a hard, wear-resisting surface on the teeth, and at the same time to retain a more soft, but more tough core or body in the tooth.

So these gears are sent to the hardening department and subjected to a carburizing process which hardens the surface of the gear to a depth of 1-32 of an inch, and refines and toughens the core. So wonderful a subject is this question of heat treating that on succeeding pages of this advertisement we will go into the detail concerning the operation of a heat treating furnace.

The hardened gear is then sent to the testing department in the heat treating room, and by a variety of unique tests, is examined as to its hardness and evenness of hardening.

Then the gear is sent to another machine for straightening these gears inasmuch as frequently they bulge out of true during their subjection to the extreme heat. After being straightened the gear is again subjected to running tests and endurance tests, when it is ready for the grinding or sand blasting room. After being polished to mirror smoothness, the finished gear is again inspected for dimensions, and finally is subjected to its last running test for trueness.

You have probably noticed in following through this manufacturing process, that "inspection" and "test" are two words very frequently encountered. It is because Brown-Lipe products are subjected to this careful and exhaustive inspection and testing largely that they enjoy the enviable reputation in which they are held by the manufacturing public. And it is this reason also that accounts in a great measure for the extreme life and satisfactory service rendered by Brown-Lipe products.

HEAT TREATING

As indicated in one of the preceding pages, there is perhaps no single operation or handling which is fraught with so much importance, or which has required so much experimentation in the perfecting of the process, as that of the heat treating of the metal after it has been machined. For this reason the heat treating departments of the Brown-Lipe Companies are beyond doubt the most thorough and most modern, both in physical and mental equipment, of any heat treating plant known, and the methods employed to insure absolute results are most extensive and complete.

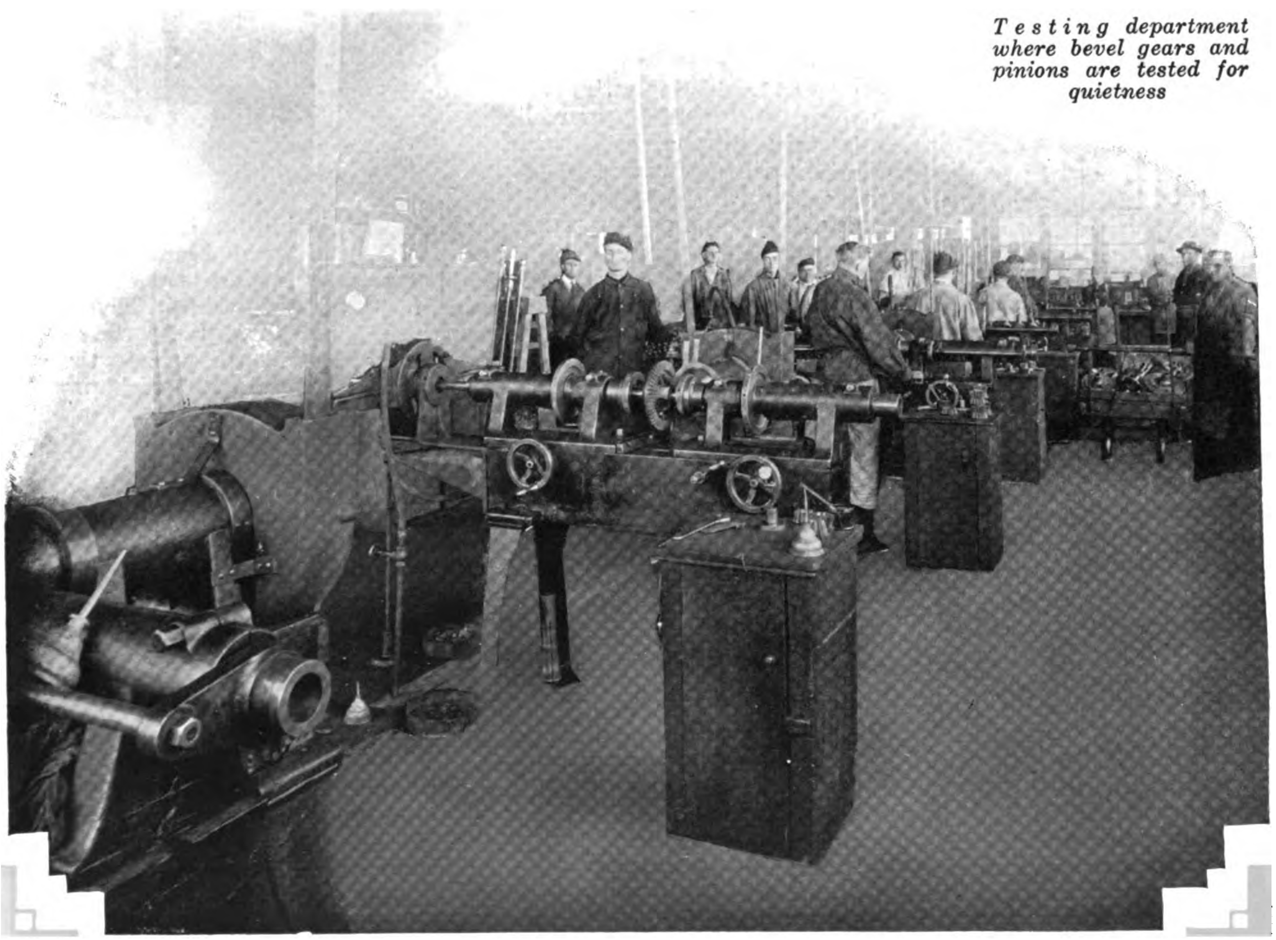
When the gears are brought into the heat treating department they are first turned over to an operator who lays them out to be placed in a certain furnace. Each individual gear is

Gears Numbered

then numbered in such a manner that two or three years afterwards, if the case requires, the gear can be identified as having been heated upon a certain day, in a certain furnace,—in a certain pot and the position in which that pot was placed in that furnace. The exact number of hours it was in that furnace and the amount of heat that was put into it can also be told from individual records that are kept of each furnace during each heat of every day.

After the gears are thus identified, the screw holes and rivet holes are plugged with fire clay so as to prevent the carburizing mixture from coming into contact with anything other than the surface. Together with this secret carburizing mixture the gear blanks are then packed in hollow center round fire pots, the tops of which are luted on with fire clay so as to make the pots practically hermetically sealed. These pots are then put into the furnace which has been brought up to a certain temperature, and the heat treating process has been started.

It must be understood that the results obtained by this heat treating—that is, the laying of 1-32 of an inch hard surface and the retaining of a comparatively soft, tough, strong core—is accom-



Testing department where bevel gears and pinions are tested for quietness

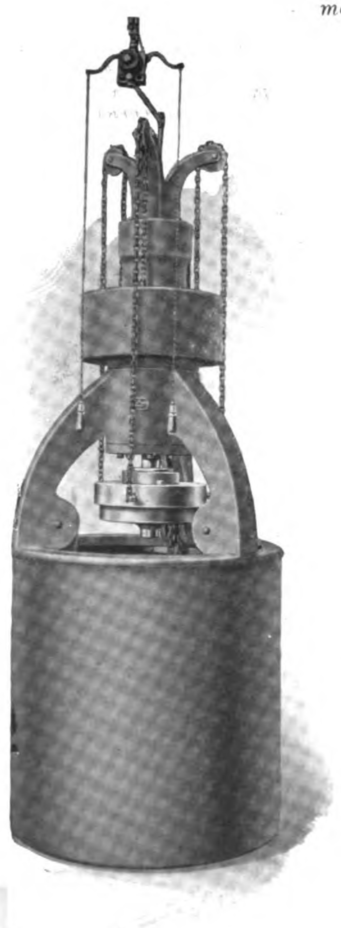
Case hardening and heat treating department—carburizing pots at right

plished by driving carbon into the surface of the gear while it lays in the carburizing mixture in the furnace.

As a matter of fact it is the gases generated inside of this hermetically sealed fire pot that do the work. When the rough blank of a carbon steel gear is brought to the heat treating department it is uniformly of about .20 carbon from center to surface; when it leaves the heat treating department the center remains substantially the same with a very slight variation to both surfaces, while the surfaces themselves to a depth of 1-32 of an inch must contain 1.00 carbon.

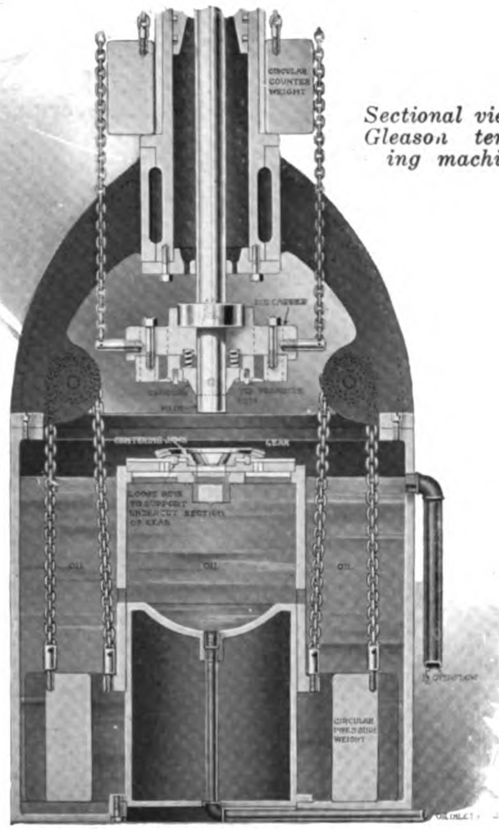
Heat Measured

A somewhat homely analogy to the heat treating of metal is that of baking bread. The molded loaves are placed in the oven and the fire is maintained at a certain heat for a certain length of time. If the oven be too hot the outside of the bread is hard and the inside is raw. If it be too cool and if it required too long a time to bake the bread, it is heavy and unsatisfactory in every way.



Gleason tempering machine—Straightens gears while hot

And just so with the heat treating of metal, only to an unlimited greater degree. Years of experience and experimentation have shown metallurgists just the best method to follow to produce given results, and where our bread-bakers only look at the oven once or twice during the baking, there is the most accurate and most absolute check kept on every furnace during every minute of its work—and here it is that the real heat treating takes place.



Sectional view of Gleason tempering machine

Connected to each furnace is an electric heat registering device known as a pyrometer. This is really an electric thermometer so constructed that it registers the heat of the furnace either at the furnace or many feet away from the furnace.

In the Brown-Lipe plant each furnace pyrometer is connected with a registering device in a room in one end of the building, before which sits an operator whose sole duty is to read and record the temperature of each and every furnace every five minutes during the carburizing process, which averages about 7 1-4 hours.

Just let that thought sink into your mind deeply —every five minutes of all this time an absolute record is made of the condition of the furnace. This operator knows that when the metal was first placed into the heating furnace that it registered a certain temperature, and it is his duty by these five minute checkings to see that the temperature of that furnace is constantly and steadily raised a certain number of degrees at certain regular intervals until at the end of the time necessary to complete the heat, a certain fixed temperature shall have been attained.

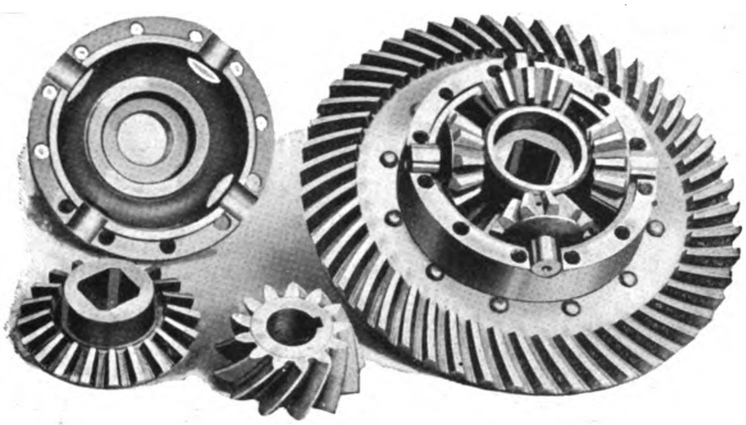
In other words, it is his duty to see that, if the temperature of a certain furnace at starting is 1185 degrees F., after the doors have been closed and the fire commences to work regularly, that furnace shall continue to increase its heat a few degrees at a time, until at the end of 2 1-2 or 3 hours according to his instructions from the metallurgist in charge of the operation, the heat in that furnace shall be 1600 degrees F., without the temperature ever having fallen backward during the process of raising it.

And in the watching of this operation this furnace is not allowed to vary over 10 degrees one way or the other. As the operator looks over his charts, if he sees that one furnace is not rising as fast as it should, or is rising too fast—that is, if the variations are 10 plus or minus from the curve which the heat should follow, he immediately notifies the man in charge of the furnace. If there is still a variation, the foreman is notified, and in turn the metallurgist himself in charge of the plant is informed and consulted.

After the gears have been properly carburized they are drawn from the fire and quenched in an oil bath, the oil of which is held at a certain definite temperature by an efficient cooling system. This treatment is for the purpose of refining the core or the central tough portion. Then when the gears are cooled to the temperature of the bath they again are heated up uniformly to 1425 degrees F., for the purpose of refining the hard shell or case which has been left in a very crystalline condition, due to the high heat used in refining the core.

Occasionally it is found that the gears in the process of case hardening warp out of true. To compensate for this warping such gears as have been found to be warped are straightened while hot in the quench bath by means of a newly devised straightening machine used for that purpose. The heat treatment completed, the gears are then sent to the testing department in the heat treating shop, and most thoroughly and carefully tested almost tooth by tooth to

Fractured gears showing case hardening results. Lower piece faulty—no case hardening. Upper piece good. Note hard strip around edges of fracture at right of good gear



Spiral bevel drive differential partly dissembled and spiral bevel drive pinion

which is known as the fire end. To insure absolute uniformity and exactness of temperature, these fire ends are changed on every pyrometer every Saturday so as to eliminate any possible danger of undue wearing or leakage of current of any sort. These new fire ends, previous to being placed in the furnace are standardized against a Bureau of Standards Couple which is gotten out in Washington, D. C.

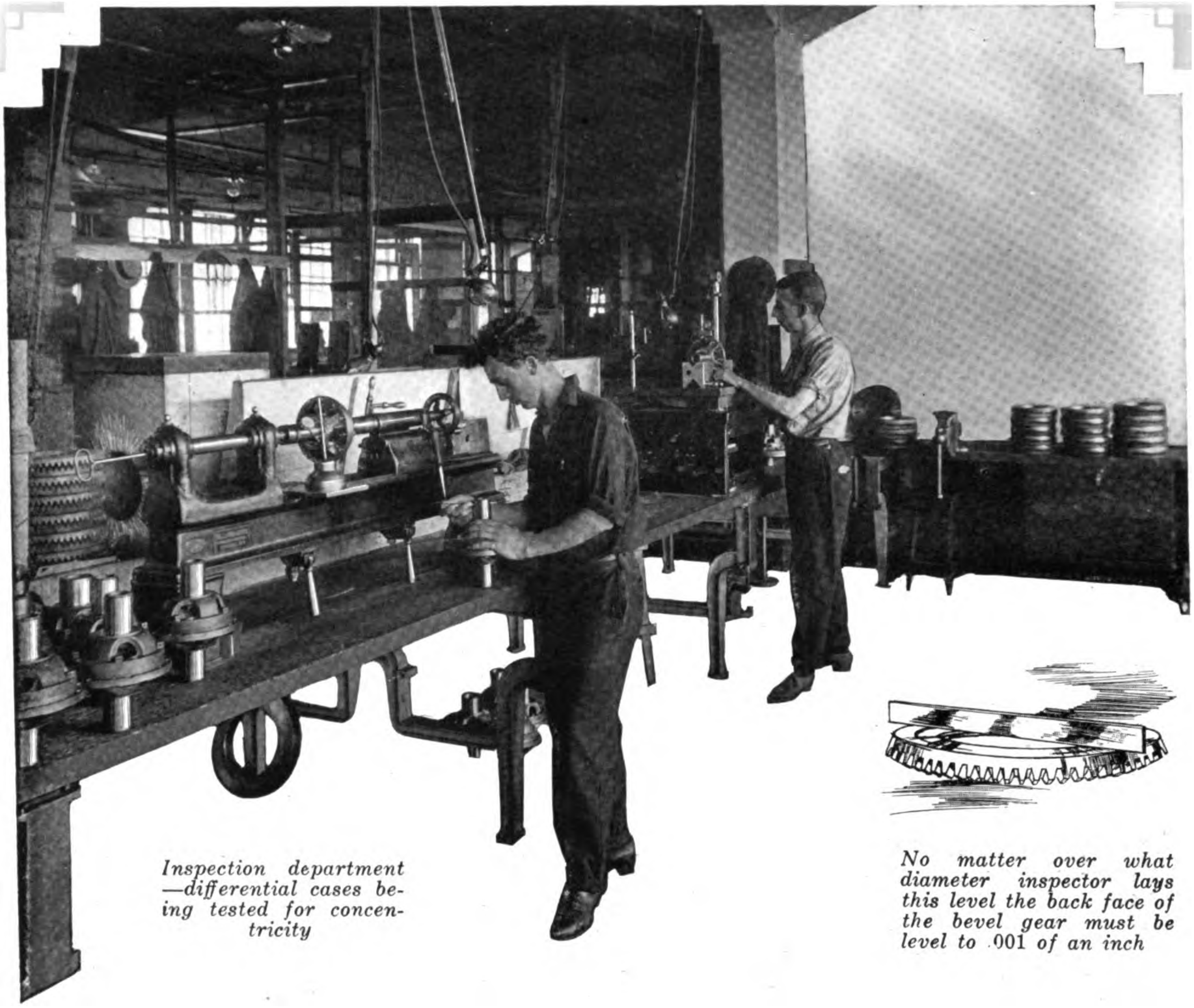
be sure that the proper amount of hardness and the proper depth of hardness have been obtained.

Just another little instance in connection with the accuracy employed throughout this heat treating department. We wish to refer again to the question of the pyrometer. These pyrometers operate on the principle that when you place two different metals in contact—for instance, copper-nickel alloy and iron — and apply heat at the point of contact, an electrical current is set up. In these pyrometers, therefore, there is a contact so constructed, which goes inside of the furnace and

From the recording station to the fire end of the Brown-Lipe heating plant is a distance perhaps of a hundred feet, and wires connected with the pyrometers at the far furnaces must be carried up to the other end of the building to the recording table.

Ordinarily electricity is conducted through copper wires, but in the conducting of the temperature variations from the pyrometers in the Brown-Lipe furnaces to the recording table, a condition arises, so minute in importance to the average lay mind as hardly to be realized, that calls for a change in this general practice of

Differential Stock Room
Bevel gears in fore-ground



Inspection department —differential cases being tested for concentricity

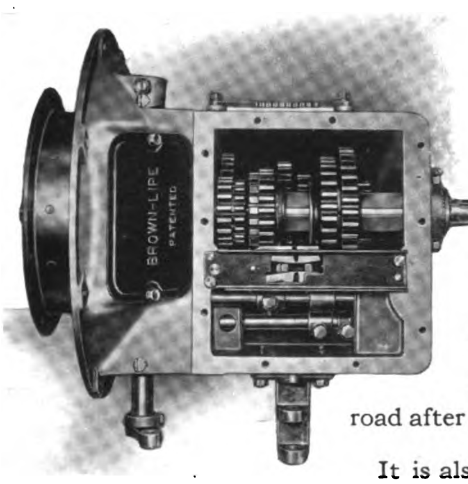
No matter over what diameter inspector lays this level the back face of the bevel gear must be level to .001 of an inch

conducting the current by copper. As we have stated before, whenever and wherever two different metals are united in the presence of heat, an electric current is set up, and in these pyrometers copper and iron are united in the furnaces to set up this electrical current. Now, then, if another union of copper and iron were made to the iron terminal of the pyrometer outside of the furnace—as would be the case if a pair of copper wires were used to transmit this current from the furnace to the recording table—a counter current would be set up at the second point of contact of the copper wire with the iron. So, to avoid even so minute a variation as might be occasioned by this second junction of copper and iron even at a very low temperature, and which would be small, a special insulated iron wire is carried straight through from the pyrometer to the recording table.

Emphasis is laid upon this apparently unimportant detail solely for the purpose of carrying conviction on the point that every single possible safeguard to insure the greatest efficiency in the finished product is employed throughout the Brown-Lipe organization.

TRANSMISSIONS

As is generally known, a transmission set is a combination of gears and shafts that provide for variable speeds and variable power applications to the driving wheel of a car. The necessity for the use of a transmission set is based on the principle that in internal combustion engines the power delivered by the engine is absolutely correlated to the speed at which the engine is revolving; in other words, if at 200 revolutions per minute a certain gas engine is delivering a power impulse of 3 h. p., at ten times that speed, or 2000 revolutions per minute, that engine is providing approximately ten times that power, or 30 h. p.



Transmission

In the driving of every car there are times when great power is required at slow speed, as evidenced in the starting of a car or in driving through mud or hill climbing. It is obvious that it requires more power to move a car from a dead stop into motion, than to propel that car forward on a perfectly level road after it has been set in motion.

It is also obvious that it requires more power at slower speed to drive that car through mud or up a hill than it required to drive it along a level road, and it must be borne in mind all the time that more power can only be obtained through greater speed of the engine.

To accommodate this condition the transmission is built so that while the engine may be turning over at top speed and delivering its maximum of power, you are still able to gear down the car so that it is not moving at top speed. Then, too, a device of some sort is necessary to provide for the question of reverse, or driving the car backward.

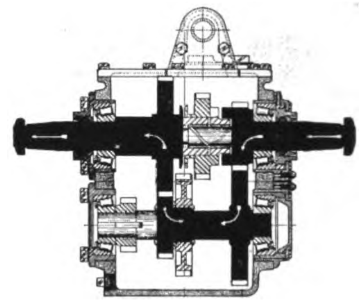
The average transmission set as exemplified in the unit power plant and multiple disc clutch construction consists, first—of the case which contains the gears and shafts. In this case is the driving gear which takes the power from the engine through the driving shaft; then there is what is called the square or rear shaft, on which are mounted two sliding gears, one of which provides the intermediate and direct speed; and the other of which operated in one direction provides low speeds, while operating in the other direction provides the reverse speed, this being a description of a three speed forward and reverse transmission.

Use of Transmission

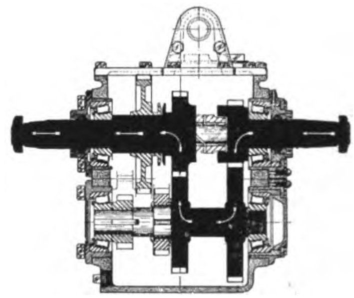
Then there is a counter-shaft which carries the counter-shaft drive gear, the intermediate speed gear, the low speed gear and the reverse speed gear. Of course, there are the bearing retainers and the various bearings which support the different shafts. Then there is what is called an idler, mounted on a stud, which is used in the obtaining of the reverse gear. The use of the transmission is very simple.

The main driving shaft is of course always revolving at engine speed, and when the car is driving on what is called "high" the wheels are turning by means of a direct transmission of actual engine speed from the crank shaft of the engine to the differential gear. When you select your gear, whether it be first or second, you simply throw out your direct connection between the main driving shaft of the car and the crank shaft of the engine through the transmission set, and interpose in the line of drive a set of gears.

An illustration of every day occurrence is seen in the bicycle. The front sprocket which is connected to your pedals,

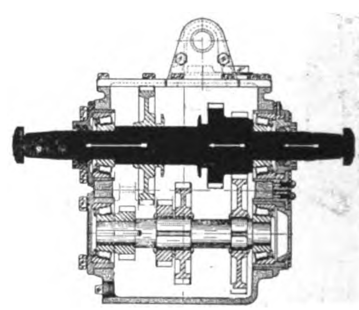


First Speed

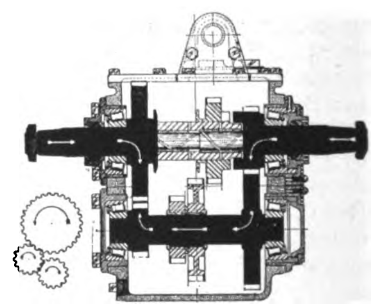


Second Speed

Solid black indicates power line. White blocks in solid black indicate gear meshing—arrows show direction of power.



Third or Direct Speed



Reverse Speed

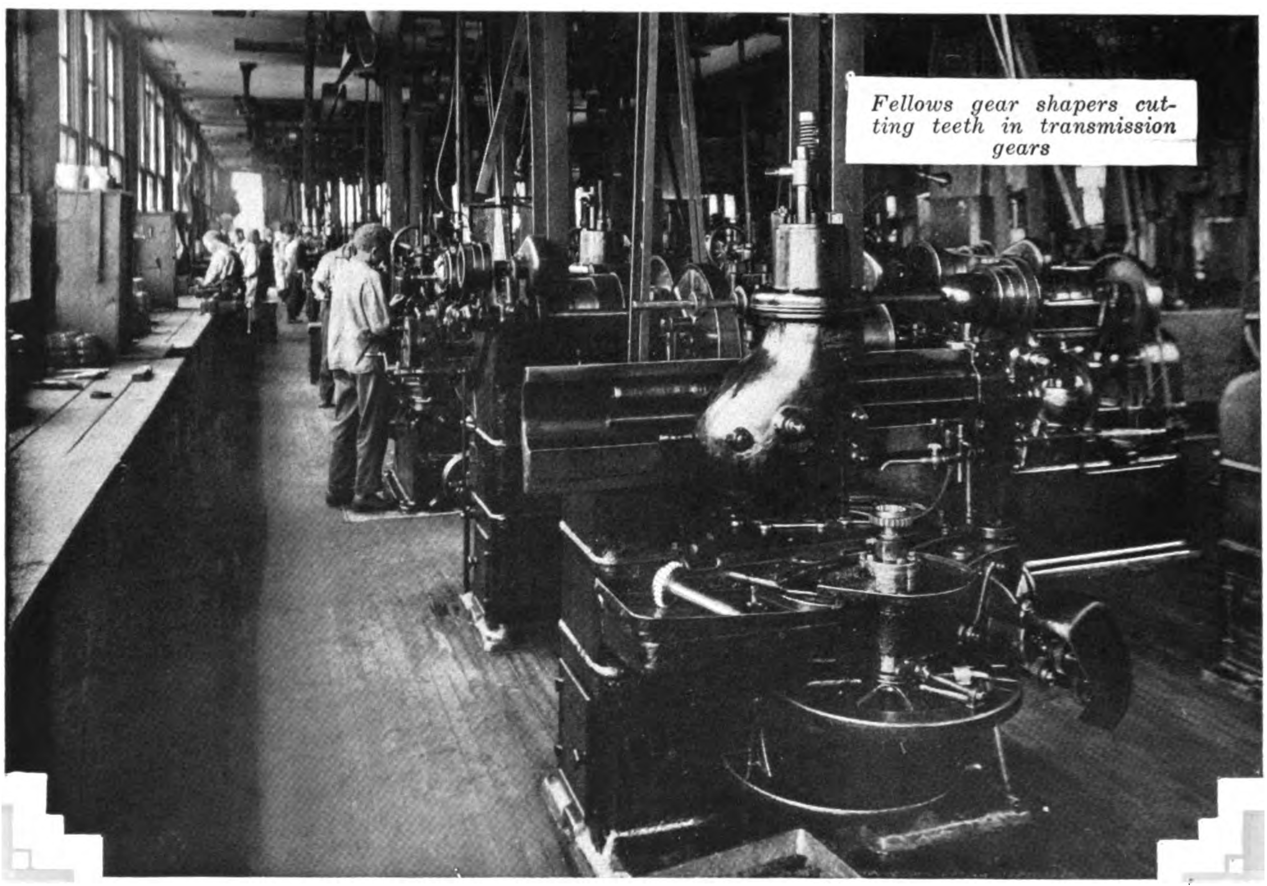
Note that in direct the gears do not play any active part in transmitting power. In the reverse an odd gear called the idler gear is introduced in the train of gears which causes the axle end of the split shaft to rotate in opposite direction to the engine end of the split shaft is a great big gear with a great number of teeth, while the rear sprocket—that is, the sprocket which is attached to the rear wheel —is a small gear with a small number of teeth. For every revolution that one pedal makes, or for every revolution that the big sprocket makes, the little sprocket on the rear wheel, and consequently the wheel itself, makes several revolutions. So that by turning your feet over once you revolve your wheel several times, the exact differential being direct in proportion to the number of teeth on the two sprocket wheels. Now, if you were to put your small sprocket on the pedal of your bicycle, and the big sprocket on the rear wheel—as is usually the case with trick bicycle riders on the stage—your feet would have to revolve two or three times to make the rear wheel revolve once; in other words, the power application might be identically the same at the pedals, but the speed of the bicycle would be different.

In your three speed transmission case the reverse principle of the average bicycle construction is in vogue. For very low speeds you put a gear of small size connected with the engine into operation with a gear of big size connected with the driving shaft of the car. For your intermediate speed you put this same small gear connected with your engine into operation with a smaller gear than used in the low selective, and yet a gear which is larger than the driving gear. And in reverse you simply use three gears instead of two gears.

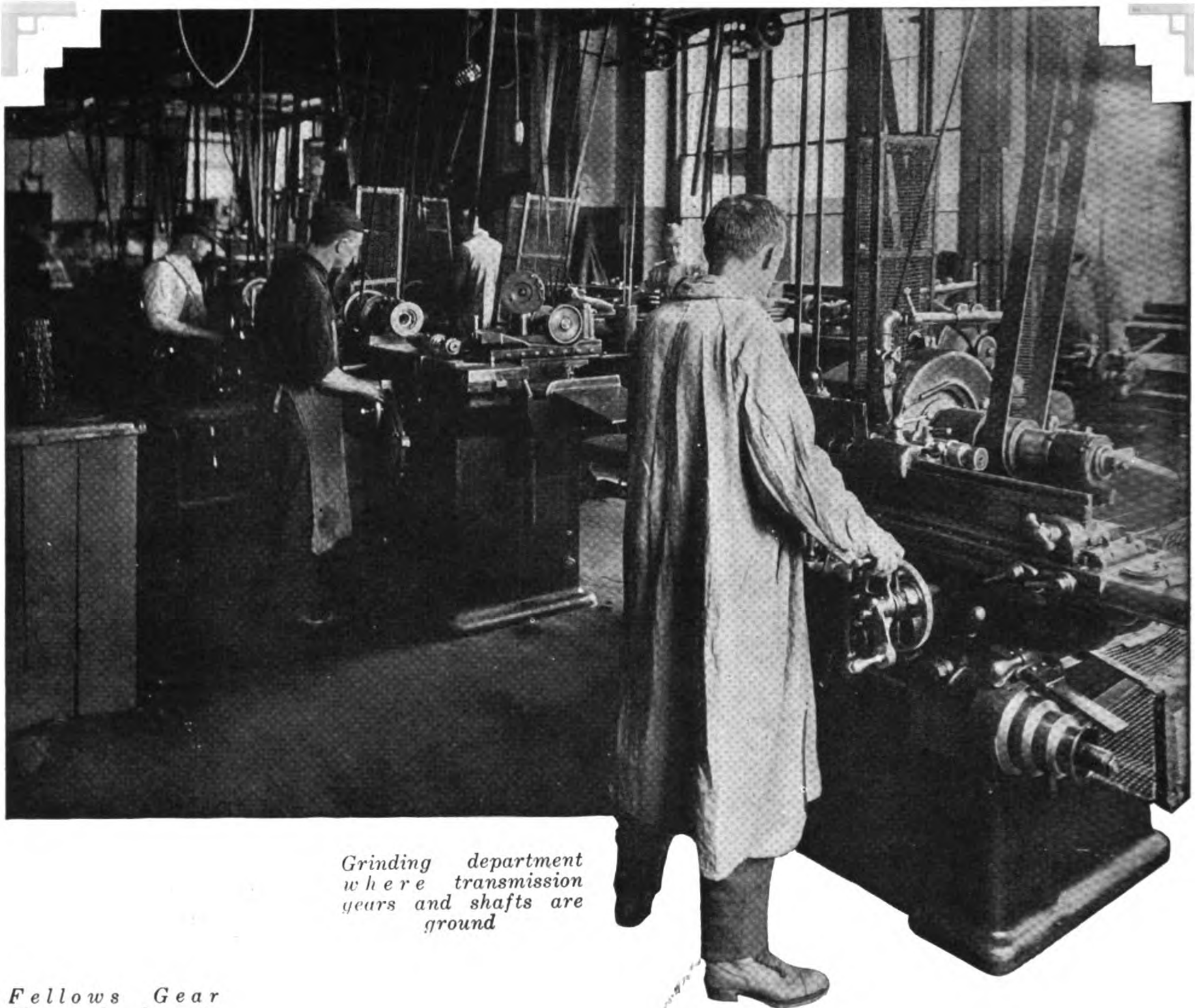
In the case of a four speed transmission where you get your fourth speed on what is called a "step up" you simply call into play the exact bicycle construction—that is, you use a small driving gear with a still smaller gear connected to the main shaft of your car; in other words, for every revolution of your engine the driving shaft of your car is revolving faster than the engine.

In the transmission department the general practice is, so far as the machining and heat treating operation, identical with those described under the heading of "Differentials," with the exception, of course, that in the differential department most of the gear cutting is bevel, while in the transmission department there are no bevel gears.

In the production of the transmission gears in the Brown-Lipe plant, however, there is one feature which is carefully watched, that is perhaps a little at variance with common practice. In the generating of gears several blanks are laid one upon the other, and then put into the gear shaper in such a manner that the cutting tool works up and down over three or four or more gears at the same time.

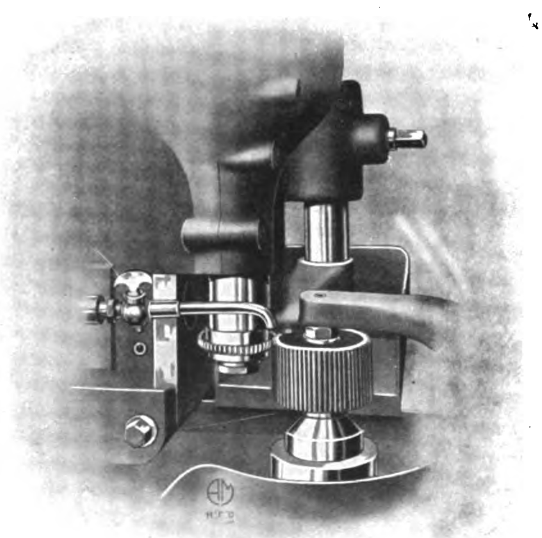


Fellows gear shapers cutting teeth in transmission gears



Grinding department where transmission gears and shafts are ground

Fellows Gear ***Shaper showing cutter at work***

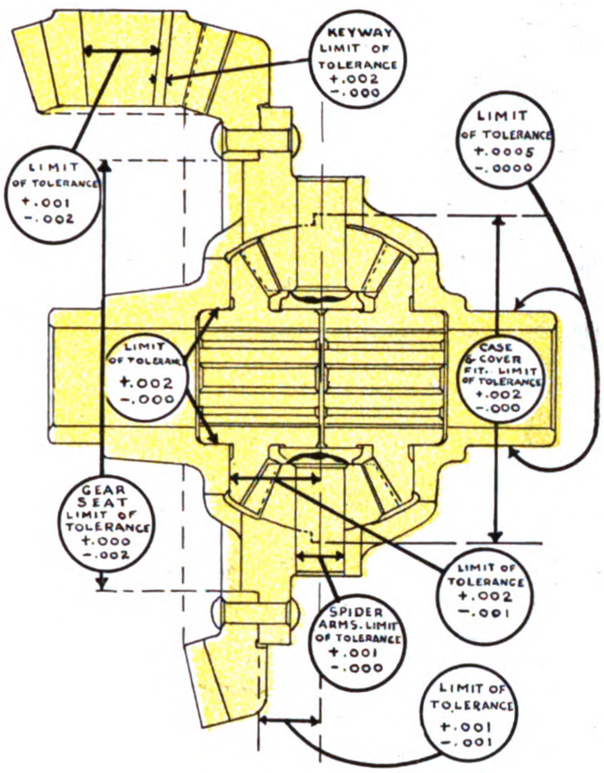


In order to have all these teeth cut at absolute right angles to the face of the gear, or in other words, to have the line of the tooth absolutely parallel with the shaft to which it is attached, the gear blank faces must be absolutely parallel and accurate. So that instead of simply assembling these blanks as they first come from the forge, all the gear faces are first ground absolutely parallel before shaping, then when they are stacked and placed in the gear shaper, the gear teeth must be cut absolutely at right angles with the face of the gear.

It is in this work—this preliminary machine work, that a very marked manufacturing refinement takes place in the Brown-Lipe Plant.

For where in cheap manufacturing this first machining operation is slighted, in the Brown-Lipe Transmission work it is held to absolute limits.

In the construction of the case in Brown-Lipe Heavy Duty Transmissions all the bearings



are mounted in malleable cages which are carefully fitted into the aluminum of the case itself, rather than being mounted directly in the aluminum. This of course is a great deal more expensive method of manufacture but by the same token it is vastly more superior and accurate.

Quality and efficiency, the earmarks of Brown-Lipe products, depend in the final analysis upon the thoroughness of the testing and inspection departments through which those products must pass.

No matter how clever a design may be, it proper materials properly machined are not embodied in the result of that design, quality and efficiency are lacking. It is, therefore, largely due to the thoroughness and completeness of the inspection departments in their checking up, not alone of materials, but of the work performed on the materials, that Brown-Lipe products stand today as unquestionably the standard upon which all competitive products are analyzed.

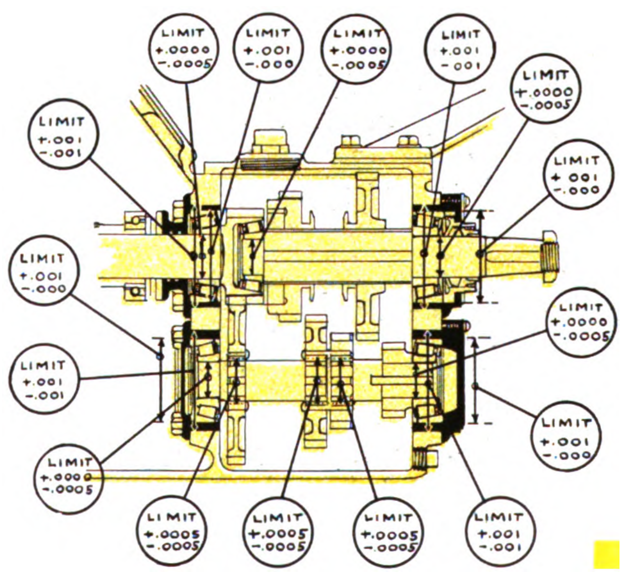
Throughout the machining of every part of every product working limits are enforced in the Brown-Lipe organizations that to the mind of the layman seem impossible of enforcement. The .001 part of an inch is just as much a factor in measurements as an inch itself and the very fact that the Brown-Lipe Companies enforce their workmen to hold themselves down to such microscopic measurements explains in detail just why Brown-Lipe products are better products and just why Brown-Lipe products cost more ultimately as a first cost but why in the hands of the consumer Brown-Lipe products represent the lowest cost.

The illustrations on this page of the differentials and transmissions show the wonderful microscopical limits to which these products are held.

In the differential, for instance, the bevel gear seat must be machined within .002 part of an inch of the indicated measurements on the blue print. The case and cover must fit to a limit of variation of plus .001 of an inch and minus absolutely nothing. The hubs are held to a limit of plus .001 of an inch variation and in the design, wherein we press on the sleeves and grind the hubs, the variation from actual indicated measurement is held as low as .000 1-4 of an inch.

Throughout the grinding of the surfaces of the internal parts—that is, the arms of the spider; the bore of the spider; the back bore and front of the side pinions; the back and hubs of the side gears, as well as the bore of the side gears where spline shafts are used—the limit of tolerance of variation from the blue print is held to .001 of an inch.

And all these and many other measurements are held there, too, for any inspector who allows any one of these measurements to vary from its absolute limitation automatically discharges himself. And what is more, through the working out of our manufacturing plans the inspection of one man is checked by that of another.



In the transmission tolerance limits of .0005 of an inch are encountered more generally than limits of .001 of an inch. Both the main shaft and the countershaft at every bearing fit are held to the specified dimensions within a minus limit of .0005 and with absolutely no oversize. In other words, the instructions to the mechanic who finishes those shafts are that his limit of tolerance

from measurements is plus nothing and minus .0005 of an inch.

Where the aluminum case is bored to furnish a seat for the bearing cage in which the shafts are mounted, the limit is plus or minus .001, while the bore of the bearing cage itself is held to a limit of plus .001 and minus nothing.

The grinding limits for the gear fits on the countershaft are plus or minus .0005 while the grinding limit on the square shaft upon which the sliding gears slide is absolutely nothing. All gears must be concentric — the measurement of concentricity being from centre of the gear to the pitch line of the teeth—to a limit of .001 of an inch.

And so right on through the entire manufacture of every Brown-Lipe product.

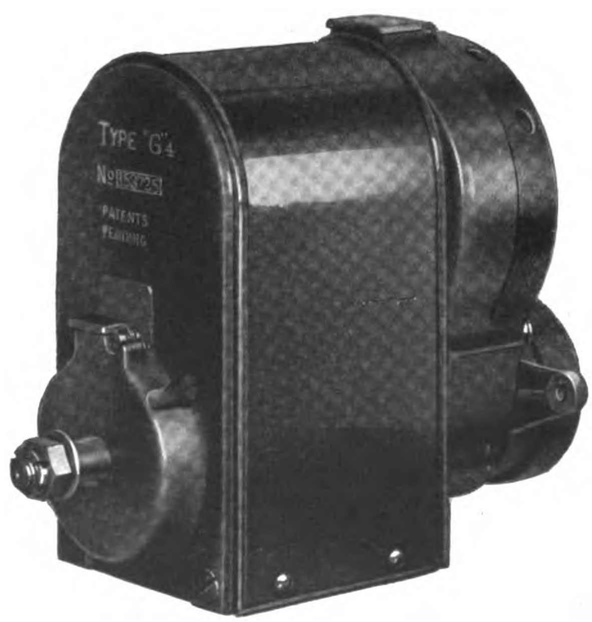
Combine these microscopical manufacturing conditions with a design which contemplates only the production of a part that will give the maximum of service with the minimum of weight and practical elimination of noise—

Combine these manufacturing conditions and this superiority of design with the fact that the metal which enters into these parts is most carefully analyzed chemically and held absolutely to the specifications we know to be best suited to the requirements—

Combine these superior points of design, workmanship, inspection and materials with the final fact that this product is treated to a degree of accuracy and perfection almost superhuman to the lay mind and you have again our reasons for claiming that

Brown-Lipe products are unquestionably the standards by which all competitive products are measured.

BROWN-LIPE GEAR CO.
SYRACUSE, N. Y., U. S. A.
BROWN-LIPE-CHAPIN CO.



EISEMANN

waterproof, high tension magneto. Simplicity personified is the keynote of the construction of this new Eisemann product. It is the most accessible, most efficient instrument that has ever been produced, and we are willing to base our contracts on actual tests of this literal statement.

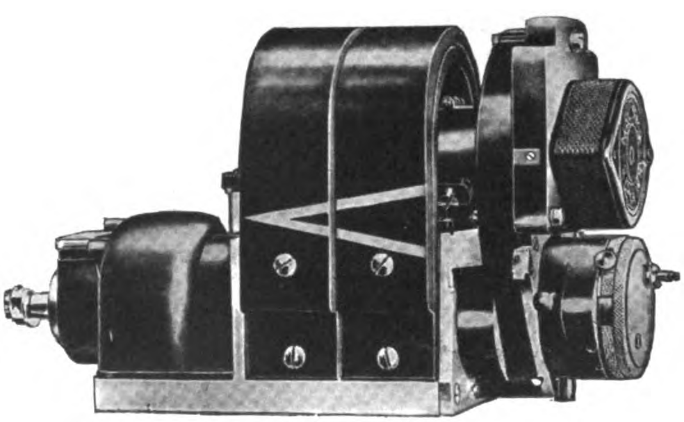
The principal features of simplification are to be found in the new contact breaker which is patented; the method of carrying the high-tension current direct from the collector ring to the distributor without the use of unnecessary brushes and conductors; the method of attaching the cables inside of the magneto and a general elimination of parts by a remarkably clever new design.

And in the increased simplicity and accessibility this new model has also gained much in efficiency. Waterproof, dustproof and practically foolproof, it is the greatest step forward yet recorded by the Eisemann Company in the maintaining of its reputation for efficiency, reliability and durability.

The Eisemann Magneto Co.

Sales and General Offices: 32-33d Street, Brooklyn, N. Y.

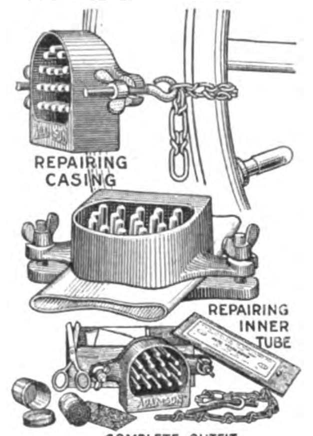
NEW YORK:	INDIANAPOLIS, IND.:	DETROIT, MICH:
245 West 55th Street	415-417 N. Capitol Avenue	802 Woodward Avenue



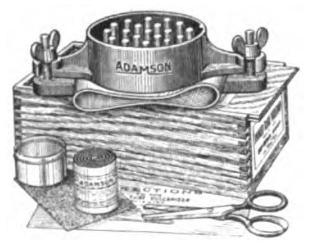
WAR IS HEL-pful!

—to ADAMSON Dealers.

Let's put an ADAMSON Vulcanizer in every "See America first" Kit!



Model "U"
For Repairing INNER TUBES and CASINGS
Price Complete $3.00



Model "T"
For Repairing INNER TUBES Only
Price Complete $2.00

THOUSANDS of people who have been "kiting" away to Europe for their vacations—to "see the sights"—will now stay at home and SEE AMERICA. Many of the better classes of people will be attracted from abroad. We will become the commercial, the educational and the sight-seeing nation.

Let's Capture the Added Domestic Business This Means For Us

Can we not—together—put an ADAMSON Vulcanizer in every "See America First" automobile kit?

There will be more overland travel in the United States —for some time. Motorists will need just the sort of service an ADAMSON Vulcanizer provides.

There is a tendency to economize which, while it may reflect itself in some lines adversely, means YOUR opportunity when it comes to selling Vulcanizers—for Adamson Vulcanizers *save many tire dollars.*

If you sell less of one thing—you can sell more of another! We hope that EVERYTHING is moving out lively! But if you want to create still more activity—get busy with ADAMSON Vulcanizers.

ADAMSON MANUFACTURING COMPANY

Hamilton, Ont., Canada **East Palestine, Ohio**

National Motor Vehicle Co., Indianapolis, Ind.

You will save enough on tires in a year, because of proper inflation, to more than offset the cost of the

MANZEL
ENGINE DRIVEN TIRE PUMP

A pump at $20 that does the work of tire inflation with the absolute minimum of effort on your part, that pumps to the efficient limit dictated by the size of your tires, and then automatically shuts off the air supply, preventing over-inflation, with resulting blowouts, and damage to your tubes and casings.

It is easy to install—"a screwdriver, a file and a wrench"—these are the tools you need, and you don't have to pay a mechanic to put it on for you. Once on it's on to stay. It weighs less and occupies less space than any other pump of the same capacity.

When you want to use it, simply couple on your hose connection, throw your pump gears into mesh, start your engine, and sit back for two or three minutes—your tire is inflated to the efficient pressure determined by its size, and then our unique safety valve takes off the

MANZEL BROTHERS

Factory and General Sales Offices,

Leaders, for 16 years, in the manufacture of quality oil

DISTRIBUTING CENTERS:

Albany	Billings	Cleveland	Des Moines	Kansas City	Memphis
Albuquerque	Birmingham	Denver	Ft. Worth	Louisville	New Orleans
Atlanta	Chicago	Dallas	Houston	Milwaukee	New York
Baltimore	Cincinnati	Detroit	Indianapolis	Minneapolis	Omaha

"THE EASIEST RIDING CAR IN THE WORLD"

MARMON

Equipped Marmon Touring Car Makes 1030 Miles in 18 Hours

LATE MARMON '41 SETS NEWRECORD

MARMON MODEL 41 IN DIFFICULT TASK

Travels 355 Miles Over Bad Road With the Gear Sealed in High; Tug-of-War Hill Is Climbed.

Marmon Model 41 Sets Fuel Mark

Marmon Climbs Mount Hamilton on High Gear

MOUNTAIN TRIP ON HIGH GEAR

Marmon Medium Six Makes Tour of 355 Miles With Lever Sealed.

Millions of People Read This News

MARMON '41' SETS NEW MARK

Makes 62.891 Miles in One Hour with Five Passengers, Top and Windshield Up

Marmon „41" mit Dach und Windfänger legt 6289 Meilen in 60 Minuten auf dem Speedway in Indianapolis zurück.

Record Run Made by a Marmon Stock Car

MARMON "41" OUT OF THE ORDINAR

Medium Six Has Arrived at Jo Hudson's Salesrooms On Market Street.

MARMON STOCK CAR BREAKS WORLD MARK

Machine With Windshield Up and Carrying Five Passengers Makes Sixty-Five Miles in an Hour at Local Speedway.

MARMON MAKES STOCK CAR RECORD

MARMON CAR IN TEST RUNS ON 'WATER' FUEL

TOURING CAR SETS A NEW SPEED RECORD

Marmon, Carrying Five Persons, Covers 62.89 Miles in 60 Minutes.

TEST IS ON SPEEDWAY

F. E. Edwards Supervises Achievement Which Is Under Sanction of the A. A. A.

BY C. G. SINSABAUGH.

MAKES NEW RECORD

Great Stock Car Climbs Mountain on High

MARMON MACHINE SETS NEW RECORD

"Forty-One" Touring Car Climbs Mount Hamilton Lick Observatory.

GOES UP ON HIGH

MARMON COMPLETES DIFFICULT JOUR

Travels From San Franc To Lick Observatory On High Gear

Marmon Car Makes Run on High Speed

Marmon Breaks World Touring Car Records

MARMON MAKES REMARKABLE TRIP

DOES HILL-CLIMBING WITH SHIFT SEALED HIGH GEAR.

HIGH GEAR CONTEST

Marmon Six Cylinder Model, With Sealed Lever Sealed, Makes Remarkable Run

Marmon "41" is so wonderful that its performances make **NEWS** not "publicity"!

From Coast to Coast motorists have read in their home papers of the greatest proofs ever given by any fully equipped touring car.

Look up this extraordinary car at the shows or ask for the new folder—"Proofs by Performance."

Marmon, New Arrival, is Great on Hills

Demonstrator Coasts From Bluff Through Downtown---First Time Accomplished.

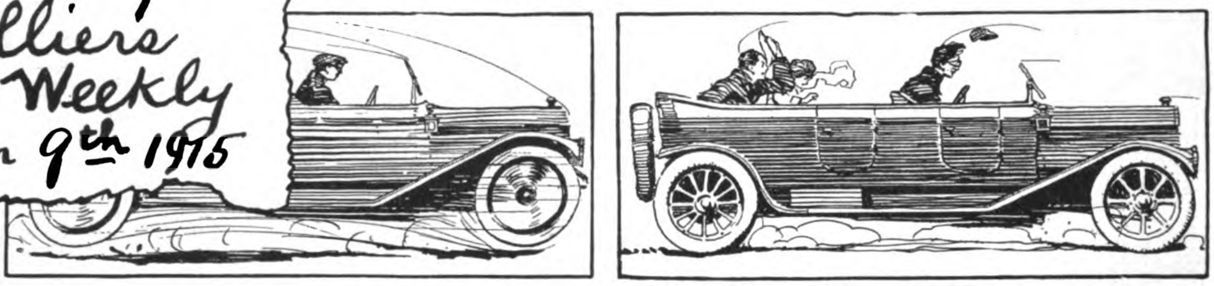
NEW YORK SHOW — JAN. 2-9 — SPACE B-3

NORDYKE & MARMON CO. (*Established 1851*) **INDIANAPOLIS, INDIANA**

"OVER SIXTY YEARS OF SUCCESSFUL MANUFACTURING"

See this Advt. Collier's Weekly Jan 9th 1915

And the Very Next Minute—? ? ? ? ?



A 40 H.P. Engine *versus* What (?) H.P. Brakes?

You *know* your car's *engine* power. But *what* do you know about its *braking* power? Can you swear that your brakes won't fail you in a pinch?

Probably you don't know just how your brakes are lined. Too few drivers do. But for Safety's Sake mark this: if the brake lining on your car gives you less than 100% gripping power, *you flirt with disaster every day you drive.*

Thermoid HYDRAULIC COMPRESSED Brake Lining - 100%

Many automobile owners do not even know that brakes are *lined.* Of those who do, few could tell you what with.

You—and thousands of others—investigate engine power carefully. Axles; tires; extras; lighting and starting systems; all are studied

Every necessity and convenience for putting and keeping the car in *motion* endure your mental acid-test.

Yet most men—perhaps YOU—neglect that all-important factor, brake lining, on which *brake reliability* depends.

Of course it's annoying when your car won't start. But—it is dangerous when it won't *stop!*

* * * * * *

Leading automobile manufacturers protect you to their best ability by equipping with good brake lining. (Thermoid is used on more high-grade cars than all other linings combined.)

But the best brake lining will wear away in time. *Less* than the best loses its friction power long before it is all gone.

You must protect yourself.

When you buy a car, insist that it be Thermoid-equipped. If you have driven your car a time, have the brake lining tested. When it comes to re-lining, demand Thermoid. In that way you can be sure.

* * * * * *

Brake lining, to be 100%, must be brake lining all through. Not merely on the outside. You trust it with your life. Hence, it must be trustworthy to the last.

Thermoid retains its 100% gripping power even until worn *paper-thin.* Hydraulic compression makes it one solid, single substance of uniform density clear through—instead of being loose and stringy (and friction-shy) on the inside, as is ordinary woven brake lining. Cut a piece of each open. You will *see* the difference.

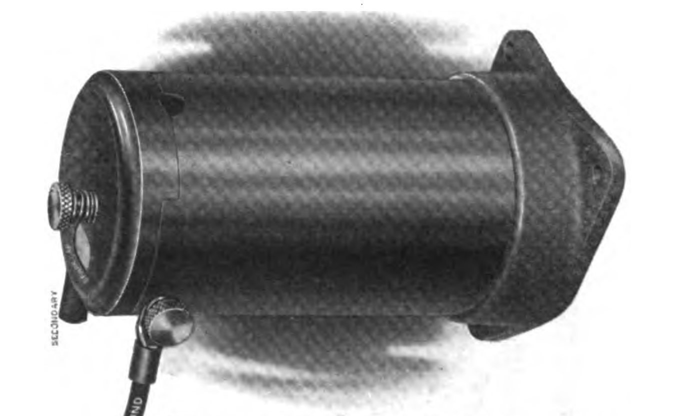
Thermoid cannot be burned out nor destroyed by any heat generated in service. It cannot be affected by oil, water, gasoline, dirt. Its wearing-life is greater. It contains 50% *more* in actual material.

No man knows how many accidents Thermoid might have prevented. We can only urge *you* to guard YOUR safety with Thermoid.

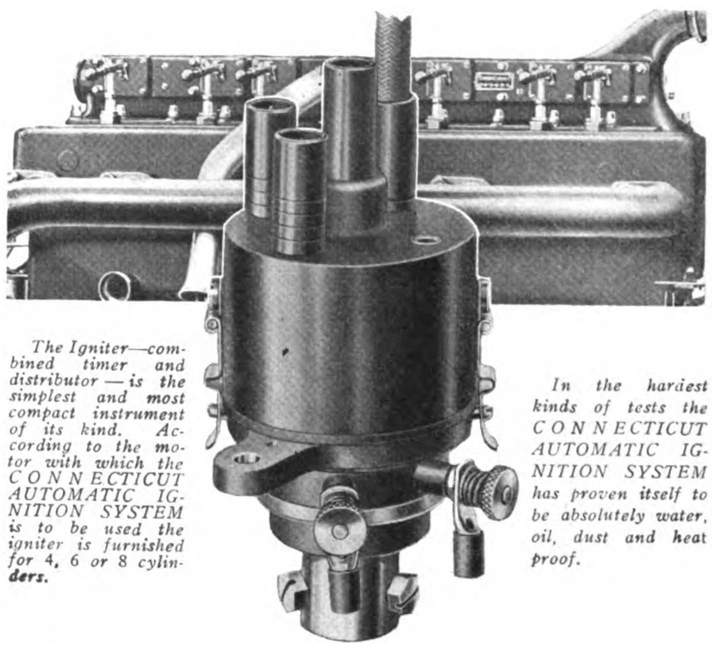
When You Must Stop Your Car, Trust Thermoid.

Thermoid Rubber Company, Trenton, N. J.

Our Guarantee: Thermoid will make good—or we will



This is the transformer coil which carries the primary and secondary windings. While the points in the breaker-box are closed the primary coil is being saturated. When the primary circuit is broken induction sets up a high tension current in the secondary winding.



The Igniter—combined timer and distributor—is the simplest and most compact instrument of its kind. According to the motor with which the CONNECTICUT AUTOMATIC IGNITION SYSTEM is to be used the igniter is furnished for 4, 6 or 8 cylinders.

In the hardest kinds of tests the CONNECTICUT AUTOMATIC IGNITION SYSTEM has proven itself to be absolutely water, oil, dust and heat proof.

The relative superiority of one ignition system over another amounts to very little unless it reveals itself in the performance of the motor, its starting, idling, hill climbing, fast running and in a hundred and one other ways.

The relative superiority of CONNECTICUT AUTOMATIC IGNITION is so conspicuous that the most inexperienced driver feels it at once in the snap and vim it engenders.

any of the others but it tempers its output to meet the needs of your car's motor for every phase of driving.

Connecticut Automatic Ignition includes every advantage of other forms of ignition and is free from the limitations to which other systems are subject.

Little Difference in Cost

So when your car is equipped with this system, and whenever you see the Connecticut Automatic Switch on the dash you can be sure the maker of your car has given you unqualified ignition efficiency.

Why compromise with an inferior equipment when the **difference in cost is so little?**

The ideal adaptation of Connecticut Automatic Ignition is in conjunction with a generator supplying current to a storage battery for lighting and starting.

The Connecticut Automatic Igniter System is fully as great an improvement over the present day magneto as the magneto was over the old-time vibrating coil.

More Effective Spark at High Speed Than Magneto

The Automatic Igniter produces its hottest spark on the slowest speeds whereas the magneto spark is weakest on slow speeds and hottest at high, but even so the Igniter will give a more effective spark on the high speed than the magneto and on medium and low speeds there is no comparison.

Material Saving When Electric Starters Are Used

On cars equipped with electric starters and in fact for any kind of starting, it will be readily appreciated what an advantage the Automatic Igniter with its hot spark will be over any other form of ignition.

When electric starters are used the saving on the Battery will be very material.

Simplest System of Ignition Thus Far Devised

A hot spark is most necessary when throttled down in traffic or otherwise, or when hill climbing with a heavy charge of gas. Under these conditions the difference over the magneto turning over slowly and producing its weakest spark is most noticeable.

It is the simplest system of Ignition thus far devised and can be quickly understood by the average garage man.

No other battery ignition system can approach Connecticut Automatic Ignition in efficiency, for the closed circuit types have the fatal weakness of being unable to protect their ignition source against draining. Mechanical and electrical lag are ever present in relay and instant contact type systems—either or both are fatal to synchronism. This kind of ignition cannot graduate the quality of its sparks to meet conditions of carburetion, starting, slow running, hill climbing, etc.

CONNECTICUT TELEPHONE & ELECTRIC COMPANY, Inc.
MERIDEN, CONN.

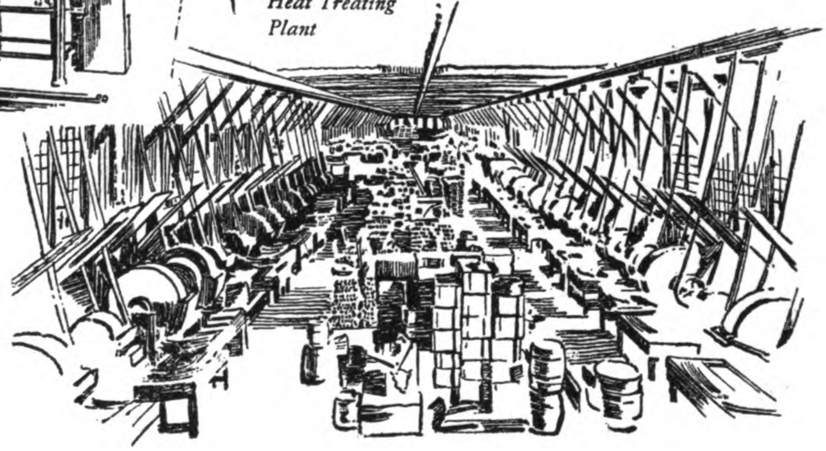
SHELDON

TRADE confidence in a product is the greatest asset any organization can acquire. We have always known this and it is our policy to conserve such an asset. The policy which has been so successful in building up the trade confidence in SHELDON Products as it exists today, will be continued in the future, and with our resources, facilities and organization, we believe that we can not only materially increase the existing prestige of SHELDON Products, but make the name SHELDON a valuable asset to the manufacturer who builds SHELDON Parts into his vehicles and to the dealer who in turn sells the finished vehicles which incorporate one or several of SHELDON Products.

The insurance of quality in SHELDON Products gets its root in the executive branch of our organization.

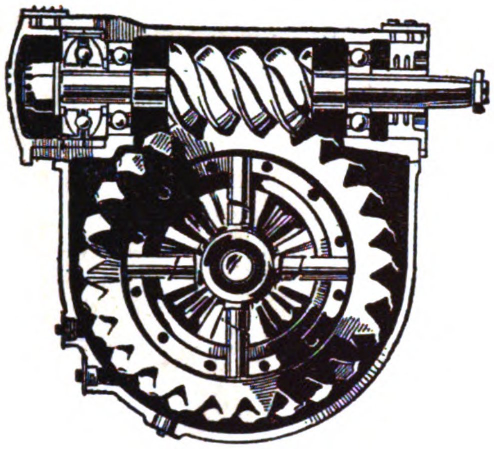
Ours is essentially the product of engineers and the designing, experimental, manufacturing, testing and selling branches of our business are under the direct supervision of a corps of engineering specialists second to none in the world in their skill, experience and practical comprehension of their respective lines.

Corner in Heat Treating Plant



The equipment of the SHELDON AXLE AND SPRING COMPANY'S plants is modern to the last detail.

One Section of Spring Grinding Department



SHEL

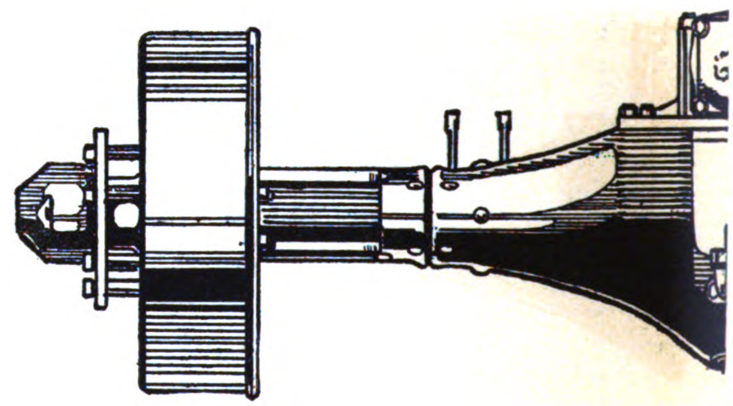
WORM GE

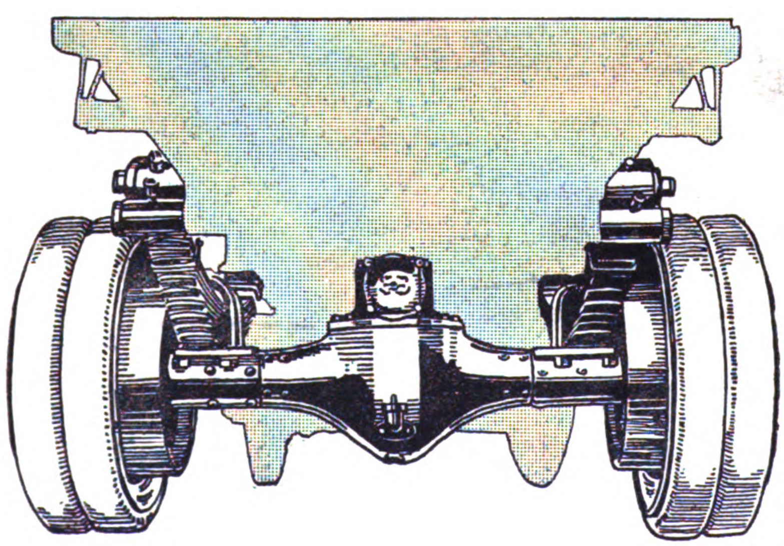
SHELDON'S preference for the worm gear type of axle is based on efficiency of that type of final drive. So thoroughly and so practically have our engineers gone about the design and manufacture of worm gear rear axles that they have produced a type of worm gear drive that transmits to the wheel from 94 to 97% of the power applied.

Efficiency, not manufacturing expediency, dominated our preference for ball bearings to take both radial and thrust loads as they appear in a rear axle.

Our preference for the semi-floating type of axle construction is based upon strength and service alone. We believe, and results have vindicated our judgment, that following the semi-floating principle it is possible to build an axle which makes accessibility an unnecessary factor in the problem.

SHELDON BRAKE AND RADIUS ROD EQUIPMENTS are built to provide the most efficient layout for truck makers who prefer the chain drive to other forms. SHELDON BRAKE AND RADIUS ROD EQUIPMENTS are individual in that they provide for the braking energy to be applied at the rear wheels instead of at the jack shaft. It will be seen readily what an improvement this type of equipment is over the conventional jackshaft brake arrangement.





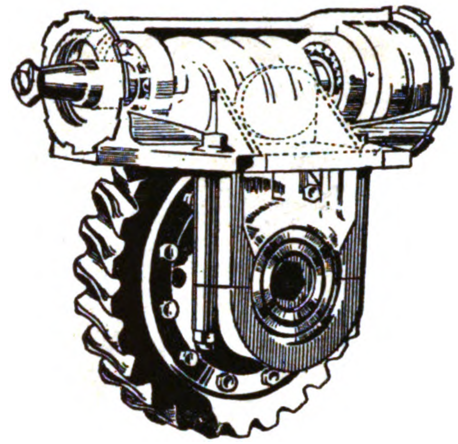
SHELDON TRUCK PARTS are sold only to manufacturers who will agree to use them on trucks with the carrying capacity for which such parts are designed.

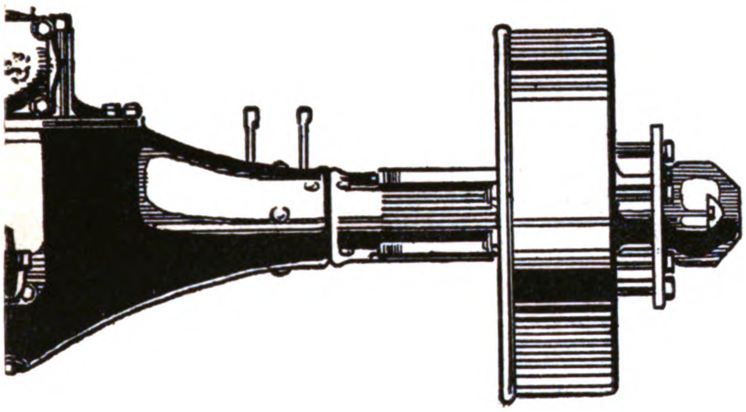
The following clause in our contract and order for automobile axles or other truck parts is a firm foundation upon which the dealer can rely in making statements as to capacity, efficiency and service.

"The buyer agrees to use

,DON

AR AXLES





SHELDON WORM GEAR REAR AXLES are made in all sizes for pleasure cars, and commercial vehicles ranging in capacity from 1500 lbs. upwards of five tons.

SHELDON FRONT AXLES cover the same range of purposes and capacities.

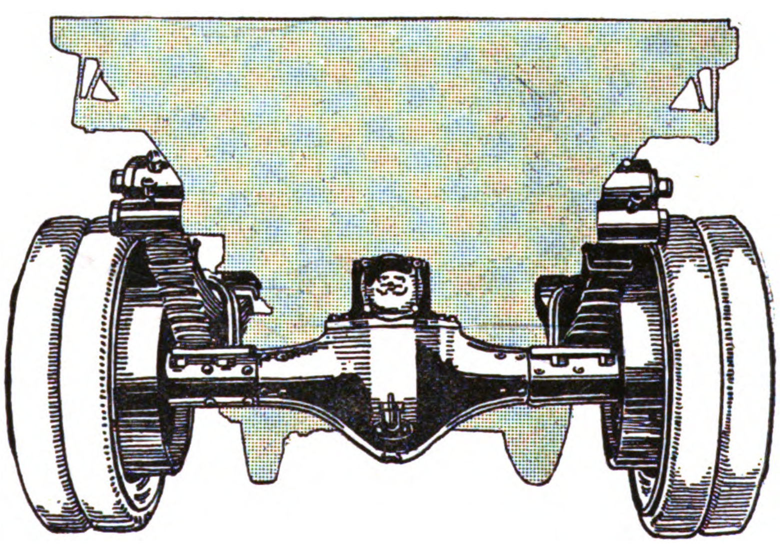
If SHELDON design evidences a preference for certain type of construction, know that no motive other than ultimate efficiency and service governs us.

The selling policy under which SHELDON Products are marketed is one of the fairest and most consistent ever conceived. Primarily it is designed to insure the unqualified satisfaction of motor vehicle manufacturers, dealers and users, and since this policy has been rounded out and put into execution it has proven to be the most economical and effective in every way.

SHELDON Products consist of worm gear rear axles, front axles and springs for trucks and pleasure cars, and brake and radius rod equipments for heavy duty trucks.

While SHELDON WORM GEAR REAR AXLES represent the highest sum of axle essentials and improvements, and while their efficiency is greater than any other known type or make, and while they are designed primarily for American road and load conditions, their finished appearance, clean lines and balance prove beyond question that American Automobile Manufacturers do not have to import parts or equipment when appearance plays any part in the selection of goods.

the material called for in this order on trucks with a carrying capacity as given herein. Any departure from this agreement relieves the seller of all responsibility for breakage, and the seller may at his option discontinue furnishing additional equipment for such trucks."



The result of 22 years' successful experience in building motor cars

THE
HAYNES
America's Greatest "Light Six"

conceded generally as the best car of its type in America today, will be exhibited at the New York and Chicago Automobile Shows.

Three Body Styles

Model 30, America's Greatest "Light Six"—Five-Passenger Touring Car, 121″ Wheelbase, Weight 2950 lbs. $1485

Model 30, The Prettiest Roadster in America.................................. $1485

Model 30, The Haynes "All-Weather" Cabriolet.................................. $1750

In Addition We Offer Model 33

THE KOKOMO "SIX"

a brand new seven-passenger touring car. This model is similar to our Model 30, America's Greatest "Light Six," with the exception that it has six inches more wheelbase, a seven-passenger body, 35x4½" tires and weighs 3050 lbs.

This model will likewise be exhibited at the leading automobile shows and the price will be announced January second at the opening of the New York Show. Deliveries February first.

Detailed specifications and full information concerning unoccupied territory upon request.

THE
HAYNES AUTOMOBILE CO.
3 S. Main Street
KOKOMO, INDIANA

This coupon for the convenience of intending automobile purchasers.

THE HAYNES AUTOMOBILE COMPANY,
3 S. Main Street,
Kokomo, Ind.

Please send me your Catalog describing America's Greatest "Light Six."

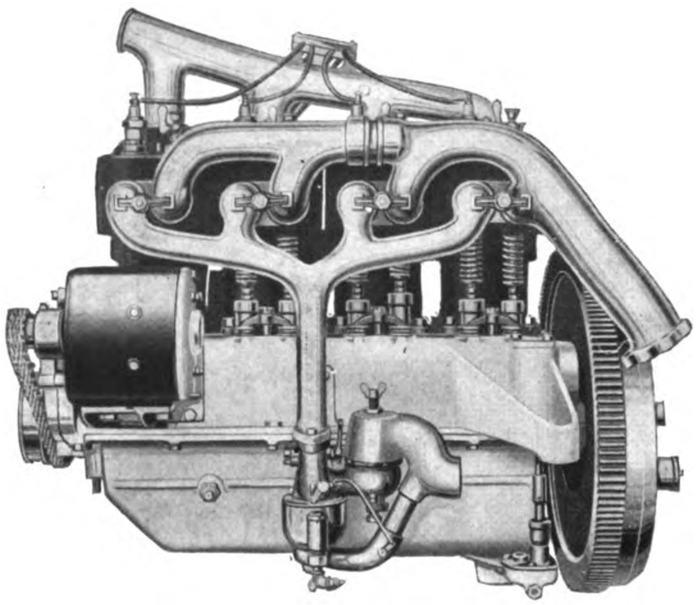
Name..............................

Address..............................

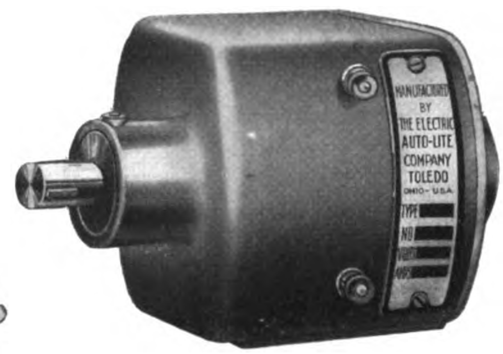
....

I expect to buy a car about..............................

The Perfect Source of Current



The AUTO-LITE G. C. Generator installed on the new Model 80 Overland.



The AUTO-LITE Model G. C. Generator is designed to be driven by either a chain, train of gears or a belt. It runs at 2½ times engine speed, has a maximum output of 14 amperes and produces current at a car speed of less than seven miles per hour.

WHEN you purchase an automobile upon which the AUTO-LITE system is installed, you secure the utmost a car manufacturer can give in electrical equipment. He has spared no expense to provide you with the most perfect source of current that it is possible to build.

The AUTO-LITE generator keeps your battery charged—all the time. At any speed over seven miles per hour it is storing up current for future consumption. It is absolutely automatic in operation and control.

This simple and positive AUTO-LITE method of governing the current output is of great advantage to car owners. It eliminates all troubles from complicated controls.

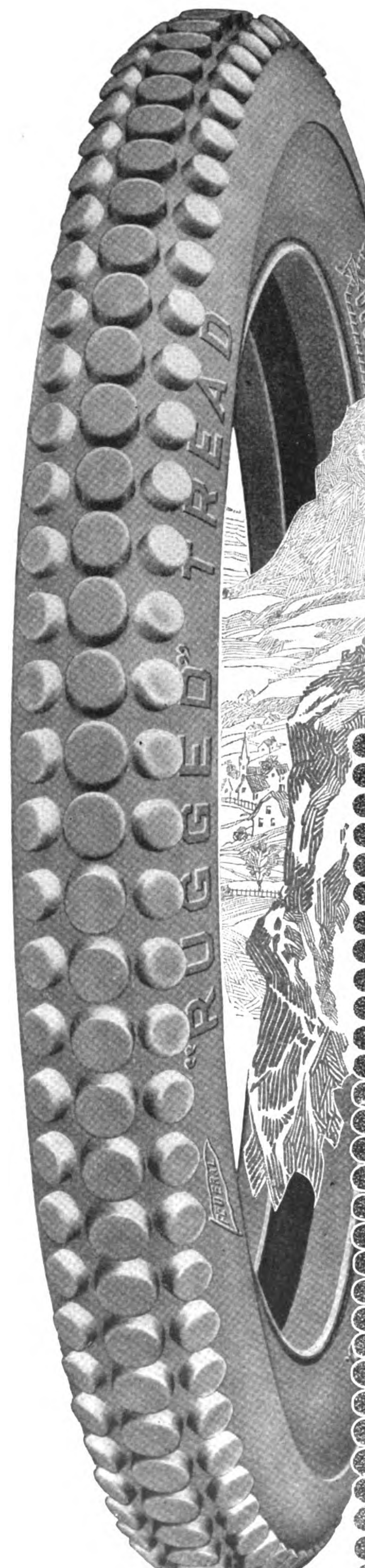
The Electric Auto-Lite Company

Home Office and Factory: Toledo, Ohio

New York Detroit Kansas City San Francisco

Electric Auto-Lite

STARTING — LIGHTING — IGNITION



As Sure-footed as the Mountain Goat!

FOR perfect security in motoring, for assured protection against the dangers of skidding, and for real Extra Service, thousands of motorists pin their faith to

FEDERAL
"RUGGED" TREAD TIRES

The Federal "Rugged" is of much heavier, stronger construction than ordinary non-skid treads and no other is heavier. "Rugged" describes it accurately.

These big, sturdy studs of rubber, broad and thick, won't let your car skid. And from the path of the wheel they deflect many an object that would cut or puncture the tire.

Double-Cable-Base

The exclusive Federal Double-Cable-Base construction positively eliminates rim-cutting, side-wall blowouts just above the rim, tube pinching, and the danger of a tire slipping off the rim.

Federal "Rugged" Tread Casings have been materially reduced in price but the Quality remains absolutely unchanged.

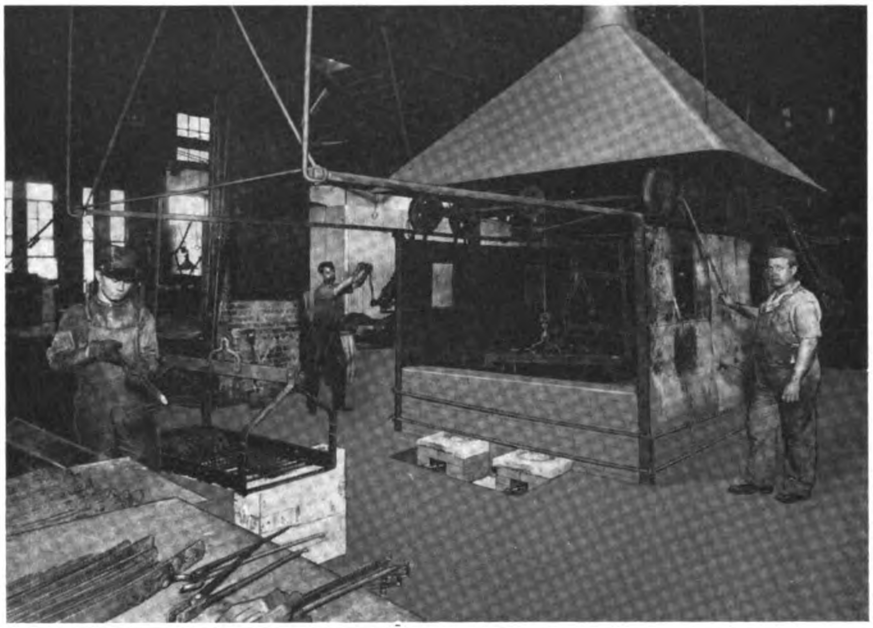
Improved methods of manufacture have lowered our production costs on these famous non-skid casings, and we have turned this saving to the benefit of the motoring public.

Begin using Federal Tires now and take advantage of their Extra Service.

FEDERAL RUBBER MFG. CO., Milwaukee

Branches, Distributors and Service Stations in all Principal Cities. **Dealers Everywhere.**

The Strength and Riding Quality of Your Automobile Springs Depend Upon Their Tempering



A View of Chemical Bath in Our Plant

A Uniform Tempering Heat

The old way of tempering a spring was to put it back into the furnace after it had been quenched in oil, which was at a cherry red heat, and leave it until the oil had burned off. Most quenching oils have a flash point between 120° C. and 180° C., and the burning off of the oil only indicated that this temperature had been reached. If the furnace happened to be hotter at one end than the other, that would make one end of the plate softer. On the whole it was all a matter of guess work.

Another way of tempering a spring is to have a special furnace in which the temperature can be regulated for a black heat. However, these furnaces are large and it is impossible to maintain a uniform heat throughout the entire chamber.

The most satisfactory way is the use of a salt bath, as shown in the photograph. This consists of a cast iron tank which contains a mixture of alkali salts. These salts melt at about 300° C. and can be heated to 650° C. The temperature is uniform throughout and evenly tempers the steel. For this method the plates of the spring are placed in a metal basket and spaced so that they do not touch each other at any point. The basket is then lowered into the molten hot salt for a given length of time, depending upon the temper required, thus producing an even temper throughout every plate.

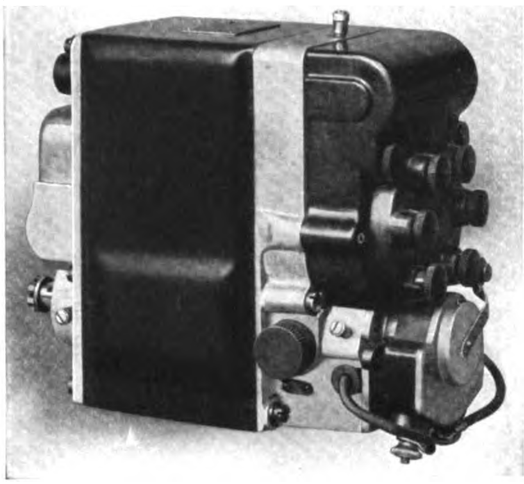
E. C. Arndt
Metallurgical Engineer
THE CLEVELAND-CANTON SPRING CO.

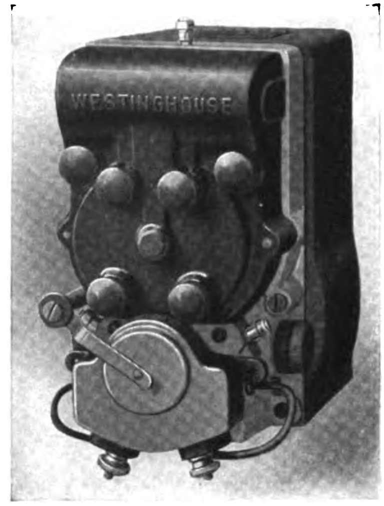
Cleveland-Canton Chrome-Vanadium Automobile Springs are Uniformly Tempered

Best Grade—
"Chrome-Vanadium"

Next Best—
"Special Analysis"

CLEVELAND-CANTON SPRING COMPANY
CANTON - - OHIO





Westinghouse Ignition and Lighting Generators

38 High Grade Cars now use Westinghouse Electric Systems.

26 of these cars are equipped with

Westinghouse Electric Ignition

Here is the list; the stars indicate those with Westinghouse Ignition:

*Allen
*American La France
Amplex
*Atterbury
*Auburn
*Austin
*Briggs-Detroiter
*Glide
*Haliday
*Case
Chadwick
*Crawford
*Davis
*Dorris
FIAT
Hupmobile
*Kissel
*Kline
*Lauth-Juergens
*Lenox
*Lexington-Howard
Locomobile
*McFarlan
*Marion
*Moreland
Norwalk
*Ohio
*Pathfinder
Pierce-Arrow
Pilot
Pullman
Richard
*Seagrave
Singer
*Speedwell
Standard
*Stewart
*Vulcan

Do not fail to see our exhibits

New York: January 2nd to 9th, Grand Central Palace, Spaces 89 to 92 and 97 to 100. Chicago: January 23rd to 30th, Coliseum, Spaces 85 to 88.

Westinghouse Electric & Manufacturing Co.

Automobile Equipment Division

Sales Offices in all Large American Cities

East Pittsburgh, Pennsylvania

MERCER

THE PRIDE OF AMERICA

Performances speak more than words. Compare the records below, and judge Mercer merit for yourself.

THE WORLD'S GREATEST ROAD RACES

(From MoToR's Historical Chart)

Showing Average Speed of Winners

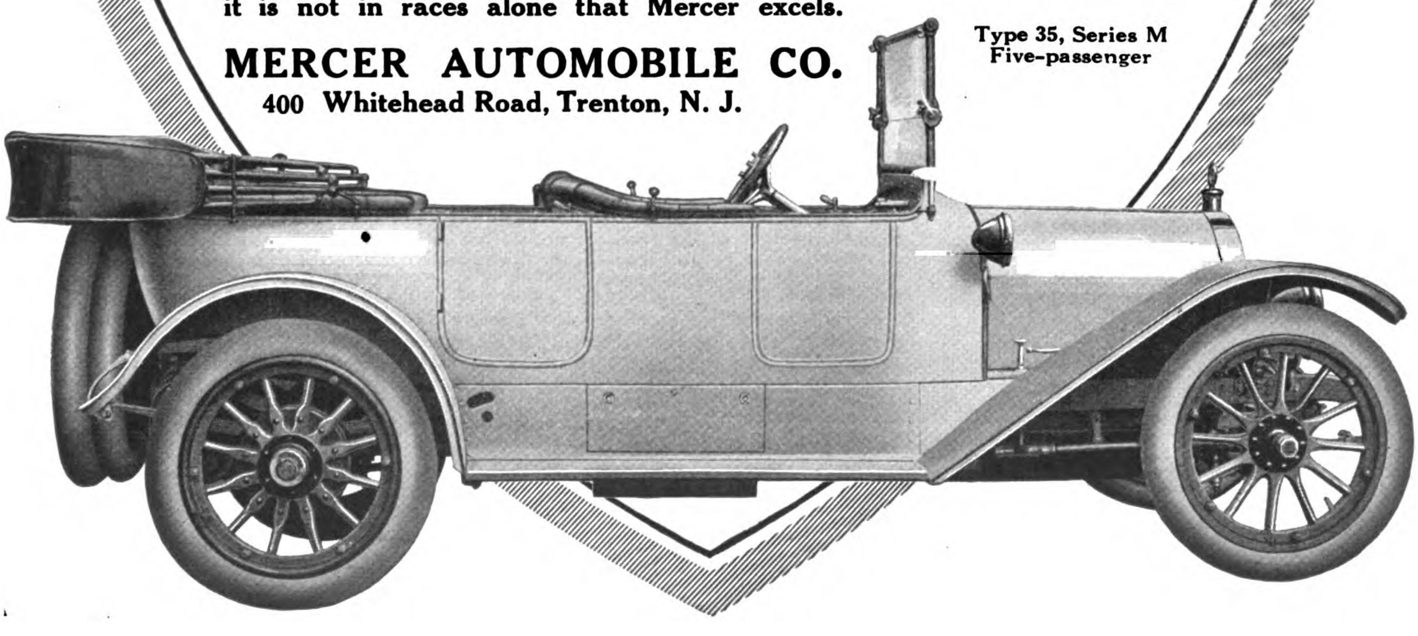
DATE	RACE	DISTANCE	DRIVER	CAR	AVERAGE SPEED M. P. H.
1904	Vanderbilt Cup	284.4 miles	Heath	Panhard	52.25
1905	Vanderbilt Cup	283.3 miles	Hemery	Darracq	62.18
1906	Vanderbilt Cup	297.1 miles	Wagner	Darracq	61.43
1906	Grand Prix (France)	619.08 miles	Szisz	Renault	62.75
1907	Grand Prix (France)	769.88 km.	Nazzaro	Fiat	70.6
1908	Vanderbilt Cup	258 miles	Robertson	Locomobile	64.3
1908	Grand Prize (America)	402.08 miles	Wagner	Fiat	65.1
1908	Grand Prix (France)	769.88 km.	Lautenschlager	Mercedes	69
1908	Florio Cup	518 km.	Nazzaro	Fiat	74.15
1909	Fairmount Park	200 miles	Robertson	Simplex	55.
1909	Vanderbilt Cup	278.08 miles	Grant	Alco	62.77
1910	Elgin	305.03 miles	Mulford	Lozier	62.5
1910	Vanderbilt Cup	278.88 miles	Grant	Alco	65.18
1910	Fairmount Park	202.5 miles	Zengle	Chadwick	58.9
1910	Grand Prize (America)	415.2 miles	Bruce-Brown	Benz	70.55
1910	Santa Monica	202.008 miles	Tetzlaff	Lozier	71.3
1911	Grand Prix (France)	405 miles	Hemery	Fiat	57.
1911	Elgin	305.26 miles	Zengle	National	66.42
1911	**Elgin (Stock 300 Cu. In.)**	**170 miles**	**Hughes**	**Mercer**	**64.61**
1911	Fairmount Park	202 miles	Bergdoll	Benz	61.25
1911	**Fairmount Park (300 Cu. In. Div.)**	**202 miles**	**Hughes**	**Mercer**	**58.**
1911	Grand Prize (America)	411.36 miles	Bruce-Brown	Fiat	74.45
1911	Vanderbilt	291.38 miles	Mulford	Lozier	74.07
1911	Santa Monica	202 miles	Herrick	National	74.93
1911	**Savannah Trophy**	**222.82 miles**	**Hughes**	**Mercer**	**68.35**
1912	Santa Monica	303.012 miles	Tetzlaff	Fiat	78.5
1912	**Santa Monica (300 Cu. In. Div.)**	**150.506 miles**	**De Palma**	**Mercer**	**69.54**
1912	Elgin	305.04 miles	De Palma	Mercedes	68.9
1912	**Elgin (Aurora Trophy)**	**305.04 miles**	**Hughes**	**Mercer**	**65.05**
1912	Grand Prix (France)	956.8 miles	Boillot	Peugeot	68.45
1912	Coupe de la Sarthe	402.1 miles	Goux	Peugeot	72.7
1912	**Tacoma (300 Cu. In. Div.)**	**150 miles**	**Pullen**	**Mercer**	**58.1**
1912	Grand Prize (America)	409.9 miles	Bragg	Fiat	68.4
1912	Vanderbilt	299.54 miles	De Palma	Mercedes	68.97
1913	Graud Prix (France)	569.68 miles	Boillot	Peugeot	72.43
1913	Le Mans Grand Prix	336 miles	Bablot	Delage	76.8
1913	Santa Monica	445.2 miles	Cooper	Stutz	73.77
1913	Elgin	301.68 miles	Anderson	Stutz	71.55
1913	**Elgin (300 Cu. In. Div.)**	**301.68 miles**	**De Palma**	**Mercer**	**66.8**
1913	Corona	301.81 miles	Cooper	Stutz	74.63
1914	Vanderbilt Cup	294.035 miles	De Palma	Mercedes	75.6
1914	**Grand Prize (America)**	**403.248 miles**	**Pullen**	**Mercer**	**77.22**
1914	Grand Prix (France)	467.6 miles	Lautenschlager	Mercedes	65.5
1914	Elgin	301.84 miles	De Palma	Mercedes	73.53
1914	**CORONA**	**301 MILES**	**PULLEN**	**MERCER**	**87.76**

Visit our exhibit at the New York, Chicago, and other Automobile Shows. You will find it is not in races alone that Mercer excels.

MERCER AUTOMOBILE CO.

400 Whitehead Road, Trenton, N. J.

Type 35, Series M
Five-passenger



Thoroughness

We have at times lost business because of our thoroughness, but subsequent evidence has proven that we are not old fashioned, if a little arbitrary. Here is an instance in point. There is about as much sense to the trunnion method of supporting a radiator as there would be in carrying a baby by the ears. This construction places the burden of resisting all of the strain a radiator can be subjected to upon the thin metal sides of its case. In a short time the weight of the radiator multiplied by the jars and jolts of rough going causes the case to pull loose from the tubes or the tubes themselves give way.

This type of construction is entirely at the mercy of the weaving there always is in the side members of a chassis frame. Good engineers know that a radiator which is supported in saddle made of channel steel and bolted to each side frame member is the only correct method of radiator suspension.

In carrying out our policy of thoroughness we will not build radiators for any manufacturer who uses any other method of attachment.

MAYO RADIATOR CO.

NEW HAVEN, CONN.

Supreme Auto Oil

Light **Medium** **Heavy**

High Viscosity **Low Cold Test**

The Ideal Cold Weather Oil

Burns cleanly—leaving a minimum carbon deposit

Does Not Congeal—Flows Freely at Zero

SUPREME AUTO OIL is especially manufactured to supply the demand for a better cold weather oil. Refined by our special process under the careful supervision of expert chemists, it will conform to the requirements of any lubricating system and economically minimize mechanical friction.

THERE IS MORE POWER IN THAT GOOD GULF GASOLINE

We have an attractive proposition for Dealers and Garages. Write our nearest office

GULF REFINING COMPANY

General Sales Offices: PITTSBURGH, PA., U. S. A.

DISTRICT SALES OFFICES:

New York **Philadelphia** **Boston** **Atlanta**
Tampa **New Orleans** **Houston**

Go to the Automobile Shows determined to see the

Herff-Brooks

Four *and* Six

YOU dealers who are looking for cars that will sell freely because they are big values, will be well repaid by studying the show exhibits of Herff-Brooks cars.

Run down the specifications point by point, from the powerful motors to the well-built rear axles and the complete equipment.

Notice the number of crank-shaft bearings, the power, the high-grade Stromberg carburetor and best Bosch ignition. Observe the Timken and New Departure bearings, the electric installation, the high-grade accessories, the complete equipment.

Frankly, such cars would be impossible at the prices if we did not build them complete in one huge factory where, for special reasons, overhead costs are very low. No car in the world is more completely manufactured in one plant than is the Herff-Brooks.

There will be much to see at the shows, but the one thing no dealer should miss is the Herff-Brooks exhibit.

Look at these specifications

Six

$1375

50 Horsepower
Six Cylinders, 4-in. x 4½-in.
Highest Grade Bosch High Tension Magneto DU System
Honeycomb Radiator
Stewart Speedometer
34-in. x 4-in. Goodyear No-Rim-Cut Tires
Stromberg Carburetor
Timken and New Departure Bearings
18-in. Folding Down Steering Wheel
124-in. Wheelbase
Seven Crankshaft Bearings
One Man Top
Turkish Upholstering
Electric Starting and Lighting
Demountable Rims, Extra Rim
Complete Equipment

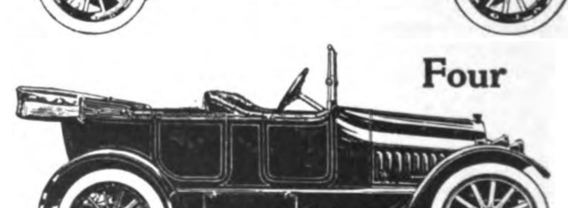
Four

$1100

40 Horsepower
Four Cylinders, 4½-in. x 5-in.
Five Crankshaft Bearings
Drop Down Steering Wheel
One Man Top
118-inch Wheelbase
34-in. x 4-in. Goodyear No-Rim-Cut Tires
Electric Lighting and Starting
Stewart Speedometer
Honeycomb Radiator
Demountable Rims, Extra Rim
Timken and New Departure Bearings.
Turkish Upholstery
Stromberg Carburetor
Bosch High Tension Magneto DU System
Complete Equipment

Make our booth your headquarters. Have your mail sent in our care both at New York and Chicago.

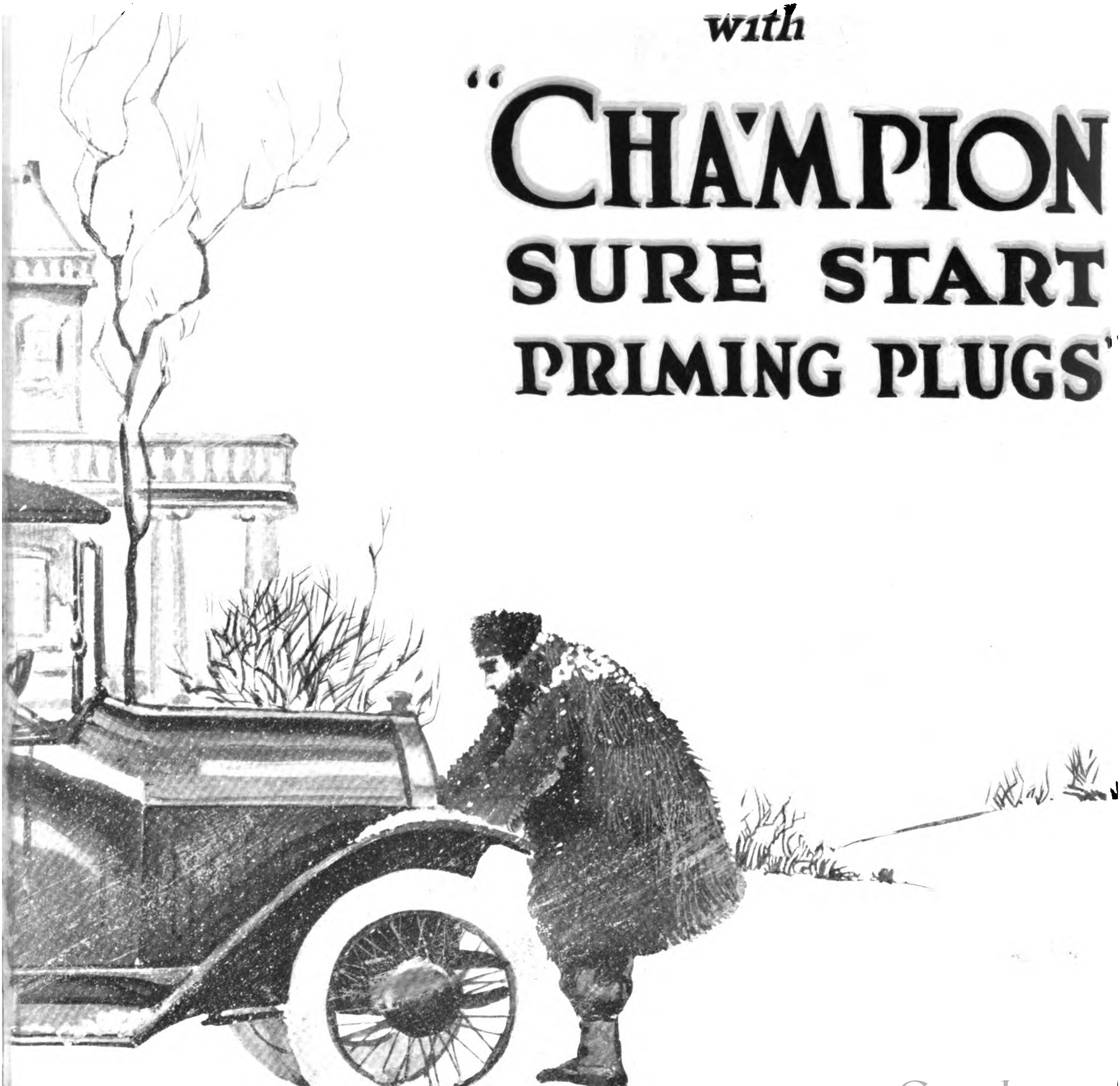
Space C-20 Third floor, New York
Space 15 Coliseum Basement, Chicago



Write for Catalogue A. E

Herff-Brooks Corporation

Indianapolis, Indiana



THE CHAMPION PRIM

VITALIZES COLD M

Start Your Motor on the First Quarter Turn

An important new feature on the 1915 Champion Priming Plug. A key lock is supplied with each plug, right on the needle valve—always in place, ready for use.

With this key lock it is the simplest thing in the world to open the needle valve, prime, and then close the valve so tightly that there is absolutely no chance for loss of compression.

Champion Priming Plugs are not an experiment. They are not a freakish idea, placed upon the market one year, and then—never again. Champion Priming Plugs have been on the market for the past four years. They have been a success from the start.

Champion Priming Plugs are **built with the same care and manufacturing methods which are used in the manufacture of all Champion Plugs.** In fact, **the Champion Priming Plug is simply a tried and proven Champion Spark Plug which has the additional feature of a truly efficient priming device.**

HOW TO OPERATE. **Simply turn the needle valve in the Champion Priming Plug, inject a few drops of gasoline which flows directly to the sparking point. Tighten the valve.** Touch the starting button, or give a pull on the crank and "away she goes." You don't even have to remove your gloves, or use a wrench. The key lock on the needle valve makes this unnecessary.

CAUTION. Beware of all Petcock type priming plugs with leaky petcocks.

TOLEDO MADE FOR THE

NG CUP PLUG

OTORS

A Few Cold Weather Don'ts

DON'T crank your head off

DON'T exhaust your storage batteries trying to start.

DON'T laboriously remove spark plugs in order to prime your motor.

DON'T depend on petcocks in your motor. Gasoline must be brought direct to the sparking points.

DON'T send for mechanician to start your car.

DON'T be towed home on account of inability to start.

DON'T forget when you are buying a set of priming plugs that you still want ignition. Insist upon the CHAMPION Priming Plug, the only plug made with a needle attachment for priming. Easiest to operate. Needle valve never opens from vibration. Absolutely no possibility of loss of compression.

CHAMPION Priming Plugs are made by the largest manufacturers of spark plugs in the world, the makers of CHAMPION Spark Plugs, which are the factory equipment of over 75 per cent. of all the automobiles made in this country. Here is made every piece that enters into the construction of CHAMPION Spark Plugs—every nut, every center wire, every bushing, every shell, every gasket, every part is carefully wrought from the raw material. Even our porcelain cores are made in our own porcelain factory.

STRONGEST GUARANTEE EVER MADE: Complete satisfaction to the user, or free replacement, repair, or your money back.

Insist upon CHAMPION—the needle valve type of Priming Plug. Made in all sizes to fit any motor.

WHOLE WORLD'S TRADE

Everlastingly Good

MOTOR NECESSITIES

Here are a few of the new "Everlastingly Good" Motor Necessities to be introduced at the Automobile Shows.

Each item produced by us represents the highest mechanical skill in production and has been carefully designed to efficiently fill the place for which it is designed.

This page offers no space even for a small portion of our entire line and few of the details of design, workmanship and finish can be brought out. "Everlastingly Good" motor necessities insure satisfaction to both user and dealer. Send for 1915 catalog and dealers' discount sheet. It represents the most up-to-date and complete line of accessories produced.

Red Head

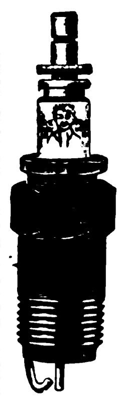
1915 SPARK PLUGS

REGULAR—This Plug is the proven master of any motor up to 40 H. P. Five years on the market; millions in successful use. It has a straight-sided porcelain that "laughs at the heat"—guaranteed not to crack from the heat of the motor.

Highest grade imported Meteor wire sparking points. The cap and center electrode are integral with the porcelain, and the core can be removed without unscrewing plug from the cylinder. All joints are absolutely gas-tight—proof against loss of compression.

They are made in all threads—porcelain or mica. The F. O. R. M. S. plug is specially designed for the engines of the Ford, Overland, Reo, Maxwell and Studebaker. Price $.75 each

REGULAR ⅞ Inch



F.O.R.M.S. ½ Inch

PRIMING—Has big straight-sided porcelain — guaranteed not to crack from the heat of the motor and almost indestructible; big steel bushing; long body shell — overcomes the depression in the cylinder head and the nut; big priming cup; heavy meteor wire firing points; oil drip bend; lower (petticoat) end of the porcelain with two insulating surfaces; expansive firing chamber; threaded stem sunk and baked into the porcelain — cannot be twisted or broken off when tightening the terminal.

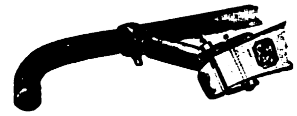
Price $1.25

PRIMING

BIG BOY — For high duty motors—where there is also an intense spark — where the regular plug is unequal to the strain—use the RED HEAD Big Boy. Has a big indestructible porcelain, a big steel bushing with wide gripping surfaces, a heavy non-burning nickel steel center electrode; three heavy nickel steel firing points, bent to provide a flow for the oil and flattened at the ends to insure a big spark. Carries an unlimited guarantee.

Price $1.00

BIG BOY



The "E. G." Frameline Bumper

This neat bumper is designed especially to equip Cadillac, Overland, Oakland, Winton, Studebaker, Cole, Mitchell, Buick, Hupmobile, Chalmers, National, Jeffery, Peerless and other cars. It is clamped to the top of the frame by an adjustable clip and yoke.

Price, finished in nickel.......... $9.00

"E. G." Adjustable Channel Bumper

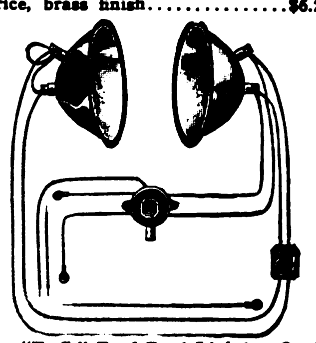
This bumper is designed to fit any car with a channel frame and is attached with forged hook bolts clamping the flanges of the frame. Fitted with stiff steel spiral springs concealed in telescopic tubes, to afford shock absorption.

Price, complete.................. $7.85

"E. G." Ford Clamp-on Bumper

This is the neatest, lightest and strongest Ford bumper on the market. It clamps on; no drilling. Original design which gives the Ford the appearance of a car with a drop frame.

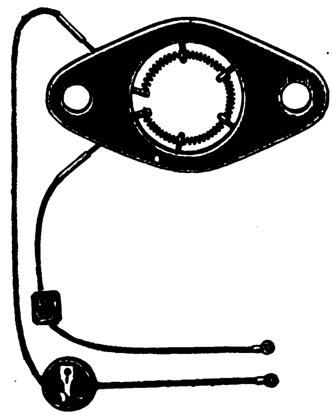
Price, brass finish............... $6.25



The "E. G." Ford Dual Lighting Outfit

Headlights connected to the magneto give illumination only when the car is running. This outfit provides for an additional 2 c. p. 3 V. bulb in each reflector which connect with dry cells and give light when the car is standing. Can also be wired up for electric tail light.

Outfit, complete, with 5-pt. switch, $5.60 to $6.15, according to size and finish.



The "E. G." Ford Vaporizer

This device heats the charge as it is sucked out of the carburetor causing it to vaporize and rise through the manifold into the cylinders. While simple and inexpensive, it is positive and efficient in its operation and insures a quick start in cold weather. Can be installed in a few minutes by anyone. Furnished complete, with wires cut to length, terminals and switch attached.

Price, ready to install............ $2.00

The "E. G." Lighting Control and Dimming Switch

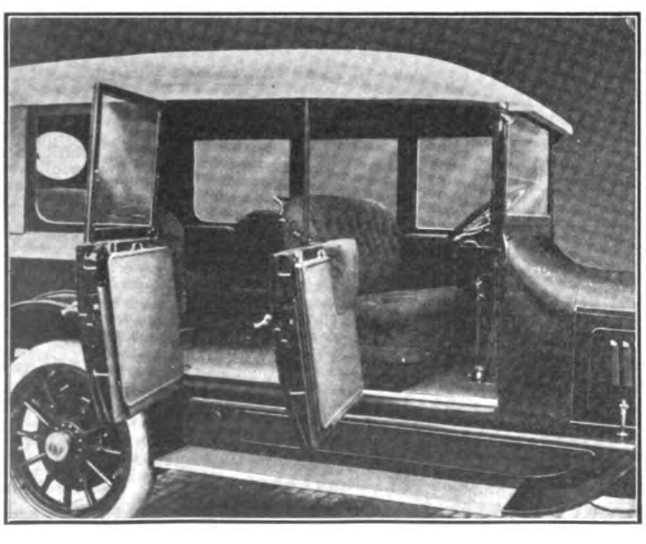
With this switch you can dim the lights without stopping or leaving the car. It is the only logical solution for overcoming the glare of the headlights. With each switch wiring diagrams are included, giving three different methods of wiring. The case and cover is of hard rubber and metal parts are brass stampings.

Price, complete $1.50
(Special design for Fords.)

Emil Grossman M'f'g Co. Inc.

Bush Terminal, Model Factory No. 20, Brooklyn (New York City)

Will Exhibit at the Automobile Show, Grand Central Palace, New York, January 2d to 9th. Spaces D117, 118, 119 — Fourth Floor



The Springfield Metal Body Exhibit at the New York Automobile Show, January 2nd-9th, is one no dealer can afford to miss.

Your purpose in attending the Show, is one of inspection, comparison and formulation of ideas as to the relative values offered.

Our purpose in exhibiting the various forms of Springfield Convertible and Demi-Convertible Bodies is to convince you of the practical merits of Springfield Bodies and the opportunity they offer you, not only to make money, but to ***enable you to sell your customers a car infinitely better adapted to their requirements and pockets as well.***

SPRINGFIELD META

New York Branch: 1737 Broadway


FEDDERS RADIATORS
f
ACHIEV
Quantity at no Sa
Fedders Quality is the result of fifteen years of specialized experience.
Fedders design as it stands today is not urged on automobile manufacturers so much as it is recommended as a criterion of style, efficiency and construction to guide them toward perfection in one of the most important details of their cars' equipment.


FEDDERS
RADIATORS
EMENT
crifice to Quality
Fedders facilities, both in shop equipment and in organization, have been developed to such a state of perfection that the automobile industry finds radiator quality reconciled with quantity production—a circumstance which works to the greatest good of the greatest number.
FEDDERS MANUFACTURING COMPANY Buffalo, New York

Record Economy Test
29 Miles on One Gallon of Gasoline
56.9 Ton Miles
Overland Model 80

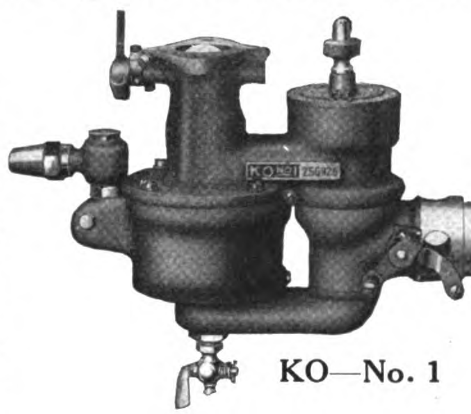
FIVE GREAT World Records

The new Stromberg Carburetors have been doing things. They have been making world records in tests which have been officially observed by such men as F. E. Edwards, technical representative of the contest board of the American Automobile Association. Each and every one of the five great records shown in this advertisement is enough to convince you that these new Stromberg Carburetors are the best on the market.

There are records in Gasoline Economy, Power, Acceleration, Flexibility. Each telling and proving conclusively of the wonderful performance of the new Stromberg Carburetors. Read the reports:

Jeffery Six

In an official test this car, which with five passengers, weighed 4100 pounds, equipped with a new Stromberg Carburetor, made the remarkable record of 28.7 miles on 1 gal. of gasoline, or 58.8 ton miles.



KO—No. 1

Overland 80

Carrying five passengers, total weight 3930 lbs., this car equipped with a new Stromberg Carburetor in an official A. A. A. test, with 1 gallon of gasoline, went 29 miles or 56.9 ton miles.

Speed With Marmon Model 41

The wonderful speed test made on the Marmon Model 41 at Indianapolis was made possible by the fact that the car was Stromberg equipped. During this test the car, with top and wind-shield up, carrying five passengers, made the remarkable record of *62.89 miles in sixty minutes* on Gasoline.

Record Hill Climbing Test
Haynes Light Six

Record Speed Test
62.8 Miles
in 60 Minutes
Constant Running
Marmon Small Six

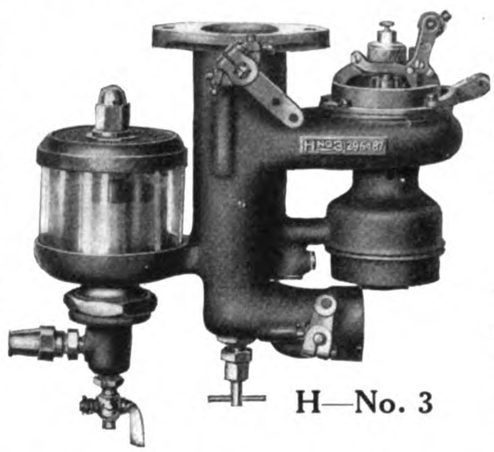
Demand More of Your New Car

You have no idea what a difference the equipping of your car with a new STROMBERG CARBURETOR will make. It will produce a great saving in your gasoline bills, for you will get more and better miles for each gallon you use. This carburetor will insure you a quick get-a-way giving you all the power that any one can desire without sacrificing in the least any of the other requisites of a perfect instrument.

All these tests were made when the temperature was low—in cold weather—under most unfavorable conditions. They indicate what one of the new Stromberg Carburetors will do on your car.

Haynes Light Six

Equipped with a new model Stromberg demonstrated its power in the Pittsburg hill district. It climbed hills on high without overheating. With car and passengers weighing 4390 lbs. running from 2 M. P. H. in high gear it was speeded up to 42 M. P. H. in 200 feet.



H—No. 3

Cole Touring Car

Four cylinder stock car carrying seven passengers, which with the car weighing 4390 lbs. and being equipped with a new Stromberg Carburetor, traveled 24.135 miles on one gallon of gasoline. In thirty minutes speed test this car averaged 55.63 miles per hour.

See This Wonderful Carburetor at Grand Central Palace New York, Auto Show January 2nd to 9th, 1915

We'll have a full display of the new Stromberg Models at the New York Auto Show—to be held in the Grand Central Palace from January 2nd to 9th, 1915. Drop in and we'll tell you which Model Stromberg will get most out of your car. If you don't come to the Show, send for literature.

Stromberg Motor Devices Co.

64-66-68 East 25th Street

CHICAGO, ILL.

Record
Economy Test
28 7/10 Miles on One
Gallon of Gasoline
58.8 Ton Miles
Jeffery Six

Brush Holder Assembly

Granting that you fully appreciate the value of a single unit electric starting and lighting system that always can be depended upon to furnish ample power for both starting and lighting—that positively and automatically prevents you from ever stalling your motor—that is small and compact, so much so that it weighs only 45 pounds—

Granting that you are cognizant of the advantage of having such a personification of efficiency and dependability as a part of your motor car, think now of this further all-important feature.

This is the plus value

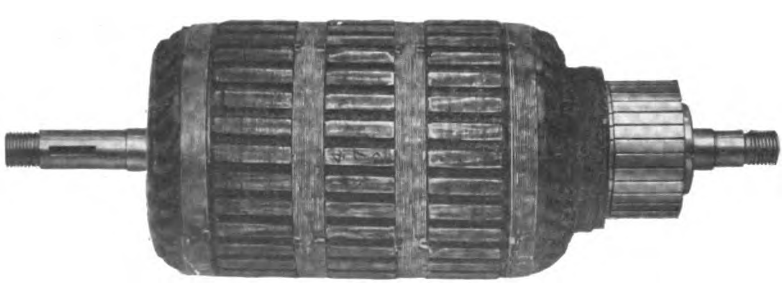
The Dyneto single unit electric starting and lighting system will more than likely outlast any car upon which it is installed.

Because of the unique design which provides for the elimination of all complications and wearing parts such as cut-outs, relays, solenoids, clutches, gears, etc.—because of the use of only the very finest and most expensive materials in its construction—because of the utmost care in the machining and manufacturing of each and every part that goes to make up the finished unit—because of the insistence of this care in manufacture by most exhaustive tests and inspection of each and every operation, singly and in assembly—

The Dyneto single unit electric starting and lighting system will stand up and perform to its fullest efficiency long after most other parts of the car upon which it is installed have required repair or replacement. About the only parts of the Dyneto that will show any wear at all are the brushes and we have made any number of tests which indicate that those brushes will stand up for as much as 100,000 miles.

Almost nothing to wear

Armature Assembly



Quality Always Present

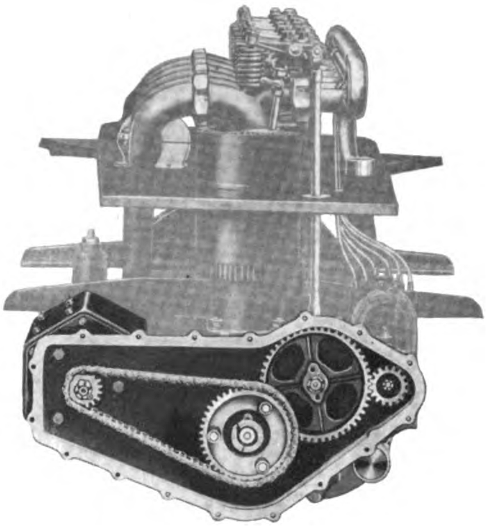
Just as prima facie evidence of the truth of these past statements, herewith are a few details.

Wherever it is possible to use stampings instead of cheaper castings, stampings are to be found in the Dyneto. The shaft is made of the finest and most expensive alloy steel specially heat treated, when a cheaper and inferior substitute might easily be used without detection till months after the system had been sold. The commutator segments not only are of special design to prevent wear, but they are made under a special process to insure hardness. In addition to this the copper used is the purest and highest grade obtainable. Dyneto brushes not only cost more as bought by us in bulk, but each brush is carefully examined and tested before it is assembled. And to insure full efficiency out of this exceptionally high value material the tools and dies with which these materials are machined are specially designed and specially produced.

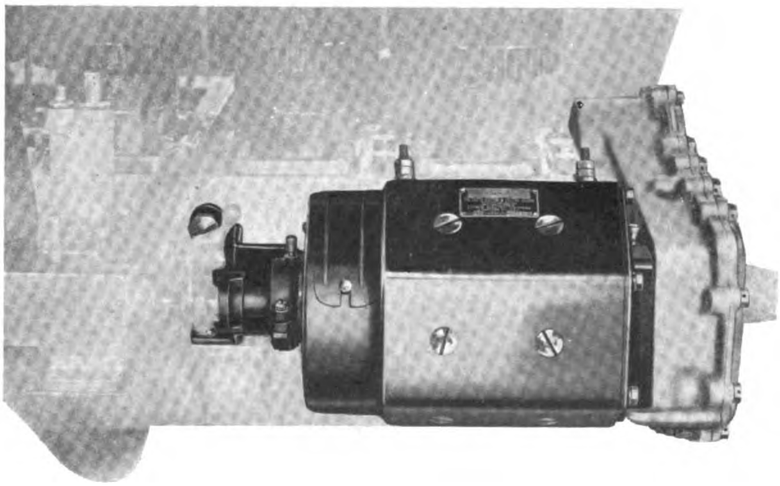
Basic Design Unique

And with this supremacy of design, materials, and construction which assures maximum efficiency, maximum dependability, maximum durability, the Dyneto is comparatively lower in price than most other starting and lighting systems on the market.

This condition is the result of our design purely. The trouble breeding complications of all other systems not only emphasize the superiority of the Dyneto but by their costliness they place the cost of the other systems comparatively above the cost of the Dyneto.



Franklin Application —End View

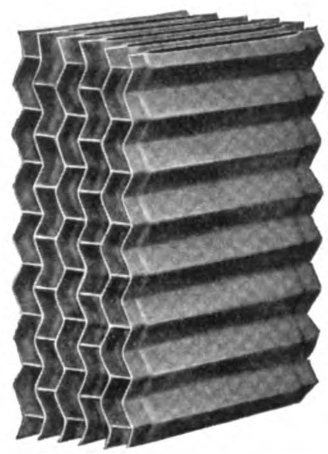


Franklin Application —Side View

MADE IN DETROIT USA

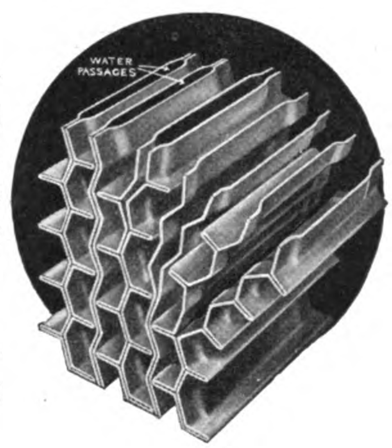
NATIONAL RADIATORS

MADE IN DETROIT USA



THE NEW NATIONAL RADIATOR upsets all precedents in radiator construction. Study the illustration for a moment and you will see why the NATIONAL RADIATOR gives greater strength, bigger cooling surface and uses less water than any other.

An Entirely New Principle of Construction



Made of continuous bands of brass, not built up cell by cell but made as a unit. Radiator leakage is not caused by rust, neither do the tubes burst from over-pressure. The continuous racking strains and jars of the road are alone responsible and surely in time cause the ordinary tubes to pull apart.

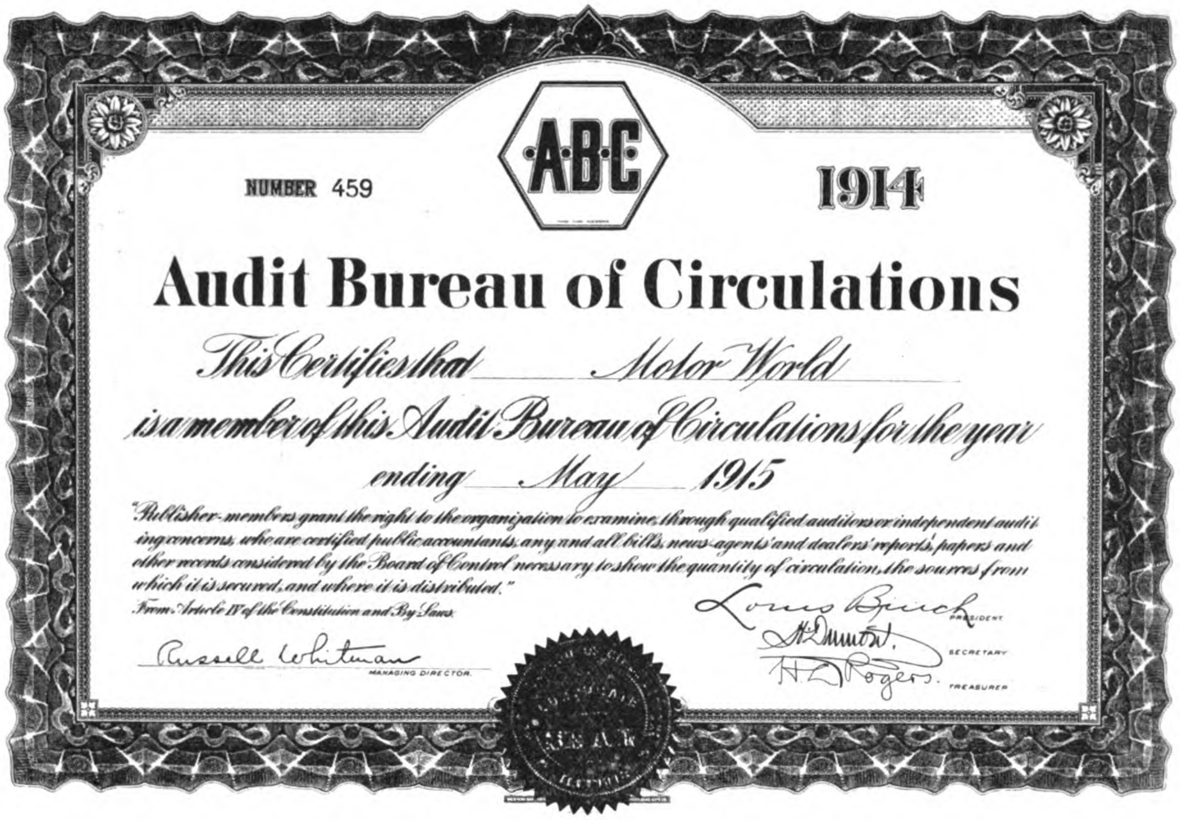
The special corrugated construction of the NATIONAL RADIATOR is a natural shock absorber, making the Radiator practically everlasting.

Both air and water tubes are exceptionally large, thus insuring free circulation and greatly increased cooling capacity.

All NATIONAL RADIATORS are tested at not less than fifteen pounds air pressure under water.

THE NATIONAL CAN COMPANY
Detroit, Michigan

STOP — LOOK — LISTEN


A·B·C

NUMBER 459 1914

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ending May 1915

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From Article IV of the Constitution and By Laws.

Russell Whitman, MANAGING DIRECTOR.

PRESIDENT

SECRETARY

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MOTOR WORLD

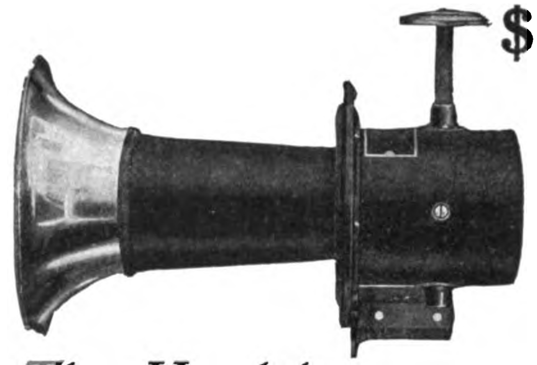
239 West 39th Street, New York

The Horn That Speaks For Itself

THE *Handphone* hand-operated horn has established an enviable reputation for efficiency, durability and power. It is mechanically perfect, easy to operate—the slightest touch of the lever gives an instantaneous loud, deep, penetrating warning.

Convince yourself of the merits of any horn before you buy—compare the *Handphone* with any other mechanical horn and the difference will be instantly apparent.

$6



The Handphone

Guaranteed for Three Years

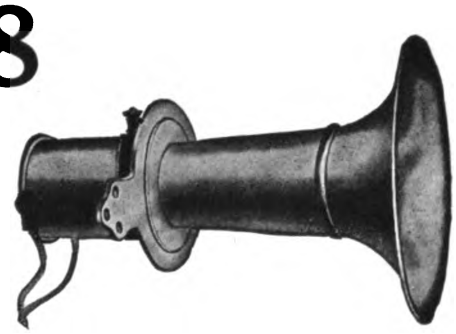
$5

Handphone Type C

Has the same mechanical construction as the larger horn.

All We Ask Is A Fair Comparison of Values

$8



Newtone Superior

The Best Motor-Driven Horn At Any Price

We believe The *Newtone Superior* to be the most perfect motor-driven horn on the market. It has a wonderful volume of sound with a minimum current consumption, an average battery lasting six months.

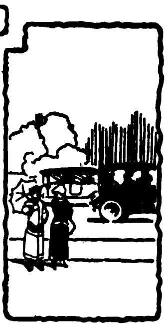
Compare it with other horns of similar type and size, selling at anywhere within double the price and judge for yourself.

Write or telegraph at our expense For The Best Dealers' Proposition Made

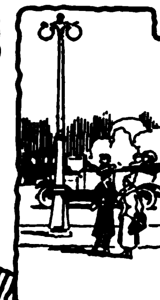
AUTOMOBILE SUPPLY MFG. COMPANY

220 TAAFFE PLACE *See Us At The Shows* BROOKLYN, N. Y.

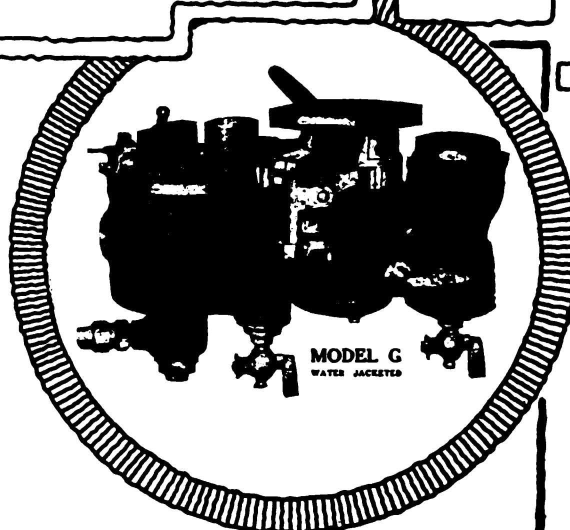

BALL BEARINGS
lows the use of these Quality
on Land and Sea or in the Air
Our present capacity is more than 20,000 bearings per day.
Each type is stocked in quantity and made in such variety of size that there is available a New Departure for every purpose—a size for every need.
Manufacturing Company
CONN., U. S. A.
1016-17 Ford Bldg., Detroit, Mich.



RAYFIELD CARBURETORS



Getting the best in carburetors



WHEN an automobile maker adopts the Rayfield carburetor as standard equipment, he does so simply because he wants the best, and is willing to pay for it.

And generally, you will notice, Rayfield equipment is advertised by the cars that use it, because most people know that the Rayfield is the best carburetor on the market and naturally have confidence in the car manufacturer who uses it.

After all, compared to the selling advantage given a car equipped with a Rayfield and the much increased efficiency of the motor, what does the slight extra cost of the Rayfield amount to? The owner of a car with Rayfield equipment will save in gasoline alone in the first two months' driving more than enough to make up its slightly greater initial cost to the manufacturer.

For every type of car, from the smallest to the largest, the Rayfield is absolutely guaranteed to save 10% to 50% in fuel and on all other points to exceed the performance of any other carburetor.

No matter what car you drive, you ought to have a Rayfield on it.

FINDEISEN & KROPF MANUFACTURING CO.

2117 Rockwell Street, Chicago, Illinois

Branches: 1140 Michigan Ave., Chicago 1211 Woodward Ave., Detroit 1902 Broadway, New York


Hannold
Undertaker
Philadelphia


Hotel Benson
Portland, Ore.


Hudner Markets
Provisions
Fall River, Mass.


E. Welch
Florist
Hartford, Conn.


U. S. Mail
Washington, D. C.


Wagner Pastry Company
Newark, N. J


Bell Telephone Company
Buffalo, N. Y.


Bonwit-Teller
Millinery and Ladies' Wear
New York

Stewart

Stewart Owners Buy More Stewarts

—because Stewart trucks, by paying for themselves in a year, are a good business investment.

—because Stewart trucks stand up under the hardest usage.

—because Stewart trucks mean big profits by making money for owners, saving time and bringing trade.

—because Stewart trucks are designed right; constructed right, and built of finest materials.

—because Stewart trucks are simple in design and simple to drive.

—because comparisons show that Stewart trucks cost less to operate than any other delivery trucks made.

—because Stewart trucks show an average annual repair expense of only $1.37 per truck.

—because Stewart trucks do the work for which larger trucks were formerly thought necessary.

These are reasons why Stewart owners never go back to other makes of delivery trucks.

These are reasons why among Stewart owners—and they are to be found in 120 cities and 85 lines of business—there is today *not a single dissatisfied user.*

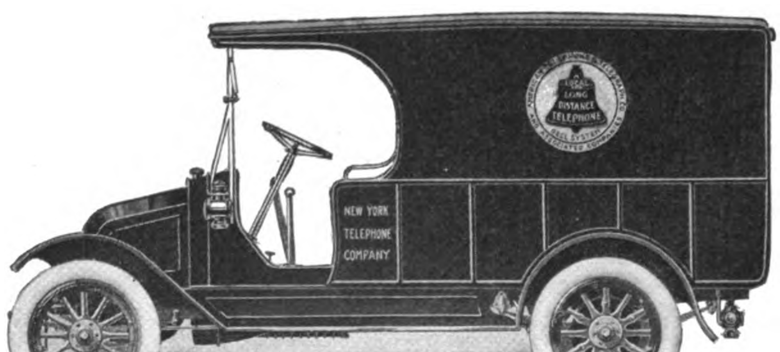
And these are reasons why Stewart owners buy more and more Stewart trucks all the time.

Not only do owners endorse Stewart trucks by first choice and by reorders. Engineers—mechanical experts of high repute—tell us that Stewart trucks are *right*. Not one of them has ever pointed to any feature of the Stewart that needs to be improved.

That Stewart trucks make good and win the confidence of owners everywhere is only natural. For Stewart trucks are built by specialists. All our facilities, all our energy, and the experience of an expert organization have been *concentrated* for five years on this type of delivery truck.

Write *today* for our book, "How Motor Delivery Pays." It contains much information of interest to every business man and every business house with goods to deliver.

Stewart Motor Corporation, Buffalo, N. Y.



Dealers: Ask About Our New Policy

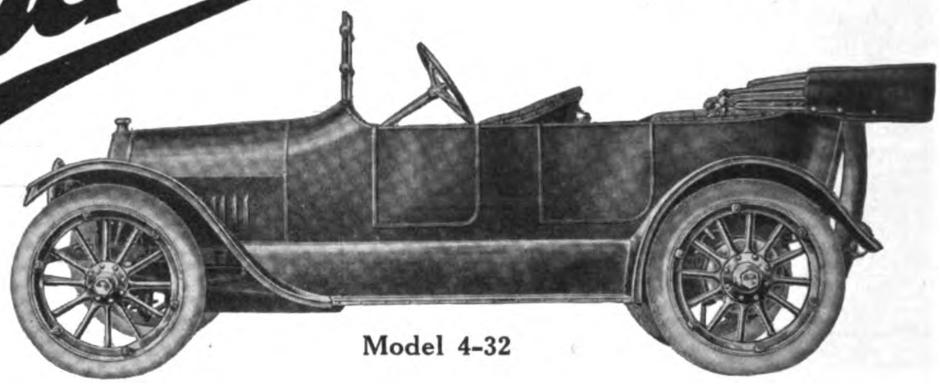
We have a dealership proposition that is unusually liberal. We can assure more prompt deliveries, by reason of increased facilities and larger output. And we do not require dealers to put up a lot of deposit money, nor to contract for a big number of trucks.

Write today and learn about the Stewart proposition—and why it will be to your advantage to handle the Stewart; providing, of course, your territory is now open.

Paterson

Four Cylinder, Long stroke Motor, Delco Starting and Lighting System,

$1095



Model 4-32

To the Man Who Sells Motor Cars

The PATERSON line of motor cars is the line with the VALUE, STYLE and FINISH, made in Flint, Mich., by W. A. Paterson Company, one of the strongest organizations in the business, who have had forty years' experience in the manufacturing industry.

The PATERSON car for 1915 represents the total and combined knowledge of the best and most carefully trained engineers in the automobile industry. This statement is proven by the fact that PATERSON QUALITY reflects the combined buying powers that compose the acknowledged leaders of the automobile world.

Our Four and Six cylinder cars are fitted with NORTHWAY long stroke motors, Weston-Mott full floating demountable rear axles, Delco Single Unit Starting and Lighting system, Stromberg carburetors, One-Man Top, and other high grade units installed and applied the PATERSON way.

We are soliciting the business of distributors in the different automobile centers, who have an established trade, and a line of agents that can and will push a standardized line of automobiles that have the VALUE, STYLE and FINISH.

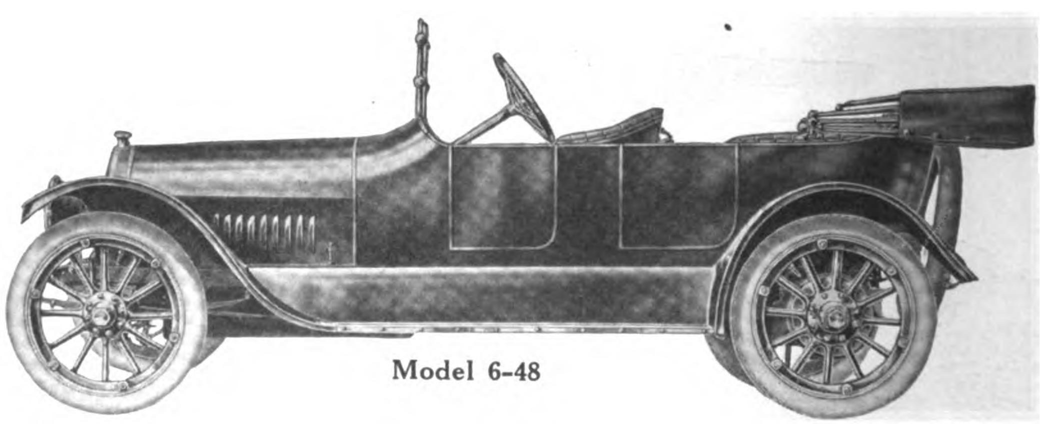
Our distributors' proposition is an attractive one, and our local agency contract deal will interest any high class dealer that desires to handle a line that will help him in building up a trade that will increase from year to year and stay with him.

W. A. PATERSON COMPANY

FLINT **MICHIGAN**

Six Cylinder, Long stroke Motor, Delco Lighting and Starting System,

$1495



Model 6-48


Lexington
We Say This to You
The owner of a Lexington Thoroughbred SIX has made an investment in automobile quality—style—service and comfort that justifies him in saying to his friends:
"Pay the price—buy a real car—buy this one. It is the best piece of automobile construction in America for the money."
$1875 f.o.b factory, and worth more
The Lexington-Howard Co.
Columbia Ave. North, Connersville, Ind., U. S. A.
See us at New York Show at Space C-19—3rd Floor, Grand Central Palace. Chicago, at Space E-5 and 6, Armory.


The most remarkable
We Also Say This To You
This automobile has been built for men who want better quality—better design— better engineering and better workmanship than is obtainable in the ordinary six-cylinder car.
This is an extraordinary car and we will prove it to the man who knows good automobiles and buys only that kind.
Price $1875 f. o. b. factory, and worth more
The Lexington-Howard Co.
Columbia Ave. North, Connersville, Ind., U. S. A.


"Six" ever built!
And This Will Interest You
The Lexington Thoroughbred Six is a perfect, silent, smooth-running car at all speeds and at all times.
When it is new—after six months—on its first birthday, and long afterwards.
We have built into this car the kind of materials—the kind of metals and the kind of machinery that does its duty and stands up because of supreme lasting quality.
Price $1875 f. o. b. factory, and worth more
The Lexington-Howard Co.
Columbia Ave. North, Connersville, Ind., U. S. A.


We Say This to Dealers
To men who can sell good cars and who want to sell a car that **stays sold**—
The Lexington Thoroughbred Six is an automobile that you can sell to that group of men in your city who are not going to argue about two or three hundred dollars if you can show them **the real thing** in a car.
This is the car—write for complete details.
$1875 f. o. b. factory, and worth more
The Lexington-Howard Co.
Columbia Ave. North,
Connersville, Ind., U. S. A.

MAKE WINTER DRIVING A PLEASURE

Ieco STEER WARMS

Don't Suffer from Cold

STEER WARMS make winter driving safe. Protect the driver from catching cold. Save cost on winter gloves. Are indispensable to motor truck drivers.

STEER WARMS are electrically heated, leather covered grips that lace on the steering wheel. These neat devices are heated by current from either storage battery, dry cell or magneto. On Ford cars they are connected to the magneto.

STEER WARMS take only half the current of electric headlights and will not damage your storage battery. They deliver the heat to the fingers where it does the most good, keeping the hands and body warm on the coldest, rawest day.

STEER WARMS are easily attached. Will fit any car. No bolts or screws—no holes to bore. Lace on—wire up—that's all. They are guaranteed to give satisfaction—money back if they do not.

Price Steer warms for any car, $7.50 per pair complete; Special Steer Warms for Ford Cars, $5.00.

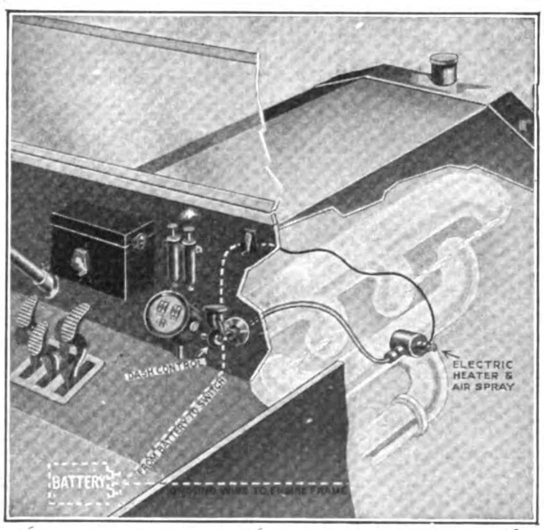
Sent postpaid complete, ready to attach, upon receipt of price, or C. O. D. if desired.

Dealers These are quick sellers. Every owner wants a set. Guaranteed. We stand back of you. Get your share of the business. Write for discounts.

EASILY ATTACHED

INEXPENSIVE

GUARANTEED



Eliminate Your Starting Troubles with IECO MANIFOLD PLUG

THE IECO MANIFOLD PLUG due to its ELECTRICALLY HEATED COIL, is guaranteed to start your car on the coldest winter day as easily as you can start on the hottest day in summer.

Tests your carburetor at any time regarding quality of mixture.

Keeps your cylinders free of carbon by using a little kerosene through the priming cup.

In addition to eliminating your starting troubles in winter and increasing the power and speed of your car while running, the IECO MANIFOLD PLUG will actually save you within three months the price of the plug in a reduced gasoline bill. The intelligent automobilist will immediately take advantage of this proposition.

The Manifold Plug has an ELECTRICALLY HEATED coil on the inside of the plug that actually boils and vaporizes the gasoline and does not depend upon superficial spraying, which is poor, to say the least, in cold weather. Besides, the vapor enters the manifold near the cylinders and cannot condense before being drawn into the engine.

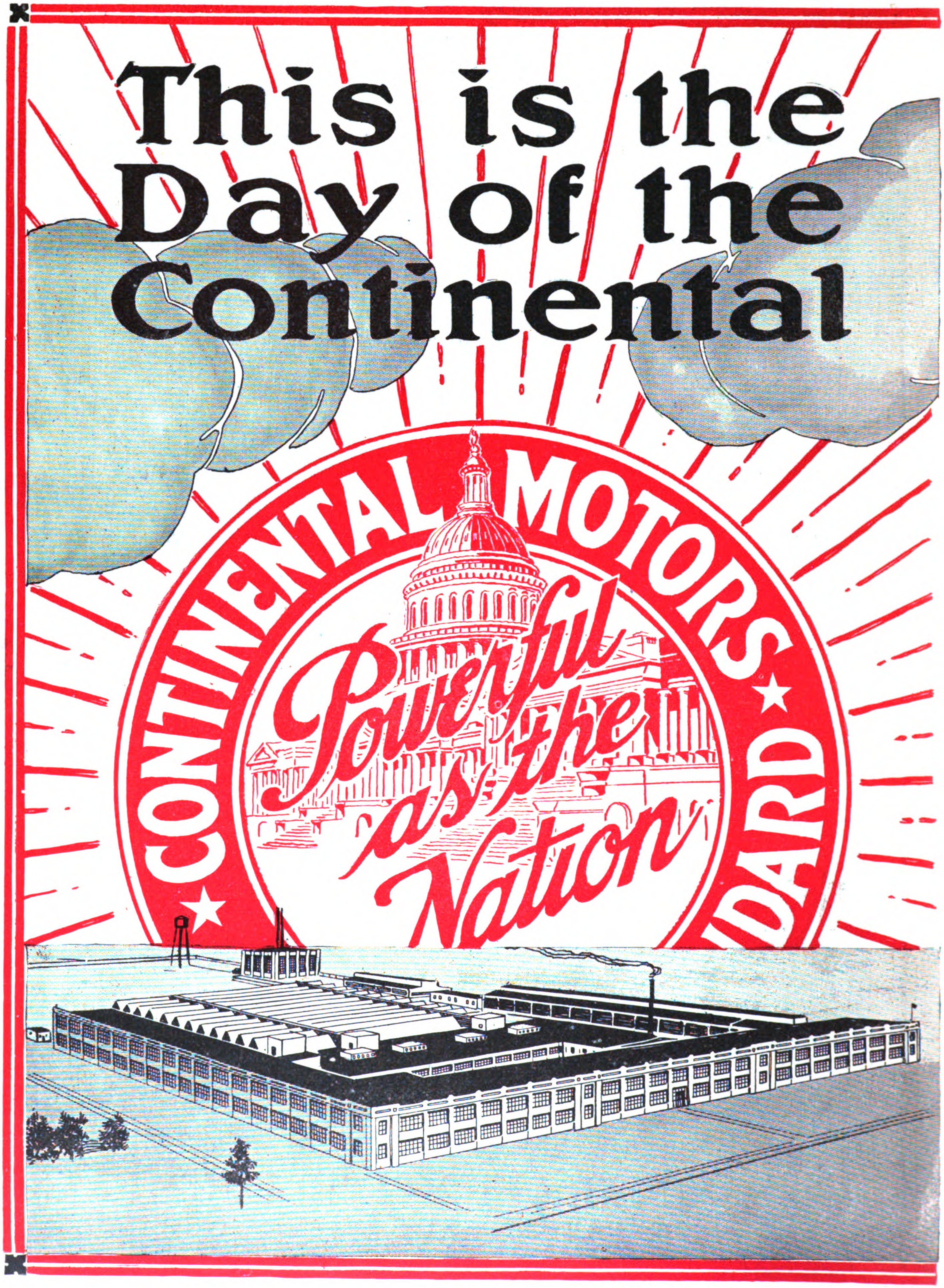
Price for any car $5.00 complete and ready to install. Current is taken from either dry cells or storage battery.

Sent postpaid on receipt of price or C. O. D. Parcel Post on receipt of order.

INTERSTATE ELECTRIC CO. EVERYTHING ELECTRICAL QUALITY SERVICE IECO NEW ORLEANS

INTERSTATE ELECTRIC CO.

358 BARONNE STREET, NEW ORLEANS


This is the
Day of the
Continental
CONTINENTAL MOTORS
Powerful
as the
Nation

123 manufacturers have seen the light; 123 leading makes of motor cars—pleasure and commercial—now take their motion from the Continental Motor; 123—where a year ago there were 60!

Such a growth is profoundly significant. It marks a positive conviction that Continental Certainty is now fundamental in the structure of motor cars whose makers are striving hardest to reach the goal of perfection.

Continental Motors

It marks the final establishment of a definite quality basis in manufacturing—assuring a permanent market for the maker, and a permanent guarantee of goodness for the owner.

The trend toward this standardization has been slow but steady. For twelve years Continental Motors have been leading the way.

Scores of makers knew the overwhelming advantages of a Standard Motor, from both the production and the sales standpoint. They only awaited the right motor, a motor of known quality and national reputation.

Now they have it in the Continental—have a motor proved by time, endorsed by more than a hundred thousand drivers, known favorably to every dealer in the land.

This is the reason for the landslide Continental-ward.

For the manufacturer who today builds into his product a Continental Motor, builds in also an added prestige that carries tremendous advantage for maker, dealer and owner.

This is the day of the Continental—broad sunlight of well-earned reputation, shining into every nook and corner of motordom.

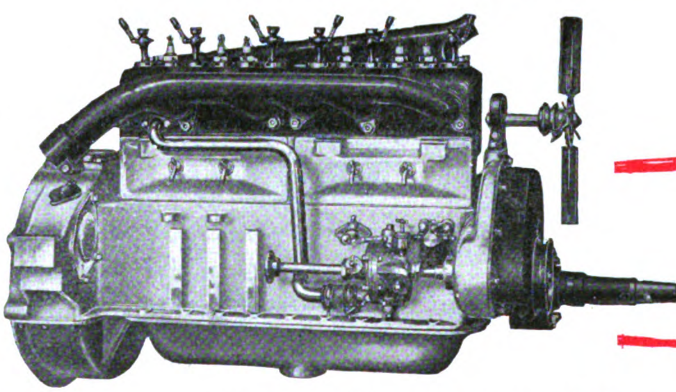
Get into the flood of light. Get your place in the sun.

CONTINENTAL MOTOR MFG. CO.

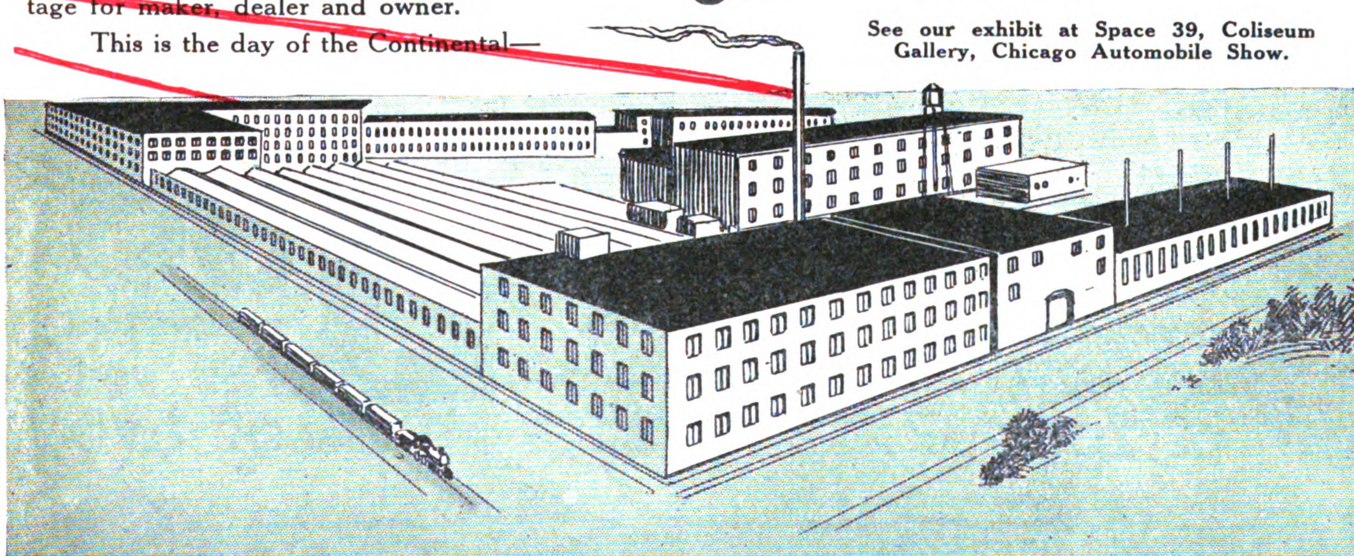
DETROIT, MICH.

Largest exclusive motor builders in the world

Factories: Detroit and Muskegon



See our exhibit at Space 39, Coliseum Gallery, Chicago Automobile Show.



CC SHOCK ABSORBER

Our 40 Years' Manufacturing Experience and Reputation Stand Back of This New Product

¾ Actual Size

The C-C Shock Absorber is not a makeshift nor the result of an impulse. It is a development and a refinement of manufacturing conditions.

It is just as real, just as efficient and just as high quality as any shock absorber ever produced at any price, notwithstanding the fact that it is made to sell for $8.00 for a set of four.

Just as the Ford Company has been able to continuously and materially reduce the cost of its car by increasing its production and by the installation of manufacturing refinements, just so have we been able to reduce the cost of shock absorbers until we have today a real Ford Shock Absorber made to sell at a price commensurate with the original cost of the car.

Unless your Ford is operated at the minimum of cost and the maximum of comfort and efficiency you are not getting all that the Ford can be made to give you. You have frequently realized that the use of an efficient shock absorber would greatly increase your Ford satisfaction but the price heretofore has been too great.

Now as a result of this 40 years of manufacturing experience, five years of which have been devoted to the problem of shock absorption, we have been able to produce the C-C and at a price you will not hesitate to pay.

Go to your dealer today, have him show you the C-C, its simplicity and sturdiness and have him explain its principle.

When you do this you will take a set of four and have them attached while you wait. It only takes half an hour.

8⁰⁰ for set of four

Cox Brass Mfg. Co.
Albany, New York

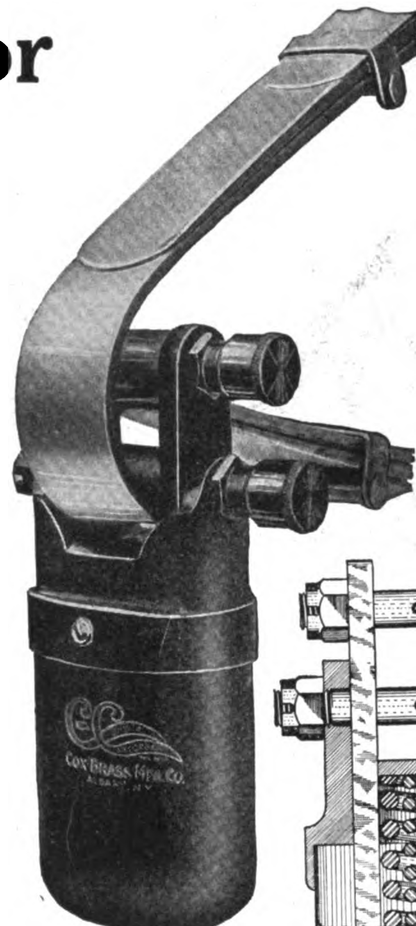
BRANCHES:

1777 Broadway, New York City
2637 Michigan Ave., Chicago, Ill.

4⁵⁰ for set of two

C-C SHOCK ABSORBER

"The New C-C for Any Car"



regardless of the kind you own, offers you through its use a degree of comfort and economy hitherto possible only by an investment of at least five times the price of the C-C.

The new universal C-C is the masterpiece of shock absorption construction. It is our supreme effort after 40 years of manufacturing experience and we are proud to put the Cox trade mark (the guarantee of absolute satisfaction) upon it.

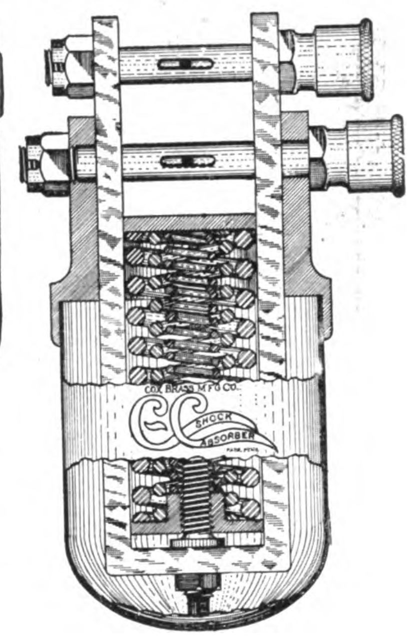
The new C-C is a sturdy, husky shock absorber designed to take care of the jolts and jars suffered by the heaviest of cars. We would not hesitate to recommend it for use on a limousine weighing two and a half tons, so certain are we that it will stand up to its work, even in that event. Note the triple spring construction as shown in the line cut herewith. That's only one of the many reasons for the superiority of the C-C.

No longer need you sacrifice your car and your comfort for the new C-C at $10.00 will serve you and your car satisfactorily as long as your car will last.

Go to your dealer to-day and have him attach a set of C-C's and you'll swear you have a new car.

DEALERS: Think what the Cox line means to you, the C-C for the Ford for $8.00 and the C-C for any car for $10.00. No longer is it necessary for you to carry in stock a dozen different sizes of shock absorbers to meet the varying calls from the different type car owners. The new C-C with an occasional spring change (that you can make yourself) will fit 95 per cent. of the cars on the road to-day.

Write us to-day for our dealers' terms. They're mighty attractive.



⅓ Actual Size

easily applicable to any car

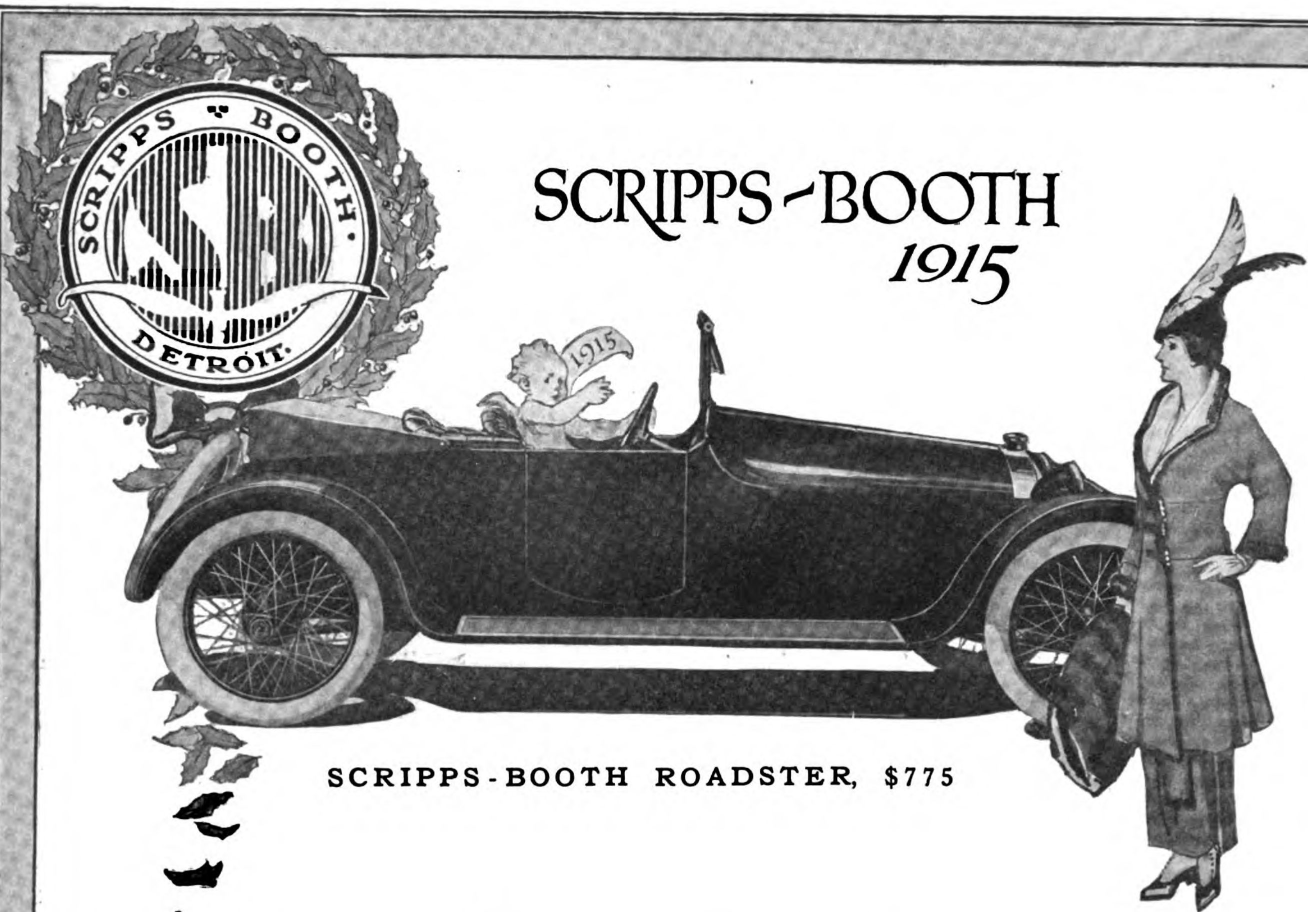
Cox Brass Mfg. Co.
Albany, New York

BRANCHES:

1777 Broadway, New York City
2637 Michigan Ave. Chicago, Ill.

10.00 per set complete

SCRIPPS-BOOTH 1915



SCRIPPS-BOOTH ROADSTER, $775

SPECIFICATIONS:

110-inch wheelbase, three passenger car.

MECHANISM

Four-cylinder motor, three-speed gearset, shaft drive, bevel gear rear axle.

EQUIPMENT.

Absolutely complete from electric self-starting and lighting system to electric door locks.

FINISH

Finest possible, both as regards upholstery, instruments, dash equipment and body finish.

DETAILS

Body—Streamline, torpedo stern, highest grade blue-black finish, domed fenders. Upholstery, finest quality long-grain buffed leather. Cowl dash instruments; sight feed oiler, lighting and dimming switches, starting strangler, starting and ignition switch, flush type speedometer, generator indicator, shroud light and foot space light.

WHEELS

Five Houk, triple-laced detachable wire, 30x3½ inches, wide hubs.

AXLE

Rear, full-floating, annular bearings throughout. Bevel drive. Ball bearing, universal joints on the Kardan shaft. All gears and shafts 3½% nickel steel. Drive shaft tubular.

New Year

The Spirit of the New Year is for better things.

The world builds on the progress of the past; each new idea, a step; each year, an epoch.

With each succeeding twelve-month of motor car progress comes greater demand for new comfort, further luxury, and more complete appointment.

SCRIPPS-BOOTH luxurious light cars offer in mechanism, the newest engineering ideas of comfort-efficiency; in appointments and interior, the newest standard of luxurious equipment; in road performance, the highest possible standard of riding comfort; and in detail, show a consistent betterment of past motor car efforts, which expresses in itself the very spirit of the New Year.

SPECIFICATIONS:

MOTOR

Sterling, valve-in-head type, high speed, gearset in unit, pump feed oiling with sight feed on dash, 2⅞ bore, 4-inch stroke, four-cylinder, water cooled. Develops 18 horsepower. Fitted with Zenith carbureter and Atwater-Kent automatic spark advance, connected with starter generator system.

STARTING

Bijur single unit electric, connected by silent chain, operated by locking dash switch.

SPRINGS

Front, semi-elliptic with over-slung frame. Rear, floating cantilever.

EQUIPMENT

Silk mohair top with side curtains, rain vision plate glass windshield, electric door lock, Klaxet horn, full tool equipment, jack. Luggage space at the rear large enough for two suit-cases and tools. Spare Houk wheel, tire and tube on all cars.

FEATURES

Klaxet button in center of steering wheel cannot be operated when ignition switch is off, eliminating miscellaneous horn blowing while the car is standing. No projecting handles or slots in the doors. Electric door locks are operated by pressing a small push button.

SCRIPPS-BOOTH CO. DETROIT, MICHIGAN

19  15

Dealers!!!

A GREATER DISCOUNT IN 1915

The placing of your initial order for Automobile Blue Books
BEFORE FEBRUARY 1, 1915
determines your discount for the entire year

A PROFIT TO YOU OF 95c ON EVERY BOOK SOLD

The following discounts take effect at once on 1915 Blue Books
LIST PRICE, $2.50 PER COPY

33 1-3% AND AN EXTRA 7% DISCOUNT

if your initial order is placed before February 1st and is for a quantity of books equal to 75% of the books you sold in 1914. Delivery date as per your instructions. All books of initial order to be delivered before July 1st.

25% AND AN EXTRA 7% DISCOUNT

on single orders, or those less than six copies, if placed before Feb. 1st. The double discount offered above to all dealers placing their orders before February 1st will be allowed them on all following orders of any quantity during 1915.

Dealers not taking advantage of the above offer will be allowed only the first discount throughout the year and thereby lose the extra 7%

New Jobbers' discounts are made to strictly recognized Jobbers

AUTOMOBILE BLUE BOOK PUBLISHING COMPANY

912 S. Michigan Ave.
Chicago, Ill.

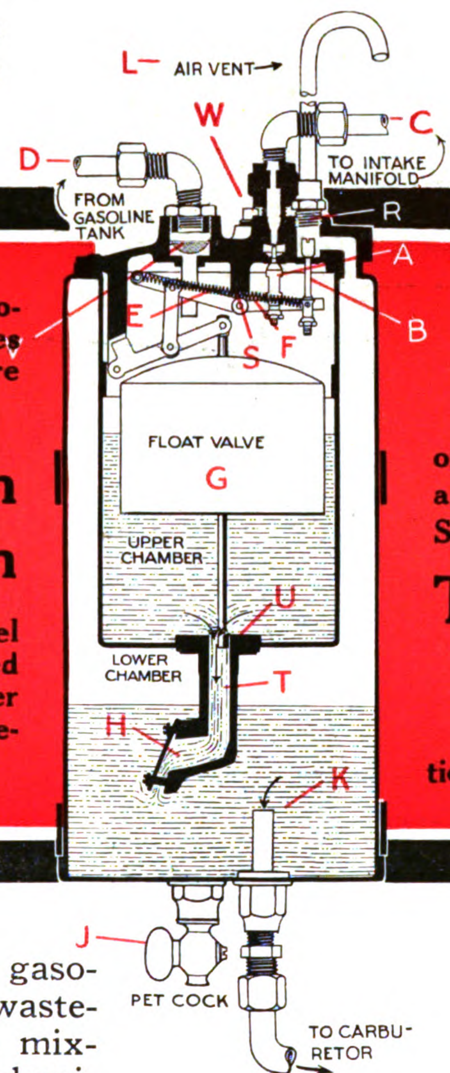
245 West 39th Street
New York City, N.Y.

Stewart PRODUCTS

The STEWART Vacuum Gasoline System does away with all need of air pressure —eliminates hand and power pumps—air gauges and all air-tight connections.

It supplies an even flow of gasoline to the carburetor at all times regardless of what the grade may be.

This system enables car manufacturers to adopt the fashionable low-set streamline body. It enables them to do away with the somewhat dangerous, odorous and inconvenient gasoline tank in the cowl, as well as the gasoline tank awkwardly placed under the front seat.



NOW

$10

The STEWART Vacuum Gasoline System absolutely overcomes all the disadvantages of pressure and gravity feed systems.

Stewart Vacuum Gasoline System

It soon pays for itself in the fuel it saves. In recent tests sanctioned by the A. A. A. it showed better than 15 per cent. increase in mileage per gallon.

Can be installed in an hour's time on any car, old or new, at any garage or at any of our Branches or Service Stations.

Try it on Your Car for 30 Days

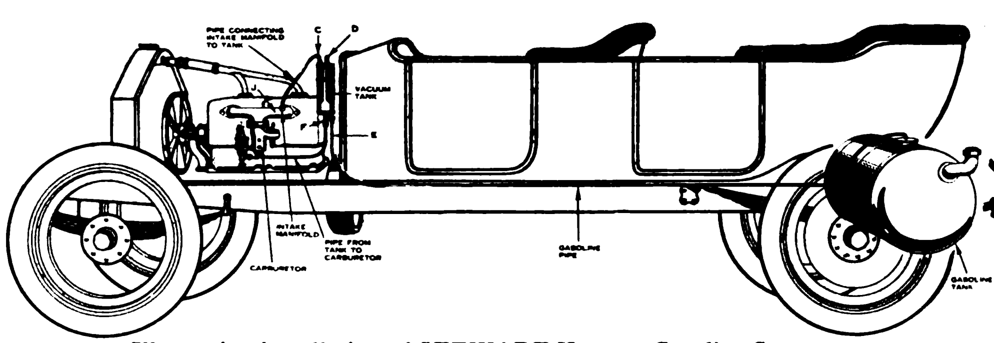
Comes complete with all connections. Write for full particulars.

There is no forcing of the gasoline through the carburetor wastefully—causing an over-rich mixture, a sluggish motor, or carbonization.

It works absolutely AUTOMATICALLY, requiring no attention whatever once it is installed.

Permits the gasoline tank to be put in its logical position in rear of car—placing the weight where it can be carried to best advantage, without detracting from the car's easy riding qualities.

DEALERS: Write for interesting Sales Proposition.



Illustrating installation of STEWART Vacuum Gasoline System, under hood on dash, or it may be mounted directly on motor.

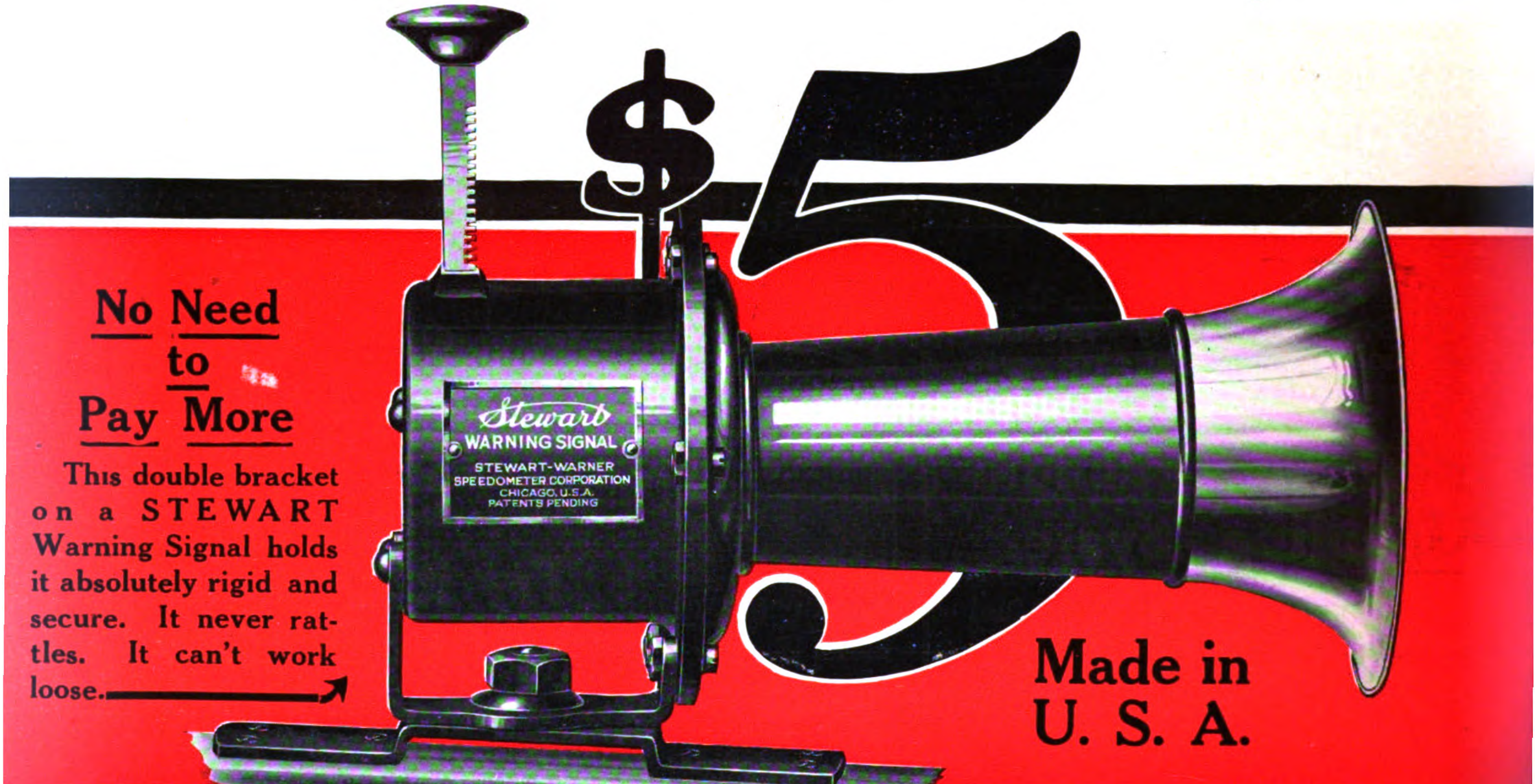
17 Branches | **Stewart-Warner Speedometer Corporation** | **70 Service Stations**

"Always on the Job"

PRODUCTS

Look for the name "Stewart" on all Stewart Products. It is a guarantee of Prestige, Quality, Service and Satisfaction.

This unprecedented price of $5.00 is only made possible by our policy of producing STEWART Products in enormous quantities.



The name "STEWART" has special significance when borne by a Warning Signal priced at $5.00—the lowest price a thoroughly high-grade hand-operated signal has ever reached. It adds authority to the statement that the STEWART Warning Signal in design, appearance, in material and performance, is the finest hand-operated signal built—regardless of price.

A swivel bracket enables the STEWART Warning Signal to be adjusted to direct warning blast **straight ahead, and fits top rail of car perfectly.**

The price is so small, the measure of quality so large for the reason that we require no separate plant to make and no separate organization to market this Warning Signal.

The STEWART Warning Signal is full-grown in every respect.

The length of the trumpet part of the horn is much greater than other makes of horn sold near its price, which means just so much more sound-carrying power.

17 Branches

Stewart-Warner Speedometer Corporation

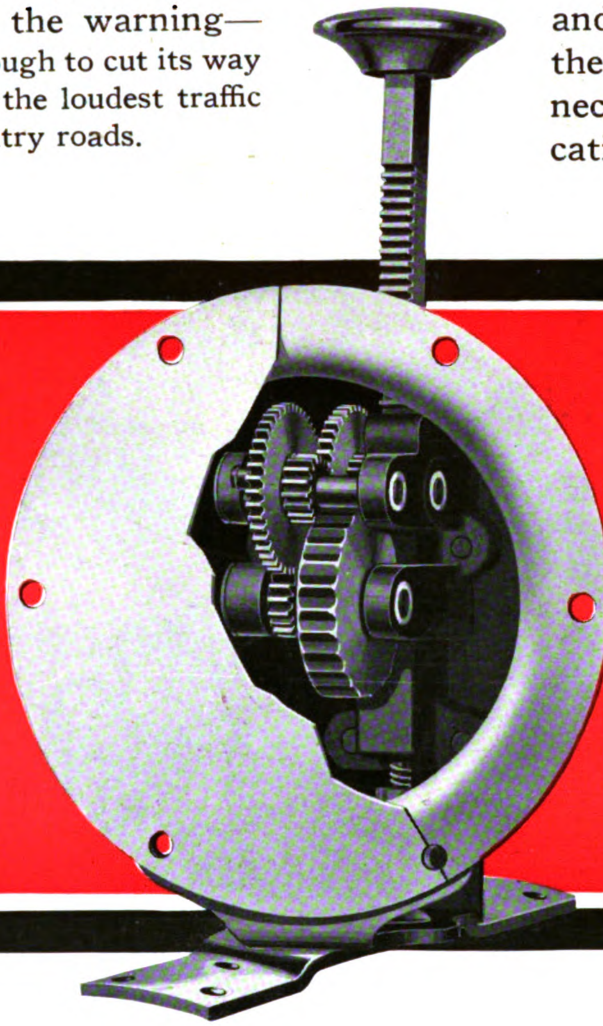
70 Service Stations

"Always on the Job"

Stewart PRODUCTS

The STEWART is the easiest operated Warning Signal sold. No effort is required, no feeling for a button or holding it down. The slightest touch of hand or elbow sounds the warning—sharp, penetrating and clear enough to cut its way through the rattle and roar of the loudest traffic and carry a mile ahead on country roads.

A felt pad oiler insures proper, CONTINUOUS lubrication to every bearing and wheel. It RETAINS the oil and eliminates the necessity of frequent lubrication.



Note the extra large Swedish steel diaphragm. One push of the plunger results in 192 distinct sound impulses against this diaphragm.

The sound produced is big-voiced and unsurpassed in penetrating and far-carrying qualities.

Stewart Warning Signal

Note the wide-faced, case-hardened gears. They are CUT, not stamped, from the highest-grade steel. They are carried in a frame with each gear mounted on double bearings.

No one-sided bearings are used, because of their being continually subjected to rack and wear.

Each bearing is mounted in a hardened steel bushing, insuring positive alignment, and exceedingly long life of service through the elimination of wear.

Built To Last

No part of this signal is soldered.

All parts are riveted or bolted to stay permanently — regardless of hardest usage.

30-Days' Free Trial

Put a STEWART Warning Signal on your car with the understanding if not satisfactory after 30 days' trial, full purchase price will be refunded. Furnished in handsome black enamel and nickel or black and brass finish.

DEALERS: Our 30-Day Free Trial makes a sale out of every inquiry.

It costs Nothing to operate

The STEWART Warning Signal is a self-contained unit dependent upon neither batteries, wires, nor connections of any kind. It has no short-circuits, loosened connections or weakened batteries to contend with. It is on the job all the time whether your batteries are or not. It does not drain current from the lighting and starting system. You pay for a STEWART Warning Signal but once. Its first cost is final. Its upkeep is nothing.

17 Branches — Stewart-Warner Speedometer Corporation — 70 Service Stations

"Always on the Job"

Ignition Advice For You

A good ignition system is a necessary part of every engine. Batteries alone, or as a part of another system, cannot be expected to retain that essential feature of absolute reliability which an ignition system should have.

If your engine is fitted with a good magneto, you obtain your ignition current from a mechanical source, a source that practically has perpetual life, a source that cannot be made inactive by ordinary damage, nor even by forgetfulness. It is not affected by heat or cold, by rain or snow, by continuous or intermittent use.

Ignition is a factor too important to slight. It should be given more than passing consideration or comment. It should be investigated as closely and as carefully as the engine itself, for upon the ignition system the ability of the engine depends. In fact, the whole car, your comfort, your pleasure, everything depends upon the ignition system.

Don't select "any ignition"; don't be misled by such broad terms as "high tension", "jump spark", or "magneto"—insist that you be given a dependable, no-worry system—a Bosch Magneto.

BE SATISFIED | *No one ignition system is used as universally as the Bosch Magneto* | **SPECIFY BOSCH**

BOSCH MAGNETO CO., 220 West 46th Street, New York

Chicago—Detroit—*Over 250 Service Stations*—**San Francisco—Toronto**

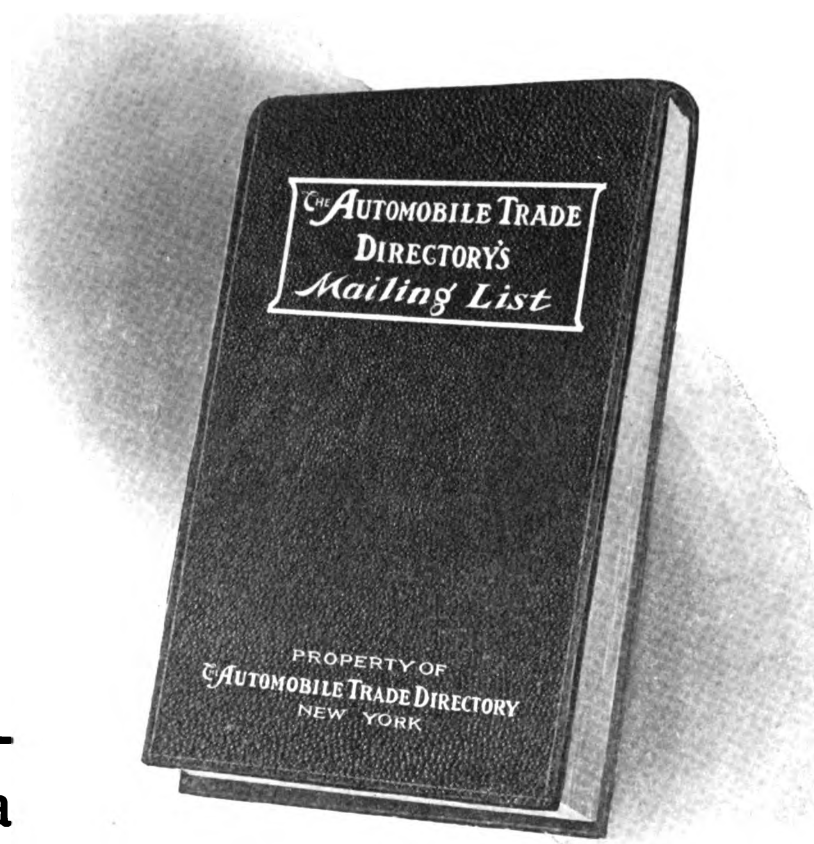
and Selling

Automobile Industry

THE Standard list of those who sell to the automobile trade. It embraces the entire purchasing power of every phase of the automobile and motor truck industry, comprising the dealers, garages, repair shops, supply houses and Purchasing Agents, Engineers and other officials of automobile, commercial vehicle and motor manufacturers.

Every name given is a live and legitimate concern or business man, conducting a business as listed. To keep pace with changes both of personnel and activities of various concerns complete supplements and revision sheets are furnished the first of each month.

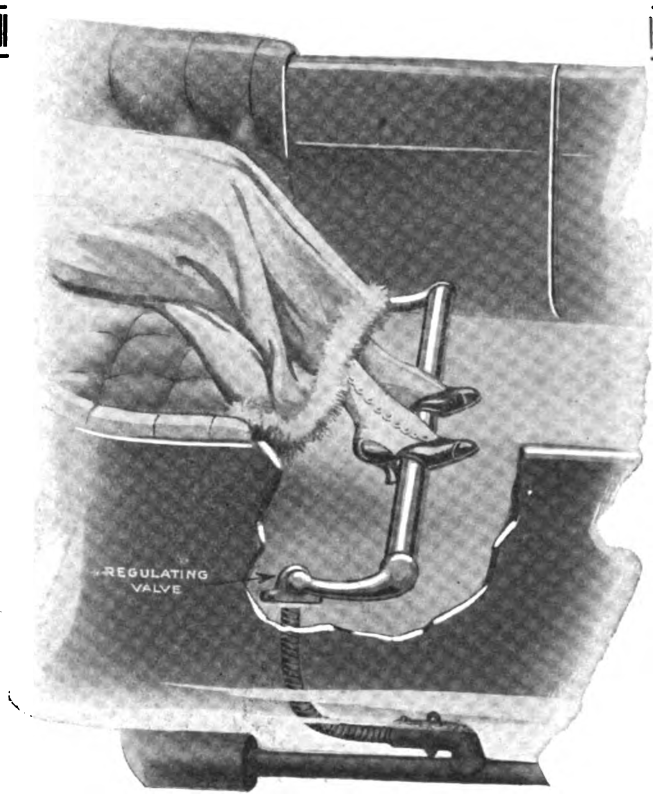
The Seller's Index



and Mailing List—
guide, the other a
plete a business sys-
can concentrate your selling effort to the more active buyers for less money than other way.

243-249 WEST 39TH STREET, NEW YORK

The Best Selling Winter Accessory on the Market



See these car comforts at the Auto Shows

K.P. Foot Rest Heater

It does seem foolish that a gasoline engine should be generating so much heat and let it all go to waste, while the passengers in the tonneau shiver with the cold.

Everybody appreciates the foolishness of that situation and realizes at a glance how simple and practical the K.P. FOOT REST HEATER is in the way it makes use of an otherwise waste commodity.

The K.P. is noiseless, odorless and expenseless. It is a handsome ornament in a car, for it looks infinitely better than the ordinary foot rest. Its regulating valve makes it easy to control by the passenger. It is easily attached. Furnished in lengths to fit any car, and made up in oxidized, nickel-plated or brass finish.

The price is $25 (f.o.b. New York), including all parts for attachment.

The dealer who has put it on display has found that it is as near a self-selling device as he could handle.

Now is the time to sell them.

Now is the time buyers want them.

Now is the time you should handle them.

Get complete literature and dealers' proposition·

BRANCHES:

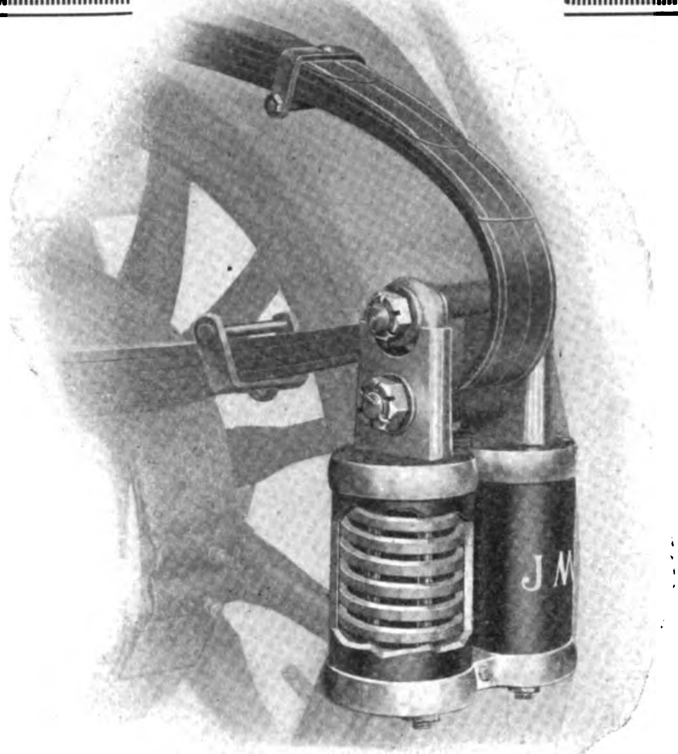
Chicago, Ill., 1467 Michigan Ave.
Buffalo, N. Y., 846 Main St.
Pittsburgh, Pa., 5919 Baum St.
Atlantic City, N. J., 12 S. Virginia Ave.
Baltimore, Md., 10 W. Eager St.
Washington, D. C., 14th & Eye Sts., N. W.
Hartford, Conn., 230 Main St.
Cleveland, O., 5906 Euclid Ave.
Cincinnati, O., 801 Main St.
Boston, Mass., 222 Eliot St.
Providence, R. I., 11 Dorrance St.
Newark, N. J., 237 Halsey St.
Brooklyn, N. Y., 143 Rogers Ave.
Albany, N. Y., 288 Central Ave.
Springfield, Mass., 216 Main St.
New Haven, Conn., 31 Temple St.
Bridgeport, Conn., 277 Fairfield Ave. and 148 Cannon St.

K.P.

The K.P. Foot Rest Heater Company
250 W. 54th Street New York City

and at every "J.M." Shock Absorber Distributor —— listed herewith.

No Dealer's Establishment is Realizing Maximum Profits without the



New York Show
Booth D 42

Chicago Show
Booth 99

J. M. Shock Absorber

They are the only really perfect shock absorbers built. They were the first of their kind, and have always maintained the highest conceivable standard of materials and construction.

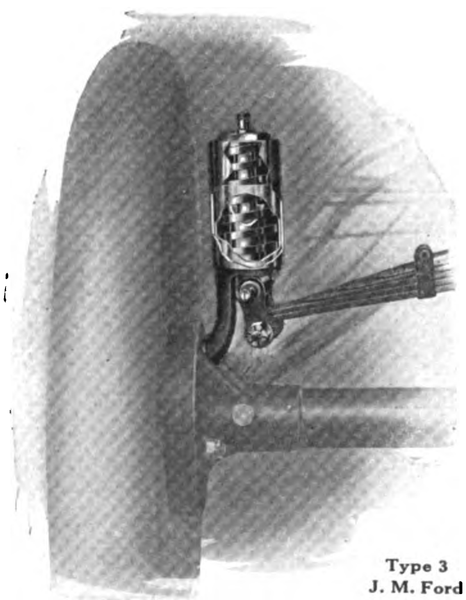
The J. M. SHOCK ABSORBER business is the kind of business any highly reliable dealer is proud to have. "J M" stands for the best in shock absorbers and when a man buys this kind at a legitimate price which gives a reasonable profit to the dealer, the J. M. Shock Absorber Company stands behind them with its nation-wide service and its responsible guarantee.

The J. M. is now produced for cars of every size and type. Altho the J. M. famous Twin type, shown at the top, has proved itself supreme for large cars, yet we have produced other models which exactly meet the needs of lighter weight cars.

BRANCHES

Pittsfield, Mass., South Street Garage.
Waterbury, Conn., 13 E. Main St.
Altoona, Pa., 1009 Chestnut Ave.
Trenton, N. J., 127 Academy St.
Minneapolis, Minn., Hennepin and Harmon Place.
St. Louis, Mo.
San Francisco, Cal.
Los Angeles, Cal.
Erie, Pa.
Atlanta, Ga.
Houston, Tex.
Dallas, Tex.
Kansas City, Mo.
Pottstown, Pa.
New Orleans, La.

CANADIAN DISTRIBUTORS:
Canadian Fairbanks-Morse Co., Ltd., Montreal, Quebec, Ottawa, Toronto, Ont. Hamilton, Winnipeg, Man. Saskatoon, Sask.
Calgary, Alta.
Edmonton, Vancouver and Victoria, B. C.
St. Johns, N. B.
ALSO IN EVERY CIVILIZED COUNTRY.



Type 3
J. M. Ford

The Ford J M Type 3 (shown below) has established its reputation as the greatest of all Ford Shock Absorbers. It is not the cheapest but it is the least expensive in the long run. It assures real comfort to all Ford owners and it lives as long as the car. Has a unique sliding tube container and is self-oiling. Illustrated pamphlet "P" tells all about it.

NOW NEARLY READY. A NEW TYPE J M FOR OVERLAND AND SIMILAR CARS

This absorber meets the demand for cars of not over 3500 pounds. It is based on J M principles, has J M construction and efficiency throughout. For Overland, Buick, Hupmobile or any car (except the Ford lighter than 3500 pounds) this is *the* shock absorber.

Write to-day for full details on this J M Type Z-2.

The Big News in Shock Absorbers

The "J.M." Shock Absorber Co., Inc.

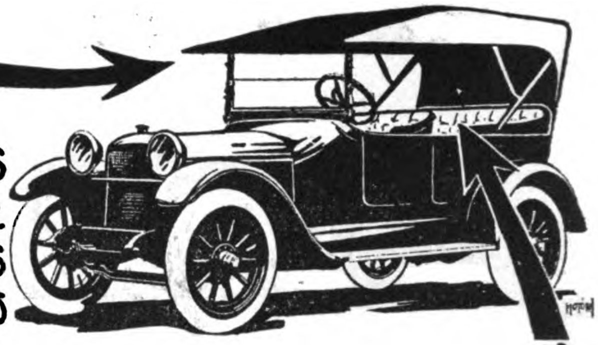
Main Office and American Factory:
210 So. 17th Street, Philadelphia

New York Factory Branch:
250 West 54th Street

JM

Use CHASE

AUTO FABRICS
LEATHER
MOTOR ROBES
DREDNAUT MOTOR CLOTHS



We Are Fabric Specialists

DREDNAUT
TRADE MARK
Motor Cloths

The Largest Manufacturers in This Line

There isn't any class of material made that is subjected to more severe service than the fabric used in automobile tops. In order to give satisfaction it must retain its appearance of newness permanently, without fading, stretching, rotting or losing its waterproof qualities, in spite of continuous exposure to sun, wind, rain, snow and dampness. None but the best can stand these conditions.

Chase Auto Top Fabrics Are Most Reliable

We are the largest and oldest manufacturers in the country engaged in this line. Every yard is made in our mills and we have the largest output of any manufacturer. With fifty years of manufacturing experience, we have specialized on the making of top fabrics for more than thirty years. No other maker is so well equipped to produce quality and reliability. No other maker has the facilities to compete with us in price, on fabrics of equal quality.

For Permanent Satisfaction, Specify Chase Fabrics

CHASE LEATHER

The finest substitute for genuine leather now on the market. Best in appearance, durability and wearing qualities. Our "Galloway," "Gibraltar," "Buckskin" and "Imperial" brands are especially popular in the automobile trade.

CHASE MOHAIR, LUSTRE TOP AND SLIP COVER CLOTHS

Unexcelled in quality—complete in assortment.

Drednaut Motor Cloths

Under this brand we market the finest rubber fabrics known in the trade.

CHASE MOTOR ROBES

The Chase Line of Motor Robes is unexcelled in assortment, variety and novelty of patterns and qualities. We have manufactured and sold more automobile and carriage robes than any other one organization in America.

Chase Mohair Body Fabrics

Something new and distinctive. Will wear a life time. You should know about these when considering your upholstering proposition.

Auto and Top Manufacturers: Write our nearest office for quotations and samples on your requirements.

L. C. CHASE & COMPANY

Boston, New York, Chicago, San Francisco, Detroit, St. Louis

The Thomas B. Jeffery Company
Jeffery
Kenosha, Wis. U.S.A.

The **Jeffery** Chesterfield Six is not in competition with low-priced cars. It is not in competition with other medium-priced cars. **It is in competition with the highest-priced cars in the world.**

The Jeffery Six and

Disregard price and consider that the **Jeffery** Chesterfield Six is equipped with the Bijur Starting and Lighting System in use by the foremost cars of the world;

—that it is the only car in the United States in its price class having a four-speed transmission;

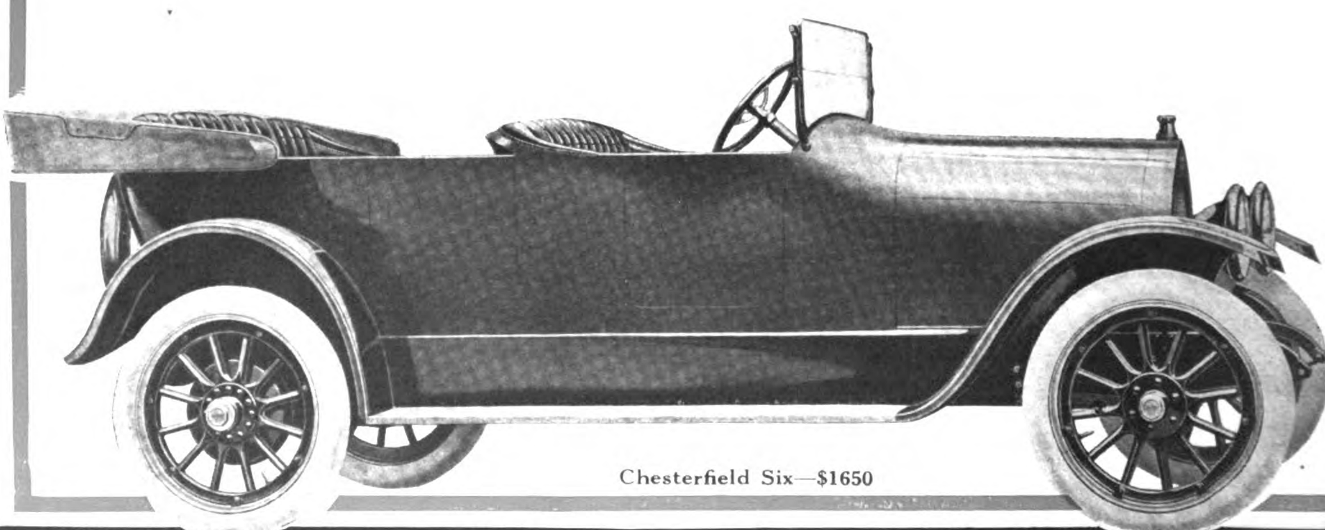
—that its worm drive is a type used exclusively on the finest electrics, and finest trucks and the best makes of foreign cars, but, with no important exceptions, on no other American car;

—that its finish—requiring 22 operations—is unsurpassed on any car here or abroad;

—that it has Tungsten steel valves five times costlier than the other kind, 3-plate dry disc clutch, imported annular bearings throughout, Bosch ignition throughout, New Model Stromberg carburetor, Stewart vacuum gasoline feed, Cantilever springs, Daimler leather coupling, Spicer universal joints, Waltham clock, and every refinement in the way of equipment.

Consider that these are actually specifications of cars in the four or five thousand dollar price class yet obtainable in the medium-priced **Jeffery** Chesterfield Six selling at $1650.

See the complete line of **Jeffery** Cars at the Shows, New York, Grand Central Palace, Space A31, or at Chicago, Coliseum, Space C3.



Chesterfield Six—$1650

Something like a thousand dollars would have to be added to the price of the **Jeffery** Six-48, if this car were made in small quantities and saddled with heavy selling expenses.

Chesterfield Six-48

The **Jeffery** Six-48 is beyond question the biggest $2400 worth of thoroughly high grade motor car obtainable on the market today.

It meets the demand of the man who wants a larger car than the Chesterfield Six—a car built to the **Jeffery** Standard of Quality—generous in size, luxurious, comfortable, easy-riding and durable as cars in the four and five thousand dollar class, yet exceedingly economical in operation.

Although a full-grown seven passenger car, it weighs but 3700 pounds and delivers remarkable mileage per gallon of gasoline.

The power plant is a 3¾ by 5¼ high-speed—high-efficiency motor with cylinders cast in pairs.

Due to its 48-H. P. power plant, it is as "quick on its feet" as the smaller **Jeffery** models. An ideal car for both city driving and long touring purposes.

The wheel base of this car is 133½ inches, and the tires are 36 by 4½, on demountable rims.

Finest materials are used as in other **Jeffery** models and the equipment is complete in every detail.

All prices f. o. b. Kenosha.

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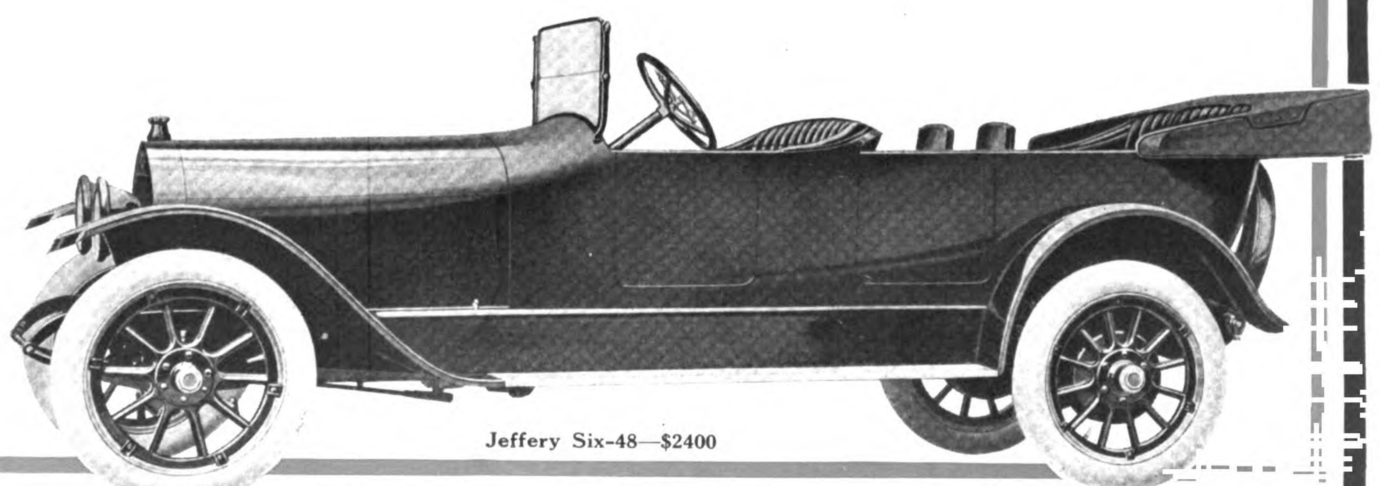

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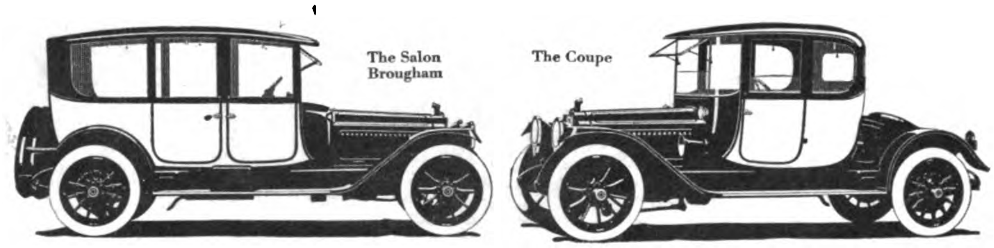

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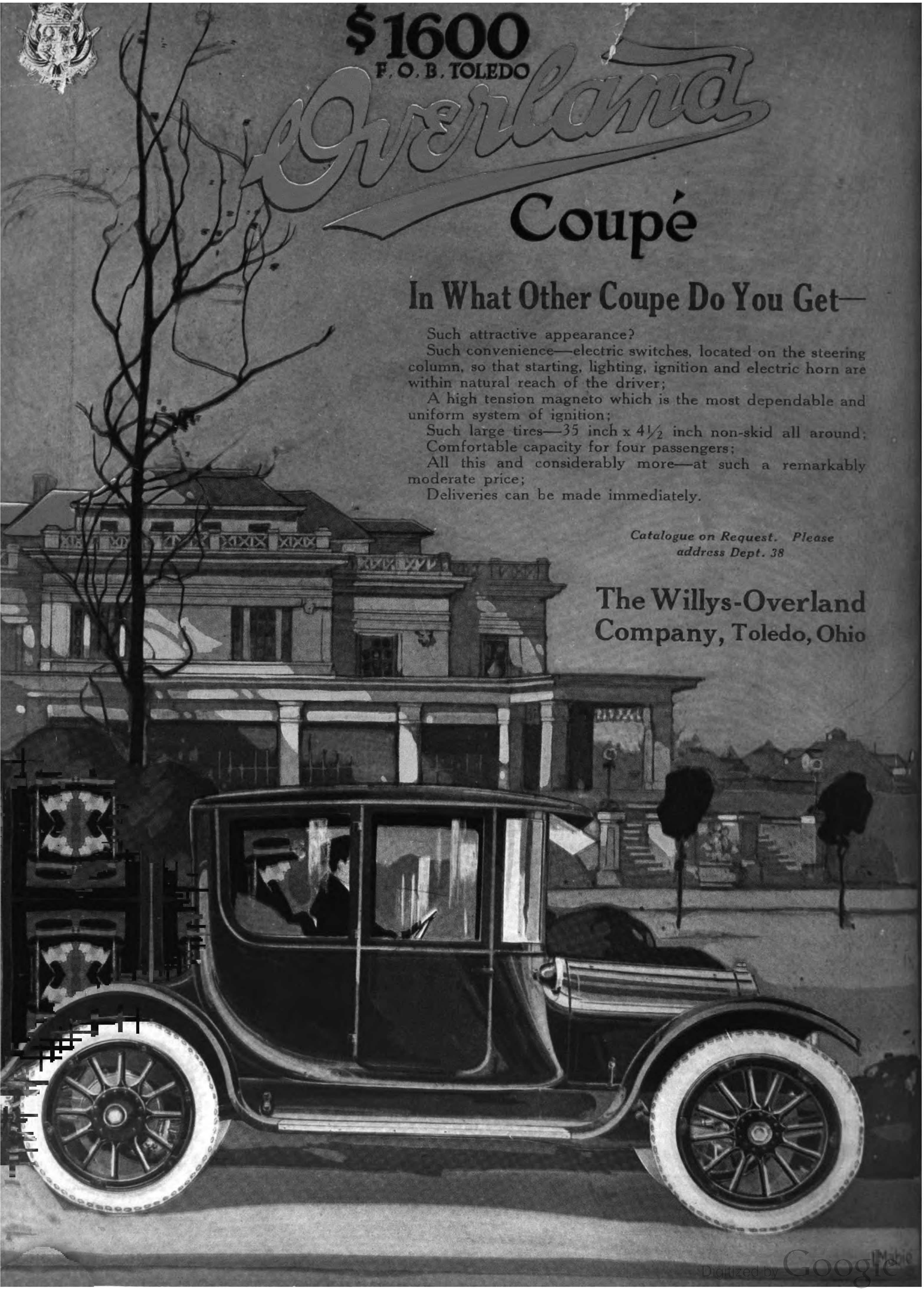
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